Czech Technical university in Prague

Faculty of Architecture

Department of Building Construction II

ARCHITECTURAL DESIGN PROCESS IN TERMS OF THE INDOOR ENVIRONMENTAL QUALITY

Doctoral dissertation

Ing. arch. Kristýna Schulzová

Supervisor: doc. Ing. Daniela Bošová, Ph.D.

Doctoral study programme: Architecture and Urbanism

Prague, 2022

Declaration:

I, Kristýna Schulzová, hereby declare that I have authored the submitted dissertation independently using the literature cited.

Já, Kristýna Schulzová, prohlašuji že jsem předloženou dizertační práci vypracovala samostatně, s použitím citované literatury.

Prague, 15.9.2022

Kristýna Schulzová

Acknowledgements:

I would like to express my deepest gratitude to my supervisor, doc. Ing. Daniela Bošová, Ph.D., for her continuous support and guidance through the doctoral research. I also thank doc. Ing. Lenka Prokopová, Ph.D. for her valuable advice.

A huge thanks to Lasse Rohde, Ph.D., for his indispensable advice on figuring out the framework for linking the indoor environmental quality to the architectural design process.

I would like to thank the architects and specialists I interviewed in the case studies for their helpfulness and the valuable information and insights they provided.

I am grateful to my friends and family for their unconditional love and support. I would especially like to thank my mother, for encouraging me to pursue the doctoral degree and supporting me on my way and my best friend, for her advice and making the entire Ph.D. journey a lot more fun.

This research was supported by the following grants and scholarships:

3/2022 - 5/2022	Erasmus+ exchange (Aalborg University, Denmark)
2021	CTU grant SGS21/074/OHK1/1T/15 The usability of integrated design tools for evaluating the quality of the indoor environment in architectural design
2018 – 2020	CTU grant SGS18/197/OHK1/3T/15 Methodology of Architectural Design in Terms of Building Physics

Abstract

The indoor environmental quality (IEQ), consisting of light, thermal comfort, indoor air quality and acoustics, is the building performance area with the most impact on occupants' health and well-being. Since the physical properties of the indoor environment are largely determined by the architectural design and features of the building, the architects' decisions made early in the design process have a key role in creating healthy and comfortable buildings.

The aim of this thesis is to closely link indoor environmental quality and building physics to the architectural design process by regarding the topic from the architectural point of view. An original framework matrix linking the individual IEQ areas to the iterative loops of architectural design process was used to find the connections and compromise solutions in architectural design that directly affect the indoor environmental quality of the designed spaces. Beside literature and an analysis of IEQ metrics, the main source of information were case studies of 15 buildings realized in the Czech Republic in the years 2010 – 2020. The architects of these buildings were interviewed and the IEQ metrics calculated and analyzed.

The research tried to determine what form should design decision support take to facilitate the architects design decisions concerning the indoor environmental quality. The findings indicate that architects do consider indoor environmental quality from the start of the design process, when they need to make imprecise decisions with incomplete information. The design decision support tools should therefore be oriented to pointing the architect in the right direction, rather than providing a precise numerical assessment.

Keywords: Indoor environmental quality; IEQ; architectural design process; building performance; design decision support

Abstrakt

Kvalita vnitřního prostředí (IEQ), která se skládá z osvětlení, tepelné pohody, kvality vnitřního vzduchu a akustiky, je oblastí vlastností budov s největším vlivem na zdraví a pohodu obyvatel. Vzhledem k tomu, že fyzikální vlastnosti vnitřního prostředí jsou do značné míry určeny prvky architektonického návrhu budovy, hrají rozhodnutí architektů učiněná na počátku procesu navrhování klíčovou roli při vytváření zdravých a pohodlných budov.

Cílem této práce je úzce propojit kvalitu vnitřního prostředí a stavební fyziku s procesem architektonického navrhování, a to prostřednictvím pohledu na toto téma z architektonického hlediska. K nalezení souvislostí a kompromisních řešení v architektonickém návrhu, které přímo ovlivňují kvalitu vnitřního prostředí navrhovaných prostor, byla použita originální rámcová matice propojující jednotlivé oblasti kvality vnitřního prostředí s iterativními smyčkami procesu architektonického návrhu. Vedle literatury a analýzy veličin popisujících kvalitu vnitřního prostředí byly hlavním zdrojem informací případové studie 15 budov realizovaných v České republice v letech 2010-2020. S architekty těchto budov byly provedeny rozhovory a byly vypočteny a analyzovány veličiny kvality vnitřního prostředí v budovách.

Výzkum se snažil zjistit, jakou podobu by měla mít podpora rozhodování při navrhování, která by architektům usnadnila rozhodování při návrhu týkající se kvality vnitřního prostředí. Ze zjištění vyplývá, že architekti berou v úvahu kvalitu vnitřního prostředí již na začátku procesu navrhování, kdy musí činit nepřesná rozhodnutí s neúplnými informacemi. Nástroje pro podporu rozhodování při navrhování by se proto měly orientovat spíše na to, aby architekta nasměrovaly správným směrem, než aby poskytovaly přesné číselné hodnocení.

Klíčová slova: kvalita vnitřního prostředí; IEQ; proces architektonického navrhování; výkonnost budovy; podpora rozhodování

Table of contents:

Glossary of terms and abbreviations

IEQ **indoor environmental quality**

the set of physical conditions inside buildings that surround the occupant and affect their senses the commonly defined areas of IEQ are: light, thermal comfort, indoor air quality and acoustics

IAQ **indoor air quality**

BP **building performance**

a measure of how well the building fulfills its intended function
the most commonly mentioned building performance aspects are the occupant comfort and health, including the indoor environmental quality and energy efficiency and sustainability

BPS **building performance simulation**

DDS **design decision support**

1. INTRODUCTION

The indoor environmental quality in buildings is a complex multidisciplinary topic that significantly impacts the health and well-being of the occupants. The physical properties of the indoor environment are determined by the architectural elements of the building, from the site and surroundings, through the massing and layout, the façade articulation and materiality to the interior design and materials. These aspects are primarily in the scope of the architectural design in the early stages of the project. Although it is to some extent possible and necessary to enhance the indoor environmental quality in the later design stages (primarily by but not limited to building systems and technologies), any changes to the design are difficult and costly, both in terms of money and energy efficiency. Therefore, the architects and their ability to foresee the impact of their early stage design decisions on the indoor environmental quality of the final building play a key role in creating healthy and comfortable buildings.

This research aims to facilitate architectural design decision making by closely linking indoor environmental quality concerns to the architectural design process, in other words to switch the perspective from the building physics of the individual IEQ areas to the architectural elements. This chapter provides a brief overview of the context and background, establishing the importance of indoor environmental quality concerns in building design and emphasizing the architects' role in the process. The research problem is defined, followed by the research aim, objectives and questions, the significance and expected contributions of the thesis and finally, an overview of the dissertation.

1.1. Context and background

In today's developed world, people spend more than 90% of their time inside buildings (KLEPEIS et al., 2001). The impact of indoor environmental quality on occupants' health and well-being has been well established (Mujan et al., 2019; Ortiz et al., 2017). There is a growing body of research on managing and achieving healthy indoor environment.

The indoor environmental quality is the key aspect of building performance, along with energy efficiency. The priorities and emphasis on these areas are continuously evolving in the scientific and professional discourse. During and after the Covid19 pandemic, the focus has shifted towards public health, but the energy crisis of 2022 seems to indicate the scales tipping to the energy efficiency side again.

The indoor environmental quality and energy efficiency are of course hardly opposing sides, but rather communicating vessels, since achieving and maintaining the desired indoor environment quality is one of the main drivers of energy consumption in buildings (and indeed, a lot of the research on indoor environmental quality has been driven by the need to establish benchmarks for the building systems industry, which is elaborated on in chapter 2.1 of the literature review). In 2020, building construction and operation accounted for 36% of global energy consumption, 85% of which was consumed by building operation. Almost half of that was used for achieving and maintaining the desirable indoor environmental quality (space heating, cooling and lighting) (United Nations Environment Programme, 2021).

Decisions made in the early design stages have the most profound impact on the final building performance (MacLeamy, 2004). In the traditional design process, the schematic design (architectural study) is often carried out by the architects, with minimal input from building

performance specialists, who are only involved in the later design stages, such as the technical specification and building permit documentation. Although this is changing nowadays with the growing trend of the integrated design process, which involves all the stakeholders from the early design stages, some early design decisions are still solely or mainly in the architects' competence. Even when the collaboration with specialist is moved earlier into the design process, it is still up to the architect to recognize the point in the design process when the specialist need to be consulted and also which building performance aspects need to be considered and when.

1.2. Problem statement

Experienced architects have learned to address the indoor environmental quality concerns and building performance in general though practice. However, for architecture students and beginning architects, it can be very difficult to:

- orient themselves in the plethora of often contradictory requirements they need to consider.
- predict the impact of their early stage design decisions on the indoor environmental quality and overall performance of the finished building.
- recognize when to consult specialists or verify some building performance aspects.
- project their technical knowledge and the specialist's feedback into the design.

This may lead to undesirable and costly compromises in later design stages, as well as frustration on the side of the architects, who may feel their design intent has been ruined by the necessity to accommodate the legislative and technical requirements on building performance.

In the traditional architectural engineering education model (also practiced at the Czech Technical University in Prague), the technical subjects are taught by specialists independently of the design studio courses. The knowledge in the technical classes is typically illustrated on model examples, either of already designed buildings or simplified assignments without a direct link to the architectural concept design. The integration of technical knowledge into a project of the students' own design is a part of the bachelors' thesis, but even then, it is preceded by an architectural study, designed in the previous semester. The integration of technical subjects into studio teaching can be addressed by the Project Based Learning (PBL) teaching model, practiced for example at the Aalborg University (Knudstrup, 2004).

Considering the building performance requirements in the early design stages can also be facilitated by various methods of design decision support (DDS). Beside the traditional design decision support methods, such as handbooks, rules of thumb and specialist consultations, there is a growing body of research and industry development on building performance simulation (BPS) via software tools. However, literature suggests that architects are still reluctant to integrate the BPS software into their practice for various reasons (Kanters et al., 2014; Attia et al., 2012; Purup & Petersen, 2020).

The discrepancy between the existence of available design decision support tools and the architect's reluctance to use them indicates a need for a deeper understanding of the connection between building performance concerns and the architectural design process, both to help the architects better incorporate those concerns and to help the design decision support tools creators make those tools more accessible and usable to the architects.

1.3. Research aim, objectives and questions

The aim of this thesis is to *closely link indoor environmental quality and building physics to the architectural design process*. This means regarding the building performance concerns through the lens of an architect, changing the perspective from the separate areas of different specializations to the architectural features.

To achieve this aim, the following objectives are defined:

Find the connections and compromise solutions (or trade-offs) in architectural design decisions that directly affect the lighting, thermal, aerial and acoustic qualities of the designed spaces.

To create a supplementary learning material for architectural students and practicing architects which will facilitate the consideration of the indoor environmental concerns in the architectural design process.

This establishes the following research questions:

Q1: *Which architectural features determine the indoor environmental quality and which indoor environmental concerns act as form givers in the architectural design?*

Q2: *Which architects' decisions form the indoor environment and when are those decisions likely to be made in the architectural design process?*

Q3: *What should the design decision support for the conceptual stage of the architectural design process look like to facilitate the achievement of good indoor environmental quality?*

1.4. Expected contributions of this research

To provide a deeper understanding of the connection between building performance (mainly indoor environmental quality) concerns and the architectural design process.

To improve the teaching of building physics subjects for architects at the Czech Technical University in Prague, and ultimately at other architectural study programmes.

To provide the architectural students and practicing architects with a guide to understanding what indoor environmental quality concerns are best addressed when in the architectural design process (since the architectural design process is non-linear and iterative, the "when" is often understood in a cause-effect kind of way, rather than chronologically).

To facilitate the creation of design decision support tools (both software and handbook) that are accessible and useful for architects.

To improve the collaboration between architects and building performance specialists by helping them find a common language and manage expectations.

1.5. Dissertation outline

Chapter 1 Introduction provides an overview of the topic and research problem, states the research aim, objectives and questions.

Chapter 2 Literature review provides an overview of the history of indoor environmental research, elaborates on the problem statement outlined in the introduction, situates the dissertation within the existing body of work (both research and design) and explains the necessity of the research described in the following chapters.

Chapter 3 Research strategy and methods describes the approach and methods used to answer the research questions and the reasoning behind them.

Chapter 4 Results presents the findings and analysis answering the research questions, using the methods and resources described in the previous chapter.

Chapter 5 Summary and discussion situates the findings presented in the previous chapter into broader context and establishes their significance within the scientific and professional discourse.

Chapter 6 Conclusions evaluates the achievement of the aims and objectives and makes some recommendations arising from this dissertation for teaching and practice, particularly in terms of design decision support methods and tools.

Appendix 1 presents the full-length architect interviews that served as one of the primary resources for the abovementioned chapters

Appendix 2 papers lists published by the author and their relevance to the thesis. One paper is included in full length.

2. LITERATURE REVIEW

This chapter elaborates on the problem statement outlined in the introduction, situates the dissertation within the existing body of work (both research and design) and explains the necessity of the research described in the following chapters.

First, the history of perception and definition of the indoor environmental quality is briefly summarized, with an emphasis of the changing role of architects in the discourse. The schools of thought about the indoor environment and the current research topics are included.

Following is an overview of the assessment, standardization and certification of the indoor environmental building performance, including the most commonly used IEQ metrics.

Finally, the research on design decision support for architects is described, highlighting some of the specifics and challenges of informing the architectural design of indoor environmental quality.

2.1. Historical overview

(note – this historical overview is a reworked version of a conference article (Schulzová & Bošová, 2019) , available in full in the Appendix)

The link between the quality of environment inside a building and the quality of life and health of its inhabitants has been recognized in the literature of Ancient Greece and Rome. Hippocrates described the influence of environmental quality (both inside and outside buildings) on human health.

From an architectural point of view, Marcus Vitruvius Pollio addressed some components of the indoor environment in his Ten Books on Architecture (Vitruvius, 1st century BC). For daylight, he recommended that *a considerable space of open sky were seen above the line connecting the top of the wall obstructing the light with the point where the light is to be introduced*. This notion approximately matches the current daylighting standards (Kaňka, 2014). Vitruvius addressed the appropriate orientation of rooms in terms of the manner and time of day they are used, considering the daylight quality, thermal gains and the prevailing winds direction.

To a lesser extent, Vitruvius also addressed the indoor air quality, especially regarding the smoke and flue gas exhaust and fresh air supply. He marginally dealt with acoustics, specifically the open-air theatre acoustics.

Vitruvius's work was popular even in the Middle Ages and some of the principles contained in it are nowadays still used in construction. The works of renaissance architecture theorists are also based on his legacy. Leon Battista Alberti in his work On the art of building in ten books (Alberti, 1542) placed a much larger emphasis on the indoor air quality in comparison with Vitruvius, recounting several histories of plague caused by spoiled air. Alberti shared Vitruvius's opinion on daylighting, also requiring that the open sky can be seen from the window openings. He already addressed acoustics in greater detail, although still not in terms of noise protection, but only in terms of sound distribution depending on the shape of the space (especially ceiling).

Andrea Palladio in his Four books of architecture (Palladio, 1570) stemmed from the works of both Vitruvius and Alberti, but he already demonstrated the individual aspects of the indoor environment on practical examples. Palladio first pointed out the interrelations between individual components of the indoor environment (particularly the conflict of daylight and thermal parameters) and the necessity of compromise solutions. Palladio used the following definition of convenience

(comfort) in a house: "*for that house only ought to be called convenient, which is suitable to the quality of him that is to dwell in it, and whose parts correspond to the whole and to each other.*"

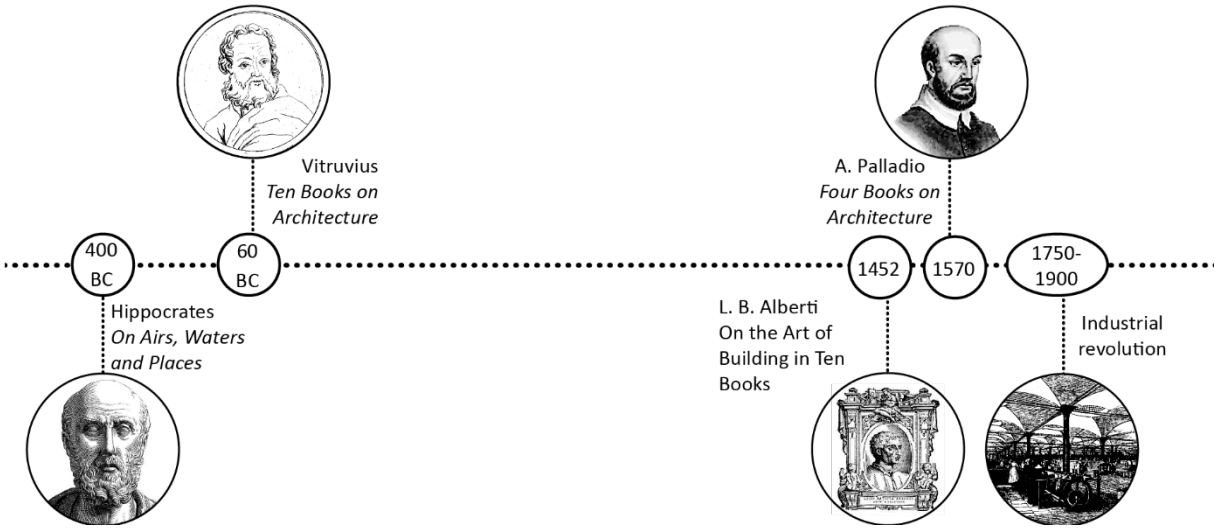


Figure 2.1 Timeline from Hipocrates to the industrial revolution (source: author)

Throughout most of the course of history, thinking about the indoor environment was in the realm of philosophy (Hensen Centnerová, 2018), while the practical implementation was in the competence of architects. The turning point in the perception of the indoor environment came in the nineteenth century, in the context of a major lifestyle change. In connection with the Industrial Revolution, there was a mass migration to the cities and people began to spend increasing amounts of time inside buildings. The impact of the environment in buildings both for work and housing on human health has thus become increasingly important and has been the subject of medical research.

The link between the indoor environment in buildings and the health of their users was complexly described by Florence Nightingale, an English social reformer and statistician, and the founder of modern nursing. She formulated the five essential points to ensure the health of houses: pure air, clear water, efficient waste water drainage, hygiene and light (Nightingale, 1859).

Another turning point in the perception of the indoor environment was the separation of an independent discipline of engineering from architecture, which took place in the beginning of the nineteenth century. There was then a rapid advancement of mechanical systems designed to ensure the desired indoor conditions – especially heating, mechanical ventilation and air conditioning and artificial lighting. These technologies were often designed to be implemented independent of the architectural design, further pushing the indoor environmental quality into the competence of engineers.

In the first decades of the 20th century, research societies have been formed for all the areas of the indoor environment and the scientists and engineers begun to set requirements for some parameters of the individual components of the indoor environment, based on medical knowledge.

The requirements for the individual areas of the indoor environment (thermal comfort, indoor air quality, light and acoustics) were more precisely defined and described. Research on the four areas is described in more depth in parts 2.1.1.-2.1.4. Standards and legislation requiring compliance with some indoor environmental parameters have arisen mostly after World War II. These regulations form the base for most of the regulations currently in force.

The second half of the twentieth century is characterized by belief in the omnipotence of technology. Fulfilment of the standard requirements for individual parameters of the indoor

environment (especially its thermal-moisture component and indoor air quality) was ensured by means of technical equipment. This was often dealt with at the project stage when the building's architecture itself has already been designed.

Another major breakthrough regarding the internal environment in buildings has been brought by the 1970s energy crisis. While previously, the requirements for its individual parameters were primarily driven by the effort to ensure a healthy and comfortable environment, energy saving efforts began to be applied in the second half of the twentieth century. For lighting in buildings, it meant returning to daylight as the main source of lighting. The demands on thermal insulation properties of building structures have increased.

In the 1980s, the impact of the quality of the indoor environment in buildings on the health of their residents became increasingly important. Especially in office buildings, there has been a phenomenon of increased incidence of health problems. WHO introduced the term Sick Building Syndrome (SBS) in 1982**.**

Several epidemiological studies have been carried out during the 1990s, suggesting that the SBS is probably caused by a synergy of several different indoor environmental parameters (mainly those related to indoor air quality) (Bluyssen, 2009)**.** This implies that indoor environment requirements based on the fulfilment of each parameter individually do not meet the actual needs. The perception of indoor environment in buildings therefore began to shift from the individual aspects toward attempts at a holistic approach. Beside the quantifiable parameters, the holistic approach also considers the “soft” parameters, mostly linked to the psychology of users and their behaviour. It is a view in which indoor environment quality is approached in an integrative multi-disciplinary way, taking account of possible problems, interactions, people and effects, focusing on situations rather than single components (Bluyssen, 2009)**.**

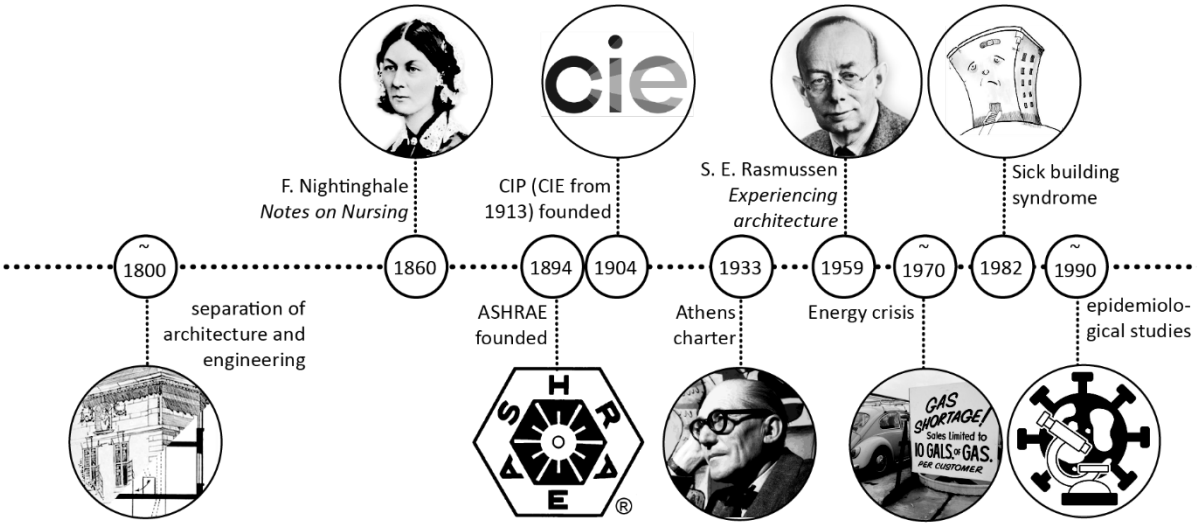


Figure 2.2 Timeline from the 19th century to present (source: author)

At the turn of the millennium, the spotlight has momentarily shifted to the global climate change. The Kyoto protocol, negotiated in 1998 and signed in 2001, required the participating countries to reduce their anthropogenic greenhouse gas emissions (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6) by at least 5% in the period of 2008-2012. In light of this, indoor environmental quality in terms of occupants’ health and comfort was seen as a bit frivolous (Licina et al., 2021).

However, the notion of “healthy buildings” prevailed. In 2010s, promoting health and well-being in buildings has moved from merely ensuring the absence of negative stimuli to also providing positive ones (Rohde et al., 2020).

Standards and Green Building certifications are including and there are currently several research projects on assessing indoor environmental quality in a holistic way, including all its areas in a single classification scheme (Larsen et al., 2020) (Wargocki et al., 2021). This is elaborated on in part 2.2.

Bellow, the modern scientific research on the individual areas of indoor environment is described, followed by a brief summary of the most influential works of architectural theory on the indoor environment.

2.1.1. Research on daylight

In 1913 the International Commission for Lighting (CIE - Commission International d’Eclairage) was founded, following from its predecessor, International Commission of Photometry (CIP), founded in 1900. It began to propose standards and develop the science of photometry. The scientific approach to lighting focused in the beginning on lighting comfort and tasking activities and then slowly shifted towards lighting and health (Bluyssen, 2009). In 1924, CIE issued the first recommendation for minimum illuminance levels in schools and factories (CIE, 1999).

For predicting the illuminance levels in interior, overcast sky model was used. The original model, proposed by German mathematician Lambert in the 18th century, calculated with uniform sky luminance distribution (Kittler, 2011). In 1942, Moon and Spencer described gradual luminance distribution, graduation from horizon to the zenith in 1:3 ratio. This sky model was adopted by CIE in 1955. In 1967, Richard Kittler defined a clear sky luminance distribution model that was adopted by CIE in 1973.

Using the overcast sky model, the daylight factor (the ratio between illuminance level on a (typically horizontal) plane in the interior to the illuminance on unobstructed exterior plane) was established (devised in 1895) and it is still used as the primary metric to assess daylight provision in buildings. Daylight factor is however a static metric, independent of climate or cardinal orientation. Other, dynamic daylighting metric have been suggested to better describe the lighting conditions, also taking the sunlight and climate into consideration.

With the progress in perfecting the artificial lighting, daylight was temporarily deemed less important as a primary source of light for work (especially in administrative buildings). Energy efficiency concerns and the growing body of research on non-visual effect of light on human health and wellbeing (Webb, 2006) have reconfirmed the irreplaceability of natural light in buildings.

Experimental research on visual comfort (Parpairi, 2004) has indicated that even if the light environmental performance is quite poor by the traditional metrics, such as illuminance levels, users still reported high satisfaction provided the presence of quality views and the possibility to control their position. The importance of views for occupants’ wellbeing has also been confirmed by multiple studies on employee satisfaction (Heschong, 2021).

2.1.2. Research on thermal comfort

The research on thermal environment essentially began in the 1920s in the USA, driven by the need to establish thermal comfort criteria for the fast-growing air-conditioning industry

(Bluyssen, 2009). The researchers determined thermal preferences via climate chambers experiments and devised comfort models based on heat exchange principle, culminating with the Fanger comfort model (Fanger, 1970), which still form the basis of thermal comfort standards. It is based on a heat balance between the heat gain generated by metabolic activity and the heat lost to the environment. The metrics of predicted mean vote (PMV) and predicted percentage dissatisfied (PPD) are derived, assuming that the highest satisfaction achieve by thermal neutrality.

This notion was challenged by (Nicol & Humphreys, 1973). They conducted comfort surveys in real conditions such as the home and the workplace and discovered people reporting comfort in a much wider range of conditions compared to the climate chamber experiments. The comfort levels were greatly influenced by the level of control and ability to take adaptive action, which led to the establishment of adaptive comfort principle.

Lisa Heschong in her revolutionary work Thermal Delight in Architecture (Heschong, 1979) dispelled the notion of thermal neutrality and uniformity.

Further field research on office workers (Guedes et al., 2009) revealed that thermal comfort is positively influenced even by perceived adaptive opportunity, when the adaptive action is not actually taken.

2.1.3. Research on indoor air quality (IAQ)

ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers, formed in 1894) recommended in 1895 as a minimum rate for ventilation 15 l/s per person. This ventilation rate was based on the work of John Billings (1836-1913), medical doctor and the American authority in the field of ventilation at that time (Hensen Centnerová, 2018).

Mechanical ventilation and air conditioning units became common in the 1930s in the USA and in the 1950s in Europe (Olsson, 2016). Engineers were increasingly convinced that ventilation is mainly a matter of comfort and not of health. There was a growing resistance to heating the large amounts of outside air prescribed for ventilation.

In light of the 1970s energy crisis, the limits for fresh air in ventilation have been significantly reduced. In 1973, ASHRAE published the first Standard 62, where the required supply air was set at 7.5 l / s per person. In 1981, ASHRAE adjusted the supply air limits to 2 l/s per person for non-smoking rooms and 10 l/s per person for smoking rooms (Hensen Centnerová, 2018).

For most of the 20th century, the principal metric for evaluation indoor air quality was ventilation rate. In 1935, the first experimental studies were performed using human nose as a sensor (Bluyssen, 2009).

However, only the European Audit project, performed during the heating season of 1993 to 1994 (Bluyssen et al., 1996) has shown that the occupants are not the only major sources of indoor air pollution. Research focus has shifted towards searching for pollutant sources, emissions and their health effect (such as the sick building syndrome), with the goal of source control (Bluyssen, 2009).

Indoor air quality research has gained new attention during and after the Covid19 pandemic of 2020.

2.1.4. Research on acoustics

Acoustics as a science has essentially been established in the 1870s. In 1877, John W. Strutt, Lord Rayleigh, published the first volume of perhaps the most influential book in the history of

acoustics, Theory of Sound (Raleigh, 1877). In this work, he summed up the existing knowledge on acoustics and added many valuable contributions of his own (Long, 2014, p. 41).

Lord Rayleigh also formulated the first governing principle of structural acoustics, the mass law, which describes the dependence of air-borne sound insulation (resistance to vibrating when influenced by sound wave) on the mass of the structure (density of material).

In the 1870s, the crucial electroacoustic devices have been patented: the moving-coil transducer (today loudspeaker's predecessor) by Ernst W. von Siemens, the telephone by Alexander Graham Bell and the phonograph by Thomas A. Edison (Long, 2014, p. 41).

W. C. Sabine is considered the father of architectural acoustics, having developed the theory of sound absorption of materials and a formula for reverberation time (Sabine, 1900) and applying it to practical design of concert halls in the US.

The effect of sound and noise exposure on humans (physiological acoustics) have been pioneered by Georg von Békésy, who was awarded the Nobel prize in physiology and medicine in 1962 for his research on the ear (Rossing, 2007, p. 20). By the 1970s and 1980s, the noise effect on human health has been recognized by the authorities and regulations began to emerge (Bluyssen, 2009).

2.1.5. Architectural theory

The quality of life in cities was one of the main themes of the early 20th century architecture theory, since the conditions in the early 20th century cities did not match the idea of a healthy environment formulated by medicine and engineering.

Probably the most important document for defining environmental requirements in buildings is the Athens Charter (Corbusier, 1943), a set of "modern urbanism" principles, adopted at the CIAM conference in 1933, published by Le Corbusier in Paris in 1943. The Athens Charter has become a theoretical basis for functionalist urbanism.

The ideas of the Athens charter were applied in the post-war reconstruction of European cities and in particular in setting the requirements for indoor environment.

The battle for enforcing the requirements for a healthy indoor environment in buildings has therefore been fought and specific requirements have been introduced into the legislation. Practical assurance of the quality of the indoor environment in the buildings became the competence of engineers and technicians in the second half of the twentieth century. While the architects needed to be aware of the existence of these requirements, it was no longer necessary to deal with them in terms of architecture theory. The focus of architecture theorists therefore shifted beyond the mere medical harmlessness of the building. The quality indoor environment of a building also included the ability to perceive the architectural qualities of the building with all the senses.

Architecture theorists warn against reducing the architectural experience and the "flattening" of space that the optimization of indoor environmental parameters can lead to (such as uniformity of illumination, reduced reverberation time, reduced airflow and temperature fluctuations).

Steen Eilar Rasmussen in his book Experiencing architecture (Rasmussen, 1957) regarded architecture as an indivisible whole, which "*confines spaces so we can dwell in it, creates the framework around our lives."* Rasmussen warned against uniformity, especially in luminous and acoustic environment. He pointed out that good light does not mean only much light, it must also

create a good contrast and allow the distinction of various surfaces. The sounds reflected by a building give us an impression of form and material. Excessive use of sound attenuation material may lead to all rooms sounding alike.

A similar view of multisensory design was described by Juhani Pallasmaa in his book Eyes of the skin, subtitled "Architecture and the senses" (Pallasmaa, 2012). He addresses the dominance of sight over the other senses (ocularcentrism) in the European culture, philosophy and in extension architecture.

He was even more acutely aware that the contemporary architecture of the interior and exterior does not allow the perception of space by hearing. *"The wide, open spaces of contemporary streets do not return sound, and in the interiors of today's buildings echoes are absorbed and censored."* Also, the omnipresent reproduced music *"eliminates the possibility of grasping the acoustic volume of space."*

2.1.6. Summary of historical overview

In all the areas of indoor environmental research and theory, two schools of thought can be observed: the first promotes highly controlled, uniform indoor environment, with neutrality as the ultimate goal. Simply put, the best stimuli would be no stimuli, with the occupant not being distracted by the environmental conditions. The second school prefers more nuanced, diverse environment, providing the occupant with adaptive opportunity; people prefer an environment they can interact with to one they can ignore.

The uniform comfort model is appealing to building physicist and lawmakers, since it can be quantified and measured. The metrics and values based on this model form base of most of the indoor environmental legislation, standards and green building certification schemes.

The more diverse, adaptive comfort model may be more appealing to architects, who are likely to think about the build environment more holistically and are vary of reducing the reality to quantifiable metrics.

In the most current research, a combination of these approaches is applied, with a rise of various human centric IEQ metrics, that may be more effective in predicting the occupants' satisfaction with the built environment.

Following is an overview of the metrics most commonly used in standards, green building certifications and other building performance assessment models.

2.2. Building performance and IEQ assessment, standardization and certification

The International Council for Research and Innovation in Building and Construction has issued the following definition of building performance (CIB, 1982):

The performance approach is thinking and working in terms of ends rather than means. Performance is concerned with what a building or building product is required to do and not with prescribing how it is to be constructed.

A design solution, traditional or novel, will always need a quantitative base for testing and evaluating its performance.

Since the building performance in concerned with what a building does (either in terms of environmental quality or resource consumption), rather than what the building elements are like, performance indicators and physical metrics are necessary to "translate" from the building design to building performance. Required values and benchmarks for these metrics are usually what is prescribed by the standards, which are the adopted by mandatory legislation.

On the Czech territory, the standards were established after the second world war and still form the base of current building legislation. In the recent years, trend is towards the unification of standards across the European countries, with certain national modifications. An overview of current building physics and indoor environmental legislation in the Czech Republic can be found in part 2.2.2.)

The first Green building certification method, BREEAM (Building Research Establishment Environmental Assessment Method) has been issued in 1990 by the British institute BRE (Building Research Establishment. In 1993, USGBC (U.S. Green Building council) began developing the LEED (Leadership in Energy and Environmental Design) certification, which has been issued and entered into use 1998. The LEED certification uses the ASHRAE standards to form IE performance benchmarks.

Although there has been several more Green building certification systems established in the following years, BREEAM and LEED are still the most frequently used.

In 2014, the International WELL Building Institute (IWBI) launched the WELL Certification, which focuses primarily on promoting human health and wellbeing in buildings.

In recent years, there have been several attempts for assessing and labeling the indoor environmental quality in buildings holistically and providing a rating of the overall level of indoor environmental quality.

(Wargocki et al., 2021) have developed the TAIL (Thermal, Acoustic, Indoor air and Luminous environmental) for rating the IAQ in hotels and offices undergoing renovation. The assessment is based on in situ measurements of finished buildings, but a more limited predicTAIL scheme for rating IEQ based on computer simulation has later also been developed (Wei et al., 2022).

(Larsen et al., 2020) have developed the IEQ-Compass, a tool for holistically evaluating the potential the IEQ in residential buildings. IEQ-Compass is based on calculating the IE performance metric based on building data and can therefore be used for prediction. The IEQ-Compass has been tested as a design decision support tool for both architects and architecture students with promising results (Rohde et al., 2021).

(Veverkova et al., 2022) have developed the HAIEQ (Holistic Assessment of Indoor Environment Quality) methodology, which evaluates the potential of an existing object to determine whether its indoor environmental quality is solved at the level of the current state of knowledge and to assess its potential for improvements.

TAIL, IEQ-Compass and HAIEQ are all primarily aimed towards refurbishment, rather than new building. In all three evaluation schemes, all indoor environmental areas are assigned the same value, as weighing their impact on user satisfaction has been deemed unrealistic (Humphreys, 2005).

2.2.1. Indoor environmental quality metrics

Light

Daylight provision

- Illuminance (E [lx])
  The total luminous flux (Φ[lm] = luminous power, the measure of the perceived power of light) incident on a unit of surface area. Measured in lux (lx), or lumens (lm) per square metre (m^2).

  $E[lx]=\Phi.S^{-1}[[lm.m^{-2}]$

- Daylight factor (DF [%])
  The ratio of Illuminance on a (usually horizontal) plane in the interior E_i to the simultaneous horizontal exterior illuminance E_H on an unobstructed outdoor horizontal plane where the light source is the entire overcast sky hemisphere. The illuminance is based a model of a uniformly cloudy winter sky, where E_H= 5,000 lx.

  $DF\ [\%] = E/E_H$

  The calculated total daylight factor consists of three components: sky D_s[%], exterior reflected D_e[%] and interior reflected D_i[%].

  DF [%] = Ds + De + Di

Direct sunlight

- Hours of sunlight on a specific day

  Sum of time on a given day (typically during March) when the sun beams may access a reference point (usually on a window plane), unobstructed by buildings, terrain and other obstacles, neglecting any cloudiness.

Dynamic daylight metrics

As opposed to the static metrics listed above (which only account for geographical latitude), the dynamic metrics consider the climatic conditions in the specific location (using actual weather data) and user behavior concerning shading devices (metrics defined by (Nabil & Mardaljevic, 2005).

- Daylight autonomy (DA [%])
  the percentage of the occupied time when the target illuminance (usually 300 lux) at a point in a space is met by daylight only, without the need for artificial lighting
- Spatial daylight autonomy (sDA[%])
  the percentage of floor area that receives the target range of illuminances (typically 300 lux) for at least 50% of the annual occupied hours
- Useful daylight illuminance (UDI[%])
  the percentage of the occupied time when the daylight illuminance is in the range >100 lux and <2000 lux (preventing thermal loads and visual discomfort – glare)

- Annual sunlight exposure (ASE[%])
  the percentage of floor area that receives daylight illuminance >1000 lux for at least 250 occupied hours per year (again leading to thermal and visual discomfort)

Glare protection

- Daylight glare probability (DGP[%])
  (as defined by EN 17037) an approach considering the illuminance at eye level and individual glare sources of high illuminance to estimate the fraction of dissatisfied occupants

View

- View out according to EN 17037
  for a space with room depth >4 m, the recommended minimum sum of window opening(s) dimension is 1,0 m x 1,25 m
  - Horizontal sight angle[°]
    the viewing angle of the outside (limited by the windows) measured from a reference point in the usable area (EN 17037 allows any location)
    (threshold values being 14°, 28° and 54°)
  - Outside distance of view[m]
    distance from the inner surface of view opening to opposite major obstructions located in front of the opening

    (threshold values being 6 m, 20 m and 50 m)
  - Number of visible layers
    number of layers (sky, urban and/or nature and ground) visible from at least 75% of the utilizable area
- Quality views according to LEED v4.1
  percentage of usable area (for a LEED credit, at least 75%) with access to both:
  - view of either (1) nature / art / urban landmarks, or (2) objects at least 25 feet (7,5 m) from glazing
  - a direct line of vision between three times the head height (=between 30 and 90 inches (~75-227 cm) above the finished floor height)
- View in (IEQ compass)

  a metric included in the IEQ Compass evaluating tool (Larsen et al., 2020) to account for compromised privacy in dwellings
  $L_{view\ in}$= distance from window to nearest viewpoint for view-in
  if $L_{view\ in}$>25 m – "open context" – privacy won't be compromised,
  if $L_{view\ in}$>25 m - „urban context" ... scoring factors:
  - $W_{windowportion}$ that assesses the risk of peering in relation to the windows size and location in the façade
  - $W_{opposing\ buildings}$ that assesses the risk of looking in from opposing buildings
  - Two correction factors for further differentiation in dense urban context:
    pedestrians and traffic ($W_{streetcorrection}$)
    nearby outdoor living areas (parks, balconies)($W_{livingareacorrection}$)

Thermal

Thermal comfort parameters (definitions mostly from ANSI/ASHRAE standard 55/2017)

- Predicted mean vote (PMV)
  developed by Povl Ole Fanger (see part 2.1.2) as an empirical fit to the human sensation of thermal comfort, predicts the average vote of a large group of people on the a seven-point thermal sensation scale where:

  +3 = hot
  +2 = warm
  +1 = slightly warm
  0 = neutral
  -1 = slightly cool
  -2 = cool
  -3 = cold

- Predicted percentage dissatisfied (PPD [%])
  an index establishing a quantitative prediction of the percentage of thermally dissatisfied people determined from PMV

- Operative temperature[°C, K, °F]
  a simplified measure of human thermal comfort derived from air temperature (dry-bulb), mean radiant temperature and air velocity

- Dry-bulb temperature[°C, K, °F]
  measured by a thermometer exposed to the air but shielded from radiation and moisture - does not vary with the moisture content of the air

- Wet-bulb temperature[°C, K, °F]
  measure by a thermometer with its bulb wrapped in cloth and moistened with distilled water. Wet-bulb temperatures are the same as dry-bulb temperatures at a relative humidity of 100%, otherwise lower than dry-bulb temperatures due to the cooling effect of evaporation

- Mean radiant temperature (MRT) [°C, K, °F]
  a measure of the average temperature of the surfaces that surround a particular point, with which it will exchange thermal radiation. Defined as the uniform temperature of an imaginary enclosure in which the radiant heat transfer from the human body is equal to the radiant heat transfer in the actual non-uniform enclosure.

- Air velocity [$m.s^{-1}$]
  the speed of air moving across the occupant

- Room air relative humidity[%]
  the ratio of the amount of water vapor in the air to the amount of water vapor that the air could hold at the current temperature and pressure

- Local thermal comfort:
  - Vertical temperature difference [°C, K, °F]
    the temperature difference between the feet and the head

- Floor temperature drop[°C, K, °F]
  evaluates the floor in terms of heat removal, i.e. in terms of the contact cooling effect on the human organism

Thermal – physical parameters of building structure:

- Heat transfer
  - Heat transfer coefficient (U [W/m^{2}K])
    The basic thermal technical metric expressing the thermal insulation capabilities of building structures [W/m2K]. The heat transfer coefficient expresses how much heat transfers through a structure with an area of 1 m^2 when the temperature difference of its surfaces is 1K. This metric evaluates the effect of the entire structure and the air layers adjacent to it on heat transfer.

  - Thermal resistance (R [m^{2}K/W])

    defined as the ratio of the temperature difference [K] between the two faces of a material to the rate of heat flow[W] per unit area [m^2]

    the inverse value of the heat transfer coefficient R=1/U

    The thermal resistance R of the individual layers of the structure depends on the thickness d[m] of the layer and the thermal conductivity λ [W/mK] of its material - R=d/λ

    On the surface of the building structure, heat is exchanged between the structure and the surrounding environment, called heat transfer. This occurs on both the internal and external surfaces of the structure.

    R_{si}[m^{2}K/W] is the heat transfer resistance on the inside of the structure

    $R_{se[}$m^{2}K/W] is the heat transfer resistance on the outside of the structure

    For practice, it is based on standard table values of thermal resistances on the inside and outside of the structure.

    The thermal resistance R_T for single-layer structure is $R_T = R_{si} + R + R_{se}$ for multi-layer structure $R_T = R_{si} + \sum_{j=1}^{j=n} Rj + R_{se}$.

  - Average heat transfer coefficient of building envelope (U_{em}[W/m^{2}K])

    $$U_{em} = \frac{H_T}{A}$$

    H_T specific loss through heat transmission (W/K), determined from the heat transmission coefficients of all heat exchange structures forming the envelope of the building at the system boundary given by its external dimensions

    A the heat-exchange area of the building envelope [m^2].

- Air tightness
  the building envelope's resistance to inward or outward air leakage (infiltration and exfiltration) through unintentional leakage points or areas in the building envelope, driven by the difference in air pressure on the indoor and outdoor side of building envelope. Measured at 50 Pa air pressure difference.
    - air change rate at 50 Pa (n_{50} [h^{-1}])
      the ratio of leakage airflow rate per hour to the heated building volume V
    - air permeability at 50 Pa (q_{50} or q_{a50} [$m^3/h \cdot m^2$])
      the ratio of leakage airflow rate per hour to the envelope area A_E
    - specific leakage rate at 50 Pa (w_{50} [$m^3/h \cdot m^2$])

      the ratio of leakage airflow rate per hour to the floor area A_F.

Thermal loads

the amount of energy necessary to achieve desirable indoor environmental conditions in the specific building. Serve to determine the energy need of a particular building.

- Heating load Q [kW]
  the amount of heat energy that needs to be added to a building/space to maintain the temperature in an acceptable range
- Cooling loads Q [kW]
  the amount of heat energy that needs to be subtracted from a building/space to maintain the temperature in an acceptable range

Indoor air quality

Ventilation rate

- Air change per hour (ACH or ACPH)
  air change rate - the number of times that the total air volume in a room or space is completely removed and replaced in an hour
- Volumetric airflow rate per person or per floor area ([m^3/h] or [l/s])

  the volume of inflow air that passes through the space per unit of time (typically corrected to standardized properties of temperature, pressure and relative humidity)

Indoor air pollutants (definitions mostly from (Bluyssen, 2009))

- Carbon dioxide (CO^2)
  produced by human and animal breathing, in high concentration acts as a simple asphyxiant (replacing oxygen needed by human body)
- Carbon monoxide (CO)
  produced by incomplete combustion, highly toxic even in small concentrations
- Volatile organic compounds (VOCs)
  organic chemical compounds that may evaporate under normal indoor atmospheric conditions of temperature and pressure. Typically released from building materials (flooring, paints…). Most typical VOCs:
    - Formaldehyde and other carbonyl compounds (in floor lacquers and plastics)

    - Benzene (in paints, glues, carpets and emissions from gasoline combustions)
    - Butanal (emissions from barbecues, cigarettes, candles)
    - Ethanol (glass cleaners, dishwasher and laundry detergents)
    - Acetone (nail polish remover, furniture polish, wallpaper)

- Particulate matter (PM)
  solid particles and liquid matter suspended in the air, further differentiated by size:
    - PM10 – coarse particles
      any particles <10 µm in diameter (mold spores, bacteria, dust, smoke, airborne viral particle)
    - PM2,5 – fine particles
      any particles <2,5 µm in diameter (mostly combustion exhausts)
    - PM0,1 – ultrafine particles
      any particles <0,1 µm in diameter (ultrafine dust, less known than PM10 and PM2,5)
- Asbestos
  previously used as construction material (currently banned), airborne fibers cause lung damage when inhaled
- Ozone (O_3)
  photochemical oxidant, formed at ground level when hydrocarbons and nitrogen react with UV light, also as discharge from laser printers and copy machines
- Radon
  attaches to aerosol, prolonged exposure causes respiratory disease, naturally contained in soil in some areas

Acoustics

(definitions mostly from (Long, 2014) and (Patel, 2019))

Ambient noise

- Sound pressure (p [Pa])
  a measure of acoustic force in a given area - local pressure deviation from the ambient atmospheric pressure, caused by a sound wave
- Sound pressure level (L_p [dB])
  a logarithmic measure of the effective sound pressure relative to a reference value, established to conveniently represent the large sound level scale. Based on the range of human hearing: 0db ~ the threshold of hearing, 140db ~ the threshold of pain
- Equivalent continuous sound level ($L_{eq,tT,A}$ [dB])
  Metric designed to represent a varying sound source over a given time as a single number, defined as the constant noise level that would result in the same total sound energy being produced over a given period.

Room acoustics

- Reverberation time (RT [s])
  defined as the time it takes for a sound to decay by 60 dB
- Speech transmission index (STI)
  the most widely used metric of speech intelligibility, based on the relation between perceived speech intelligibility and the intensity modulations in the talker's voice

Noise dampening (construction acoustics):

- Sound reduction index (R_w [dB])
  metric defining airborne sound protection, for structure assessment the estimated R'_w is used, considering the effect of the links in construction weakening the sound reduction)
- Impact sound pressure level (L_w [dB])
  metric defining impact noise protection, for structure assessment the estimated L'_w is used, considering the effect of the links in construction

2.2.2. Czech IEQ and building physics legislation

In the Czech Republic, the structure of building regulation is headed by the building law and associated implementing decrees. Standards (ČSN) only become mandatory if they are cited by in the law.

Daylight and sunlight

Legislative requirements for the amount of daylight in buildings and for the duration of sunlight were established after the Second World War and were based on the principles of the Athens Charter, in addition to technical data. On the territory of the Czech Republic, the first standard concerning daylighting was established in 1949, and the requirements for daylighting in residential rooms were established in 1955. The daylight standards are made mandatory by the implementing decrees.

The daylight provision standards are established by ČSN 73 0580 Daylighting in buildings with parts for different typologies. The sunlight provision requirements are established by the implementing decrees for corresponding typologies; for residential, it is ČSN 73 4301 Dwelling Buildings. In 2018, the new European standard EN 17037 has been adopted into the Czech legislation and combined with the existing standards.
ČSN 73 0580 - 2 Daylighting in buildings - Daylighting in residential buildings specifies for the calculation of day lighting in side-lit residential buildings two calculation points on the working plane at a height of 0.85 m at half the depth of the room at a distance of 1 m from the side walls. The minimum value of the daylight factor at these two points shall be 0.7 % and the minimum average value of these two points shall be 0.9 %.

In kindergartens, the reference plane is placed at a height of 0.45 m above the floor, in primary school classrooms the height of the working plane is 0.85 m, in gyms it is placed at floor level. According to ČSN 73 0580-1 Day lighting in buildings. Part 1: Basic requirements and ČSN 73 0850-3 Daylighting in buildings. Part 3: Daylighting in schools, the requirements for the value of D are determined by the class of visual activity carried out in the space under assessment. For playrooms of kindergartens, (stem) classrooms of primary schools and offices, this is class IV, medium precision. The minimum required D-value is 1.5% and the average value is 5%; the required uniformity of side

lighting is 0.2. For office buildings, combined lighting is also permitted: the required minimum value of D_{min}=0.5% and the average value of D_m=1.5% for the combined lighting. A 1 metre strip from the walls is excluded from the grid of control points, the grid points are to be 1-6 metres apart. According to the new EN 17037, a strip 0,5 m from the side walls is excluded from the working plane under consideration.

The requirements for insolation have been stablished since 1960 in the standard ČSN 73 4301 Residential Buildings - 90 minutes on 1.3. In the Prague Building Regulations, the insolation requirements for new buildings were abolished in 2018, but it is still necessary to assess the impact of new construction on the solar gain of existing buildings. In playrooms of kindergartens, the sunlight provision in required by the Decree No.268/2009 Coll. Decree on Technical Requirements for Buildings, as well as by the new European standard EN 17037.
The criterion for the assessment of solar gain in the new European standard EN 17037 is the same as in the original Czech standard, the solar gain time (minimum 90 minutes on a selected day between 1 February and 21 March), but the location of the reference point and the limiting angles of incidence of the sun's rays differ, which may cause differences in the resulting insolation time.

Thermal

The requirements of thermal technology in the Czech territory were established after the Second World War by the set of ČSN 73 0540 Thermal protection of buildings (still in use today), the first standard of which was developed in 1954.

Currently, standards for heat transfer coefficients are set by ČSN 73 0540-2 Thermal protection of buildings - Part 2: Requirements valid since 2012. This standard establishes required U_N, recommended U_{rec} and the recommended values for passive buildings U_{pas} for envelope structures. In Table 2.1, the relevant values of the heat transfer coefficient for buildings with a prevailing design indoor temperature θ_{im} in the range 18 °C to 22 °C are listed.

Table 2.1 Required and recommended values of the heat transfer coefficient for buildings with a predominant design indoor temperature ϑ_{im} in the range 18 °C to 22 °C inclusive according to ČSN 73 0450-2:2012

Structure description	Heat transfer coefficient U_N [W/m^{2}K]		
	Required values $U_{N,20}$	Recommended values $U_{rec,20}$	Recommended values for passive buildings $U_{pas,20}$
exterior wall	0.30	heavy: 0.25 light: 0.20	0.18 - 0.12
roof flat and sloped up to 45° (included)	0.24	0.16	0.15-0.10
Opening filling in exterior wall and steep roof, from the heated space to the exterior, except for doors	1.5	1.2	0.8 - 0.6
inclined opening with a slope of up to 45°, from the heated space to the exterior	1.4	1.1	0.9
Door filling of the opening from the heated space to the exterior (including frame)	1.7	1.2	0.9
Floor and wall of the heated space adjacent to the ground	0.45	0.30	0.22 - 0.15
Ceiling and interior wall from heated to unheated space	0.60	0.40	0.30 - 0.20

In addition to the requirements for the performance of building structures, a great deal of attention is paid to the assessment of the energy performance of the building. In recent years, changes in requirements have been particularly relevant to the assessment of the energy performance of a building. Currently, a new Decree No. 264/2020 Coll. on the energy performance of buildings, valid from September 2020, is in force, replacing the existing Decree No. 78/2013 Coll., and modifying the

methodology for the assessment of the energy performance of buildings.

Ventilation

Requirements on ventilation are primarily set by the Decree No. 268/2009 Coll. Decree on Technical Requirements for Buildings, which requires that: occupied rooms shall have sufficient natural or forced ventilation and shall be adequately heated with the possibility of regulating the internal temperature. For the ventilation of occupied rooms, a minimum outdoor air exchange rate of 25 m^3/h per person or a minimum ventilation rate of 0,5 l/h shall be provided during the occupancy period. Carbon dioxide CO2 shall be used as an indicator of the quality of the indoor environment and shall not exceed a concentration of 1 500 ppm in the indoor air.

For workplaces without the presence of chemical substances, dusts or other sources of pollution, the decree requires a minimum amount of outdoor air supplied to the workplace of 25 m^3/h per employee performing work classified as work class I or IIa (office administrative work falls into work class I).

For schools, the requirements for air exchange are set out in Decree No. 410/2005 Coll. Decree on hygiene requirements for premises and operations of establishments for the education and training of children and adolescents, which, however, contains two completely contradictory provisions (Zmrhal, 2017, p. 26): in § 18 it states "Natural ventilation must be provided by micro-ventilation systems or ventilation slits in the case of tight windows", while in Annex 2 the requirement for air flow for classrooms is stated as "20-30 m^3/h per pupil".

Acoustics:

At the beginning of the 20th century, when the basic physical law of building acoustics was formulated - the law of the effect of the area weight on the sound insulation of single walls - the Austro-Hungarian building code required that the area weight of the inter-dwelling walls should correspond at least to the area weight of a 25 cm thick solid brick wall. The first normative regulation that mentioned requirements for permissible noise levels was the Czechoslovak State Standard of 1953. This regulation already addressed, among other things, the principles of the layout of residential buildings from an acoustic point of view.

At present, the main legislative regulation of building acoustics is Government Regulation No. 272/2011 Coll., which sets out the hygienic limits for noise and vibration. The maximum permissible equivalent sound pressure level A in the external protected space is determined by the sum of the basic noise levels $L_{Aeq,T}$ = 50 dB and the appropriate corrections.
The outdoor protected area of a building is defined as the space of 2 metres around residential buildings, buildings for school and pre-school education and for health and social purposes, as well as functionally similar buildings.
If the noise is from sources inside the building (e.g. ventilation equipment), the assessed quantity is the maximum sound pressure level A L_{Amax}. The hygiene limit for school accommodation is A $L_{Aeq,T}$ or L_{Amax} = 45dB, but the typical range for kindergartens is 30-45 dB and the design value is 40 dB.
The hygiene limit for steady and variable noise for workplaces where attention- and concentration-intensive work is carried out and for workplaces intended for creative work is expressed in terms of the equivalent sound pressure level A $L_{Aeq,8h}$ equal to 50 dB.

Acoustics in buildings are further addressed by ČSN EN 12354 Building acoustics and ČSN 73 0532 - Acoustics - Protection against noise in buildings and related acoustic properties of building products - Requirements governing the required acoustic properties of building structures.

In Table 2.2, the requirements of the version of the ČSN 73 0540 standard valid in 2010 – 2020 and the new version valid from 2021 are listed for residential, school and office buildings.

Table 2.2 Requirements of ČSN 73 0540 version :2010 and :2020 on noise protection of selected interior structures

Protected space:	**Version of**	**Ceilings**		**Walls**	**Doors**
	ČSN 73 0532	**R'w≧**	**L'n,w≦**	**R'w≧**	**R'w≧**
Residential – between apartments	:2010	53	55	53	27
	:2021	54	53	53	27
Residential – between rooms of the same apartment	:2010	47	63	42	-
	:2021	47	58	40	-
Schools – between classrooms	:2010	52	58	47	-
	:2021	53	55	47	37
Schools – between classroom and corridor	:2010	52	58	47	32
	:2021	53	58	47	32
Offices and workrooms with normal administrative activities, corridors, ancillary spaces	:2010	47	63	37	27
	:2021	52	58	37	27
Offices and workrooms with high demands, executive offices	:2010	52	58	45	32
	:2021	52	58	42	27
Offices and workrooms for confidential meetings or other activities requiring high noise protection	:2010	52	58	50	37
	:2021	52	58	50	35

The requirements for reverberation time in schools are given in EN 73 0527 Acoustics - Design in the field of spatial acoustics - Spaces for cultural purposes - Spaces in schools - Spaces for public purposes.
The recommended reverberation time for classrooms and lecture theatres with an approximate volume of up to 250 m^3 is 0,7 s. For playrooms in kindergartens and nursery schools, no recommended reverberation time is specified, but the use of broadband ceiling tiles, i.e. tiles with a weighted sound absorption coefficient $\alpha w \geqq 0,8$, is required.

2.3. Design decision support for the conceptual phase of architectural design

The majority of building performance, indoor environmental and other, is decided in the conceptual phase of the project, where the cost of design changes is relatively low and the potential to influence the building performance is high (MacLeamy, 2004). For this reason, tools to inform design decisions with regard to building performance have been one of the building science topics of the 21st century (Zeiler[1] et al., 2007)

Although there has been a shift towards integrated design process (IDP) and involving all the stakeholders from the earlier design stages, especially in smaller building projects, decision making in the conceptual phase is handled primarily the architects (Kanters et al., 2014). Therefore, informing architects of the impact of their conceptual decisions on the final building performance is crucial for achieving the desirable outcome.

Traditionally, architects have used their design experience and intuition, combined with rules of thumb and graphical design methods, such as sun diagrams, and consulting specialist, to inform their decisions. In the recent two decades, building performance simulation (BPS) has been gaining attention as a means of more accurately evaluating the design, as the traditional methods of DDS are often deemed insufficient.

Although the development of the BPS software tools has been advancing rapidly, they have not yet been widely adopted into architectural practice. Several barriers to integrating BPS into architectural design process have been identified by researchers. An international survey (Kanters et al., 2014) has identified that architects view the BPS tools as too complex, too expensive, their use is too time consuming and not integrated in the architects' workflow (possibly also due to the tools not being integrated in CAAD software used by the architects). Other barriers, identified by (Attia et al., 2012) include the difference in geometry representation and design language used by architects and the building physics language of the BPS tools. Another issue lies in the iterative nature of the architectural design process (Plowright, 2014), which is at odds with the fact that the PBS tools mostly focus on post-design evaluation (Attia et al., 2012).

The barriers to integrating building performance design decision support in the early design stages (not just in terms of integrating BPS but also collaboration with specialists) can be explained by a fundamental difference in the design thinking paradigm (Bleil De Souza, 2012). To make sense of the complex reality of a building design project and inform design decision, a certain degree of abstraction is necessary. However, while the building performance experts (who design the BPS tools and provide the DDS) abstract reality by mathematical representations and building physics principles, architects do that by visual and spatial representation systems. These contrasting abstraction paradigms may lead to misunderstandings and lack of mutual respect, where both the architects and building performance specialists view the other party as necessary evil instead of an ally. This has also been partially indicated by a survey on architect-BPS consultant collaboration by (Alsaadani & Bleil De Souza, 2016).

3. RESEARCH STRATEGY AND METHODS

This chapter describes the approach and methods used to answer the research questions and the reasoning behind them. The research questions are:

Q1: Which architectural features determine the indoor environmental quality and which indoor environmental concerns act as form givers in the architectural design?

Q2: Which architects' decisions form the indoor environment and when are those decisions likely to be made in architectural design process?

Q3: What should the design decision support for the conceptual stage of architectural design process look like to facilitate the achievement of good indoor environmental quality?

3.1. The iterative loops in the architectural design process

Since the aim of the thesis it to approach the indoor environmental quality from the architectural perspective, the strategy is based on the nature of the architectural design and the way it differs from other professions involved in the building design process.

The most salient characteristics of architectural research are:

- Holistic – even when focusing on a single aspect of the design, the architect always keeps the big picture in mind and considers the relative importance of requirements in the context of the entire design
- Iterative – all aspects of the design go through multiple iterations. The iterative loops are not linked consecutively (Figure 3.1a) but rather are interconnected (Figure 3.1b) - each design decision influences other aspects, so the architect needs to look outside the "loop" he is currently in.

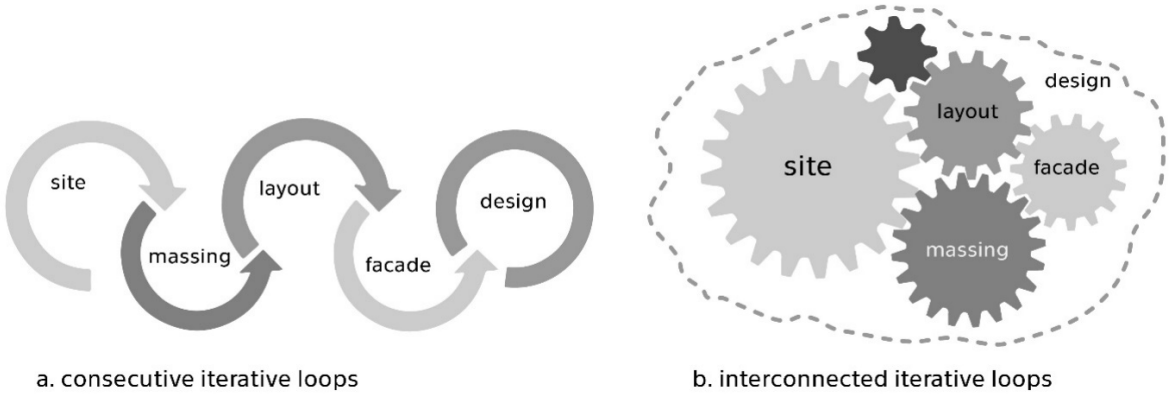


Figure 3.1 The holistic, iterative nature of architectural design process (source: author)

Due to the nature of the architectural design, it is not possible to identify a universal design process model. Attempts at prescribing a certain workflow are viewed negatively by architects, rendering the design decision support useless. This has been proven by (Purup & Petersen, 2020) via a survey of Danish architects. It is more effective to approach the architectural design process as a series of design task, the order of which differs on a case-by-case basis. For the purpose of this research, the design tasks have been grouped into seven groups, also referred to in this text as "iterative loops". Below, they are listed in the approximate order of level of detail. This is also the most common chronological order in which these tasks appear, but the precise workflow is always case specific and in some extreme cases (such as prefabricated housing), the order may be significantly rearranged.

- Site/context
- Volume/massing
- Spatial layout
- Façade/envelope
- Structural/construction
- Building systems
- Interior design

There is also significant overlap between these groups. For example, windows (which are arguably the building element most influencing the IEQ) are designed in almost all of them.

These iterative loops were one of the starting points to answer the research questions.

3.2. Q1 → the framework matrix

As with other building performance areas, the "translation" between the architectural features and the indoor environmental quality (simply put, between what the building looks like and what in can do) in not obvious (Bluyssen, 2009, p. 181). Therefore, quantitative metrics are used as "converters", enabling the prediction of final indoor environmental quality based on the building elements. The connections between the architectural design and IEQ have been identified using several resources, ranging from general (literature) to individual (case studies of existing buildings) and approaching the question from both directions: architectural elements determining the IEQ and IEQ concerns as form givers for architectural design (see Figure 3.2).

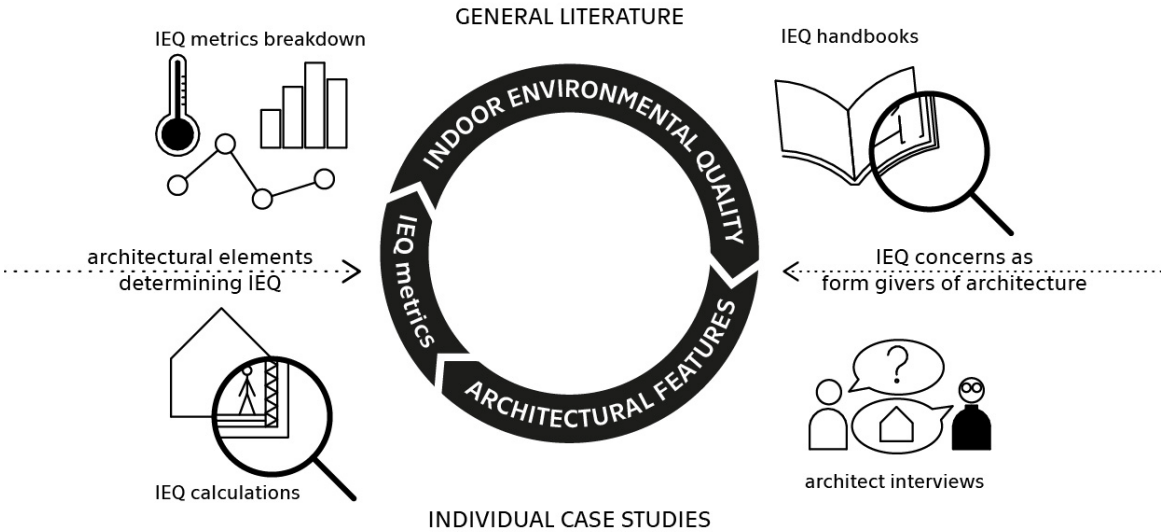


Figure 3.2 The resource for identifying connections between IEQ and architectural design (source: author)

IEQ metrics breakdown

To identify how the architectural elements determine the indoor environmental quality in general, a breakdown of the metrics most commonly used to predict IEQ have been performed. For each metric, it was identified which architectural elements are used for their calculation.

Handbooks of IEQ design

To identify which IEQ concerns generally act as form givers in the architectural design, several handbooks (written by respectable authorities on the field of indoor environment in buildings) have been studied.

The information extracted from general resources serve as a basis for the individual case studies described below.

Case studies

To find the connections between architectural design and IEQ on an individual building level, case studies (15 in total) of recently realized buildings have been performed. To identify the IEQ concerns that are considered by the architects when designing the building, the architects (and in one case, also the chief project engineer) of those projects have been interviewed. To illustrate and sometimes supplement the information provided by the architects, some indoor environmental metrics have been calculated, analyzed or acquired directly from the project documentation provided by the architects. A detailed description of the case study methodology (including the calculation methods and interview guide) are included in part 3.4 Case studies.

The connections between architectural elements and indoor environmental quality have been organized in a framework matrix formed by the seven iterative loops and the four main areas of indoor environmental quality (Table 3.1). A separate framework matrix has been filled in for both of the general information sources – one table for IEQ metrics and one for each of the literary resources.

Table 3.1 Framework matrix

	Light	Thermal	Indoor air quality	Acoustics
interior design				
building systems				
structural construction				
façade envelope				
spatial layout				
massing volume				
site context				

For the individual case studies, a framework matrix has been filled in using first only the answers from the interviews (to better understand which IEQ aspects the architects think about when designing a building) and then supplemented by the data from the IEQ metrics analysis performed by the author.

Note: Only the building elements directly affecting (or affected by) the indoor environmental quality have been included in the framework matrices. The omission of those aesthetic and

functional aspects that do not have a direct connection to the IEQ is purely for comprehensibility reasons and is not intended to diminish their importance in the architectural design.

3.3. Q2 → architects' decisions and causation

The second research question concerns the architects' decisions affecting the indoor environmental quality and when are these decisions likely to me made in the process. Answering this question is necessary to provide relevant design decision support provided as needed and targeted to the point when the architects' decision has the biggest impact on final IEQ.

Since the design process and workflow is individual on project-by-project basis, the "when" in the question is often not understood chronologically but rather in a cause-effect way. In which design task (and iterative loop) it this or that decision likely to be made and what other decisions need to be made before and which decisions are affected afterwards?

The framework matrix of architectural elements and IEQ areas filled in as the answer to research question Q1 is used as a starting point.

The aim is to approach the IEQ from the architectural perspective. Since the architect is not considering the IEQ areas in separation in the same way experts often do, the columns dividing the framework into four distinct areas of indoor environment become unnecessary. The information about which building elements affect which IEQ areas (and vice versa) is retained, but the borders between IEQ areas are removed and building elements unified. Afterwards, the elements are arranged in causal relations, using the information from the architect interviews.

3.4. Case studies

The case studies methodology is chosen because architects (and especially architecture students) have a hard time grasping building performance concepts outside the context of a building design scenario (Folan, 2011). Presenting the indoor environmental quality issues using real buildings and including the opinions and concerns of their architects makes them both easier to understand and more trustworthy.

Total of 15 case studies have been chosen from the following typologies (3 each): residential (both multi-family and single-family), schools (kindergarten and elementary) and office buildings. These typologies were selected for two reasons – they are the types of buildings people spend most of their time in and also in those typologies, all the indoor environmental quality areas apply quite proportionately (meaning there is not an emphasis on one of them).

All of those buildings are contemporary realizations, build from 2010 to 2020. There were originally also two older multi-family housing projects (a 19th century tenement house and a 20th century prefabricated panel neighborhood), but those were excluded from the framework analysis described in parts 3.2 and 3.3, since they were lacking interviews with the authors. The IEQ parameters analysis of those cases has been published in a conference article (Schulzová & Bošová, 2020), available in the appendix.

All the buildings are located in the Czech Republic. This choice has been motivated by several reasons – the relatively easy possibility to interview the architects and the comparable legislative and climatic conditions. Also, this location makes it easier to use the results of this research as a teaching material for the students of the Czech Technical University in Prague.

All the selected buildings have been well received by the professional public and most of them have received some kind of regional or national award.

3.4.1. Architect interviews

The architects have been contacted via e-mail or mobile phone. All of the approached architects agreed to the interviews. The interviews have been conducted by the author in February to June of 2022 (the author has performed the IEQ analysis beforehand and was therefore familiar with the projects when interviewing their authors). The interviews were performed in Czech using the following guide:

Interview guide (translated into English):

Introductory question:

- What does the indoor environment mean to you? What do you imagine by this term?

Project-specific questions:

- Were there any specific requirements for the quality of the indoor environment in the project brief? What requirements were the project based on? (only mandatory legislation or other?)
- At what stage of the design process did you start thinking about indoor environmental quality?
- Did you work with any specialists/professionals in the concept phase (architectural study)? Alternatively, did you use any tools to verify the properties of the indoor environment/building physics before consulting with specialists? (e.g. software, diagrams, orientation rules...)
- What compromises (architectural, conceptual) have you had to make to meet the requirements of the indoor environment?
- Did you have to make any architectural changes to meet the requirements for the indoor environment and satisfy the authorities? (at later stages of the project)
- Were you surprised by anything about the finished building in terms of the quality of the indoor environment? Did anything turn out differently than you had imagined/expected/designed?

General questions (on their architectural practice):

- What do you need to know as an architect to design a building with a good indoor environment?
- What would make it easier for you to design a good indoor environment for buildings?
- (legislation, environment, software and tools...)
- What do you consider essential in terms of collaboration between architects and specialists/professionals?

3.4.2. IEQ calculations

The metrics have been calculated using the project documentation provided by the architects. The calculated metrics have been compared to legislation requirements both at the time of construction and at the time of writing the thesis.

Light

- Daylight factor - calculations performed in the software Building Design by Astra Software, using the computing module Wdls 5.0 and ČSN EN 17037
- Sunlight – direct sunlight hours have been evaluated on 1.3. using software Světlo+ by JPSoft

Thermal

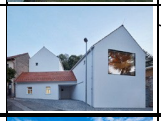
- U – the heat transfer coefficient of the structures has been calculated using the TEPLO and ENERGIE software by Svoboda software

IAQ

- Ventilation principle – both natural and mechanical ventilation (if used) illustrated in plan and section using the project documentation

Acoustics

- Noise sources – noise sources, their location in relation to protected spaces and have been illustrated in plan using the project documentation
- Reverberation time – reverberation time has been calculated in specific rooms (classrooms and offices) using the Pachyderm plugin for Rhino and the architectural means used to improve it (noise absorbing surfaces) have been illustrated in plan and interior elevations
- Noise protection – the noise attenuating qualities (both against airborne and impact noise) of building structures have been calculated using the software NEPRŮZVUČNOST by Svoboda software.

		Building	design year build year	Authors		interview:
Residential buildings	multi-family	Apartment House Ostravská Brána	2006 - 2007 2008 - 2010	Kuba, Pilař – Tomáš | Pilař a Ladislav Kuba		Tomáš Pilař
		Residential Block 4BLOK	2011 - 2016 2015-2017	Chmelař architekti | David Chmelař Vojtěch Nedorost		David Chmelař
		Villa Houses Krásnopolská	2015-2016 2017-2018	Atelier 38 s.r.o. | Tomáš Bindr, Petr Doležal		Tomáš Bindr
	single-family	Terraced Houses Zruč	2012 2014-2015	PRO STORY Jiří Zábran, Tereza Nová		Jiří Zábran
		Family House Prokop	2016-2017 2017-2018	ASGK Design, s.r.o. | Gabriela Kaprálová, Karolína Jiroušková, Monika Tomšová		Karolína Jiroušková
		Family House in Jinonice	2016 2018-2019	ATELIER 111 architekti s.r.o. | Jiří Weinzettl, Barbora Weinzettlová, Veronika Indrová		Jiří Weinzettl
Schools	kindergartens	Kindergarten Sedlejov	2016 2018	ARCHOO s.r.o. | Jiří Ondráček, Jaroslav Svoboda		Jiří Ondráček
		Kindergarten Přístavní	2016 2018	XTOPIX | Barbora Burýšková, Pavel Buryška		Barbora Burýšková
		Kindergarten Nová Ruda Vratislavice	2015-2018 2017-2018	Petr Stolín, Alena Mičeková		Alena Mičeková
	elementary schools	Jára Cimrman Elementary School Lysolaje	2015 2017-2018	Progres atelier | Vojtěch Kaas, Jan Kalivoda		Jan Kalivoda
		Elementary School Líbeznice	2014 2015	Projektil architekti | Adam Halíř, Ondřej Hofmeister, Marek Sankot, Bohdana Linhartová, Adam Hašpica		Adam Halíř
		Elementary School Amos Psáry	2014-2017 2019	SOA architekti, s.r.o. | Ondřej Píhrt, Štefan Šulek, Ondřej Laciga		Ondřej Píhrt
Office buildings		Office Building THE BLOX	2008-2013 2013-2015	DAM architekti s.r.o. | Jan Holna, Petr Šedivý		Jan Holna
		Office Building Konplan	2016 2019	PRO-STORY s.r.o. | Jiří Zábran, Tereza Nová		Jiří Zábran, Jiří Kott
		Prague 7 Townhall	2016-2017 2017-2020	Atelier bod architekti | Vojtěch Sosna, Jakub Straka, Jáchym Svoboda		Vojtěch Sosna

LIGHT		THERMAL AND IEQ		ACOUSTICS		
daylight	sunlight	heat transfer	ventilation	noise sources	reverberation time	noise protection
X	X	X	X	X		X
X	X	X	X	X		X
X	X	X	X	X		X
X	X	X	X	X		X
X	X	X	X	X		X
X	X	X	X	X		X
X	X	X	X		X	X
X	X	X	X		X	X
X		X	X			X
X		X	X		X	X
X		X	X		X	X
X		X	X			X
X		X	X	X		X
X		X	X	X		X
X		X	X	X		X

4. RESULTS

This chapter presents the findings and their analysis using the sources and methods described in the previous chapter. The links between the architectural elements and indoor environmental quality extracted from IEQ metrics analysis and IEQ handbooks are presented in parts 4.1 and 4.2, respectively. These lay the foundation for the individual case studies, presented in part 4.3. Each case study begins with the information extracted from the case-specific part of the architect interview, starting with the framework matrix answering research question Q1 and followed by the overview of the design process, displaying the chronological and causal progression of the architectural design decisions forming the indoor environmental quality. The architect interviews are then illustrated and supplemented by information derived from either the IEQ metrics calculations performed by the author of this thesis or directly from the project documentation provided by the architects and expanded framework matrices are presented.

A summary of the framework matrices from the case studies, sorted by the typologies, as well as a summary of the architectural design process analysis from the architect's interviews, are presented in part 4.4. The summary of the non project-specific parts of the architects interviews are presented in the part 4.5.

4.1. IEQ metrics - framework analysis

Table 4.1 IEQ metrics - framework analysis

	Light	Thermal	Indoor air quality	Acoustics
interior design	wall surfaces - color, reflectivity furniture layout (usable area)	wall surfaces	materials (pollutants -VOCs…) interior plants	surface materials (noise attenuation)
building systems	shading devices - movable blinds (user scenarios)	ventilation heating internal heat sources	ventilation - mechanical, heat and moisture recuperation pollutant sources - combustion moisture (washing machines…)	noise sources
structural construction	floor height room sizes - height, ceiling span	construction system (load bearing structures) thermal mass	floor height - room volumes	load bearing structure → impact noise conduction floor and walls composition → noise dampening (impact and airborne)
facade envelope	windows - size (height/width), placement on room wall, glazing, frame shading - balconies, overhang, fixed blinds wall thickness, color	structure composition (materials, thickness) glazing/wall ratio; wall + roof colors shading - balconies, overhang, fixed blinds windows - glazing, frame; air tightness	composition - hydrothermal physics (moisture, mold growth…)	structure composition (thickness, mass) window placement, properties, openability
spatial layout	room geometry (depth, width, ceiling depth)	natural ventilation - cross ventilation, chimney effect user scenarios - number of occupants	occupants - number, group placement of pollutant sources: smoking areas, fireplaces (CO, PMs) washing machines, bathrooms (moisture)	noise sources within layout room geometry (height, width)
massing volume	shading obstacles (height, distance) to itself and surroundings facade orientation	shape façade/volume ratio façade orientation room angle and orientation		
site context	terrain shape, landscape, greenery surrounding buildings - height, distance, color(reflectivity)	orientation to cardinal directions surroundings - shading, wind protection climate - sun, wind, heating/cooling hours	air quality (pollution, traffic) presence of radon in soil	local sound pressure levels: noise sources - traffic, industry… background noise levels vibrations

4.2. IEQ handbooks – framework analysis

Table 4.2 Koen Steemers & Nick Baker - Healthy homes (2019) - framework analysis

	Light	Thermal	Indoor air quality	Acoustics
interior design	view of indoor plants		indoor surfaces/materials	absorption surfaces – possibility of multiple reflections
building systems		local thermostatic controls fast response heating - lower base temperature		
structural construction		thermal mass-reduce temperature swings		
facade envelope	near and distant views; diffuse daylight always provide shading control for sun facing windows	ventilation-remove heat + air flow solar shading (more important if no thermal mass)	ventilation - air quality - pollutants moisture and condensation - permeable structures	noise attenuation of facade - may prevent natural ventilation but even towards noisy street provide openable windows
spatial layout	orientation towards views circadian rhythms - shallow plan rooms special consideration for limited mobility occupants			
massing volume				
site context	access to views		ventilation - consider wind direction, air quality outside	urban noise - existing and future

Table 4.3 Philomena Bluyssen - The Indoor Environment Handbook (Bluyssen, 2009) - framework analysis

	Light	Thermal	Indoor air quality	Acoustics
interior design	interior surfaces with high reflectance finishes		building materials and finishes: insulation, plywood, paint, furniture (particle board), floor/wall covering material – pollutant sources adsorption/desorption capability → mold growth	resilient floor finishing layer (carpet or rubber) noise absorbent surface materials glazed walls – sound reflective
building systems	self-controlled solar screens (glare prevention)	heating and cooling systems designed according to comfort requirements easy heat recovery from mechanical ventilation	ventilation system components (filters, ducts, humidifiers) as pollutant sources	mechanical ventilation can be noisy, especially at low frequencies active noise control (powered system)
structural construction				connections in structure sound leak from holes through the wall floating floor or vibration dampeners to prevent construction vibrations
facade envelope	size and distribution of apertures solar-reflecting glazing reflectance of exterior finishes	passive cooling by natural ventilation large glazed areas → potential overheating	air leakage – not a good way to ensure natural ventilation (uncontrollable)	openable windows towards noisy environment
spatial layout	division of spaces so no-one looks into the direction of the window → glare prevention		clean air supplied to the right places location of pollutant sources: smoking areas, laser printers	
massing volume				
site context			outdoor pollutant sources (traffic and industry)	noisy surroundings → natural ventilation not possible

4.3. Case studies

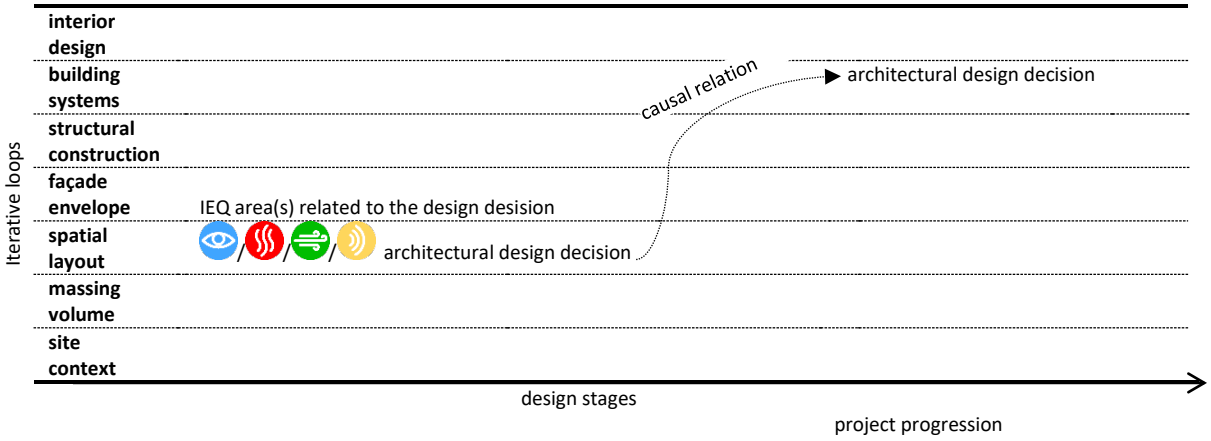
This part summarizes the case studies of the 15 buildings. It focuses on the project – related part of the interviews. The full-length interviews are included in appendix.

For each case study, the first two-page spread shows only the information gathered from the architect interviews, to better show what do the architects think about when designing the building. This is followed by another two-page spread where the information from construction documentation (provided by the architects) as well as IEQ metrics calculations and analysis performed by the author, are added to the framework to fill in the missing information.

For numerical values of IEQ metrics, legislative requirements are listed in brackets after the calculated value, if they were different at time of construction than they are now, both values are presented as follows: (requirement at time of construction/requirement now).

In the results section, the following floor numbering system is used: ground floor = 1st floor, 1 floor above ground floor = 2nd floor etc. This floor numbering system is common in the Czech building documentation, where the ground floor is numbered as 1.NP (NP meaning "nadzemní podlaží"= "above ground floor"), the first floor above that is 2.NP etc. The "traditional" floor numbering system (ground floor, 1st floor etc.) is still sometimes used in Czech common speech and may therefore appear in some of the interview excerpts, where it is clarified by the author in brackets.

Table 4.4 Guide to the design process tables



Apartment house Ostravská Brána

Design year: 2006 - 2007
Build year: 2008 - 2010
Place: Kostelní náměstí, Moravská Ostrava, Ostrava
Author: Kuba & Pilař architekti | **Tomáš Pilař** (interviewed), Ladislav Kuba

Figure 4.1 Apartment House Ostravská Brána (source: archiweb.cz)

Figure 4.2 Apartment House Ostravská Brána interior (source: https://ekonom.cz/c1-53744210-stavby-ktere-letos-bodovaly-u-odborniku)

Interview excerpts:

The basic footprint was determined by a zoning decision that another investor had had there for some time (…) so we had to fit into that footprint and just in some nuances where we rounded that corner and did that console there, so we had to work with it that way. In the end it turned out that the planning permission wasn't quite able to meet the requirements of the developer in terms of floor area and number of apartments, so the building was modified anyway and then the planning permit and the building permit were done together.
Some of the apartments, if they were one-sidedly oriented either to the street or to the square, just didn't meet the required values of the sunlight and daylighting, so the apartment mix was dealt with for a long time. We had to stretch the apartments across the layout, so the apartments got bigger. The layouts are quite deep in some cases, since we had to get the sunlight into the apartments somehow, because the investor didn't want to have any kind of non-apartments, so called ateliers. The investor's originally planned for more smaller apartments on the lower floors. In the end, it turned out that even the second floor towards the street would be non-residential space, commercial units. Then, facing the street, there are duplexes, precisely because it was not possible to make those apartments in the 2nd) floor (upper 1st floor/mezzanine).
The only building in close proximity is the Bishop's building. The daylight and sunlight levels there, when the diagrams were done, came out fine and then on the opposite side, there was nothing standing there at the time, so we didn't have to deal with that.
(…) it was expected that the street 28. října would be busier in the future, so a noise study was done and then the values on the facade and in the interior were calculated on the basis of that.
Of course, there was also a noise study of the stationary sources both from the surrounding area and then from ours, and then there was also a noise study of the indoor environment in terms of the noise of the parking lot impacting the 1st and 2nd floor, the soundproofness of the structures.
We then did a study for the city on the material and general conceptual solution of the public space of the whole square. Unfortunately, the reconstruction ended up being a big compromise. There was supposed to be some artwork in that space, but that just didn't happen. And it became more of a traffic solution than a quality public space."

Table 4.5 Apartment house Ostravská Brána - framework analysis (interview)

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design					
building systems		heat recuperation only in commercial spaces, not apartments asecondary heat stations in each apartment"	mechanical ventilation - only in commercial spaces, natural for apartments	noise from mechanical equipment – impact on surroundings calculated	
structural construction				noise from indoor parking →soundproofing of structures	
facade envelope				noise study from surroundings – façade soundproofing	
spatial layout	apartment mix and building program determined by sunlight requirements			parking in souterrain - noise source for 1st and 2nd floor	
massing volume					basic footprint determined by previous planning permit
site context	craped urban situation →difficult to achieve sunlight and daylight only the Bishop's building in close proximity (daylight not worsened there)				also designed the public space – not realized to their satisfaction

IEQ aspects most considered by the architects:

- sunlight and daylight provision for apartments – investor didn't want so called "ateliers"
- district heating, asecondary heat exchange stations in apartments
- natural ventilation in apartments, mechanical ventilation only in commercial spaces
- noise from surroundings, noise from parking inside house → soundproofing of structures

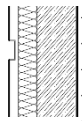
Table 4.6 Apartment house Ostravská Brána - design process (interview)

	site analysis + pre-requisites	architectural study	building permit documentation	after building
interior design				
building systems			mechanical ventilation with heat recuperation only in commercial spaces, not apartments district heating + asecondary heat exchange stations in apartments	partial heating autonomy advantageous in uncertain energy situation
structural construction		noise from indoor parking →soundproofing of structures		
façade envelope		noise study from surroundings – façade soundproofing		
spatial layout	investor didn't want any non-apartments ("ateliers")	apartment mix and building program determined by sunlight requirements		
massing volume	basic footprint determined by previous planning permit			
site context	street expected to become noisier only the Bishop's building in close proximity	daylight and sunlight values on the neighboring façade sufficient	noise from mechanical equipment – impact on surroundings calculated	designed the public space – compromise, more traffic solution than public space the public spaces and ground floor not used as expected – the locality not central enough in urban context

Table 4.7 Apartment House Ostravská Brána structures and window properties

structures composition and properties (1:50)

exterior wall



-interior plaster 10mm
-reinforced concrete 250mm
-mineral wool 120mm
-air gap 50mm
-glass-cement panel 10mm

U = 0.35 W/m²K (<0.38/0.30)

R'w = 63 dB (>43 all envelope)

wall between apartments

-interior plaster 10mm
-Porotherm (bricks) OR reinforced concrete 240 mm
-interior plaster 10mm

R'w (Porotherm) = 53dB (>53/53)

R'w (concrete) = 55 dB (>53/53)

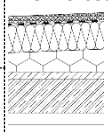
partition inside apartment

-interior plaster 10mm
-Porotherm (bricks) 115 mm
-interior plaster 10mm

R'w = 42 dB (>42/40)

roof

- river rock aggregate
- waterproofing sheets 5 mm
- thermal insulation 180mm
- sloping thermal ins. 50-220 mm
- concrete screed 50 mm
- reinforced concrete slab 220 mm



- air gap - grid
- plasterboard ceiling

U = 0.16 W/m²K (<0.24)

ceiling between apartments

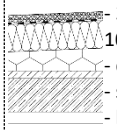
- 3-layer glued flooring 10 mm

- concrete screed 50 mm
- step insulation 30 mm
- levelling layer 20 mm
- reinforced concrete slab 220 mm
- interior plaster 10 mm

R'w= 65 dB (>52/54)

L'n,w = 32 dB (<58/53)

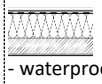
ceiling above loggia



- 3-layer glued flooring 10 mm
- concrete screed 50 mm
- step insulation 30 mm
- levelling layer 20 mm
- reinforced concrete slab 220 mm
- mineral wool 180 mm
- ventilated air gap 270 mm
- ceiling panel glass cement 10 mm

U =0,18 W/m²K (>0.24)

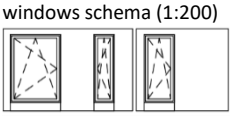
loggia floor (= terrace roof)



- ceramic tiles 10 mm
- mortar targets 5 mm
- waterproofing sheets 5mm
- 180 mm foam glass panels
- reinforced concrete slab 120 mm
- interior plaster 10 mm

U = 0.23 W/m²K (>0.24)

windows schema (1:200)



clear height = 2.66 m
window height = 2.2 m
window sill = 0.26m
window lintel = 2.5m
window frame 30-40%

τ_k = 0.6-0.7 (triple glazing)

$\tau_{s,nor}$ = 0.779

U = 1.04 W/m².K (>1.70/1.50)

R'w = 36 dB (>43 all envelope)

Daylight and sunlight

Due to the cramped urban situation, the daylight levels on the façade directly adjacent to the neighboring Bishops' building on south are already low, which is exacerbated inside the apartments by the narrow windows with deep window linings (which would need to be even deeper if the exterior wall was to meet the current U value requirements).

The sunlight requirements determined the apartment mix. It was not possible to place smaller one-bedroom apartments on the upper 1st floor (mezzanine) as the investor originally planned and in the upper floors, the apartments had to be stretched through the layout to achieve the required sunlight duration in at least one room.

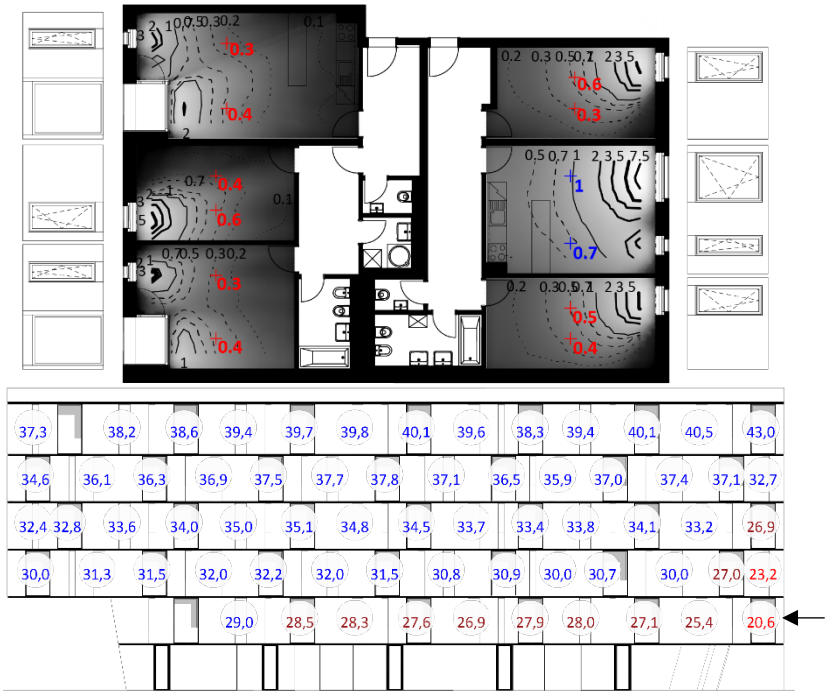


Figure 4.3 Apartment House Ostravská Brána daylight factor [%] in upper 1st floor (mezzanine) apartment (1:250) and on southwest facade (1:500) (source: author)

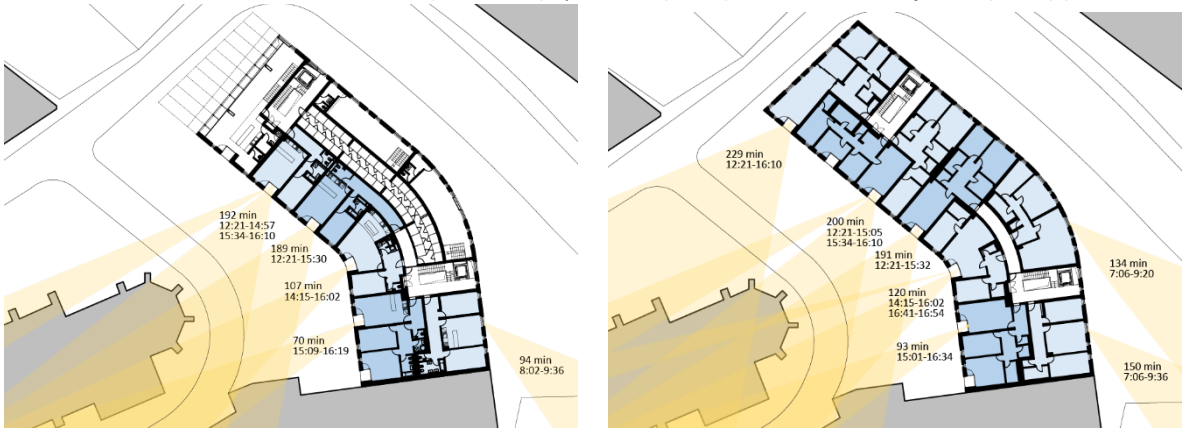


Figure 4.4 Apartment House Ostravská Brána sunlight in apartments on upper 1st floor (left) and 3rd floor (right) in urban context (1:1000) (source: author)

Thermal and indoor air quality

Only 3 of 8 apartments on typical floor can be cross-ventilated (oriented on opposite facades).
The exterior wall doesn't comply with the current U value requirements, which became stricter since the time of construction.

Figure 4.5 Apartment House Ostravská Brána natural ventilation schema on typical floor (1:1000) (source: author)

Acoustics

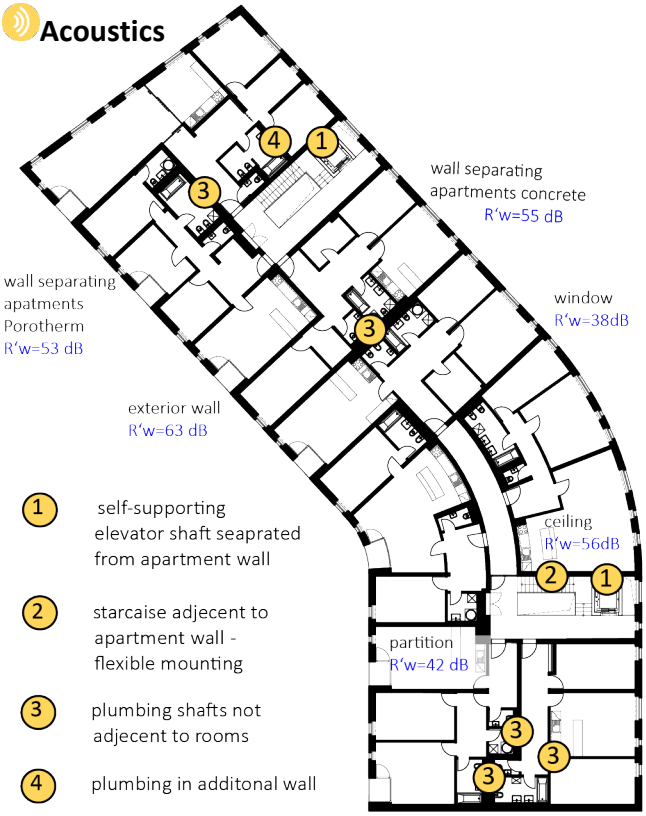


Figure 4.6 Apartment House Ostravská Brána acoustics (1:500) (source: author)

Table 4.8 Apartment house Ostravská Brána framework analysis supplemented by IEQ metrics calcualtions

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design					
building systems		*heat recuperation only in commercial spaces, not apartments asecondary heat stations in each apartment"*	*mechanical ventilation - only in commercial spaces, natural for apartments*	*noise from mechanical equipment – impact on surroundings calculated*	
structural construction				*noise from indoor parking →soundproofing of structures* **self-supporting elevator shaft separate from apartment wall**	
facade envelope	**narrow windows and deep linings → low daylight levels inside**	**façade does not meet U requirements now (did at time of construction)**		*noise study from surroundings – façade soundproofing*	
spatial layout	*apartment mix and building program determined by sunlight requirements*		**only the largest apartments can be cross-ventilated**	*parking in souterrain - noise source for 1st and 2nd floor*	
massing volume					*basic footprint determined by previous planning permit*
site context	*craped urban situation →difficult to achieve sunlight and daylight only the Bishop's building in close proximity (daylight not worsened there)*				*also designed the public space – nor realized to their satisfaction*

Residential Block 4BLOK

Design year: 2011 - 2016
Build year: 2015 - 2017
Place: Vršovice, Praha
Author: Chmelař architekti | **David Chmelař** (interviewed), Vojtěch Nedorost

Figure 4.7 Residential Block 4BLOK (source: archiweb.cz)

Figure 4.8 Residential Block 4BLOK interior and balcony (source: archiweb.cz)

Interview excerpts:

"We needed to meet the noise coefficient, because it's an exposed place: a tram, a four-lane road. We had to consider considered insolation and daylighting, struggling a lot with the corners. That's why I wanted the mass to be compact in the ground floor, but to be purposefully penetrated or made more accessible and not to be a closed block, but to have holes in it, because we know that of course the worst are the corners in those blocks. Or the whole actually north facade into the courtyard is completely blocked off, it's no use to you.

we wanted that courtyard to be the leitmotif of the whole project and I had the idea that the green balconies were actually supposed to be a symbol of the greenery growing through the house, that actually the trees that are in the middle are growing through the house, that it's actually a birch grove in the middle of the city.

It's common sense, that we actually know that if there's not enough light, there have to be bigger windows. Plus, I like the bigger windows from the indoor environment viewpoint, I like the contact with the outside and conversely the changing of the outside weather to have an impact on the inside. There was a complicated spreadsheet on the "ateliers", where it's an atelier because of the lighting, because you can't guarantee the insolation, there was one that didn't meet noise limits. When the apartments sold out, we found out it actually didn't need full insolation (because the legislation changed), so about five of those ateliers because of the insolation were re-approved as apartments. There were two things being tweaked as they were being done, that weren't quite in the design. How and in what part of the house to insulate against the propagation of vibrations from the tram track? We were deliberating until the last minute about what method to choose, to make it effective so that you don't just have to double slab the entire house. There are kind of rubber isolation strips at the column headers in the basement. It was a challenge to calculate how much we would actually need to make it work out at the inspection, when we would measure it accurately. I was surprised that the contractors came up with the fact that triple glazing was worse for noise propagation, although as again on other sites they said it was questionable. That double glazing is better, that there's not as much mass that can resonate, that can vibrate.

The common spaces are worked out to a higher standard than other rival projects, the occupants have a positive relationship with it. We have dog washing facilities by the front door, I've seen towels on hooks there, so obviously they use that when they come in from outside. So that was my delight, also seeing that it was trampled by kids playing soccer in that courtyard. That the way we thought it was supposed to work, they take the elevator down, they come into the yard, they don't have to go through the public area where there's a lot of cars, that it works nicely for the house."

Table 4.9 Residential Block 4BLOK - framework analysis (interview)

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design					cultivated common spaces
building systems		heat recuperation with the mechanical ventilation	mechanical ventilation only 2 blocks in Vršovická street - poor air quality + noise	recuperation units on roof - noise study required	
structural construction				vibration protection - flexible padding in the column headers	
facade envelope	large windows →daylight →contact with exterior			triple glazing - said to be worse than double (more mass that can vibrate)	
spatial layout	corner parts of block problematic apartments not fulfilling requirements → "ateliers"			apartments not fulfilling acoustic requirements →"ateliers"	
massing volume	compact ground floor, above mass efficiently lightened/perforated			no noise barriers on roof	
site context	block structure - anticipated difficulties cultivated courtyard views			tramway, frequented road - noise (requirement for facade and mechanical ventilation), vibrations	block urban structure

IEQ aspects most considered by the architects:

- daylight and sunlight provision; contact with exterior; cultivated courtyard views
- heat recuperation in mechanically ventilated apartments
- mechanical ventilation in blocks oriented toward main street
- noise coefficient (busy road), noise from recuperation units on roof, vibration proofing

Table 4.10 Residential Block 4BLOK - design process (interview)

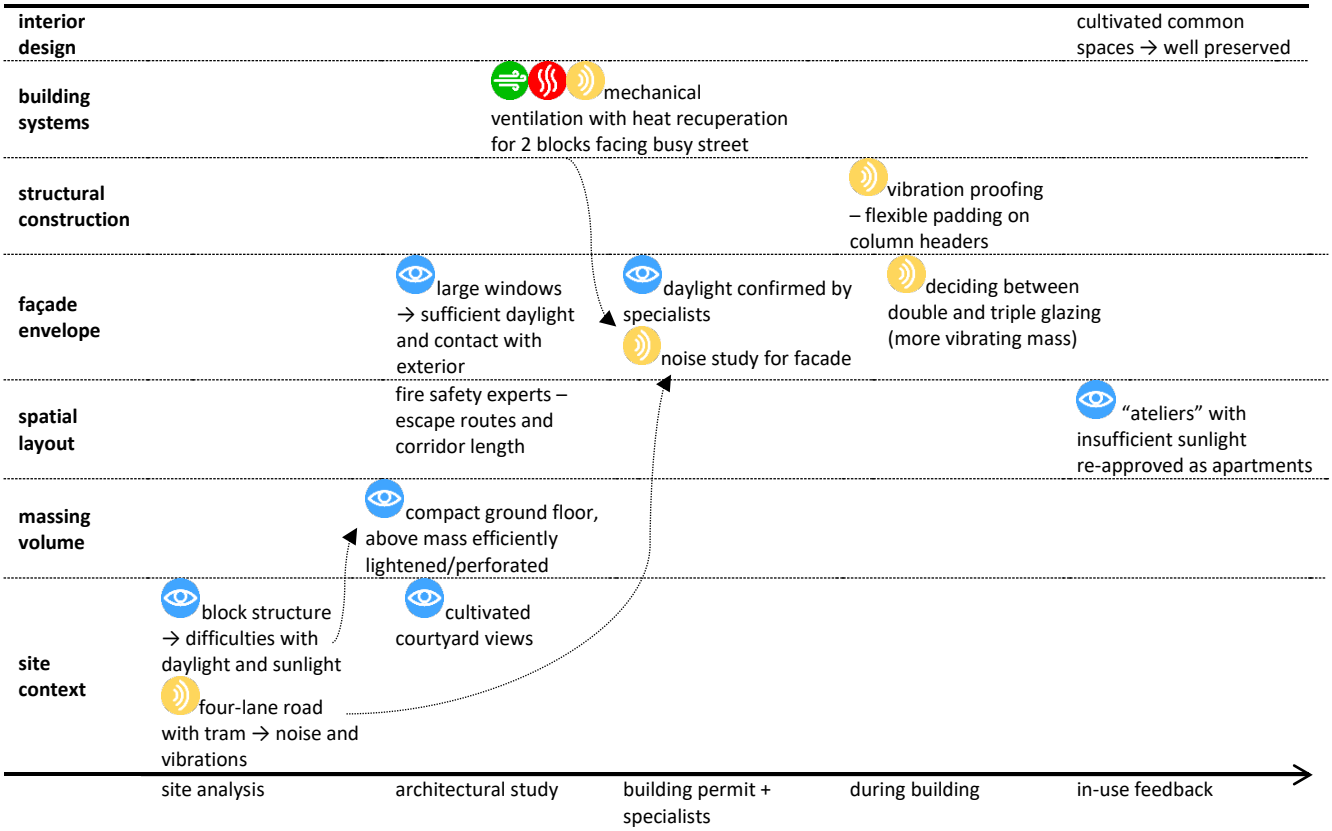


Table 4.11 Residential Block 4BLOK structures and window properties

structures composition and properties (1:50)

exterior wall
-interior plaster 10mm
-reinforced concrete 250mm
-mineral wool 180mm
-exterior plaster 10 mm
U = 0.25 W/m²K (<0.30)
R'w = 57 dB (>38 all envelope)

wall between apartments
- interior plaster 10mm
- reinforced concrete 220mm
- interior plaster 10mm
R'w = 54 dB (>53)

partition inside apartment
-interior plaster 10mm
-hollow brick 150 mm
-interior plaster 10mm
R'w = 44 dB (>42/40)

roof
- river rock aggregate 50mm
- waterproofing sheets
- thermal insulation XPS in slope min.300mm
- reinforced concrete slab 200 mm
- interior plaster 10 mm
U = 0.16 W/m²K (<0.24)

ceiling between apartments
- wooden floor 14 mm
- concrete screed 50 mm
- step insulation 50 mm
- reinforced concrete slab 200 mm
- interior plaster 10 mm
R'w = 58 dB (>52/54)
L'n,w = 46 dB (<58/53)

green roof
- vegetation layers
- levelling layer 20 mm
- waterproofing sheets
- thermal insulation XPS in slope min.300mm
- reinforced concrete slab 200 mm
- interior plaster 10 mm
U =0,16 W/m²K (>0.24)

ceiling above souterrain
- wooden floor 14 mm
- concrete screed 50 mm
- step insulation 90 mm
- reinforced concrete slab 200 mm
- interior plaster 10 mm
U = 0.37 W/m²K (>0.60)

windows schema (1:200)

clear height = 2.6 m
window height = 2.4/2.0 m
window sill = 0/0.4 m
window lintel = 2.4m
window frame 34-36%
τ_k = 0.66-0.64 (triple glazing)
$\tau_{s,nor}$ = 0.779
U = 1.04 W/m².K (>1.50)
R'w = 36 dB (>38 all envelope)

Daylight and sunlight

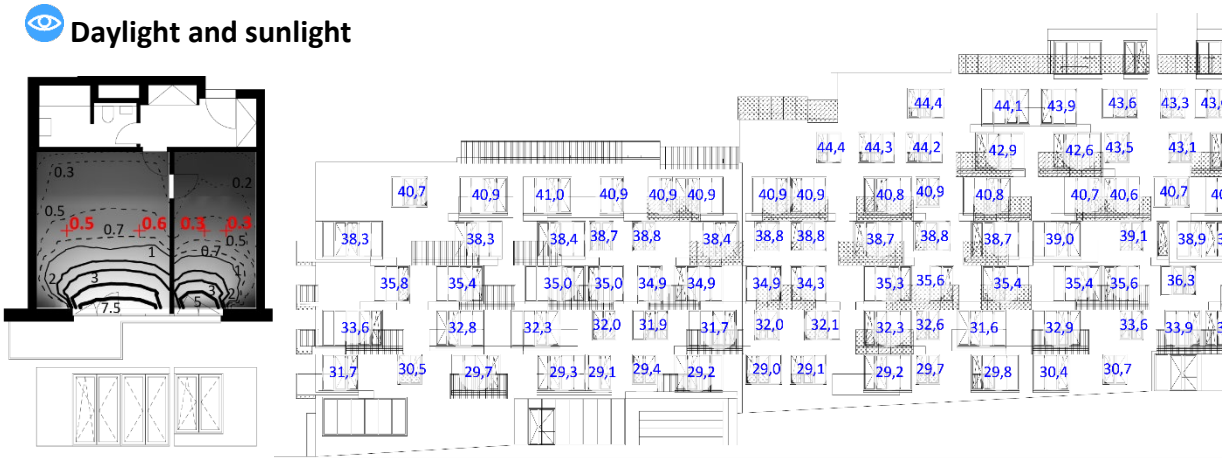
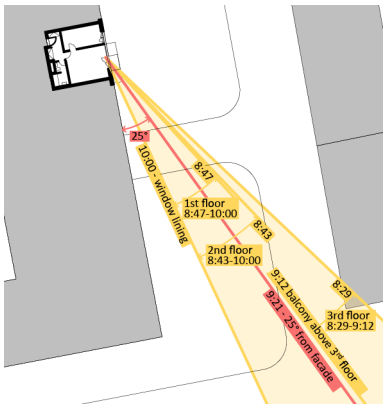


Figure 4.9 Residential Block 4BLOK daylight factor [%] levels in typical 1st floor apartment (1:250) and on east facade (1:500) (source: author)

Although the daylight factor levels on the street façade are sufficient, the daylight levels in in some of the lower floor apartments do not meet the legislative requirements, mostly due to low window lintels and shading by the balconies (which were not included in the façade daylight factor calculation to get a better understanding of the urban situation). As the architect mentioned in the interview, there apartments were approved as so called "ateliers".



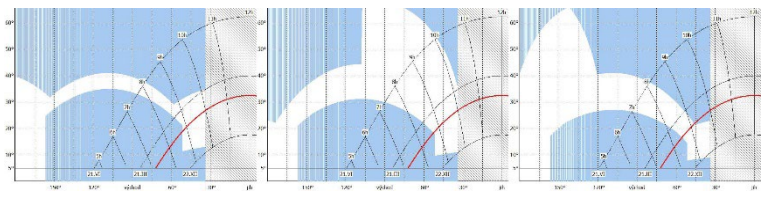


Figure 4.10 Residential Block 4BLOK sunlight duration in 1st, 2nd and 3rd apartment on 1.3. (source: author)

The „ateliers" with insufficient sunlight provision were re-approved as apartments when the sunlight requirements for new development were removed from Prague Building Regulations in 2018.

Figure 4.11 Residential Block 4BLOK sunlight duration in typical apartment on 1st, 2nd and 3rd floor on 1.3. in urban context (1:1000) - the 25°angle from façade describes requireement at time of construction (source: author)

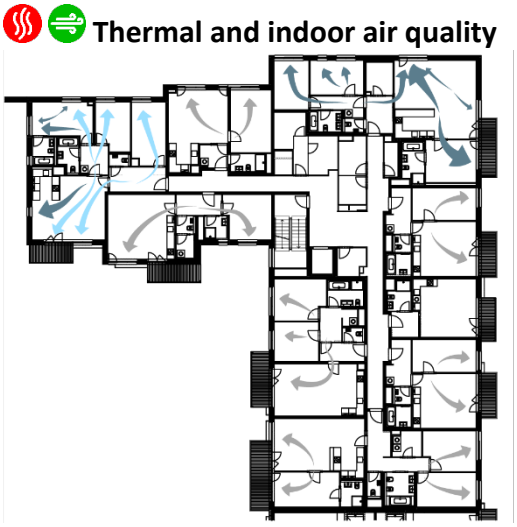


Figure 4.12 Residential Block 4BLOK natural ventilation on 2nd floor of Block I (source: author)

In the two blocks facing the busy Vršovická street, all the apartments have mechanical ventilation with heat recuperation. The other two blocks are ventilated naturally, with mechanical ventilation only in bathrooms and the kithcen exhaust hoods (at the time of construction, mechancial ventilation with heat recuparation was not the standard.) Since there are mostly smaller one bedroom or studio aparments on the lower floors, a lot of them are oriented only on one façade and cannot be cross ventilated.

Figure 4.14 Residential Block 4BLOK mechanical ventilation on 2nd floor, Block II(source: adapted from documentation)

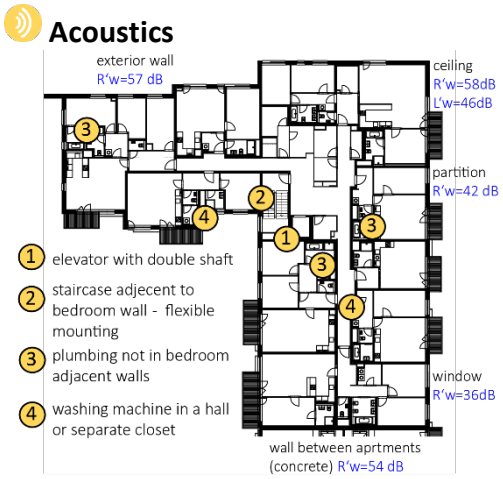


Figure 4.13 Residential Block 4BLOK acoustics in layout of 2nd floor, Block I (source: author)

Table 4.12 Residential Block 4BLOK - framework analysis (interview + IEQ metrics)

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design					*cultivated common spaces*
building systems		*heat recuperation with the mechanical ventilation*	*mechanical ventilation only 2 blocks in Vršovická street - poor air quality + noise*	*recuperation units on roof - noise study required* **washing machines in halls or separate closets**	
structural construction				*vibration protection - flexible padding in the column headers* **double shaft elevators**	
facade envelope	*large windows →daylight →contact with exterior*			*triple glazing - said to be worse than double (more mass that can vibrate)*	
spatial layout	*corner parts of block problematic apartments not fulfilling requirements → "ateliers"*		**cross ventilation only possible in larger apartments**	*apartments not fulfilling acoustic requirements →"ateliers"*	
massing volume	*compact ground floor, above mass efficiently lightened/perforated*			*no noise barriers on roof*	
site context	*block structure - anticipated difficulties cultivated courtyard views*			*tramway, frequented road - noise (requirement for facade and mechanical ventilation), vibrations*	*block urban structure*

Villa Houses Krásnopolská

Design year: 2015 - 2016
Build year: 2017 - 2018
Place: Krásnopolská, Ostrava
Author: Atelier 38 s. r. o. | **Tomáš Bindr** (interviewed), Petr Doležal

Figure 4.15 Villa Houses Krásnopolská (source: Roman Polášek, archiweb.cz)

Figure 4.16 Villa Houses Krásnopolská interior (source: https://www.rksting.cz/prodej-byty-ostrava-pustkovec-119594)

Interview excerpts:

"We originally had one house proposed. It was terraced, one side of it was dissolved down the slope, but the zoning ordinance changed and it was no longer possible. The site is relatively small, it was primarily intended to be developed with single-family houses. The multi-family housing was only a conditionally permitted development, which led to the building department being very protective of everything. We went to the edge there, to the decimetres per square buildable area of one building, to the square metres buildable area of the whole site. In Ostrava, the distancing rule is that it has to be the tilted facade of the taller of the buildings when there are room windows in one of them. The authorities had us do both sunlight and daylight assessment. The daylighting for the one apartment downstairs in that northern section didn't comply for the two rooms, so those rooms were renamed the gym, the study, the library.
But I can't say that the apartments are dark, you don't feel anxious there. By the fact that we used mostly floor-to-ceiling windows, there' s big glass windows in that main living area, nobody complained about that.
Ostrava is really specific in that you can sell a square meter of gross floor area for much less money than in Prague. And apart from the plot of land, which is many times more expensive in Prague, the production price of the house itself is almost the same in Prague as in Ostrava, because companies with a nationwide presence are interested in construction. In Ostrava, in development for sale, there are never requirements for heat recovery or air conditioning or some such extra standard.
Fortunately, we at least managed to convince the investor that it should be floor heating so that there are no radiators. There isn't district heating system here, which is very widespread in Ostrava thanks to the mining heritage, so it's on gas boilers with central heating. And goodness for the floor heating, because if it's going to be converted to heat pumps, for example, that's a real victory. There are boxes in all the windows, or preparations for outside blinds, but because of the cost, those blinds were not installed when the apartments were sold. Which means that the blinds are not the same for all apartments.
There it is a combination of in-situ cast concrete ceilings and columns and masonry perimeter walls. The occupants complain about the noise transmitted in the structure. I don't know how it is getting into that structure, because of course we have impact noise insulation in the floors.
We didn't do interior design on any of the 21 apartments, they've done individual finishes on those apartments so they're done differently maybe in layout. Someone kept exposed reinforced concrete ceilings, which may be problematic for spatial acoustics."

Table 4.13 Villa Houses Krásnopolská - framework analysis (interview)

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design				individual interior finishes - only one apartment with concrete ceilings	
building systems	exterior blinds (just preparations due to cost)	floor heating, not radiators	only natural ventilation		
structural construction				impact noise carries through construction (in-situ concrete) → occupant complaints	
facade envelope	exterior blinds preparation floor length windows - rooms don't feel dark				
spatial layout	rooms with insufficient daylight → „library", „home gym", „study"				
massing volume	maximum height - to achieve 45°shading angle for neighbor house				
site context	daylight and sunlight study required by authorities				region - low prices of real estate in Ostrava but high construction cost limitations from city planning

IEQ aspects most considered by the architects:

- distancing formed by shading requirements, still insufficient daylight in some rooms
- floor heating, exterior blinds (only preparation due to cost)
- only natural ventilation (mechanical would be too expensive)
- impact noise carried through in-situ concrete construction

Table 4.14 Villa Houses Krásnopolská - design process (interview)

interior design				one apartment kept exposed concrete ceilings
building systems	convinced investor about floor heating			no air conditioning units on façade so far floor heating can be connected to heat pumps in the future
structural construction				impact noise carries through in-situ concrete structure
façade envelope	floor length windows → rooms don't feel dark		exterior blinds preparation	different blinds in each apartment
spatial layout		rooms with insufficient daylight → „library", „home gym", „study"		
massing volume	maximum height - to achieve 45°shading angle for neighbor house			
site context	multi-family housing – only conditionally allowed region - low prices of real estate in Ostrava but similar cost to other parts of republic			
	architectural study	building permit	during building	in-use feedback →

Table 4.15 Villa Houses Krásnopolská structures and window properties

structures composition and properties (1:50)

exterior wall (lower floors)
-interior plaster 10mm
-hollow brick 300mm
- EPS 150 mm
- thin-layer plaster 5mm
U = 0.18 W/m²K (<0.30)
R'w = 57 dB (>33 all envelope)

exterior wall wooden frame (attic)
-plasterboard 2x12.5mm
- grid - closed air gap 50 mm
- vapor barrier
- OSB board 15 mm
- mineral wool 160 mm + 120 mm
- safety waterproofing
- ventilated air gap 40 mm
- OSB boards
U = 0.14 W/m²K (<0.30)

partition inside apartment
-interior plaster 10mm
- hollow bricks 140 mm
-interior plaster 10mm
Rw = 41 dB (>42/40)

sloping roof
- sheet metal roofing
- sheeting
- counter battens 60x40mm
- diffusely open membrane
- mineral wool between rafters 180mm
- mineral wool in grid 50mm
- vapor barrier
- plasterboard ceiling
U = 0.15 W/m²K (<0.24)

ceiling between apartments
- vinyl flooring 5 mm
- glue mm
- concrete screed 50mm
- floor heating system board
- step insulation 30 mm
- reinforced concrete slab 200 mm
- interior plaster 10 mm
R'w= 58 dB (>52/54)
L'n,w = 30 dB (<58/53)

terrace roof
- concrete tiles on pads
- safety waterproofing
- XPS 220 mm
- asphalt sheet
- reinforced concrete slab 200 mm
- interior plaster 10 mm
U =0,13 W/m²K (>0.24)

floor on terrain
- vinyl flooring 5 mm
- glue mm
- concrete screed 50mm
- floor heating system board
- thermal insulation EPS 170 mm
- asphalt sheets
- foundation concrete slab 200 mm
- gravel
- terrain
U = 0.20 W/m²K (>0.45)

windows schema (1:200)

clear height = 2.6 m
window height = 2.3 m
window sill = 0 m
window lintel = 2.3 m
window frame 32 %
τ_k = 0.68
(triple glazing)
$\tau_{s,nor}$ = 0.779
U = 0.90 W/m².K
(1.50)
R'w = 36 dB
(>33 all envelope)

Daylight and sunlight

Figure 4.17 Villa Houses Krásnopolská daylight factor [%] levels on the 1st floor (1:250) (source: author)

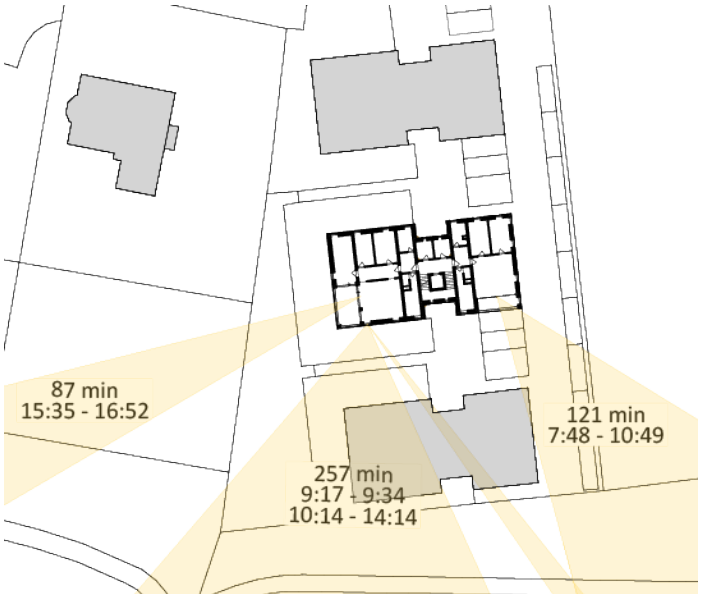
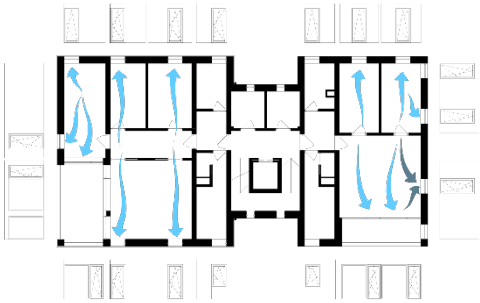


Figure 4.18 Villa Houses Krásnopolská sunlight duration on 1.3. on 2nd floor (1:1000) (source: author)

Thermal and indoor air quality

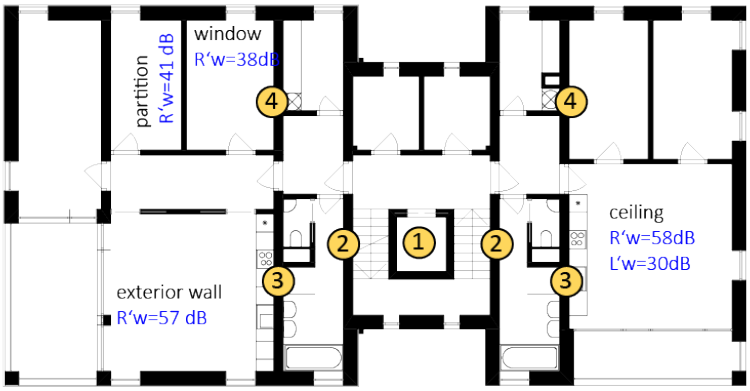


the bedrooms in lower floor apartments do not meet the daylight requirements due to narrow windows with rather low lintels and shading by the neighboring villa house

since all the apartments are have windows in two or three facades, they can be cross ventilated

Figure 4.19 Villa Houses Krásnopolská natural ventilation in 2nd floor apartments (1:500) (source: author)

Acoustics



1 elevator shaft separated from apartments by staircase
2 staircase not adjacent to rooms
3 plumbing not adjacent to bedrooms
4 washing machine by bedroom adjecent wall- possible noise source

all the structures meet legislative requirements.

Even though there are floating floors in the apartments, impact noise still carries through the structures according to the architect, which might be caused by insufficient flexible separation of the floating floors concrete screed layer.

Table 4.16 Villa Houses Krásnopolská - framework analysis (interview + IEQ metrics)

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design				*individual interior finishes - only one apartment with concrete ceilings*	
building systems	*exterior blinds (just preparations due to cost)*	*floor heating, not radiators*	*only natural ventilation*	**plumbing not adjacent to bedrooms**	
structural construction				*impact noise carries through construction (in-situ concrete) → occupant complaints*	
facade envelope	*exterior blinds preparation* *floor length windows - rooms don't feel dark* **narrow windows and low lintels in the rooms with insufficient daylight**				
spatial layout	*rooms with insufficient daylight → „library", „home gym", „study"*		**all apartments can be cross-ventilated**	**elevator separated from apartments by staircase** **staircase not adjacent to bedrooms**	
massing volume	*maximum height - to achieve 45°shading angle for neighbor house*				
site context	*daylight and sunlight study required by authorities*				*region - low prices of real estate in Ostrava but high construction cost* *limitations from city planning*

Terraced Houses Zruč

Design year: 2012
Build year: 2014 - 2015
Place: Plzeňská, Zruč-Senec
Author: Zábran Nová architekti | **Jiří Zábran** (interviewed), Tereza Nová

Figure 4.20 Terraced Houses Zruč
(source: Jana Labuťová, archiweb.cz)

Figure 4.21 Terraced Houses Zruč bathroom interior
(source: Jana Labuťová, archiweb.cz)

Interview excerpts:

That was a critical moment, deciding whether those houses were going to have a west-facing garden or a south-facing garden and whether they were going to face the street or be sideways.
It worked out better for us sideways, because as the sun moves, it actually mediates that upstairs façade, which is separated from the neighboring house by atrium. And that's why the angle of the roof is chosen. On the floor where you sleep and live, you don't have the neighbor behind the wall, which is quite an interesting moment in a terraced house and we haven't seen it anywhere else.
We made a simple diagram for the sun, it doesn't really matter if it's August or June, we'll just illuminate the bathroom over the sloping roofs. That's also something incredible with a terraced house because a traditional terraced house doesn't have a bathroom window, especially floor-length.
I was worried about the corner window to the southwest. There's just double glazing everywhere, like everywhere back then. And I think to save money, much to our chagrin, there's a plastic window. It's called a structural corner, just a corner without a post and back then nobody saw it here, they didn't want to do it and we were scared of it. And it's there and there's no problem with it. Unfortunately, to this day, nobody wants to do it for us because they'll say "we can already do it, but we're not going to put a warranty on it." Yeah, right, so there' s a drop in the winter. So what?
Of course there are computer models, I'm sure you have that at the CTU, those thermal bridges and condensation, those curves, it doesn't work out at all. But that's no reason not to do it, is it? In practice, there's no problem with it. 'll just wipe it down there in extreme cold. But throughout the year, there's a nice detail where the occupant sits on that parapet and looks out into that garden undisturbed by anything. It's nice from the outside too, there's actually that glass that goes over there that mirrors the sky right back into that sky. And it's not cut through by the plastic frame.
They chose to leave the concrete exposed. (…) But in that family home, I don't think there's any reason to worry about acoustics, because you have curtains, carpets, sofas, soft material. It's fine. (…) they covered the drywall up when it got really cold the other day, like 20 degrees colder. And something kind of rotted in there, but then it dried out again. But somebody thought to open it up and there was all this mold, so they had all these rowhouses opened up. And we think it's because they just installed the plaster on the wall quickly and then the bad luck of it cooling down so quickly. They think we designed the wrong diffusion film, we've been litigating for 3 years and it's like actually annoying.

Table 4.17 Terraced Houses Zruč - framework analysis

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design				exposed concrete ceilings - balanced by curtains, carpets, couches…	
building systems					
structural construction			drywall closed still damp, it was freezing - mold		
facade envelope	corner window - uninterrupted view of garden windows in all rooms including bathroom	possible condensation in corner window			
spatial layout	atria on 2nd floor - windows in bathrooms but not visible to neighbor			no neighbor behind bedroom wall	
massing volume	roof angle chosen to allow sun in 2nd floor windows			atria on 2nd floor - no neighbor behind bedroom wall - privacy atria protected from street by building mass	
site context	orienting the houses - western or southern garden, facing the street or sideways			houses sideways to street - noise protection	city planning - number of houses (city wanted 6, architect 4, there are 5)

IEQ aspects most considered by the architects:

getting daylight and sunlight into all rooms, including bathroom
great garden views through corner window

didn't worry too much about condensation on windows

orienting away from the street, no neighbor behind bedroom wall (privacy)

Table 4.18 Terraced Houses Zruč - design process (interview)

interior design			exposed concrete ceilings → acoustics balanced by curtains, carpets, couches	
building systems				
structural construction			drywall closed still damp, it was freezing - mold	
façade envelope	corner window - uninterrupted view of garden windows in all rooms including bathroom		local contractor had difficulty manufacturing the corner window in obtuse angle	
spatial layout				
massing volume	roof angle chosen to allow sun in 2nd floor windows atria on 2nd floor - no neighbor behind bedroom wall - privacy atria shielded from street by building mass			
site context	orienting the houses - western or southern garden, facing the street or sideways			
	architectural study	building permit	during building	in-use feedback

Table 4.19 Terraced Houses Zruč - structures and window properties

structures composition and properties (1:50)

exterior wall 1st floor
-interior plaster 10mm
- Porotherm brick 365 mm
- EPS 140 mm
- plaster on screed 5 mm
U = 0.16 W/m²K (<0.30)
R'w = 45 dB (>33 all envelope)

exterior wall 2nd floor
-interior plaster 10mm
- Porotherm brick 365 mm
- mineral wool in wooden grid 140mm
- diffusely open foil
- slats 40/60 - ventilated air gap 40mm
- spruce planks vertical cladding
U = 0.19 W/m²K (<0.30)
R'w = 45 dB (>33 all envelope)

partition inside apartment
-interior plaster 10mm
-Porotherm bricks 80 mm
-interior plaster 10mm
R'w = 38 dB (>42/40)

sloped roof
- sheet metal roofing
- battens 60/40 40mm
- counter battens 60/50 60mm
- diffusely open membrane
- wood sheeting 25 mm
- mineral wool between rafters 280mm
- vapor barrier
- aluminum grid 30mm
- plasterboard ceiling 12,5 mm
U = 0.13 W/m²K (<0.24)

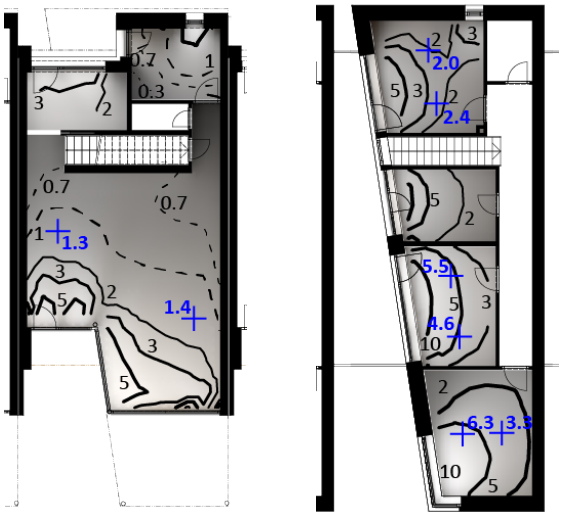
ceiling between floors
- flooring 10 mm
- concrete screed 50 mm
- step insulation 50 mm
- reinforced concrete slab 250 mm
- interior plaster 10 mm
Rw= 58 dB (>47)
Ln,w = 46 dB (<63/58)

roof terrace above living room
- wooden boards 138/23 23 mm
- impregnated wooden rack min. 50mm
- rectification pads
- waterproofing PVC foil
- EPS 160 mm
- EPS sloping wedges 10-120 mm
- vapor barrier asphalt sheet
- reinforced concrete slab 250 mm
U =0.21 W/m²K (>0.24)

floor on terrain
- flooring 10 mm
- concrete screed 50 mm
- floor heating system board 50 mm
- thermal insulation EPS 90 mm
- waterproofing 5 mm
- concrete foundation 150 mm
- gravel
- terrain
U = 0.26 W/m²K (>0.45)

windows schema
clear height 1st fl.=2.72 m
wall height 2nd fl.=3.57 m
window height = 2.4 m
window sill = 0/0.38m
window lintel = 2.4/2.78m
window frame 12-26%
τ_k = 0.74- 0.88 (double glazing)
$\tau_{s,nor}$ = 0.846
U = 1.04 W/m².K (>1.70/1.50)
R'w = 34 dB (>33 all envelope)

Daylight and sunlight

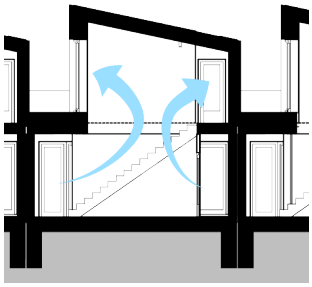


The roof angle was chosen by the architects to allow sun light in the second-floor rooms. Despite the narrow dimensions of the terrace, atrium between the second-floor neighboring houses, the rooms (including bathroom) on the second floor receive excellent daylight, since a large part of sky is visible from the rooms. Orienting the bedroom and bathroom windows to the atrium maintains privacy.
All the rooms receive sufficient sunlight.

Figure 4.22 Terraced Houses Zruč - daylight factor [%] on 1st (left) and 2nd (right) floor (1:200) (source: author)

Figure 4.23 Terraced Houses Zruč sunlight provision on 1.3. on 1st (left) and 2nd (right) floor (1:1000) (source: author)

Terraced Houses Zruč – thermal and indoor air quality



The staircase allows for chimney effect ventilation. In summer, the first-floor windows are shaded by the overhang.

Figure 4.25 Terraced houses Zruč - chimney effect ventilation (1:250) (source: author)

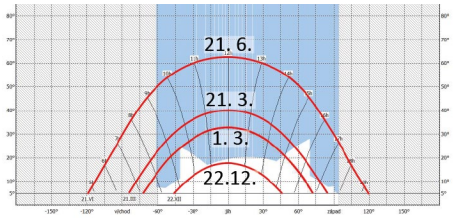


Figure 4.24 Terraced Houses Zruc - sun paths for the living room window (source: author)

Terraced Houses Zruč – acoustics

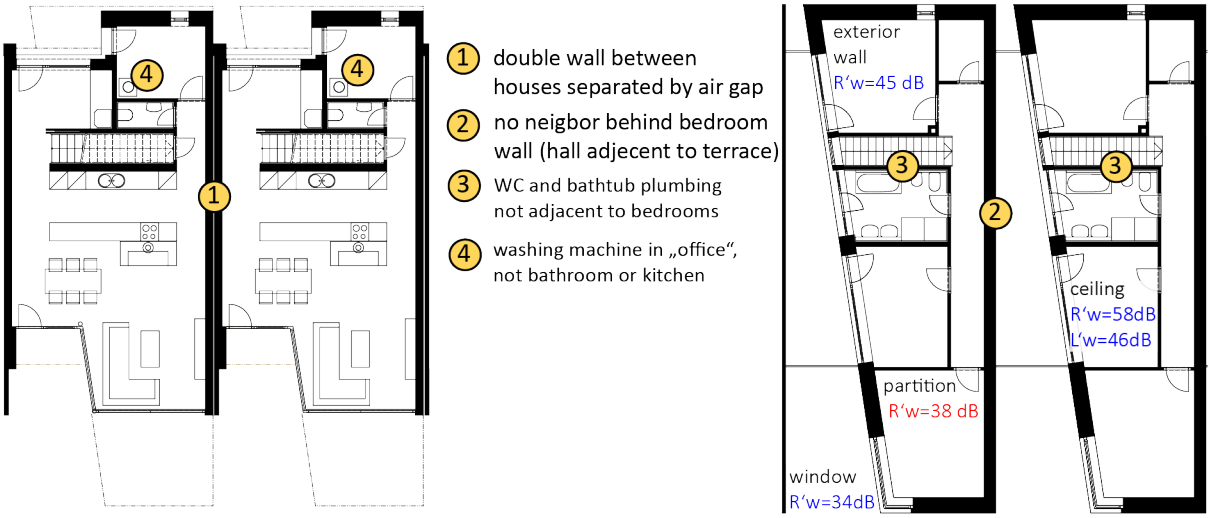


Figure 4.26 Terraced Houses Zruč – acoustics on 1st floor (left) and 2nd floor (right) (1:250) (source: author)

Table 4.20 Terraced Houses Zruč - framework analysis (interview and IEQ metrics)

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design				*exposed concrete ceilings - balanced by curtains, carpets, couches...*	
building systems					
structural construction			*drywall closed still damp, it was freezing - mold*	**double wall between row houses – air gap**	
facade envelope	*corner window - uninterrupted view of garden windows in all rooms including bathroom*	*possible condensation in corner window*		**no street-facing windows**	
spatial layout	*atria on 2nd floor - windows in bathrooms but not visible to neighbor*		**chimney effect ventilation possible**	*no neighbor behind bedroom wall*	
massing volume	*roof angle chosen to allow sun in 2nd floor windows* **roof angle allows excellent daylighting despite narrow atrium**	**1st floor living room windows shaded by the overhang in summer**		*atria on 2nd floor - no neighbor behind bedroom wall - privacy atria protected from street by building mass*	
site context	*orienting the houses - western or southern garden, facing the street or sideways*			*houses sideways to street - noise protection*	*city planning - number of houses (city wanted 6, architect 4, there are 5)*

Family House Prokop

Design year: 2016 - 2017
Build year: 2017 - 2018
Place: Příbram
Author: ASGK Design, s.r.o.|Gabriela Kaprálová, **Karolína Jiroušková** (interviewed),Monika Tomšová

Figure 4.27 Family House Prokop (source: Peter Fabo, archiweb.cz)

Figure 4.28 Family House Prokop (source: Peter Fabo, archiweb.cz)

Interview excerpts:

The client originally bought a house, they thought they were just going to refurbish it and eventually move in, but they just found out with the structural engineer that the condition was completely inadequate for them to live there. While the house stands largely in the footprint of the original house, the main mass is actually an open L, the original was an L two-story, classic right-angled. The back part of it was a big barrier for the site, which isn't exactly large, it's adjacent to the further view of an orchard, so there's not the cramped feeling on that lot that you might see from, say, a plan, but still, it was important to open up that north garden and it used to be completely blocked off there, by this wing that the owners didn't actually use.
But at the same time, because the house is part of a classic village, we wanted to respect the mass at least in the gable, to approach it traditionally, to keep the northern facade there. It's more open to the south now, also because we're further away from the village square. Living space needs sun, so it's nice that it worked out here with the massing. Prokop House is actually very much oriented to the cardinal points. At the ground floor, there's actually the very most south-facing room, where there's both a dining area and some seating area, and that directly connects to the terrace, and that terrace connects to yet another volume where there's a fairly large workshop and boat storage. That was a separate block that we needed to put somewhere, but it really works in that the terrace is a link between that north and south garden. We wanted to orient a terrace this big to the south, there's a big HS portal, which actually counts for natural passive gains. It's partially covered, so there's no overheating in the summer, which is also solved by the sliding shutters, which have a security character, because the Prokop house is not permanently occupied. Those shutters actually maintain some kind of indoor climate when the clients are not there, so that after a long time they come in and the interior is not overheated. The original brief was that the house shouldn't have an unnecessarily large volume. We designed it with a sloping roof, with an elevated space above the living area. When the clients saw that, they said that they weren't going to heat that space. Now there's an extra bedroom that wasn't originally going to be there, so we wouldn't have primarily oriented it to the south. This is perhaps the very place where the view and the position gave priority to the location of the bedroom over where we would probably naturally orient it.
And to the very north is the master bedroom with its own walk-in closet and bathroom. The street isn't very noisy, but mainly because the bedroom doesn't quite need the overheating, so it was given the northern position. There's two more bedrooms on the second floor facing north.
Originally there was a heat pump proposed, but given that the client uses it as a holiday cottage, there is a regular solid fuel boiler plus electric boiler supplementary heating, so the energy label didn't come out as nicely as we had originally thought."

Table 4.21 Family House Prokop - framework analysis

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design					
building systems		heat pump vetoed by investor (temporary use)			
structural construction					
facade envelope		sliding shutters - prevent overheating			sliding shutters - safety (house used temporarily)
spatial layout	cardinal orientation crucial	bedroom to north - prevent overheating living room - south - solar gains, needed shading	all rooms naturally ventilated	bedrooms to street - quiet, so non-issue	
massing volume	original west wing barrier between north and south garden → open views	overhang South protects living room			
site context	north - village common south - view of orchard			street - village common not noisy	

IEQ aspects most considered by the architects:

- cardinal orientations, views, visually connecting two gardens
- living room shading to prevent overheating;
  aimed at higher energy label but client didn't want heat pumps in a weekend house
- natural ventilation in all rooms
- no real issues, quiet surroundings

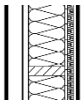
Table 4.22 Family House Prokop - design process (interview)

interior design				interior finishes out of architects' control
building systems		designed heat pump to achieve highest energy label	client wished to replace heat pump with solid fuel heat pump vetoed → worse energy label	
structural construction				
façade envelope		sliding shutters for shading and safety		
spatial layout		cardinal directions → south living room → north bedrooms (cooler) quiet village street	client didn't want to heat unnecessary volume in living room → bedroom added to southern part on 2nd floor great views from southern bedroom + terrace	
massing volume	original west wing (two floors) – barrier between north and south garden	sloping roof (lower north) west – only smaller volume to open views		
site context	original house needed to be torn down great views of southern orchard	wanted to respect village context, north gable toward village commons		site terrain levels done a bit differently than originally planned
	original site	architectural study	client changes	during building

Table 4.23 Family House Prokop - structures and window properties

structures composition and properties (1:50)

exterior wall

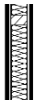


-plasterboard 2x12.5 mm
OR larch cladding 19 mm
-mineral wool in wooden grid 40 mm
- OSB board 15 mm
- min. wool in wooden frame 240 mm
- wood fibreboard 35 mm
- slats 40/40 in grid 2x40 mm
- vertical larch cladding 26 mm

U = 0.15 W/m²K (<0.30)

R'w = 48 dB (>33 all envelope)

partition



- plasterboard 2x12.5 mm
- mineral wool in wooden frame 40 mm
- plasterboard 2x12.5 mm

R'w = 42 dB (>42/40)

sloped roof

- sheet metal roofing
- wooden sheeting 24 mm
- counter battens 40/60 40mm
- diffusely open membrane
- wood fibreboard 35 mm
- mineral wool between rafters 240mm
- OSB board 15 mm
- vapor barrier
- min. wool in wooden grid 40 mm
- plasterboard ceiling OR wooden cladding

U = 0.16 W/m²K (<0.24)

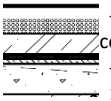
ceiling between rooms

- flooring wood 25 mm
- acoustic pad 3 mm
- gypsum-fibre board 25mm
- wood fibreboard 45 mm
- OSB board 22 mm
- mineral wool in wood frame 240 mm
- gypsum-fibre board 30 mm
- plasterboard 25 mm

R'w= 52 dB (>52/54)

L'n,w = 62 dB (<63/58)

floor on terrain



- flooring (wood 25 mm OR ceramic tiles 10 mm
- gypsum-fibre boards 10 + 25 mm
- floor EPS 100 mm
- levelling grit 27 mm
- concrete foundation slab 150 mm
- waterproofing asphalt sheet 5mm
- concrete 50 mm
- backfilling dirt
- terrain

U = 0.30 W/m²K (>0.45)

windows schema

clear height = 2.66 m
window height = 2.2 m
window sill = 0.26m
window lintel = 2.5m
window frame 23-30% (hidden frame in wall)

τ_k = 0.7-0.77 (triple glazing)

$\tau_{s,nor}$ = 0.779

U = 0,69 W/m².K (>1.50)

R'w = 33 dB (>33 all envelope)

Daylight and sunlight

Figure 4.29 Family House Prokop - daylight factor [%] levels in rooms on 1st (left) and 2nd (right) floor (1:250) (source: author)

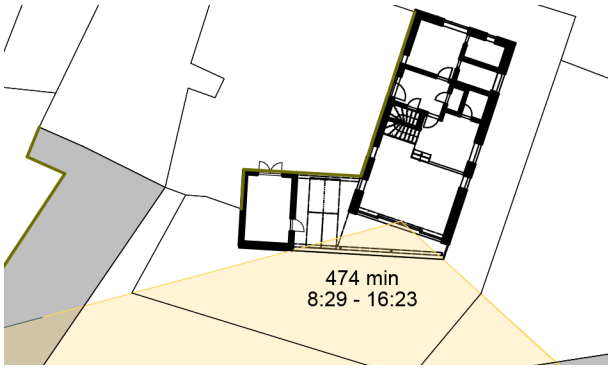
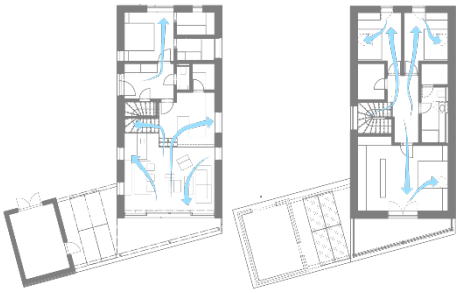


Figure 4.30 Family House Prokop - sunlight duration in living room on 1.3. (1:500) (source: author)

Thermal and indoor air quality



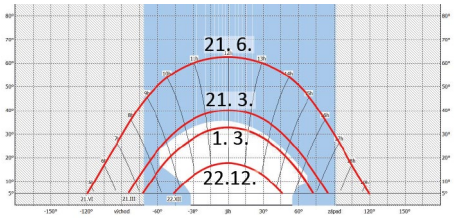


Figure 4.31 Family House Prokop - sun paths for the living room window (source: author)

Figure 4.32 Family House Prokop - natural ventilation on 1st (left) and 2nd (right) floor (1:500) (source: author)

Acoustics

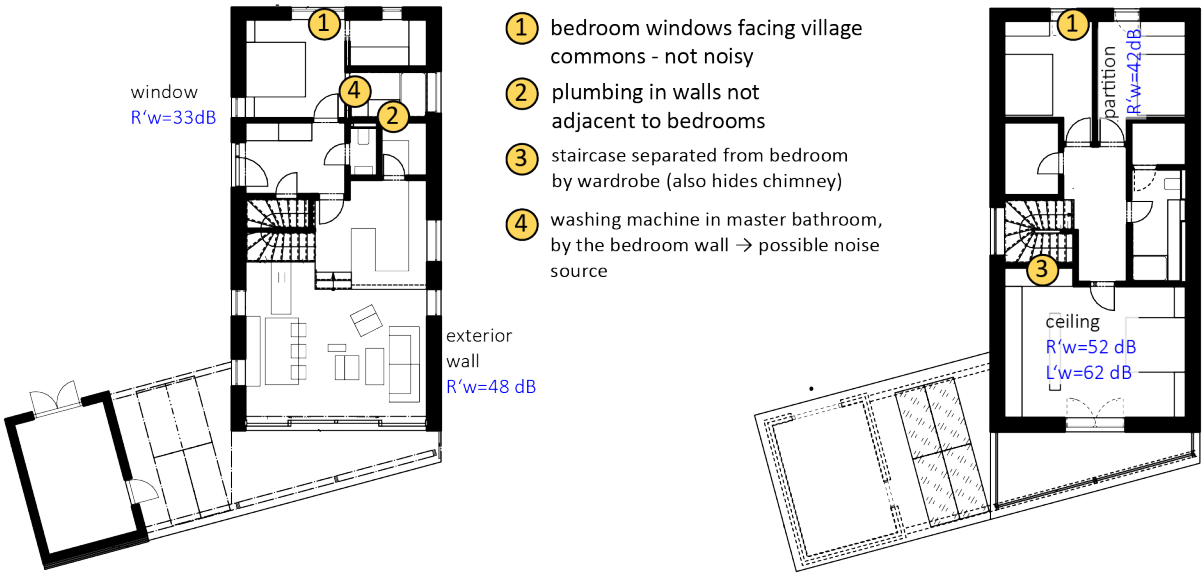


Figure 4.33 Family House Prokop - acoustics on 1st (left) and 2nd (right) floor (1:250) (source: author)

Table 4.24 Family House Prokop - framework analysis (interview + IEQ metrics)

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design					
building systems		*heat pump vetoed by investor (temporary use)*		**washing machine by bedroom-adjacent wall**	
structural construction				**plumbing in walls not adjacent to bedrooms**	
facade envelope		*sliding shutters - prevent overheating*			*sliding shutters - safety (house used temporarily)*
spatial layout	*cardinal orientation crucial*	*bedroom to north - prevent overheating living room - south - solar gains, needed shading*	*all rooms naturally ventilated* **cross ventilation and chimney effect of skylights**	*bedrooms to street - quiet, so non-issue* **staircase not adjacent to 1st floor bedrooms and separated by a wardrobe from 2nd floor bedroom**	
massing volume	*original west wing barrier between north and south garden → open views*	*overhang south protects living room* **→ shading from March till October**			
site context	*north - village common south - view of orchard*			*street - village common not noisy*	

Family House in Jinonice

Design year: 2016
Build year: 2018 - 2019
Place: Jinonice
Author: ATELIER 111 architekti s.r.o. | **Jiří Weinzettl** (interviewed), Barbora Weinzettlová, Veronika Indrová

Figure 4.34 Family House in Jinonice (source: Boys Play Nice, archiweb.cz)

Figure 4.35 Family House in Jinonice interior (source: Boys Play Nice, archiweb.cz)

Interview excerpts:

"In Jinonice, there was certainly an awful lot of specificity to the site, tight compact development. Very difficult foundation conditions, a slope, actually north slope, so that the sun was coming exactly from the slope. That also predetermined a lot of things.
It was practically impossible to get sun on the whole ground floor, so the concept is based the need to get out of the vestibule one floor up, so that we could open up the second floor living space, which on the one hand has some kind of a view to the street, contact with the street, it is already daylighted, sunny, but most importantly it has direct contact visually and physically with the garden. Even from the third floor, basically from the attic of that back tower where the kid's rooms are, you can run out right into the garden and not by a footbridge, but directly onto the terrace.
There are some standards, in terms of lighting, sunlight, possibly noise, if there are heat pumps somewhere, which is not the case in Jinonice, that accompany us on every building, these are obvious. In a compact development like this, fire safety is always a limiting factor. There may have had to be some compromises in the size of openings so that we didn't compromise the quality of the surrounding buildings. Or rather, their safety.
There's no solar heat gains problem with the northern street facing window, but of course the big HS portals are also to the south into the garden and we have a glass ceiling in the sort of hall, so that's probably the most sensitive in terms of heat gain there. But the tower-like mass with those kids' rooms and the bedroom pretty much shades that glass ceiling, so that helps partly.
The house is naturally ventilated, naturally shaded. There is no air conditioning, no need to install additional air conditioning. We additionally dealt with the shading on the south side of the large HS portals at the large windows, we put some additional canvas there, which the client requested not only to shade the interior spaces, but probably mainly to shade the adjacent exterior spaces.
There is no privacy problem with the large street facing window, t when there's more light outside we can see out beautifully, but you just can't see in. And then when it gets dark and you turn the lights on, you learn to pull down the blinds. I haven't heard a single feedback from the investor that he regretted the big window, on the contrary. I get the feeling he's glad for the perspective that the big window gives him. Just behind the window there' s actually an office area that can be completely separated. But it's separated not so much so that you can't see from the street into the interior of the layout, but rather because sometimes we want to separate the office from the living space."

Table 4.25 Family House in Jinonice - framework analysis

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design					
building systems		no alternative energy sources		no heat pumps that might make noise	
structural construction					
facade envelope	large street-facing office window - privacy not compromised, roller blinds	shading elements (canvas sheets) additionally installed on occupants' request glazed ceilings in corridor - possible overheating			fire safety (in urban context) limiting for window sizes
spatial layout	all floors have visual and physical contact with garden				
massing volume	ground floor doesn't allow sunlight - rooms moved above	glazed ceilings shaded by tower-like mass of bedroom wing			
site context	northern slope				cramped compact urban context

IEQ aspects most considered by the architects:

get sun and daylight in rooms (difficult with northern slope)

shading of large windows and glazed ceiling

natural ventilation

no noisy building systems (no need to protect surroundings)

Table 4.26 Family House in Jinonice - design process

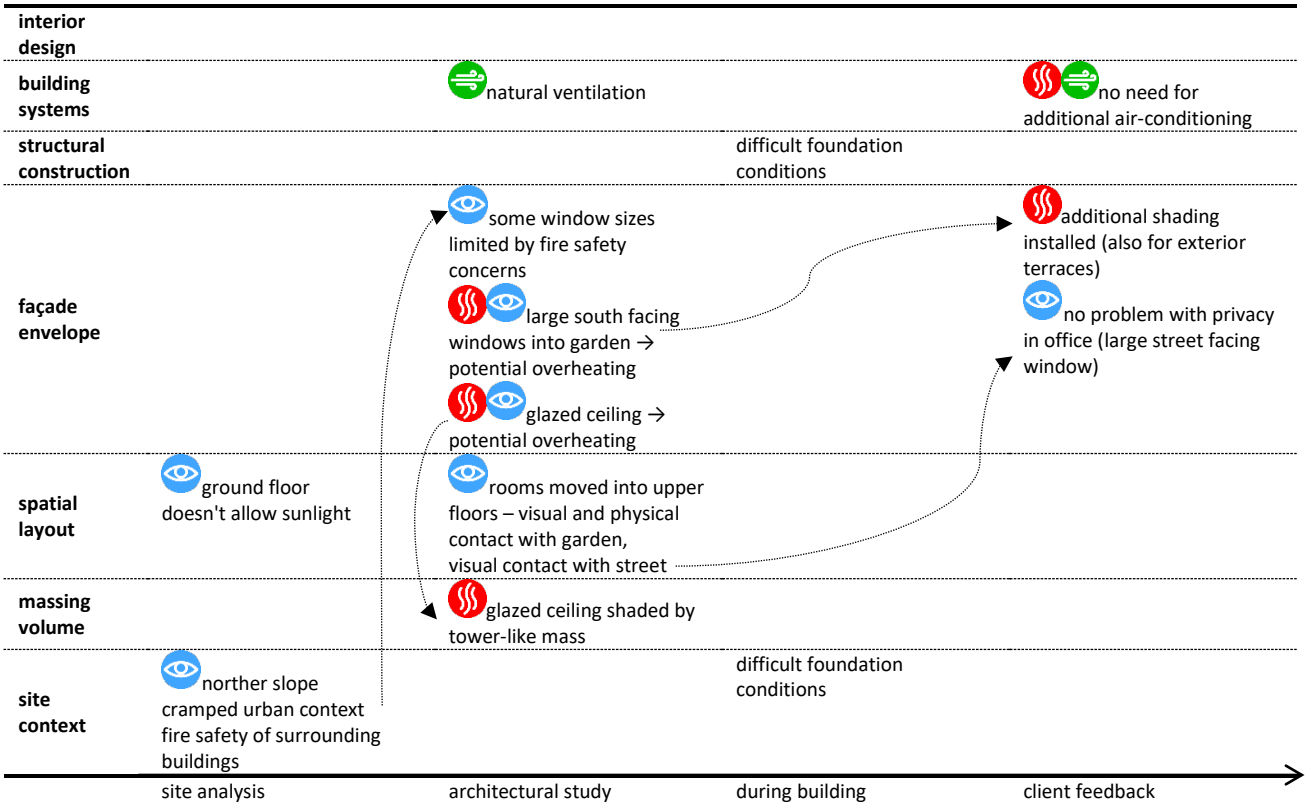
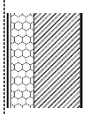


Table 4.27 Family House in Jinonice - structures and window properties

structures composition and properties (1:50)

exterior wall



-interior plaster 10mm
- brick block with inserted mineral wool 300 mm
- EPS 150mm
- exterior plaster 10 mm

U = 0.13 W/m²K (<0.30)

R'w = 45 dB (>30 all envelope)

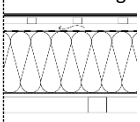
partition between kids' rooms

- wooden cladding 20 mm
- hollow brick 80 mm
- wooden cladding 20 mm

R'w = 40 dB (>42/40)

roof above living room

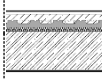
- ceramic roof tiles
- 60/40 mm battens
- counter battens 60/40 mm
- diffusion-opened foil
- mineral wool 400 mm
- vapor barrier
- wooden cladding 20 mm
- load bearing trusses



U = 0.10 W/m²K (<0.24)

ceiling between rooms

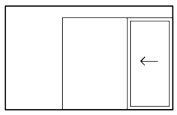
- wood flooring
- anhydrite screed 40 mm
- floor heating system board 50 mm
- step insulation 30 mm
- reinforced concrete slab 250 mm
- interior plaster 10 mm



R'w= 60 dB (>52/54)

L'n,w = 32 dB (<63/58)

windows schema (1:200)



clear height = 2.7 m
window height = 2.45 m
window sill = 0 m
window lintel = 2.45m
window frame 9 %
(frame hidden in insulation)

τ_k = 0.91
(triple glazing)

$\tau_{s,nor}$ = 0.779

U = 0.90 W/m².K
(1.50)

R'w = 36 dB
(>30 all envelope)

Daylight and sunlight

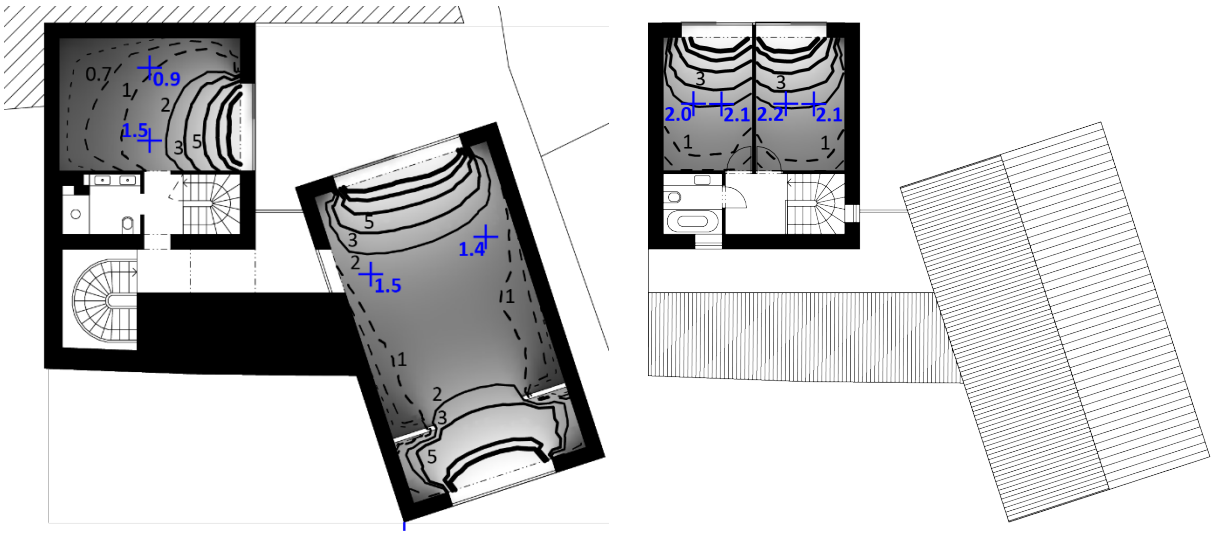


Figure 4.36 Family House Jinonice - daylight factor [%] levels on 2nd (left) and 3rd (right) floor (1:250) (source: author)

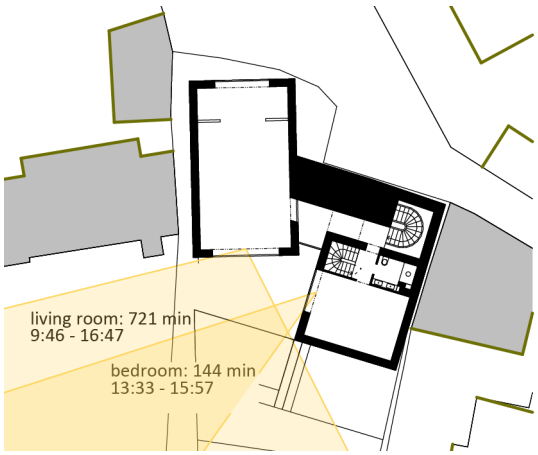


Figure 4.37 Family House Jinonice - sunlight duration on 1.3. in 2nd floor rooms (1:500) (source: author)

Thermal and indoor air quality

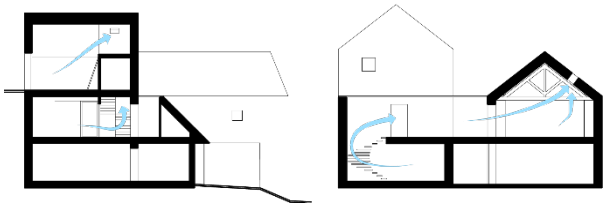


Figure 4.38 Family House Jinonice - ventilation schema in section (1:500) (source: author)

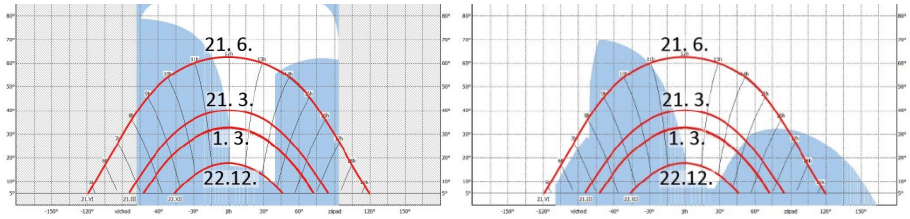


Figure 4.39 Family House in Jinonice - sun paths on glazed corridor wall (left) and roof (right) (source: author)

Acoustics

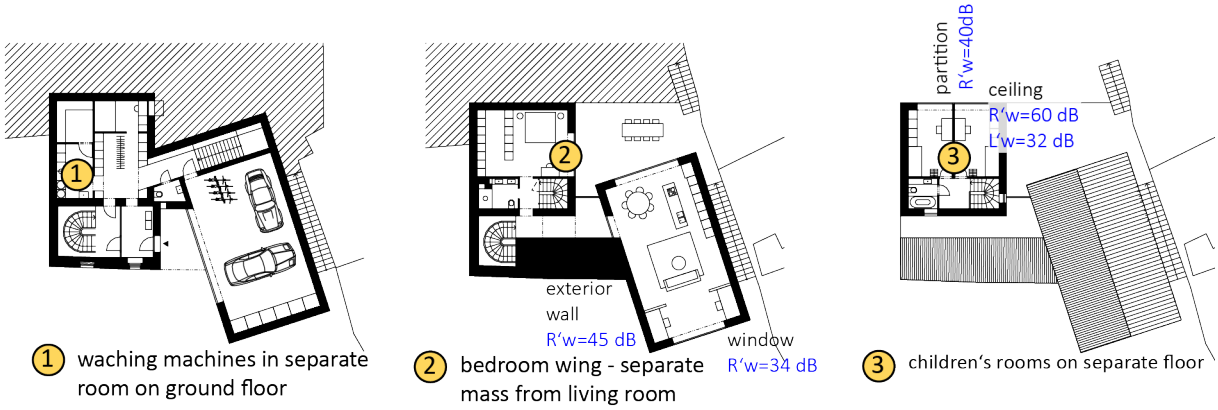


Figure 4.40 Family House in Jinonice - acoustics on 1st (left), 2nd (middle) and 3rd (right) floor (1:500) (source: author)

Table 4.28 Family House in Jinonice - framework analysis (interview + IEQ metrics)

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design					
building systems		*no alternative energy sources*		*no heat pumps that might make noise*	
structural construction					
facade envelope	*large street-facing office window - privacy not compromised, roller blinds*	*shading elements (canvas sheets) added on occupants request glazed ceilings in corridor - possible overheating*			*fire safety (in urban context) limiting for window sizes*
spatial layout	*all floors have visual and physical contact with garden*			**privacy in bedrooms: children's bedrooms on separate floor; entire bedroom wing separate from living room (zoning)**	
massing volume	*ground floor doesn't allow sunlight - rooms moved above*	*glazed ceilings shaded by mass*			
site context	*northern slope*				*cramped compact urban context*

Kindergarten Sedlejov

Design year: 2016
Build year: 2018
Place: Sedlejov
Author: ARCHOO s.r.o. | **Jiří Ondráček** (interviewed), Jaroslav Svoboda

Figure 4.41 Kindergarten Sedlejov exterior (source: Jaroslav Svoboda, archiweb.cz)

Figure 4.42 Kindergarten Sedlejov interior (source: Jaroslav Svoboda, archiweb.cz)

Interview excerpts:

"We try to do all houses in the modern way, in the passive standard. There' s actually nothing too complicated about it. Since it's a small village, Sedlejov, we wanted to do a kindergarten, which, since it is being subsidized, will maybe cost a little bit more in the base, that is in the acquisition cost. But it will be as cheap as possible in the operating costs

My aim was to make it so that it was unobtrusive, so that it didn't assert itself too much when viewed from the village, because the village is relatively well preserved.
And on the other hand, I wanted the interior to be different and modern, or rather contemporary.

And by making the building already in that low energy standard, the question of heating and cooling is actually easier for the professionals.

In a passive house, the house starts to work in a commonsense kind of way. The chimney effect of the skylights upstairs works perfectly as ventilation.

The initial sketch was the conceptual design and we added one window in there by calculating the daylight.

From the beginning, we planned for the air conditioning ducts to be an artistic element in the interior. The specialists basically just did the math and confirmed it technically, but the initial sketches already looked like that.

In terms of the design, we only added a window between the playroom and the dressing room, which wasn't in the design, we agreed with the mayor on that during the construction.

There are acoustic ceilings everywhere because the reverberation in this kindergarten would probably be too much without them.

The arches, that was an artistic element from the beginning. The fact that it's actually quite a clever structure, we didn't come to that until the documentation, when even the structural engineer was surprised at how a relatively subtle structure for a relatively large span, and more importantly it's relatively simple to assemble."

Table 4.29 Kindergarten Sedlejov - framework analysis

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design				acoustic cladding	contemporary interior, artistic elements
building systems		heat pump with reverse running for cooling (so far not necessary)	mechanical ventilation as aesthetic element in interior		aim for low operational cost (even at a higher acquisition cost)
structural construction					load bearing arches as artistic element
facade envelope	calculated illumination levels, added a window accordingly	passive standard (insulation) chimney effect cooling (roof windows)	ventilation - chimney effect (roof windows) - sufficient for cooling - didn't need to run reverse cooling yet		
spatial layout	required illumination levels on tables	chimney effect cooling			
massing volume					
site context	only one way to place building - allows for good sunlight access				no many possibilities of situating the house

IEQ aspects most considered by the architects:

- light forming the space, illumination levels on tables
- passive standard, natural cooling (chimney effect)
- mechanical ventilation as an artistic design element, natural ventilation (chimney effect)
- reverberation

Table 4.30 Kindergarten Sedlejov - design process

interior design	contemporary interior	acoustic cladding		
building systems	ventilation ducts as artistic element in interior low operational cost allowed by passive standard	specialists confirmed ventilation dimensioning		reverse cooling almost unnecessary
structural construction	load bearing arches as artistic element	structural engineer confirmed the arches are structurally good, subtle structure for large span	strong reaction from locals when only load bearing arches built	
façade envelope	added a window according to illumination calculation roof windows – chimney effect ventilation passive standard (higher acquisition cost, lower operational cost)		added a window between playroom and dressing room	
spatial layout	calculated illumination levels on tables contemporary interior, hall			chimney effect sufficient for cooling
massing volume	classic village house form with gable roof			classic village house form well accepted by locals
site context	village house unobtrusive in urban context only one way to place building on site			architects wish they have designed the garden as well
	concept design (architectural study)	cooperation with specialist	during building	feedback from use

Table 4.31 Kindergarten Sedlejov - structures and window properties

structures composition and properties (1:50)			windows schema (1:200)
exterior wall -interior plaster 10mm -sand lime blocks 175 mm -EPS 2x150mm -screed+thin-layer plaster 10 mm U = 0.12 W/m²K (<0.30) R'w = 47 dB (>30 all envelope)	roof - ceramic roof tiles - 60/40 mm battens - counter battens 60/40 mm - diffusion-opened foil - PIR thermal insulation boards 2x100 mm - asphalt strip (waterproofing + vapor barrier) - prefabricated system of reinforced concrete beams and aerated concrete inserts 230 mm - glass wool in the ceiling grid 50mm - plasterboard 12.5 mm U = 0.10 W/m²K (<0.24)	floor on terrain - fully glued natural linoleum - self-levelling anhydrite screed 20 mm - floor heating system board - EPS boards 2x100 mm - concrete screed 70 mm - PVC foil (water and radon insulation) - reinforced concrete foundation slab 150 mm - compacted gravel - terrain U =0,18 W/m²K (>0.24)	window height = 2.45 m window sill = 0 m window lintel = 2.45m window frame 17 % τ_k = 0.83 (triple glazing) $\tau_{s,nor}$ = 0.779 U = 0.82 W/m².K (1.50) R'w = 36 dB (>30 all envelope)
partition between playroom and hall -interior plaster 10mm -sand lime blocks 175 mm R'w = 47 dB (>47)			

Daylight and sunlight

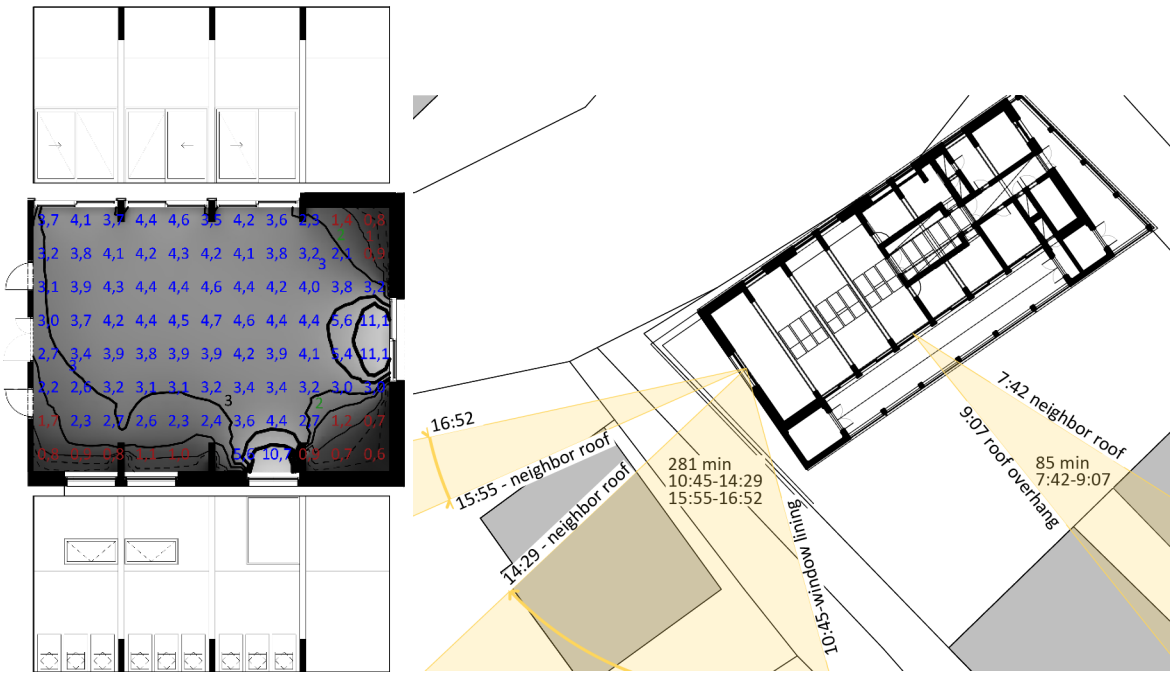
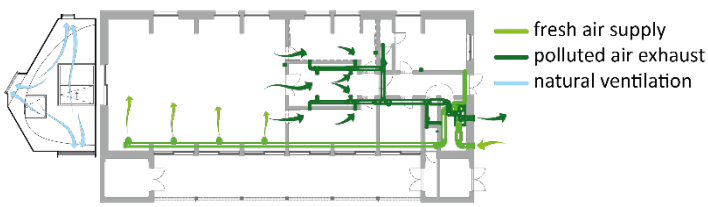


Figure 4.43 (left) Kindergarten Sedlejov daylight factor [%] levels in playroom (1:250) (source: author)

Figure 4.44 (right) Kindergarten Sedlejov - sunlight duration on 1.3. (1:500) (source: author)

Thermal and indoor air quality



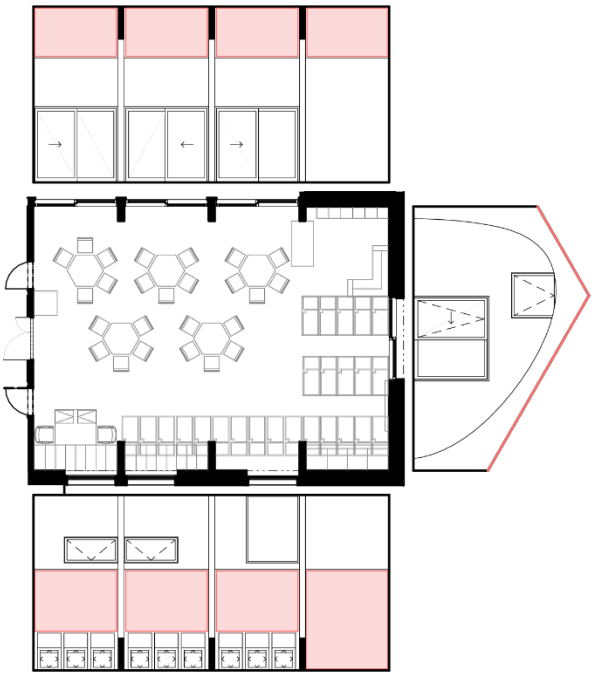
According to the architect, the chimney effect natural ventilation is enough to keep the kindergarten cool in the summer without the need for turning on mechanical cooling.

Figure 4.45 Kindergarten Sedlejov - natural and mechanical ventilation schema (1:500) (source: adapted from project documentation)

Acoustics

Table 4.32 Kindergarten Sedlejov reverberation time in playroom

Frequency [Hz]	125	250	500	1000	2000	4000
calculated reverberation time T[s] (no acoustic treatment)	0.53	1.03	1.30	1.39	1.24	1.10
calculated reverberation time T[s] (acoustic cladding)	0.48	0.55	0.59	0.59	0.62	0.64
optimal reverberation time ratio calculated/optimal T/T_0	0.65 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.65 - 1.2
optimal reverberation time range T_0[s]	0.45-0.83	0.56-0.84	0.56-0.84	0.56-0.84	0.56-0.84	0.45-0.84



The entire playroom ceiling is covered in acoustic perforated plasterboard. In the gap above that, there is 50 mm of glass wool acoustic insulation.
The perforated acoustic panels are only placed on the ceiling, where they are not reachable by the children.

Figure 4.46 Kindergarten Sedlejov acoustic cladding in playroom (1:250) (source: author)

Table 4.33 Kindergarten Sedlejov - framework analysis (interview + IEQ metrics)

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design				*acoustic cladding*	*contemporary interior, artistic elements*
building systems		*heat pump with reverse running for cooling (so far not necessary)*	*mechanical ventilation as aesthetic element in interior*		*aim for low operational cost (even at a higher acquisition cost)*
structural construction				**glass wool acoustic insulation in ceiling**	*load bearing arches as artistic element*
facade envelope	*calculated illumination levels, added a window accordingly*	*passive standard (insulation) chimney effect cooling (roof windows)*	*ventilation - chimney effect (roof windows) - sufficient for cooling - didn't need to run reverse cooling yet*		
spatial layout	*required illumination levels on tables*	*chimney effect cooling*			
massing volume	**southeast facing floor to ceiling windows shaded by roof overhang**	**southeast facing floor to ceiling windows shaded by roof overhang**			
site context	*only one way to place building - allows for good sunlight access*				*no many possibilities of situating the house*

Kindergarten Přístavní Stříbro

Design year: 2016
Build year: 2018
Place: Přístavní, Stříbro
Author: XTOPIX | **Barbora Burýšková** (interviewed), Pavel Buryška

Figure 4.47 Kindergarten Přístavní (source: Ondřej Tylčer, archiweb.cz)

Figure 4.48 Kindergarten Přístavní classroom interior (source: Ondřej Tylčer, archiweb.cz)

Interview excerpts:

"The site itself was very limiting, in the sense that it was small and sloping.
So we didn't have a lot of options as far as how to site the building. We couldn't even play with the form, so the economic and situational conditions here actually resulted in a very basic shape.

The lighting of the glare must already be covered in the study, also with regard to the orientation of the building and the location on the site. In terms of window placement, size, uniformity, etc., it's already terribly important to influence that and anchor it in the study, so there's certainly no delay there.
We then deal with the acoustician at later stage, unless we have a specific requirement, so it usually waits until after the study until the follow-up stage, which in this case was the preparation of the documentation for the joint planning and zoning decision and the building permit. So there was an acoustician involved and the same with actually the heat and ventilation specialist.
These two professions actually follow on after the study. You don't put anything off until later, it's really too late
In terms of acoustics, for example, so that we can already make it clear in the study that we will design reasonable structural heights and clear heights of the interior spaces.
The house was pretty cleverly oriented. Basically, none of the classrooms are oriented or exposed to that critical west side. There's always lighting on two sides. There's kind of that grid on the façade plus there's always that one big window in each classroom.
By orienting the building, we avoided quite significant overheating. The investor specifically did not want heat recovery in this case. We just added screening to the windows to make up for it.
what I think is still a discussion for some people about this house and it relates to the interior environment, but not explicitly the technical one, but more the interior environment, is for example the colour scheme, because we then went for a concept in the interior that each classroom has its own colour, which was to help the children with orientation. The orange classroom, the greenish classroom, the blue classroom, and some people were a little bit worried about that, but once the building was occupied, all of a sudden those colours went very much into the background because there was that clutter and it muted it quite a lot."

Table 4.34 Kindergarten Přístavní Stříbro - framework analysis (interview)

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design	each playroom its own color scheme, but mostly covered by toys				
building systems		no heat recuperation (+cooling), fortunately works without it	the investor explicitly refused mechanical ventilation with heat recuperation		
structural construction					
facade envelope	window placements, sizing, uniformity	cleverly placed windows prevent overheating exterior shading			
spatial layout		no playroom oriented only towards one façade - prevents overheating			room sizes minimal allowed by standards - not possible to add more space
massing volume				room heights impact the reverberation time (spatial acoustic)	
site context	daylight, sunlight considered when placing building on site				limiting site - small, sloped

IEQ aspects most considered by the architects:

- sufficient daylight – as early as possible
- prevent overheating
- natural ventilation
- clear heights to ensure good room acoustics

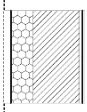
Table 4.35 Kindergarten Přístavní Stříbro - design process (interview)

interior design		acousticians – designed acoustic ceilings in classrooms	the color scheme in classrooms less visible, covered by toys
building systems	investor explicitly refused mechanical ventilation with heat recuperation	ventilation and heating specialists	building doesn't overheat even without mechanical cooling (heat recuperation)
structural construction			
façade envelope	grid of smaller windows and one large window windows oriented to prevent overheating	designed shading of windows	
spatial layout	all classrooms oriented in two cardinal directions to prevent overheating		
massing volume	building mass very compact, limited by site and economical requirements orientation to prevent overheating		
site context	small, limiting site		
	architectural study	building permit documentation cooperation with specialists	user feedback

Table 4.36 Kindergarten Přístavní Stříbro - structures and window properties

structures composition and properties (1:50)

exterior wall

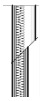


-interior plaster 10mm
-hollow brick 300 mm
-EPS 140 mm
- screed + thin-layer plaster 4.5 mm

U = 0.24 W/m²K (<0.30)

R'w = 50 dB (>30 all envelope)

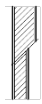
drywall partition



- plasterboards 2x12.5 mm
- acoustic insulation 50 mm
(- installation gap)
- plasterboards 2x12.5 mm

R'w = 50 dB (>47)

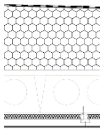
masonry partition



-interior plaster 10mm
-hollow brick 140/80 mm
-interior plaster 10mm

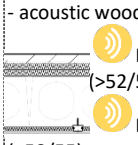
R'w = 42/40 dB (>47)

roof above playroom
- PE foil
- EPS slope wedges 30-150 mm
- EPS thermal insulation 280 mm
- asphalt sheet
- levelling cement screed 30 mm
- ceiling panel 250 mm
- acoustic insulation 30 mm
- acoustic wood wool panel 25 mm



U = 0.09 W/m²K (<0.24)

ceiling between playrooms
- vinyl flooring 4 mm
- anhydrite 46 mm
- flor heating system board 55 mm
- step insulation EPS 40 mm
- self-levelling screed 5 mm
- ceiling panel 320 mm
- acoustic insulation 30 mm
- acoustic wood wool panel 25 mm



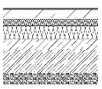
R'w = 58 dB (>52/54)

L'n,w = 52 dB (<58/55)

green roof
- drought-resistant plants
- vegetation layers
- PVC foil
- EPS slope wedges 0-80 mm
- EPS thermal insulation 280 mm
- asphalt sheet
- levelling cement screed 30 mm
- ceiling panel 320 mm
- acoustic insulation 30 mm
- acoustic wood wool panel 25 mm

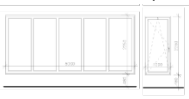
U =0.10 W/m²K (>0.24)

playroom floor on terrain
- vinyl flooring 4 mm
- anhydrite 46 mm
- flor heating system board 55 mm
- thermal insulation EPS 90 mm
- concrete screed 70 mm
- asphalt sheet
- reinforced concrete slab 150 mm
- gravel
- terrain



U = 0.26 W/m²K (>0.60)

windows schema (1:200)



clear height = 3.0 m
window height = 2.25 m
window sill = 0.48 m
window lintel = 2.73 m
window frame 24%; 35%

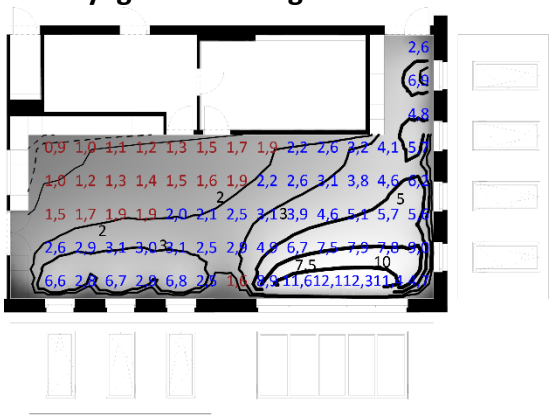
τ_k = 0.76; 0.65 (double glazing)

$\tau_{s,nor}$ = 0.846

U = 1.10 W/m².K (>1.50)

R'w = 34 dB (>38 all envelope)

Daylight and sunlight



All classrooms receive sufficient sunlight provision, as required by the valid legislation.

The daylight factor levels are sufficient in the most of the playroom layout, although the daylight uniformity is slightly lower compared to the other two kindergarten case studies included in this thesis.

Figure 4.49 Kindergarten Přístavní Stříbro - daylight factor [%] levels in playroom (1:250) (source: author)

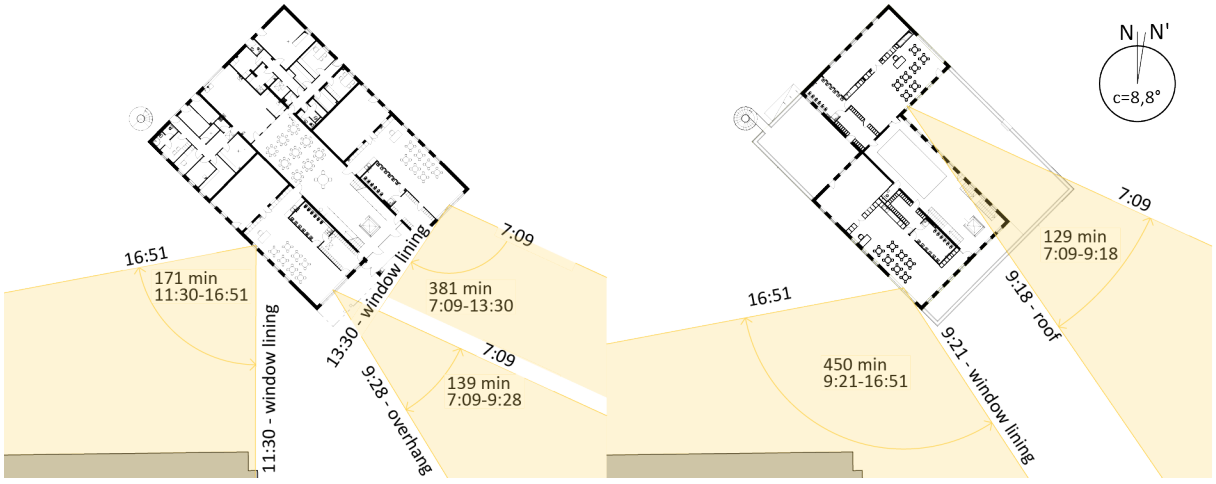
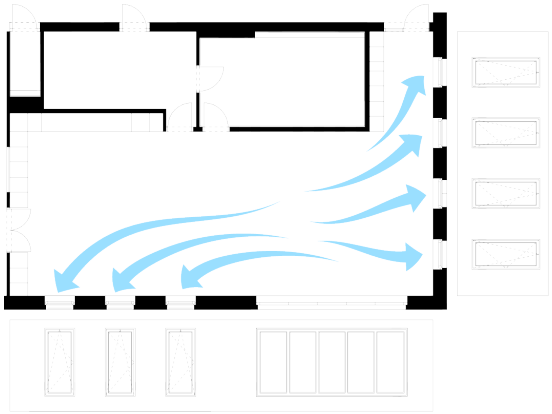


Figure 4.50 Kindergarten Přístavní Stříbro - sunlight duration on 1.3. on 1st (left) and 2nd (right) floor (1:1000) (source:author)

Thermal and indoor air quality



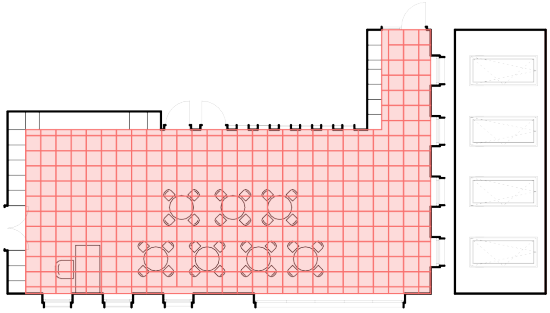
There is no mechanical ventilation in the playrooms. They can be naturally cross-ventilated through the windows on perpendicular facades. According to the architect, this is sufficient to cool the playrooms in the summer. The overheating is also mitigated by exterior shading and the orientation.

Figure 4.51 Kindergarten Přístavní Stříbro - natural ventilation schema in playroom (1:250) (source: author)

Acoustics

Table 4.37 Kindergarten Přístavní Stříbro - reverberation time in playroom

Frequency [Hz]	125	250	500	1000	2000	4000
calculated reverberation time T[s] (no acoustic treatment)	0.89	1.00	0.98	0.97	1.00	0.98
calculated reverberation time T[s] (acoustic cladding)	0.58	0.63	0.66	0.75	0.76	0.79
optimal reverberation time ratio calculated/optimal T/T_0	0.65 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.65 - 1.2
optimal reverberation time range T_0[s]	0.45-0.83	0.56-0.84	0.56-0.84	0.56-0.84	0.56-0.84	0.45-0.84



The spatial acoustics in the playrooms is resolved by ceiling cladding made of acoustic magnesite-bonded wood fiberboard.

Figure 4.52 Kindergarten Přístavní Stříbro - acoustic ceiling in playroom (1:250) (source: author)

Table 4.38 Kindergarten Přístavní Stříbro - framework analysis (interview + IEQ metrics)

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design	*each playroom its own color scheme, but mostly covered by toys*				**magnesite-bonded wood fiberboard ceiling panels**
building systems		*no heat recuperation (+cooling), fortunately works without it*	*the investor explicitly refused mechanical ventilation with heat recuperation*		
structural construction					
facade envelope	*window placements, sizing, uniformity*	*cleverly placed windows prevent overheating exterior shading*	**natural cross-ventilation through windows in perpendicular facades**		
spatial layout	**slightly lower daylight uniformity in classrooms**	*no playroom oriented only towards one façade - prevents overheating*			*room sizes minimal allowed by standards - not possible to add more space*
massing volume				*room heights decide the reverberation (room acoustic)*	
site context	*daylight, sunlight considered when placing building on site*				*limiting site - small, sloped*

Kindergarten Nová Ruda Vratislavice

Design year: 2015 - 2018
Build year: 2017 - 2018
Place: Donská, Vratislavice nad Nisou, Liberec
Author: Petr Stolín, **Alena Mičeková** (interviewed)

Figure 4.53 Kindergarten Nová Ruda (source: Petr Šmídek, archiweb.cz)

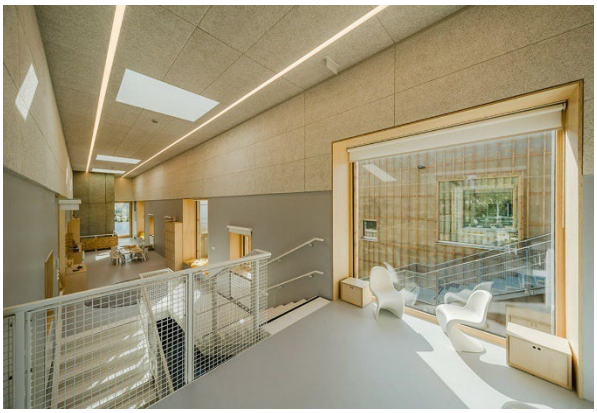


Figure 4.54 Kindergarten Nová Ruda interior (source: Petr Šmídek, era21.cz

Interview excerpts:

"(…)they originally wanted a wooden building. But in the option that the site offered, we would have had to go with a multi-story building. There would be such standard limitations for a public building, especially a kindergarten building, of wood, that we ended up deciding with the mayor that it wasn't quite efficient, so we stuck with the classic brick building.
In terms of the light, or the use of windows basically in this case, it was based on our personal experience from the ZEN houses project that we ourselves inhabit. It' s very much in there in terms of the light and the connection between the exterior and the interior.
We don't really consult with an acoustician, because of course the acoustic measures are often taken out of the project. They are expensive, complicated, but intuitively we always try to get some acoustic material in there so that there is a balance of which materials are reflective and which are not. We've managed to do that in the kindergarten and I think it works nicely there.
For air quality, we went the natural route of designing the windows to open. There's no special air conditioning or heat recovery. That we are able to cross ventilate the house, even by some effect of connecting the upper and lower floor and that's how they use it there.
…we opted for insulated brick which already has that mineral wool in it in sufficient width … a well insulated building that is not demanding on heating.
Now we're going to install some fabric sun screens. We thought the outer shell would filter it out, where we moved the openings a little bit to overlap the outer facade and the inner openings.
But in the end, we went with that solution, so now we have fabric sun screens designed in there that will be built into the interspace of that prefabricated façade. They required that because they're doing movie projections with the kids, so they wanted more shading as well. We did interior blinds on the ground floor. And they use those for the sleeping area.
The children started using it very intuitively from the beginning, the first ones who had a bit of a negative reaction were the adults and the head mistress eventually revealed that I had to specially select a team to embrace the building, which was successful.
They've been very sensitive in using that house, they've understood it and they've let the children in. They have this philosophy of freedom and personal responsibility. And that's how they're raising these kids. First, they teach them how to use the house and then they give them that freedom, it's very nice to watch."

Table 4.39 Kindergarten Nova Ruda Vratislavice - framework analysis

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design				balancing the area of reflective and absorbent materials	railing on stairs - they will probably remove that, children tend to climb it
building systems		no mechanical ventilation with heat recuperation	only mechanical ventilation in the canteen	elevators	
structural construction					
facade envelope	shading elements added later - also light blocking for movie projection	openings in outer layer (polycarbonate) displaced from inner openings (shading) textile shades added later insulation → lower operational costs	natural ventilation through openable windows		
spatial layout			allow cross ventilation including chimney effect		completely accessible (later but only minor changes to the design)
massing volume					
site context					

IEQ aspects most considered by the architects:

- connection between interior/exterior, outer shell partially shading
- well insulated building → lower operational costs
- natural ventilation through openable windows
- balancing the area of absorbent and non-absorbent materials

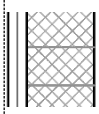
Table 4.40 Kindergarten Nova Ruda Vratislavice - design process

	architectural study	building permit	during building	user feedback
interior design	balancing the area of acoustically reflective and absorbent materials			railing on stairs - they will probably remove that, children tend to climb it
building systems	no mechanical ventilation or heat recovery	mechanical ventilation for cafeteria	added elevators	
structural construction	investor wanted wooden building but too many limitation (esp. fire safety) → opted for brick			
façade envelope	openings in outer shell shifted a little bit to overlap the outer facade and the inner openings (shading) well insulated façade (insulated brick) → lower operational cost openable windows			now adding fabric sun screens in façade interspace (also to shade during movie projections)
spatial layout	possibility to cross ventilate entire building		completely wheelchair accessible – only minor changes	children use intuitively headmistress needed to hand-pick teacher team to embrace the building
massing volume				
site context				

Table 4.41 Kindergarten Nová Ruda Vratislavice structures and window properties

structures composition and properties (1:50)

exterior wall

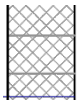


- natural linoleum 3 mm OR acoustic wood fibreboard 15 mm
- interior plaster 5 mm
- brick block with inserted mineral wool 500 mm
- exterior plaster 20 mm
- grid of crossed slats 40 + 60 mm
- flat fiberglass sheets 1 mm

U = 0.15 W/m²K (<0.30)

R'w = 48 dB (>30 all envelope)

partition between playroom and hall

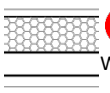


- natural linoleum 3 mm
- interior plaster 5mm
- hollow brick 440 mm
- interior plaster 5 mm
- ceramic tiles + glue 15mm

R'w = 40 dB (>47)

roof

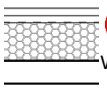
- waterproofing PVC foil 2,5 mm
- sloping wedges EPS 180-280 mm
- vapor barrier asphalt sheets 4mm
- pre-stressed concrete ceiling panels 150 mm
- 2 x grid aluminum profiles 60 mm
- acoustic wood fibreboard 15 mm



U = 0.17 W/m²K (<0.24)

floor on terrain

- natural linoleum/vinyl 3 mm
- levelling screed 2 mm
- poured self-levelling anhydrite screed 48 mm
- floor heating system board 45 mm
- vapor barrier
- EPS 250 mm
- waterproofing asphalt sheets
- pre-stressed concrete ceiling panels 150 mm
- ventilated gap
- terrain



U =0,12 W/m²K (>0.24)

windows schema

window height = 1.1-2.6 m
window sill = 0-0.83 m
window lintel = 1.2-2.95m
window frame 43/16 %

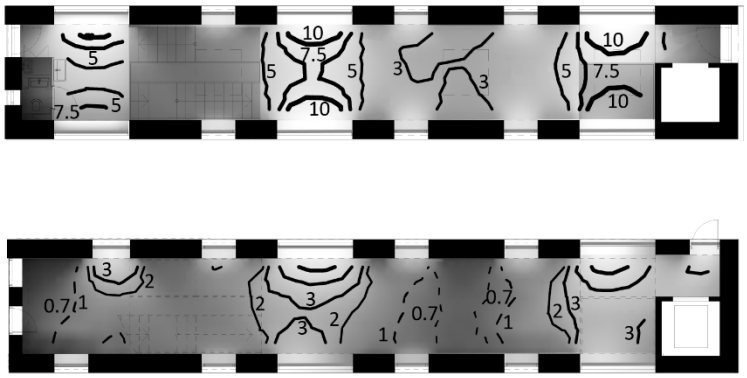
τ_k = 0.57/0.84 (triple glazing)

$\tau_{s,nor}$ = 0.779

U = 0.82 W/m².K (1.50)

R'w = 36 dB (>30 all envelope)

Daylight

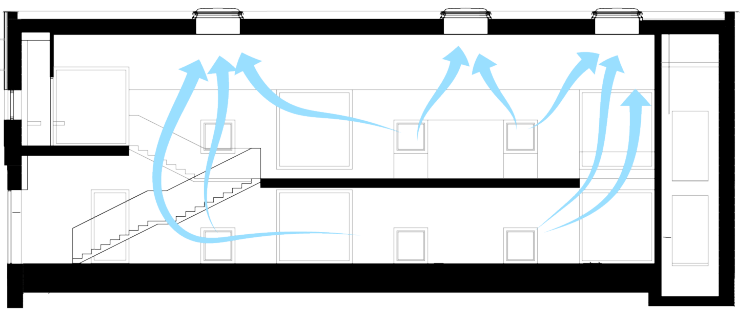


On the 1st floor, where the bedroom is located, the daylight levels are quite low, which is also caused by the low clear height (only 2.5 m).

In the playroom on 2nd floor, the daylight levels are significantly higher.

Figure 4.55 Kindergarten Nová Ruda Vratislavice - daylight factor [%] levels on 1st (bottom) and 2nd (top) floor (1:250) (source: author)

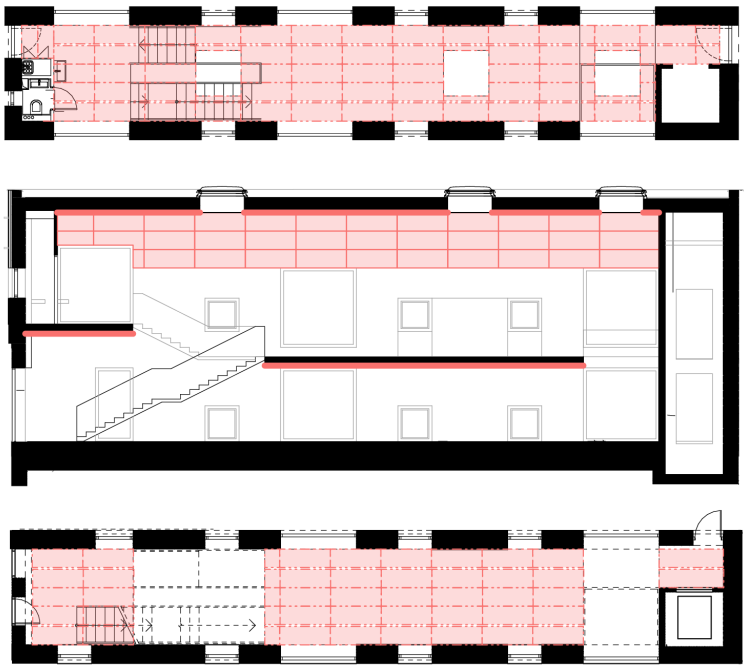
Thermal and indoor air quality



There is no mechanical ventilation in the playrooms. However, the chimney effect natural ventilation is sufficient to cool the rooms in the summer.

Figure 4.56 Kindergarten Nová Ruda Vratislavice - chimney effect ventilation (1:250) (source: author)

Acoustics



Spatial acoustics in classroom is ensured by acoustic cladding made of magnesite-bonded wood fiberboard, which meet the fire-safety requirements.

The acoustic panels are only placed on ceilings or in the height above 2.95 m to not be reachable by the children.

Figure 4.57 Kindergarten Nová Ruda Vratislavice - acoustic cladding schema (1:250) (source: author)

Table 4.42 Kindergarten Nová Ruda Vratislavice - framework analysis (interview + IEQ metrics)

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design				*balancing the area of reflective and absorbent materials* **magnesite-connected wood fiberboard cladding on ceiling and top parts of the walls**	*railing on stairs - they will probably remove that, children tend to climb it*
building systems		*no mechanical ventilation with heat recuperation*	*only mechanical ventilation in the canteen*	*elevators*	
structural construction					
facade envelope	*shading elements added later - also light blocking for movie projection*	*openings in outer layer (polycarbonate) displaced from inner openings (shading) textile shades added later insulation → lower operational costs*	*natural ventilation through openable windows*		
spatial layout	**daylight levels low in 1st floor bedrooms and higher in 2nd floor playrooms**		*allow cross ventilation including chimney effect*		*completely accessible (later but only minor changes)*
massing volume					
site context					

Jara Cimrman Elementary School Lysolaje

Design year: 2015
Build year: 2017 - 2016
Place: Žákovská 164, Lysolaje, Prague
Author: Progres atelier | Vojtěch Kaas, **Jan Kalivoda** (interviewed)

Figure 4.58 Jary Cimrman Elementary School (source: Alex Shoots Buildings, archiweb.cz)

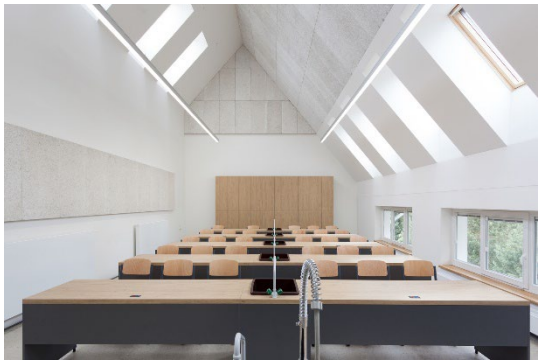


Figure 4.59 Jary Cimrman Elementary School new classroom (source: Alex Shoots Buildings, archiweb.cz)

Interview summary and excerpts:

"School is a place where you actually spend a lot of time, it should be ergonomic and it should work well in that you can concentrate on what you have to do there. Acoustics, lighting and fresh air are related to that. So we tried to put more emphasis on the indoor environment than we needed to.
In the beginning, you are working with the facade and also modeling the mass to reach daylight in some places that you wouldn't otherwise reach. We adapted the layout to let in the overhead north light. A lot of the extension is in the attic, so we wanted the windows to be able to stay uncovered and have access to diffuse daylight even when the sun was shining yet not overheat the space.
The classrooms in the previous extension were overheating. From the feedback we got, those spaces of ours, even though there's no cooling designed in, work well in the summer.
We ideally wanted natural ventilation, because there's obviously a lot less things that can go wrong. We have electrically openable windows at the top of the ridge, but only thanks to that there is a natural air flow and the classrooms can be ventilated.
The physics and chemistry classroom has acoustics calculated to the parameters of a lecture hall, (…) we wanted the teachers to be able to speak well there so that they would not get tired in 10 minutes and could lecture for the entire lesson. And if there's going to be an experiment and there's going to be noise and more kids talking, so that they can understand each other.
We knew we needed an area where we're going to use some acoustic material, but it can be treated in different ways, so it's designed along with the interior space. When it was not sufficient, we added acoustic "noticeboards" at the height level of a talking person, where it has the most effect.
There is also a flight path, and protected indoor environment of classrooms, so the windows and the envelope had to be assessed for airborne noise protection.
We were building one part above the gym where there is no support, so we had to develop a system of steel frames that sit up against the perimeter walls. That completely freed up the layout, the interior space and the daylighting, with the openings and so on.
During the construction, the gym was not well covered and got flooded so the gymnasium underneath got flooded, the ceilings were soaked through, the parquet floors were under water. The insurance company paid it as a claim, so we got to refurbish the gym interior, that was not originally planned, with acoustic tiles, lighting, an acoustic ceiling and wood paneling on the walls. I think the gym is the sore heel of a lot of schools where the acoustics are not addressed in any way."

Table 4.43 Jara Cimrman Elementary School - framework analysis

	Light	Thermal	Indoor air quality	Acoustics
interior design		honed concrete floors with carpets where kids sit on the floor (daycare)		acoustically absorbent surfaces later added acoustic "noticeboards" on speaking persons height level
building systems		no mechanical cooling in classrooms	prefer natural ventilation over mechanical	
structural construction	steel frames above gym – free layout, daylight access			gym – floors and ceiling dilatated to prevent vibrations transmission
facade envelope	where possible - northern windows - can be uncovered even in summer	southern windows need to be covered in summer shades - aluminum blinds	openable windows by the roof ridge - chimney effect ventilation	windows and envelope assessed for noise protection
spatial layout	classrooms toward north			chemistry and physics classrooms lecture hall parameters
massing volume	mass modeled to reach (northern) light			
site context	the older classrooms oriented to garden - no problem	some of the earlier built classrooms overheat		flight path - noise source

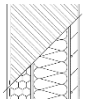
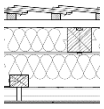
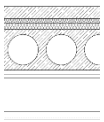
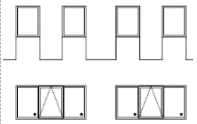
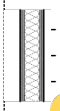
IEQ aspects most considered by the architects:

- northern daylight – diffuse, openings can remain un chimney shaded in summer, minimize need for artificial lighting
- prevent overheating (also because new classrooms are in the attic)
- natural ventilation, no need for mechanical systems (effect)
- emphasis on room acoustics in classrooms (lecture hall parameters)
  flight path – windows and envelope

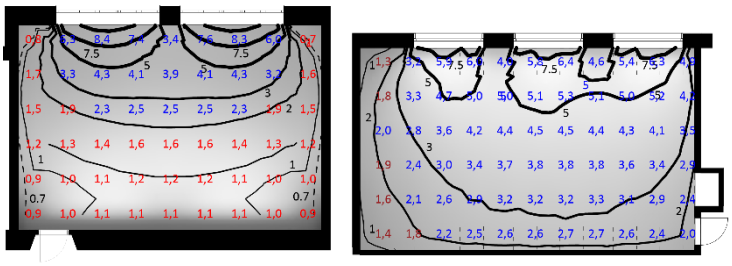
Table 4.44 Jara Cimrman Elementary School - design process (interview)

interior design		specify areas for acoustically absorbent materials	added acoustic "noticeboards" in speaking height	additional gym project – acoustic cladding
building systems			electric opening windows by roof ridge → chimney effect ventilation	
structural construction			steel frames above gym – free layout, daylight access	additional gym project – acoustic separation
façade envelope		windows (skylight) – facing north		
spatial layout		classrooms towards north		
massing volume		mass modeled to reach northern light		
site context	don't build into garden original building: classrooms facing garden, only corridors shaded by new building			
	site analysis	architectural study	building permit	during building

Table 4.45 Jara Cimrman Elementary School Lysolaje - structures and window characteristics

structures composition and properties (1:50)			windows schema (1:250)
exterior wall (filling)  -interior plaster 10 mm - hollow bricks 440 mm - exterior plaster 25 mm load bearing part:-EPS 2x150mm -screed+thin-layer plaster 10 mm U = 0.25 W/m²K (<0.30) R'w = 47 dB (>30 all envelope)	roof above classroom - ceramic roof tiles - 60/40 mm battens - counter battens 40/40 mm - diffusion-opened foil - mineral wool between rafters 160 mm - mineral wool between steel beams 240 mm - vapor barrier - grid (air gap) 80 mm - plasterboard ceiling 15 mm  U = 0.15 W/m²K (<0.24)	ceiling between new classroom and gym - self-levelling cement screed 80 mm - step insulation EPS 30 mm - thermal insulation PPS 40 mm - prefabricated reinforced concrete panel 265 mm - air gap - gym ceiling with acoustic cladding  R'w = 59 dB (>52/53) L'n,w = 35 dB (<58/55)	 roof windows: window height = 2.13 m window sill = 3.1/5.8 m window lintel = 4.1/6.8 m window frame 30% vertical windows: window height = 1.1 m window sill = 0.4 m window lintel = 1.5 m window frame 33% τ_k = 0.70; 0.67 (triple glazing) $\tau_{s,nor}$ = 0.779 U = 1.10 W/m².K (1.50) R'w = 34 dB (>30 all envelope)
partition between classroom and hall  - plasterboards 2x12.5mm - acoustic insulation 100 mm - plasterboards 2x12.5 mm R'w = 53 dB (>47)			

Daylight



The daylight factor levels in the original side-lit classrooms are only sufficient in the half closer to the windows, while in the newly designed classroom lit by vertical windows as well as skylights on both sides, the lighting is much more uniform.

Figure 4.60 Jára Cimrman Elementary School Lysolaje - daylight factor [%] levels in old (left) and new (right) classroom (1:250) (source:author)

Thermal and indoor air quality

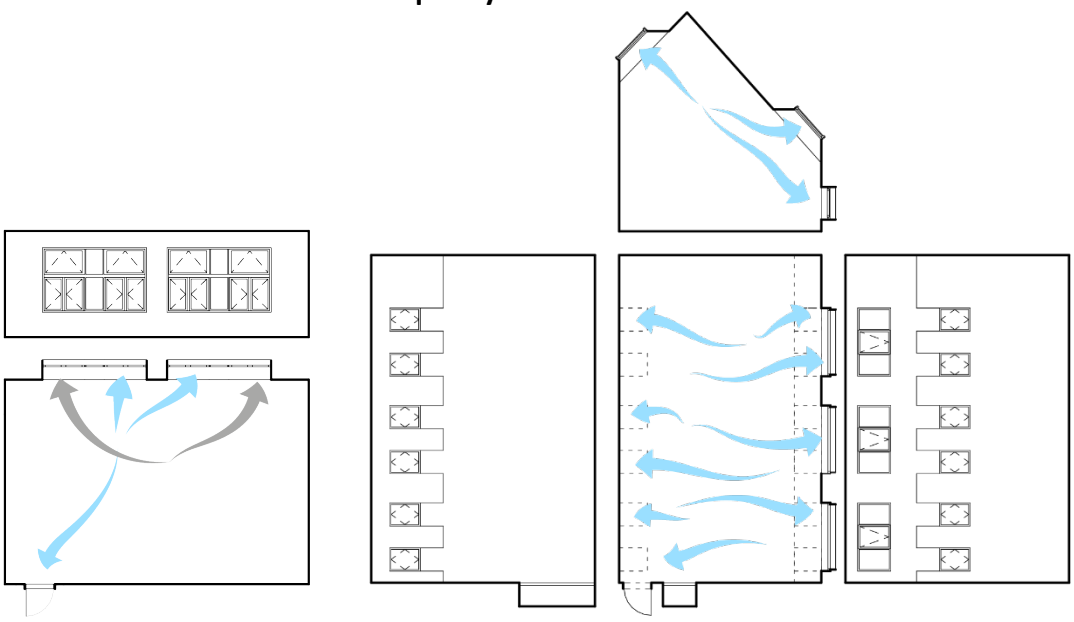


Figure 4.61 Jára Cimrman Elementary School Lysolaje - natural ventilation in old (left) and new (right) classroom (1:250) (source:author)

The chimney effect cross-ventilation in the new classroom is sufficient to prevent overheating.

Acoustics

Table 4.46 Jara Cimrman Elementary School Lysolaje - classroom reverberation time (old and new classroom)

Frequency [Hz]	125	250	500	1000	2000	4000
calculated reverberation time T[s] (old classroom)	1.43	1.50	1.43	1.34	1.31	1.21
calculated reverberation time T[s] (new classroom, no treatment)	0.58	0.88	1.15	1.25	1.01	1.07
calculated reverberation time T[s] (new classroom, acoustic cladding)	0.56	0.51	0.56	0.59	0.54	0.56
optimal reverberation time ratio calculated/optimal T/T_0	0.65 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.65 - 1.2
optimal reverberation time range T_0[s]	0.45-0.83	0.56-0.84	0.56-0.84	0.56-0.84	0.56-0.84	0.45-0.84

The architects placed emphasis on the spatial acoustics in the newly designed classroom. Besides acoustic glass wool cladding of the sloped ceiling and upper part of the wall, they designed also “noticeboards” of the same material in the height of the speaking person.

Figure 4.62 Jára Cimrman Elementary School Lysolaje - acoustic cladding in new classroom (1:250) (source:author)

Table 4.47 Jara Cimrman Elementary School Lysolaje - framework analysis (interview + IEQ metrics)

	Light	Thermal	Indoor air quality	Acoustics
interior design				*acoustically absorbent surfaces* *later added acoustic "noticeboards" on speaking persons height level*
building systems		*no mechanical cooling in classrooms*	*prefer natural ventilation over mechanical*	
structural construction	*steel frames above gym – free layout, daylight access*			*gym – floors and ceiling dilatated to prevent vibrations transmission*
facade envelope	*where possible - northern windows - can be uncovered even in summer*	*southern windows need to be covered in summer* *shades - aluminum blinds*	*openable windows by the roof ridge - chimney effect ventilation*	*windows and envelope assessed for noise protection*
spatial layout	*classrooms toward north* **daylight levels in old classrooms much lower and less uniform than in the newly designed one**			*chemistry and physics classrooms lecture hall parameters*
massing volume	*mass modeled to reach (northern) light*			
site context	*the older classrooms oriented to garden - no problem*	*some of the earlier built classrooms overheat*		*flight path - noise source*

New Elementary School Pavilion Líbeznice

Design year: 2014
Build year: 2015
Place: Měšická, Líbeznice
Author: Projektil architekti | **Adam Halíř** (interviewed), Ondřej Hofmeister, Marek Sankot, Bohdana Linhartová, Adam Hašpica

Figure 4.63 New pavilion of elementary school Líbeznice (source: Andrea Thiel Lhotáková; archiweb.cz)

Figure 4.64 New pavilion of elementary school Líbeznice – classroom interior (source: Andrea Thiel Lhotáková; archiweb.cz)

Interview excerpts:

"(the original project) was to be built as a kindergarten pavilion within the elementary school campus. (then the municipality were) a situation where now the kids have grown up and they've gone from the kindergarten age to the elementary school age and they needed to convert it to a school.
There was already a spatial planning decision, so we redesigned the existing house from kindergarten to elementary school, keeping the original outside perimeter and cornice height, so that the municipality could meet the deadline of getting the school up and running and getting the subsidy.
The kindergarten was intended to be a completely prefabricated structure. When we redesigned for elementary school, there was a threefold increase in the number of children to the existing volume that we had defined. (…) a prefabricated structure was not suitable with the internal heat gain loads, so we went for a massive structure, which we fitted with activation of the concrete core.
it was a very close collaboration between everybody, the structural engineers, the cooling and general technology of the indoor environment specialists and us architects who fulfilled the spatial requirements.
(…) we had to verify that we would meet the daylighting requirements, which are quite harsh for classrooms. I think that was the very first thing we addressed before we gave the Mayor the information that yes, we can redesign it. (…) Because daylighting a classroom from the ceiling, let's face it, is not the easiest way to do that.
The shape of the classrooms in the circular floor plan is quite specific, so we needed to find out again with the acousticians how we are able, especially considering that we will be cooling and heating through the ceiling, to meet the requirements of reverberation, spatial acoustics. Both in the classrooms and in the corridors. The corridor, the foyer, is circular, on one side there are air conditioning units stacked in these niches, which are covered with acoustic cladding, and there's a full glass wall opposite.
When a building has some fairly sophisticated technology in it, it's impossible to have a janitor who's not trained to use that kind of technology doing the maintenance, you need basically a college educated person so that the indoor environment matches the way the house is equipped."

Table 4.48 New Pavilion of Elementary School Libeznice - framework analysis

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design				*spatial acoustics: ceiling used for heating/cooling → hanging acoustic objects*	
building systems		*heating and cooling through ceiling*	*from the beginning planned to ventilate mechanically*	*air conditioning units in corridor, covered by acoustic cladding ceiling used for heating/cooling*	*sophisticated building systems need qualified maintenance workers*
structural construction		*inside heat gains too high for prefabricated structure → massive concrete for activated thermal mass (ceiling)*			
facade envelope	*daylight - skylights plus windows in the back of classroom - needed a study*			*glazed corridor wall - acoustically reflective*	
spatial layout	*unusual layout - window in wall behind students*	*elementary school larger inside heat gains (more children) - higher cooling demand*		*circular floorplan - unusual, reverberation difficulties*	*original project was kindergarten, later changed to elementary school*
massing volume					*mass (footprint and height) stayed the same from kindergarten project*
site context					*originally kindergarten pavilion on elementary school campus*

IEQ aspects most considered by the architects:

- daylight in classrooms (strict requirements hard to meet with skylights)
- cooling – large inside heat gains due to number of students
- mechanical ventilation
- spatial acoustics – unusual classroom shape, round corridors with glass wall

Table 4.49 New Pavilion of Elementary School Libeznice - design process

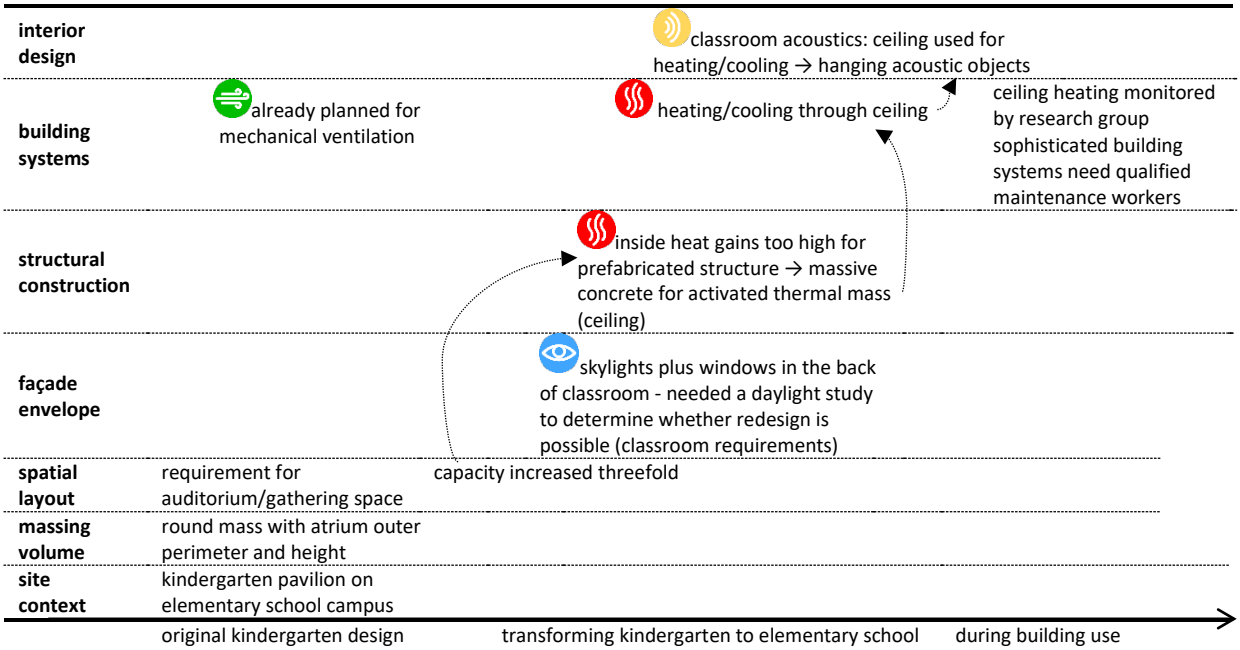
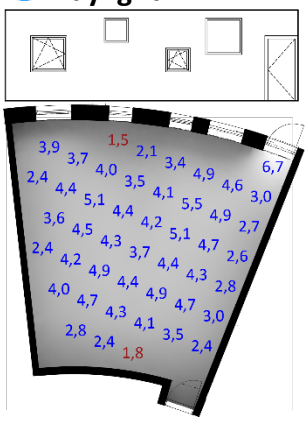


Table 4.50 New Elementary School Pavilion Líbeznice - structures and window properties

structures composition and properties (1:50)			windows schema (1:250)
exterior wall (concrete) -interior plaster 10 mm - reinforced concrete 200 mm - EPS 180 mm - diffusely open plaster - ventilated air gap 40 mm - larch plank cladding 20 mm U = 0.15 W/m²K (<0.30) R'w = 44 dB (>30 all envelope)	roof above classroom - drought tolerant plants - substrate + draining 195 mm - asphalt sheets (waterproofing) 9 mm - EPS 240 mm - asphalt sheet (vapor barrier) 4 mm - cement poured foam 60 mm - reinforce concrete slab 250 mm U = 0.14 W/m²K (<0.24)	floor on terrain - linoleum flooring - cement poured screed 60 mm - step insulation EPS 30 mm - reinforced concrete slab 300 mm - concrete screed 80 mm - gravel 180-325 mm - terrain U = 0.25 W/m²K (<0.85)	openable windows: window height = 1.2/0.8 m window sill = 0.95 m window lintel = 2.15/1.75 m window frame 31/44% fixed windows: window height = 1.2/0.8 m window sill = 1.53/1.73 m window lintel = 2.73 m window frame 21/30% τ_k = 0.56-0.79 (triple glazing) $\tau_{s,nor}$ = 0.779 U = 1.20 W/m².K (1.50) R'w = 35 dB (>30 all envelope)
partition between classroom and hall - interior blaster 10 mm - hollow bricks 190 mm - interior plaster 10 mm R'w = 52 dB (>47)			
exterior wall (masonry) - interior plaster 10 mm - insulated bricks 380mm - EPS 180 mm - plaster 20 mm - ventilated air gap 40 mm - larch plank cladding 20 mm U = 0.15 W/m²K (<0.30) R'w = 44 dB (>30 all envelope)			

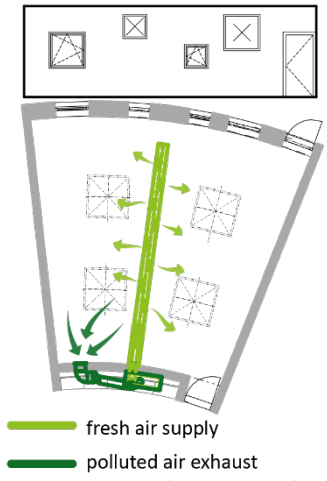
Daylight



The daylight factor levels in the classrooms are sufficient and uniform, which was one of he first thing the architects (in consultation with specialist, Lenka Prokopová, who conducted a daylight study) needed to verify before deciding whether the original kindergarten design could be converted into an elementary school.

Figure 4.65 New Elementary School Pavilion Líbeznice daylight factor [%] levels in classroom (1:250) (source: author)

Thermal and indoor air quality



Ventilation in classrooms is mechanical. Each of the eight classrooms has it's own air conditioning unit, located in the corridor above the lockers. The air handling units are covered with acoustic panels to improve acoustics in the corridors.

The clean air intake is located above the roof, which does not overheat due to the grass covering (Zmrhal, 2017, pp. 123-124).

Figure 4.66 New Elementary School Pavilion Líbeznice mechanical ventilation schema (1:250) (source: adapted from documentation)

Acoustics

Table 4.51 New Elementary School Pavilion Líbeznice - reverberation time in classroom

Frequency [Hz]	125	250	500	1000	2000	4000
calculated reverberation time T[s] (no acoustic treatment)	1,08	1,08	1,18	1,30	1,20	1,30
calculated reverberation time T[s] (the designed acoustic elements)*	0,73	0,76	0,75	0,67	0,66	0,58
calculated reverberation time T[s] (the realized acoustic elements)	1,02	0,98	1,06	1,10	0,98	1,14
optimal reverberation time ratio calculated/optimal T/T_0	0.65 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.8 - 1.2	0.65 - 1.2
optimal reverberation time range T_0[s]	0.45-0.83	0.56-0.84	0.56-0.84	0.56-0.84	0.56-0.84	0.45-0.84

*acoustic elements designed in the acoustic study by Ing. Stanislav Bříza in June 2014 - part of the project documentation

The spatial acoustics in classrooms is resolved by hanging acoustic objects made of glass wool with textile covering. It was not possible to use acoustic ceiling cladding, since the ceiling is also used as a thermal mass for cooling. originally, the specialist (Stanislav Bříza) originally designed acoustic panels corresponding to 35% of the floor area, but the realized panels only correspond to 14 %, also due to collision with the mechanical ventilation air duct (see Figure 4.66)

Figure 4.67 New Elementary School Pavilion Líbeznice - hanging acoustic objects as designed (left) and as realized (right) (1:250) (source: author)

Table 4.52 New Elementary School Pavilion Líbeznice - framework analysis (interview + IEQ metrics)

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design			**mechanical ventilation air ducts on ceiling limited the area available for acoustic panels**	*spatial acoustics: ceiling used for heating/cooling → hanging acoustic objects* **only part of the designed acoustic panels realized**	
building systems		*heating and cooling through ceiling*	*from the beginning planned to ventilate mechanically*	*air conditioning units in corridor, covered by acoustic cladding ceiling used for heating/cooling*	*sophisticated building systems need qualified maintenance workers*
structural construction		*inside heat gains too high for prefabricated structure → massive concrete for activated thermal mass (ceiling)*			
facade envelope	*daylight - skylights plus windows in the back of classroom - needed a study* **sufficient, uniform lighting in classrooms**			*glazed corridor wall - acoustically reflective*	
spatial layout	*unusual layout - window in wall behind students*	*elementary school larger inside heat gains (more children) - higher cooling demand*		*circular floorplan - unusual, reverberation difficulties*	*original project was kindergarten, later changed to elementary school*
massing volume					*mass (footprint and height) stayed the same from kindergarten project*
site context					*originally kindergarten pavilion on elementary school campus*

Elementary School Amos Psáry

Design year: 2014 - 2017
Build year: 2019
Place: Pražská, Dolní Jirčany, Psáry
Author: SOA architekti, s.r.o. | **Ondřej Píhrt** (interviewed), Štefan Šulek, Ondřej Laciga

Figure 4.68 Elementary School Amos Psáry (source: Boys Play Nice, archiweb.cz)

Figure 4.69 Elementary School Amos Psáry classroom (source: Boys Play Nice, archiweb.cz)

Interview excerpts and summary:

"The project is really specific, in that the state environmental fund picked it up as a pilot project for a subsidy calls for public buildings in the passive standard. The project was then already a finished documentation for the building permit. But it turned out the house only needed very little to get to the passive standard. So we modified the project, and we made it a passive building, and actually the only major modification was that we increased the thermal insulation of the building by 4cm, so that there was not 20cm of wool, but 24cm. Of course, some window parameters were specified to match the passive standard, but actually the biggest technological intervention was the addition of mechanical ventilation of all the spaces, which we previously only designed as supplementary.
We wanted the school to have some kind of a heart where everyone would naturally meet and then disperse into those individual clusters, into which the classrooms are arranged.
We have already projected daylighting into the competition design, as it directly affects the layout of the school, the depth of the classroom etc. Of course, we also thought about the orientation of the classrooms in terms of overheating, but these are all parameters that are good to keep in mind, but it is not always possible to meet everything 100%. The orientation of the classrooms is certainly important, but if you don't have all the classrooms facing north, which is hard to do all the time, or not even all facing north and south, then you have to use the west east somewhere, but you can solve it with some external shading, which is not so technologically complicated.
We thought it was important to have the possibility of natural ventilation possibility, even though it was probably clear to us that we were going to be moving some air in there. We focused on making sure the windows had opening parts. And where it's not necessary, because we wanted large windows, we made them fully glazed. Only natural ventilation is not quite optimal, because you can't ensure the teachers will open the windows the way they're supposed to. the right discipline, usually the teacher, to ventilate the way it's supposed to. That's why even before passivity we had forced ventilation built in.
All the air handling equipment, including the heat pumps, are on the roof of the building and there are noise barriers around them, which we had to incorporate, of course, so that they don't interfere with the appearance of the building. The windows, which had very good thermal properties required by the passive standard, also work quite well in terms of acoustic attenuation."

Table 4.53 Elementary School Amos Psáry - framework analysis

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design	visual purity				
building systems	light guides for deeper classrooms		mechanical ventilation originally intended as supplementary (only natural requires discipline from teachers - impossible to ensure), but necessary for passive standard	heat pumps and ventilation units in roof - noise sources	
structural construction					
facade envelope	large windows, fixed glazing where no need for opening light guides for deep classrooms	increasing insulation from 20 to 24 cm to reach passive standard window parameters	openable windows to allow natural ventilation	window parameters for passive standard sufficient acoustically	
spatial layout	classroom depth determined by daylight requirements deeper classrooms harder to daylight	orienting classrooms north or south to prevent overheating - not always possible			central space and "clusters" of classrooms (not liked by teachers who lack common staff room)
massing volume				noise barriers on roof	central space and "clusters" of classrooms
site context					site morphology - gentle slope

IEQ aspects most considered by the architects:

natural daylighting in classrooms and corridors, visual purity of interior

prevent overheating, passive building standard (later in project)

possibility of natural ventilation, supplementary mechanical ventilation

technologies on roof as noise source for surroundings

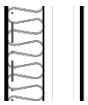
Table 4.54 Elementary School Amos Psáry - design process

interior design				
building systems	supplementary mechanical ventilation	light guides for deeper classrooms (required by hygienic station)	mechanical ventilation for all spaces ventilation units on roof – noise source for surroundings	heat pumps have lower efficiency than specified by manufacturer
structural construction				
façade envelope	windows – openable parts large glazed surfaces exterior shading of west and east windows		increase insulation thickness window parameters for passive standard – fulfill also acoustic requirements	
spatial layout	classroom depth → daylight classrooms toward north or south if possible			teachers lack common staff rooms
massing volume	central space and "clusters" of classrooms		integrate noise barriers on roof (ventilation units)	
site context	gently sloped site			
	competition proposal	building permit	adapting for passive standard	feedback from users

Table 4.55 Elementary School Amos Psáry structures and window properties

structures composition and properties (1:50)

exterior wall

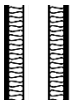


- interior plaster 10mm
- reinforced concrete 300 mm
- EPS 240 mm
- exterior plaster 10 mm

U = 0.18 W/m²K (<0.30)

R'w = 47 dB (>30 all envelope)

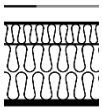
partition between classrooms



- plasterboard 2x12.5 mm
- acoustic insulation 100 mm
- air gap 130 mm
- acoustic insulation 100 mm
- plasterboard 2x12.5 mm

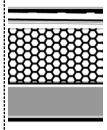
R'w = 52 dB (>47)

roof
- metal sheet roofing
- diffusely open foil 8 mm
- sheeting wooden planks 24 mm
- ventilated air gap 60 mm
- mineral wool 120 mm
- mineral wool 300 mm



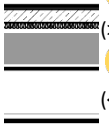
U = 0.13 W/m²K (<0.24)

terrace roof
- fully glued natural linoleum
- self-levelling anhydrite screed 20 mm
- floor heating system board
- EPS boards 2x100 mm
- concrete screed 70 mm
- PVC foil (water and radon insulation)
- reinforced concrete foundation slab 150 mm
- compacted gravel
- terrain



U =0,13 W/m²K (>0.24)

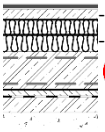
ceiling between classrooms
- acoustic linoleum 3.8 mm
- anhydrite 65 mm
- flor heating system board 50 mm
- step insulation EPS 30 mm
- reinforced concrete slab 240 mm
- installation air gap
- ceiling panels



R'w = 58 dB (>52/54)

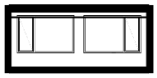
L'n,w = 52 dB (<58/55)

floor on terrain
- acoustic linoleum 3.8 mm
- self-levelling anhydrite screed 65 mm
- floor heating system board 50 mm
- thermal insulation EPS 180 mm
- reinforced concrete slab 250 mm
- protective concrete layer 48.5 mm
- waterproofing PVC 1.5 mm
- base concrete 100 mm
- sand gravel 200 mm
- terrain



U = 0.18 W/m²K (>0.45)

windows schema (1:200)



clear height = 3.0 m
window height = 2.27 m
window sill = 0.85 m
window lintel = 3.12 m
window frame 17 %

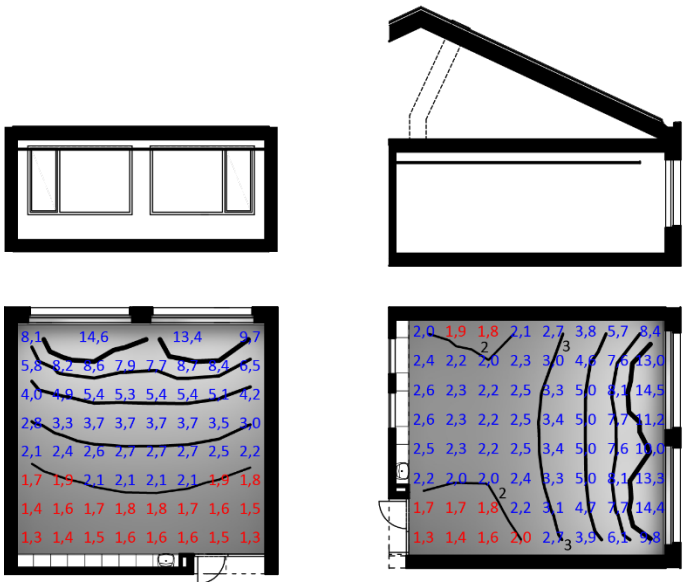
τ_k = 0.83 (triple glazing)

$\tau_{s,nor}$ = 0.779

U = 0.7 W/m².K (1.50)

R'w = 36 dB (>30 all envelope)

Daylight

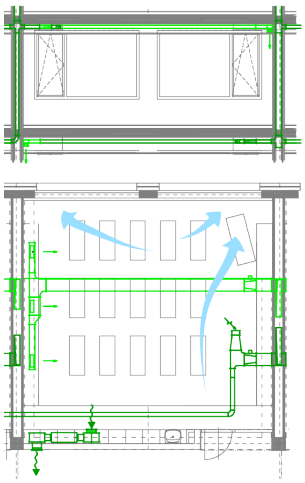


The back parts of the classrooms have lower daylight factor levels than required. The architects however wanted deeper classrooms to allow more flexibility in furniture layout and modern teaching methods, and they settled with the hygienic station that the back parts would be considered a service area.

In the primary school's classrooms on the 3rd floor, the play area in the back part is daylit by light guides.

Figure 4.70 Elementary School Amos Psáry - daylight factor [%] levels in 2nd floor middle school classroom (left) and 3rd floor primary school classroom with light guides (right) (1:250) (source: author)

Thermal and indoor air quality



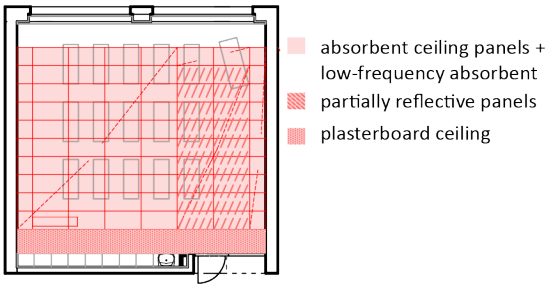
The architects planned on mechanical ventilation from the first concept, although originally it was only conceived as supplementary to natural ventilation.

When the design was converted into passive standard to receive further subsidies, the mechanical ventilation was enhanced and includes heat recuperation. The air ducts are installed in the air gaps in the partitions between classrooms and covered by acoustic insulation from both sides.

The air handling units are placed in the attic.

Figure 4.71 Elementary School Amos Psáry - ventilation in classroom schema (1:250) (adapted from project documentation, original drawing by Jakub Rybář)

Acoustics



The spatial acoustic in classrooms is solved by several types of acoustic ceiling cladding: above the pupils, there are acoustically absorbent mineral wool ceiling panels with low frequency mineral wool absorbent laid in the ceiling gap.
Above the teacher, the ceiling panels are partially acoustically reflective.

Figure 4.72 Elementary Schools Psáry - acoustic ceiling in classroom (1:250) (source: adapted from project documentation, original drawing by David Valenta)

Table 4.56 Elementary School Amos Psáry - framework analysis (interview + IEQ metrics)

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design	*visual purity*			**ceiling panels in classrooms – absorbent above pupils, partially reflective above teacher**	
building systems	*light guides for deeper classrooms*		*mechanical ventilation originally intended as supplementary (only natural requires discipline from teachers - impossible to ensure), but necessary for passive standard*	*heat pumps and ventilation units in roof - noise sources*	
structural construction				**ventilation ducts in air gaps in partitions - acoustic insulation from both sides**	
facade envelope	*large windows, fixed glazing where no need for opening light guides for deep classrooms*	*increasing insulation from 20 to 24 cm to reach passive standard window parameters*	*openable windows to allow natural ventilation*	*window parameters for passive standard sufficient acoustically*	
spatial layout	*classroom depth determined by daylight requirements deeper classrooms harder to daylight*	*orienting classrooms North or South to prevent overheating - not always possible*			*central space and "clusters" of classrooms (not liked by teachers who lack common staff room)*
massing volume				*noise barriers on roof*	*central space and "clusters" of classrooms*
site context					*site morphology - gentle slope*

Office building THE BLOX

Design year: 2008 - 2013
Build year: 2013 - 2015
Place: Evropská, Praha
Author: DAM architekti s.r.o. | **Jan Holna** (interviewed), Petr Šedivý

Figure 4.73 Office Building THE BLOX (source: Filip Šlapal, archiweb.cz)

Figure 4.74 Office Building THE BLOX lobby interior (source: Filip Šlapal, archiweb.cz)

Interview excerpts:

"All the office buildings, whether or not they are built with any attempt to be green, are actually forced to be relatively green buildings because of the certifications. BLOX is one of the first buildings, if not the first in the Czech Republic, that has the highest certification from BREEM. In order to make the house economical, to make it green and have the smallest possible carbon footprint, it's not about putting in some flashy technology that, say, boils water out of the air, it's about making an honest house out of materials that are preferably from nearby provenance.
We won a competition for BLOX, then we did the architectural study and then we did the planning permission which became effective. And the moment it became legal, the investor sold it to the developer who eventually built it. The client changed and the morphology of the house changed because the client didn't like the original design and also the planning permission came out with so many conditions that the shape had to change, though not completely, it was still the L shape.
And as you actually see that snake on the facade there, it's all about that mass kind of flowing, zigzagging between those individual requirements and the zoning limits that are there and the distance limits that are there, so rather than being subject to some environmental things, we were more subject to initiatives.
If you make a glass façade towards Evropská street, and you have glass areas that are from floor level to ceiling level, they have to have some kind of safety specification, where actually the glass is so heavy and has such safety properties that it immediately generates noise barrier properties.
Quite frankly, we make a house, we design it and then we have our lighting specialist go through it to see if it's adequately daylighted. Office buildings have the added advantage of being able to use combined lighting, of course it is not a cure-all, but you calculate that in addition to natural lighting you can also have artificial lighting and mix it. Of course, you solve all that with a specialist.
Oddly enough, I don't remember much environmental compromise on the interior. Of course, I don't take it as a very big compromise when we're dealing with different window sizes and so on to get the light where we need it to be in the interior, that's not a compromise. That's a common practice.
There's a city park, there's the noisy Evropská street around it. But the hygiene departments suddenly established that there's going to be a huge amount of noise in this environment. So these panels that you see here on the roof, they're noise barriers to keep the noise from coming through the building into the park area.
And at the same time, this whole facade, which is dimpled, perforated, has an acoustically absorbent material in the back so that the noise from Evropská doesn't bounce off of it."

Table 4.57 Office Building THE BLOX - framework analysis

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design					
building systems	combined lighting	highest BREEM certification doesn't require complicated technology	highest BREEM certification doesn't require complicated technology		
structural construction					
facade envelope		fulfilling Czech standards sufficient for highest BREEM certification		perforated façade and acoustic panels behind glazed façade works well as acoustic barrier	
spatial layout					
massing volume				acoustic panels on roof to reflect street noise	mass formed by limitations
site context				prevent noise from street to park behind house	

IEQ aspects most considered by the architects:

- comply with combined lighting standards for office buildings
- green building certification BREEM
- green building certification BREM
- noise from Evropská street

Table 4.58 Office Buildings THE BLOX - design process (interview)

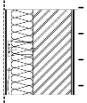
interior design			
building systems		highest BREEM certification doesn't require complicated technology	combined lighting in office (easier to achieve than natural)
structural construction			
façade envelope		fulfilling Czech standards sufficient for highest BREEM certification	perforated façade and acoustic panels behind glazed façade works well as acoustic barrier
spatial layout			
massing volume	mass formed by limitations		hygienic station required acoustic panels on roof to reflect street noise
site context	requirements and limitations distancing (to prevent shading of surroundings)		hygienic station required prevent noise from street to park behind house
	planning decision	achieving BREEM certification	requirements from authorities

Note: in this case, the architect didn't reveal much of the design process itself in connection to the indoor environmental quality, as he believes the building performance aspect of the design should be in the competence of specialists, see the following direct quote:
"I even think that knowing this stuff in great detail can actually be detrimental to the profession in general. (…) when people actually do their job properly, they actually stop seeing into those other fields the further away that field is, in a good way, because they really can't take in that other field anymore. (…) when I start to get interested in these things, I actually start to make my own direct ideas about things that I don't know completely, and that can be devastating again because you don't take some more ideas from a person who actually understands it."

Table 4.59 Office Building THE BLOX - structures and window properties

structures composition and properties (1:50)

exterior wall (cladding)

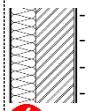


- interior plaster 10 mm
- hollow brick 240 mm
- mineral wool 140 mm
- ventilated air gap 45 mm
- metal cladding 5 mm

U = 0.15 W/m²K (<0.30)

R'w = 66 dB (>43 all envelope)

exterior wall (plaster)



- interior plaster 10 mm
- hollow brick 240 mm
- EPS 160 mm
- exterior plaster 6 mm

U = 0.15 W/m²K (<0.30)

R'w = 66 dB (>43 all envelope)

partition between offices

- interior blaster 10 mm
- hollow bricks 190 mm
- interior plaster 10 mm

R'w = 46 dB (>45/42)

terrace roof above office

- concrete tiles 50 mm
- rectification pads 15-140 mm
- waterproofing PVC foil 2 mm
- sloping wedges EPS 40 -165 mm
- thermal insulation EPS 160 mm
- vapor barrier asphalt sheet 4 mm
- reinforced concrete slab 300 mm
- air gap+ hanging system 325 mm
- ceiling grid 36 mm
- ceiling panels 19 mm

U = 0.14 W/m²K (<0.24)

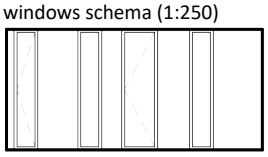
ceiling between offices

- solid carpet 6 mm
- floor boards on steel stands 38 mm
- installation gap 106 mm
- step insulation EPS 30 mm
- reinforced concrete slab 300 mm
- air gap+ hanging system 325 mm
- ceiling grid 36 mm
- ceiling panels 19 mm

R'w = 60 dB (<52)

L'n,w = 49 dB (<58)

windows schema (1:250)



clear height = 3.0 m
window height = 2.95 m
window sill = 0 m
window lintel = 2.95 m
window frame 29/21%

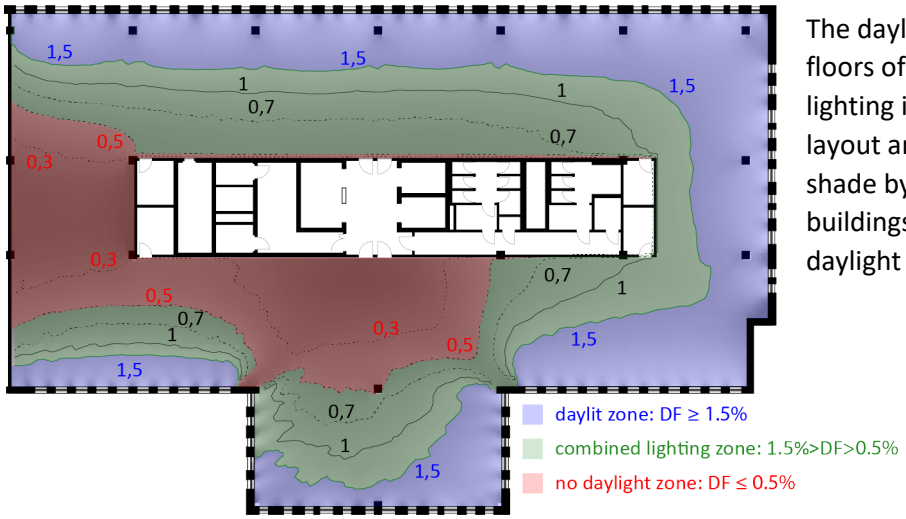
τ_k = 0.56-0.79 (double glazing)

$\tau_{s,nor}$ = 0.846

U = 1.10 W/m².K (1.50)

R'w = 39 dB (>43 all envelope)

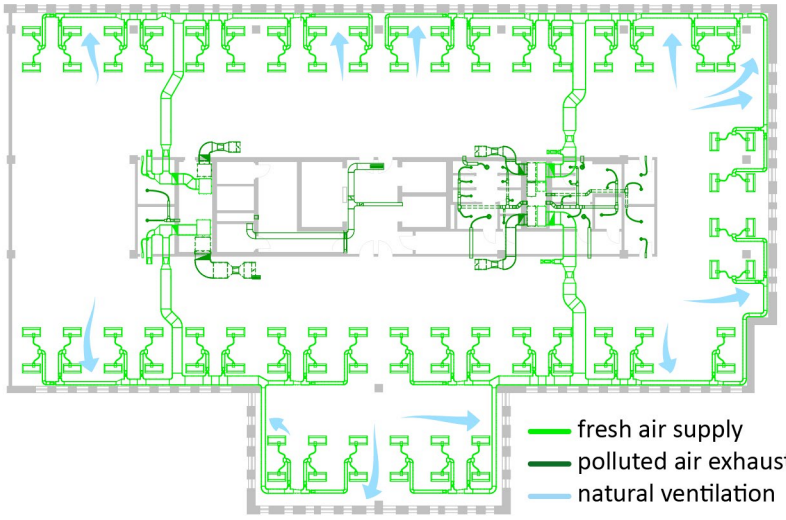
Daylight



The daylight levels in the lower floors offices require combined lighting in a large part of the layout and in some parts that are shade by the surrounding buildings, there are even no daylight zones.

Figure 4.75 Office Building THE BLOX - daylight factor [%] levels in a 3rd floor office (source: author)

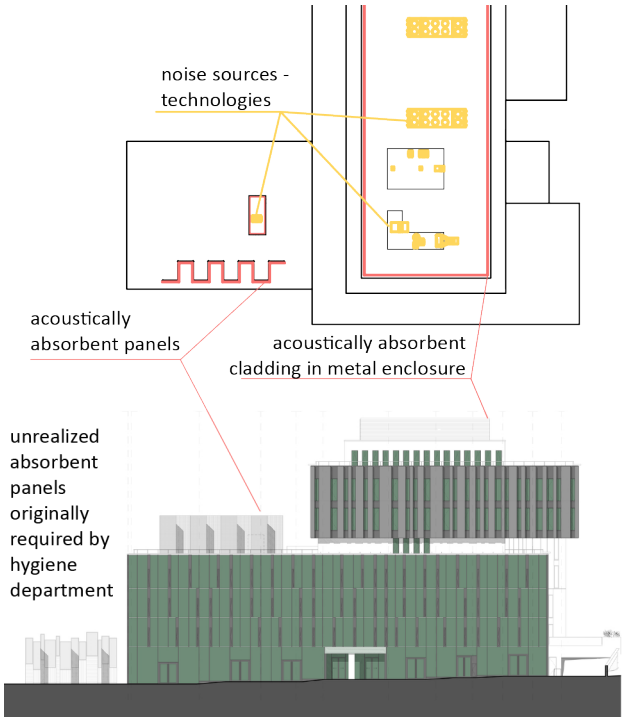
Thermal and indoor air quality



The offices are fully mechanically ventilated (the air outlets are located on the ceilings), but there is also the possibility of natural ventilation via openable windows.

Figure 4.76 Office Building THE BLOX - ventilation schema in 3rd floor office (source: adapted from documentation, original drawing by Michal Přikryl)

Acoustics



The architect was quite displeased with the acoustically absorbent measures required by the hygiene department to protect the park behind the building from the street noise. On the roof of the northern wing, there are acoustically absorbent panels. The panels designed next to the building on the east side ended up not being realized.

The noise from building system units on the roof (heating, cooling and air handling) is resolved by metal enclosure lined in acoustically absorbent cladding. Although the enclosure is slightly receded from the building ledge, it is still visible from the street.

(see also Figure 4.73)

Figure 4.77 Office Building THE BLOX – acoustic measures to prevent noise in urban environment – northern facade (1:1000) (source: adapted from project documentation by DAM.architekti)

Table 4.60 Office Building THE BLOX - framework analysis (interview + IEQ metrics)

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design					
building systems	*combined lighting* **combined lighting necessary in most lower offices area**	*highest BREEM certification doesn't require complicated technology*	*highest BREEM certification doesn't require complicated technology*	**building system units on roof surrounded by metal enclosure with acoustic cladding**	
structural construction					
facade envelope		*fulfilling Czech standards sufficient for highest BREEM certification*		*perforated façade and acoustic panels behind glazed façade works well as acoustic barrier*	
spatial layout	**low daylight factor levels in lower floor offices**		**openable windows in offices → natural ventilation**		
massing volume				*acoustic panels on roof to reflect street noise* **metal enclosure surrounding building system units on roof adds to the height visually**	*mass formed by planning limitations*
site context	**lower floor offices shaded by surrounding buildings**			*prevent noise from street to park behind house*	

Office Building Konplan

Design year:	2016
Build year:	2019
Place:	Borská pole, Plzeň
Architect:	PRO-STORY s.r.o. | **Jiří Zábran** (interviewed)
Chief project engineer:	**Jiří Kott** (interviewed)

Figure 4.78 Office Building Konplan (source: Petr Polák, archiweb.cz)

Figure 4.79 Office Building Konplan interior (source: Petr Polák, archiweb.cz)

Interview excerpts:

Architect (Jiří Zábran):

"…there's these stretch metal lamellas that shade the interior, and they're angled so that it's shaded from 8:00 to half past 4. Because then people should go home, they've got these German managers, they're keeping them at work till the evening.

The façade acts so beautifully when you drive around it, it's near the roundabout, so it's always changing. The way that the lamellas are closing, opening up, reflecting the sunlight, it's like a jewel. The building physics played a major role in the design of that building. Jiří Kott was the chief engineer there, we were like fire and water. He tended to interfere with my architecture and I tended to interfere with his HVAC, we had some disagreements, but in the end the building just works and I have to say in retrospect that he did an incredible job. He used a lot of interesting solutions in terms of the building physics, especially for the cooling, although I was against the ceiling outlets because it meant having suspended ceilings, the installations and concrete couldn't have been exposed."

Chief project engineer (Jiří Kott):

"The investor specified a lot of indoor environmental quality requirements, since he was building it for his empoyees, which are valuable, there is not a lot of such people on the market. They specified the method of heating and cooling, the wish to supply air to the interior through the ceiling outlets of the Inducool exhaust unit, which it blows the air nicely to the sides, and swirls it in the room, not like a fan-coil. They wished to have underfloor heating supplemented by small space heaters, so the employees feel like they can influence their own thermal comfort. But the building control system then adjusts the floor heating, so the room temperature remains the same.

Architect Zábran came up with the stretch metal lamellas on the façade, which is an interesting solution, it works in terms of heat gains from the sun to the interior, reducing glare. The thermal comfort is also ensured by the triple glazing with surface treatments that eliminate heat transfer out and in, while keeping the panes see-trough.

We also managed to convince the investor of more expensive acoustics solution, they had bad experiences from the previous office space they rented. The outer walls are floor to ceiling glazing and the inside core is exposed concrete, we had the flooring (acoustically absorbent carpet) and the ceiling panels to solve the acoustics. The investor specifically refused double floors because of previous bad experience, in terms of acoustics and variability, so the floor compositions were quite complicated, including the water supply to the flower planters on the façade the architect came up with, but the engineers managed to deal with it without compromising the aesthetic intent."

Table 4.61 Office building Konplan - framework analysis (interview with architect + chief project engineer)

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design			***architect didn't like the ventilation ducts in suspended ceilings, because technologies couldn't be exposed***	reflective vertical surfaces (floor length glazing and exposed concrete) - acoustic carpet and ceiling panels to solve it solo acoustic elements in cafeteria (architect's wish)	
building systems		investor wanted ceiling heating/cooling system - Indocool outlets floor heating complemented by small space heaters → employees fell they can influence their thermal comfort	Indocool ceiling outlets, swirl air around room (better comfort)		
structural construction				elevator shaft within a shaft with flexible acoustic insulation intricate detailing to achieve exposed concrete in interior	complicated floor composition, lot of plumbing
facade envelope	***stretch metal lamellas on facade - shading from 8 to 4:30, then people should go home*** ***reflects light beautifully, like a jewel***	facade lamellas help prevent heat gains triple glazing with metal coating to prevent heat gains			added footbridges behind the lamellas so the windows could be washed flower planters on facade required complicated floor plumbing
spatial layout					
massing volume				cooling units on the roof integrated into the building mass	
site context				needed to manage noise towards surroundings	

Note: architectural elements mentioned and addressed primarily by the architect are in ***bold italics***

IEQ aspects most considered by the architect:

- shading by the stretch metal lamellas
- ceiling exhausts → couldn't have exposed concrete and technologies
- solo acoustic panels in cafeteria

IEQ aspects specified by the investor:

- heating/cooling by ceiling outlets
  small space heaters so employees can regulate their thermal comfort
- ceiling Indocool outlets
- no double floors; excellent room acoustics

Table 4.62 Office building Konplan - design process

interior design	exposed concrete ceilings and walls floor to ceiling glazing	***architect didn't like suspended ceilings***	architect wanted solo acoustic elements in dining rooms but didn't specify layout – irregular layout interfered with HVAC outlets	
building systems		ceiling air conditioning Indocool (+heating/cooling) outlets – client's request floor heating complemented by small space heaters		roof recuperation units less noisy than anticipated
structural construction				
façade envelope	***stretch metal lamellas on facade - shading from 8 to 4:30, then people should go home*** ***flower planters integrated in facade***	triple glazing with metal coating to prevent heat gains		
spatial layout	basic layout (vertical communications, bathrooms, central tract, openspace office space)			
massing volume				
site context				parking and new traffic generated by the new building is bigger noise source that technologies
	architectural study	technical specification + building permit	during building	in-use feedback

Note: architectural elements mentioned and addressed primarily by the architect are in ***bold italics***

Table 4.63 Office building Konplan structures and windows

structures composition and properties (1:50)

exterior wall

- interior plaster 10 mm
- reinforced concrete 220 mm or aerated concrete 250 mm
- mineral wool 220 mm
- exterior plaster 10 mm

U = 0.20 W/m²K (<0.30)

R'w = 57 dB (>43 according to noise study)

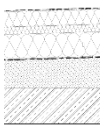
partition between offices

- plasterboard 2x12,5 mm
- mineral wool 60 mm between aluminum profiles 75 mm
- plasterboard 2x12,5mm

R'w = 52 dB (>45/42)

roof

- waterproofing MPVC foil 1.5 mm
- thermal insulation mineral wool 100 + 60 + 160 mm
- vapor barrier asphalt sheet 4 mm
- sloping clay concrete 0-210 mm
- reinforced concrete slab 240 mm



U = 0.145 W/m²K (<0.24)

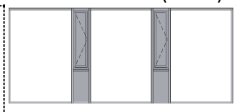
ceiling between offices

- solid carpet 6 mm
- cement screed 64 mm
- floor heating system board with step insulation 50 mm
- thermal insulation EPS 30 mm
- levelling layer polystyrene concrete 60 mm
- reinforced concrete slab 240 mm
- installation gap + ceiling panels 300 mm

R'w = 58 dB (<52)

L'n,w = 30 dB (<58)

windows schema (1:250)



clear height = 3.09 m
window height = 2.98 m
window sill = 0,02 m
window lintel = 3.0 m
window frame (including opague openable panels) 21%

τ_k = 0.79
(triple glazing with metal coating)

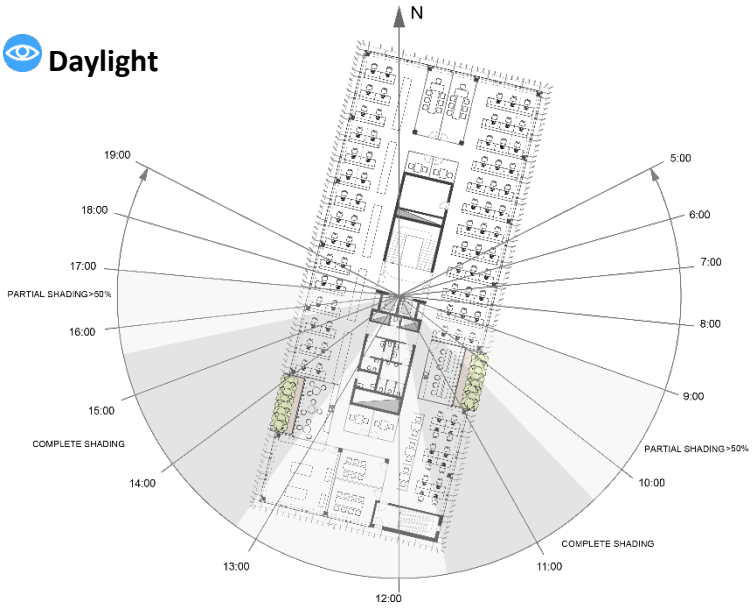
$\tau_{s,nor}$ = 0.6

U = 0.80 W/m².K (1.50)

R'w = 43 dB
(>43 according to noise study)

Note: the information on the indoor environmental quality in the building given by the chief project engineer was comprehensive enough not to require a second table completed from the author's IEQ calculations and analysis – there was nothing to add.

Daylight



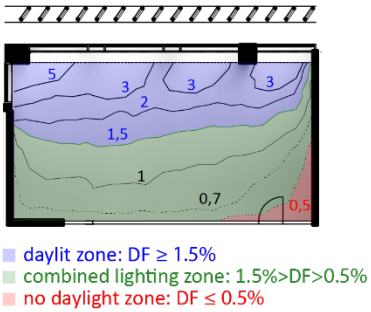


Figure 4.80 Daylight factor [%] levels in 2nd floor office (1:250) (source: author)

Figure 4.81 Office Building Konplan - shading schema on 21.6. (source: Valbek and Jiří Zábran)

Thermal and indoor air quality

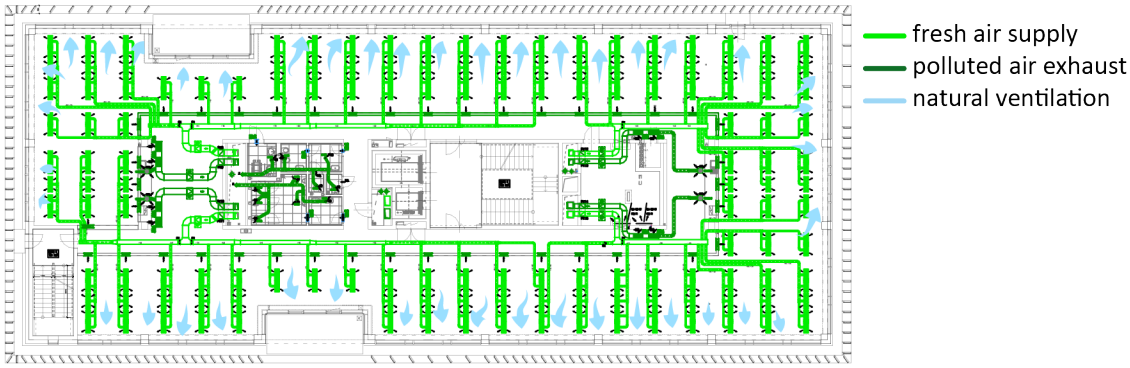
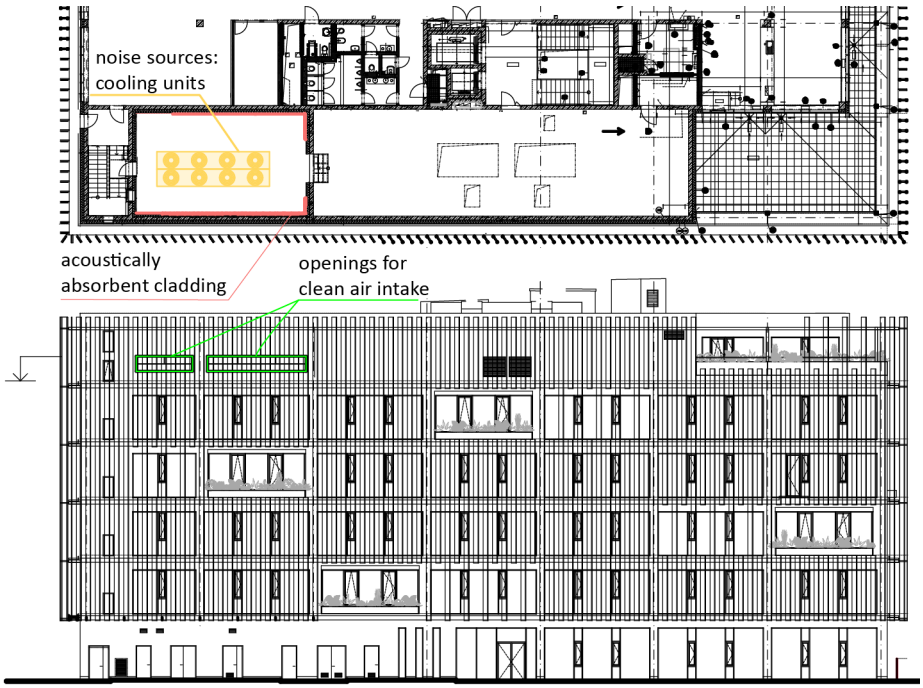


Figure 4.82 Office Building Konplan - ventilation schema in 2nd floor offices (1:500) (adapted from project documentation, original drawing Vladimír Černý)

Acoustics



On the 6th floor there is an inner courtyard where the cooling units are hidden. They do not appear on the silhouette of the building, when looking at the building there is a layer of slats, a walkway 60 cm around the whole building, the wall is opaque behind the cooling units, there is an omitted 1 m strip near the floor to suck in air from the outside but the wall also acts as a silencer upwards, the units make noise upwards but not sideways.

Figure 4.83 Office Building Konplan - acoustic treatment of noise sources on roof (1:500) (source: adapted from project documentation)

Prague 7 Townhall

Design year: 2016 - 2017
Build year: 2017 - 2020
Place: Praha
Author: Atelier bod architekti | **Vojtěch Sosna** (interviewed), Jakub Straka, Jáchym Svoboda

Figure 4.84 Prague 7 Townhall (source: Tomáš Slavík, archiweb.cz)

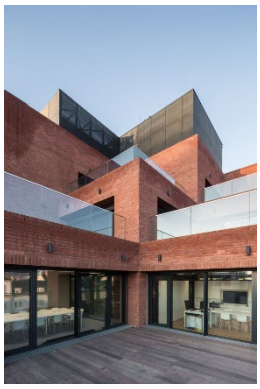


Figure 4.85 Prague 7 Townhall roof (source: Tomáš Slavík, archiweb.cz)

Figure 4.86 Prague 7 Townhall interior (source: Tomáš Slavík, archiweb.cz)

Interior excerpts:

"…our job was basically to cram 200 employees into the existing volume.
In that house, it was quite limiting that there are only 3.3 metres of construction height on the general floors. Which meant that in order to meet the legislative minimum for room clear height at all, we were getting less than 30cm of ceiling space.
What affects it from a formal point of view is, for example, the size of the windows, so maybe that's essential, but then as far as the indoor environment is concerned, for example, in terms of fresh air or heat recovery, those are all things that can be added to the house later.
After the competition, we had a team of specialists and we consulted right away. The submission of the study had the detail of basically a building permit, it was structured that way as well, so it had quite a lot of technology already thought out in concept. We gave the investor three energy concepts to choose from. The energy specialists suggested heat pumps with ground boreholes, which was impossible to get permit for in the time available, since they would have had to be terribly deep and there is a high underground water level, it would need a hydrological permit, so it was not possible. The investor chose the simplest option: keeping it connected to the district heating pipeline right in the street. The original heat exchange station was dismantled and exchanged for a smaller one, since the house was insulated and needed less energy.
The architectural form is based on deep sunk windows, to make the house look very powerful, heavy. But the depth of glazing and wall thickness has a terrible effect on the daylight calculation, the lights are designed to be on all the time, although it is not actually used.
Shading the surroundings didn't need to be addressed, because the house was basically a renovation of an existing volume, a façade reconstruction and a change in layout.
For acoustics, there was a condition in the building permit that the noise load of the surroundings must be measured before the building was approved, since there are chillers on the roof. There's an extension on the top floor that's used as a wedding hall, and there's a stretch metal fence enclosure on top of that. And it's covered on the inside with acoustic material to absorb any noise from the chiller unit.
We used heating and cooling registers suspended from the ceiling, very flat fixtures that are able to make the house cooler in the summer and that coolness falls on you from above, which is nice because you don't get cold from your feet. They are cover by perforated ceiling panels, a sort of aluminum folding grid. In the ceilings, we used acoustically absorbent boards, which also increased the fire resistance of the existing ceiling slabs.

Table 4.64 Prague 7 Townhall - framework analysis

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design		*aluminum grid ceiling panels hide ceiling registers*		*aluminum grid ceiling panels hide acoustic panels*	
building systems	*artificial lights designed to be on all the time (not used) light controls in every office*	*ceiling heating and cooling registers (to prevent cold feet), flat to fit in ceiling space replaced existing heat exchange station*	*offices not mechanically ventilated, only meeting rooms*	*chillers on roof needed stretch metal enclosure lined with acoustic panels*	*only 30 cm for ceiling installations - minimized technology to fit*
structural construction				*acoustic panels also increase fire safety*	*limiting factor - floor height only 3.3 m (only 30 cm ceiling space)*
facade envelope	*thick walls and deep-set windows → artificial lighting to be on all the time*	*mechanical blinds - automatically drawn when risk of overheating*			
spatial layout				*6x3 office module dividers on clear floor → impact noise carries between offices*	*originally designed 6x6 office module but occupants prefer it divided into 6x3*
massing volume	*kept original volume - no need to address shading of surroundings*			*chillers on roof needed stretch metal enclosure lined with acoustic panels*	
site context		*district heating pipeline in the street ground heat pumps impossible to get approved high underground water*		*required measurement for mechanical equipment on roof*	

IEQ aspects most considered by the architects:

- sufficient daylight
- prevent overheating; heating/cooling from ceiling to prevent cold feet
- natural ventilation in offices (mechanical ventilation spatially impossible)
- room acoustics in offices and meeting rooms; noise from roof chillers into surroundings

Table 4.65 Prague 7 Townhall - design process

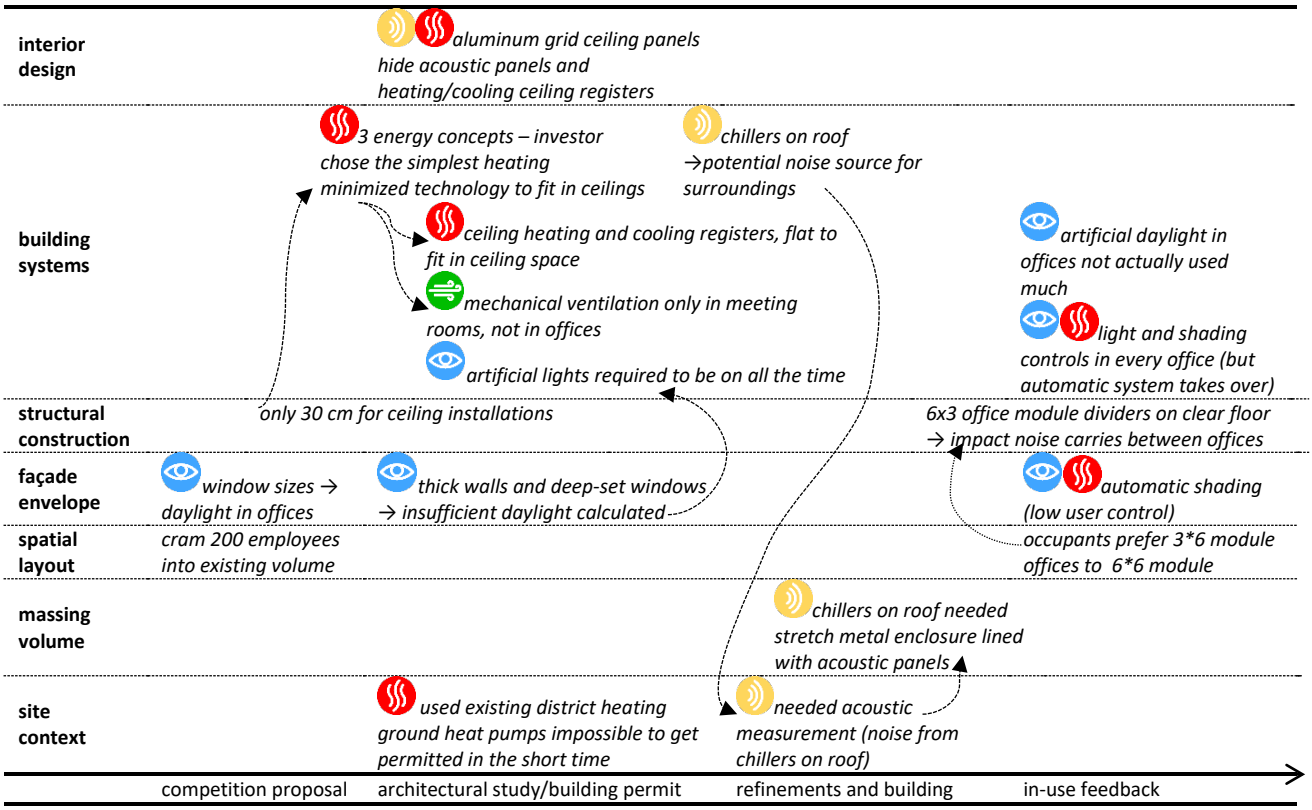
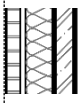


Table 4.66 Prague 7 Townhall – structures and window properties

structures composition and properties (1:50)

exterior wall

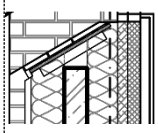


- interior plaster 10 mm
- mineral wool 180 mm
- reinforced concrete permanent shuttering 150 mm
- mineral wool 220 mm
- ventilated air gap 40 mm
- ceramic bricks 100 mm

U = 0.15 W/m²K (<0.30)

R'w = 58 dB (>30 all envelope)

exterior wall - windows sill



- plasterboard 2x12,5 mm
- air gap 75 mm
- mineral wool 100 mm
- PIR panel 60 mm
- mineral wool 180 mm
- reinforced concrete permanent shuttering 150 mm
- mineral wool 220 mm
- ventilated air gap 40 mm
- ceramic bricks 100 mm

U = 0.06 W/m²K (<0.30)

R'w = 58 dB (>30 all envelope)

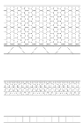
partition between offices

- plasterboard 2x12,5 mm
- acoustic insulation 100 mm
- plasterboard 2x12,5 mm

R'w = 45 dB (>45/42)

roof

- waterproofing PVC foil
- EPS in slope 260 – 395 mm
- vapor barrier asphalt sheet 40 mm
- steel structure 180 mm
- acoustically absorbent mineral wool 90 mm
- air gap (heating systems) 140 mm
- aluminum grid ceiling 40 mm



U = 0.15 W/m²K (<0.24)

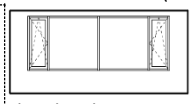
ceiling between offices

- wood flooring 15 mm
- concrete screed 50 mm
- step insulation mineral 35 mm
- old concrete panels or new reinforced concrete slab 250 mm
- fire resistant and acoustically absorbent cladding 20 mm
- air gap (heating systems) 130 mm
- aluminum grid ceiling 40 mm

R'w = 54 dB (>52)

L'n,w = 54 dB (<58)

windows schema (1:250)



clear height: 2.7 m
window height = 1.77 m
window sill = 0.75 m
window lintel = 2.52 m
window frame 22%

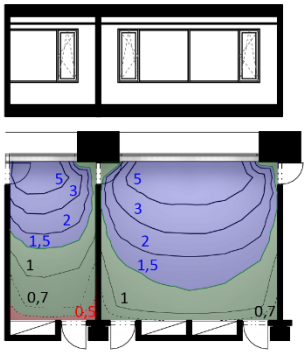
τ_k = 0.78
(double glazing)

$\tau_{s,nor}$ = 0.846

U = 1.20 W/m².K (1.50)

R'w = 30 dB
(>30 all envelope)

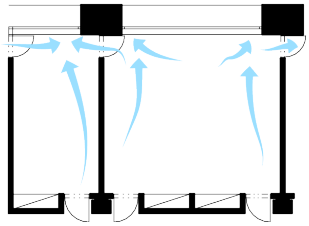
Daylight



Due to thick walls and deep-set glazing, the daylight levels in offices require the use of combined lighting, but according to the architect, the employees actually don't switch the artificial lighting on most of the time.
However, due to quite shallow layout of the offices, the daylit zone takes up much larger part of the office area than in the other office building case studies.

Figure 4.87 Prague 7 Townhall - daylight factor [%] levels in 4th floor offices (1:250) (source: author)

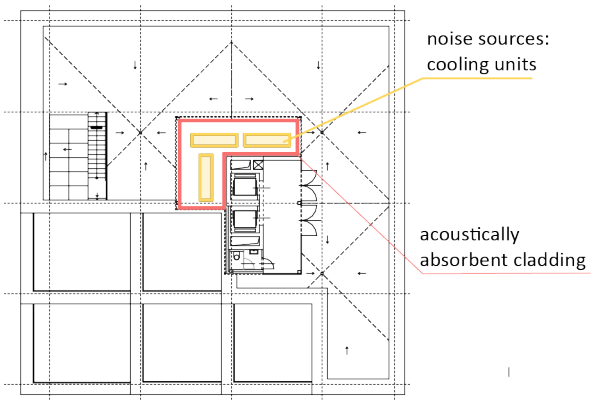
Thermal and indoor air quality



It was not possible to install mechanical ventilation in the offices due to low ceiling height of the original building. The offices can be naturally cross-ventilated using the openable windows and doors between the offices.

Figure 4.88 Prague 7 Townhall - natural ventilation schema in offices (1:250) (source: author)

Acoustics



There is a stretch metal enclosure around the cooling units on the roof lined with acoustically absorbent cladding.
The enclosure is visible from the street, but doesn't impact the primary building silhouette (see also Figure 4.84 and 4.85).

Figure 4.89 Prague 7 Townhall - acoustic treatment of noise sources on roof (1:500) (source: adapted from documentation)

Table 4.67 Prague 7 Townhall - framework analysis (interview + IEQ metrics)

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design		*aluminum grid ceiling panels hide ceiling registers*		*aluminum grid ceiling panels hide acoustic panels*	
building systems	*artificial lights designed to be on all the time (not used) light controls in every office*	*ceiling heating and cooling registers, flat to fit in ceiling space replaced existing heat exchange station*	*offices not mechanically ventilated, only meeting rooms*	*chillers on roof needed stretch metal enclosure lined with acoustic panels*	*only 30 cm for ceiling installations - minimized technology to fit*
structural construction				*acoustic panels also increase fire safety*	*limiting factor - floor height only 3.3 m (only 30 cm ceiling space)*
facade envelope	*thick walls and deep-set windows → artificial lighting to be on all the time*	*mechanical blinds - automatically drawn when risk of overheating*			
spatial layout	**relatively shallow office layouts → daylit zone takes up large part of office**		**natural ventilation between offices**	*6x3 office module dividers on clear floor → impact noise carries between offices*	*originally designed 6x6 office module but occupants prefer it divided into 6x3*
massing volume	*kept original volume - no need to address shading of surroundings*			*chillers on roof needed stretch metal enclosure lined with acoustic panels* **the metal enclosure doesn't significantly impact he building silhouette**	
site context		*district heating pipeline in the street ground heat pumps impossible to get permitted, high underground water*		*required measurement for mechanical equipment on roof*	

4.4. Summary of case studies

4.4.1. Summary of framework analyses by typologies

Bellow, the framework analyses from individual architect interviews are summarized, sorted by the typologies (residential, schools and kindergartens and office buildings).

A more general summary from all the case studies and its comparison with the framework derived from the literature resources (parts 4.1 and 4.2) is shown, described and discussed in the following chapter 5. Summary and discussion.

Table 4.68 Residential buildings - summary of interview framework analyses

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design				exposed concrete ceilings may worsen spatial acoustics but can be mitigated by furniture and textiles	
building systems		heat recuperation (in mechanical ventilation systems) only in commercial spaces alternative energy sources and other "premium" solutions often not considered or vetoed by the investor	mechanical ventilation only in the commercial spaces or apartments that required it due to unfavorable outside conditions		
structural construction				load bearing structures and compositions of structures considered to prevent noise transmission through the house	
facade envelope	window size to allow daylight and contact with exterior	envelope composition designed to meet energy label requirements	natural ventilation (openable windows)		fire safety affects possible window sizes and placements
spatial layout	apartments not meeting sunlight and daylight requirements can be approved as "ateliers"	orienting towards cardinal directions (mostly possible in single-family housing)			fire safety (fire escape routes, length of corridors)
massing volume	massing decisions heavily influenced by daylight/sunlight				
site context	distancing of buildings to prevent shading usually already addressed on city planning level				city planning and building permit authorities heavily enter into design in apartments for sale – necessary to consider local real estate cost

In all three interviews about multi-family residential buildings, the architects mentioned the practice of getting the apartments that do not meet legislative requirement approved as so-called "ateliers" or alternatively, labelling rooms that have insufficient daylight as other use, such as "home office" or "gym". In the large residential block 4BLOK, the architect even said they had a spreadsheet of "ateliers" and the indoor environmental requirements they didn't comply with, and got some of them re-approved as apartments when the sunlight provision legislation changed in Prague. In the Apartment House Ostravská Brána, the investor explicitly refused to have "ateliers", which greatly influenced the apartment mix and didn't allow for smaller layouts, especially on lower floors.

Table 4.69 Schools and kindergartens – summary of interview framework analyses

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design	visual purity, anticipate the children to enliven the space with their toys and art		mechanical ventilation is a strong visual element in interior	acoustic cladding and reverberation time already considered in conceptual design	
building systems		often no mechanical cooling in classrooms even if there is mechanical cooling, prefer to be able to cool space naturally	often only natural ventilation in classrooms, mechanical ventilation still supplemented by natural		aim for low operational cost even at higher acquisition cost sophisticated building systems require qualified maintenance
structural construction				room clear height impacts spatial acoustics	the contractor chosen by the lowest bid, but usually still good result
facade envelope	windows designed to ensure sufficient and uniform lighting orienting windows toward ideally northern light (not always possible)	orienting windows to prevent overheating outside shading openable windows to achieve natural ventilation (also for cooling	openable windows designed also in mechanically ventilated classrooms	façades assessed for noise protection but usually when windows meet thermal requirements, they have sufficient noise reduction	
spatial layout	classroom depth limited by daylight	trying to achieve chimney effect ventilation (cooling)	trying to achieve chimney effect ventilation	room height and shape impact spatial acoustics	
massing volume				recuperation/cooling units on roofs require acoustic barriers	
site context					local government and school representatives participating in the project from the start lead to better results

In schools and kindergartens, sufficient daylight provision in classrooms was the primary form giving factor mentioned by all the architects. In the kindergartens, it is also required to ensure sufficient sunlight duration in the playrooms. In elementary schools, where sunlight provision is not required, they try to orient the windows toward northern light. Since that was not always possible, exterior shading (usually in the form of aluminum roller blinds) was often designed to prevent overheating. Only half of the school and kindergarten projects (3 out of 6) has mechanically ventilated classrooms with heat recuperation. Natural ventilation was considered the primary means of cooling the classrooms. Where possible, the architects tried to achieve the chimney effect ventilation and sounded quite proud of the fact that it manages to cool the classrooms sufficiently without the need for mechanical cooling. However, Ondřej Píhrt (Elementary school Amos Psáry) mentioned that relying on natural ventilation puts the responsibility in the teachers' hands, which may lead to insufficient indoor air quality. The spatial acoustics in classrooms was already to some degree addressed in the conceptual design, at least determining the interior surfaces where acoustically absorbent materials could be used.

The architects always tried to achieve the lowest possible operational costs, even when that meant slightly higher acquisition and construction costs. They explained that the construction of schools is typically financed by subsidies, but operation is the responsibility of the local government. They tried to avoid overcomplicated building systems, both due to cost and the need for qualified maintenance.

The cooperation with the local government and the school representatives was often mentioned as crucial for the final result. The architects stated that it is important to consult the authorities (especially the hygiene department, who overviews the fulfillment of IEQ requirements) early in the building permit process to arrive at a mutually agreeable solution. Since the contractor for publicly subsidized construction is selected on the basis of the lowest price bid, the architects

often needed the investor (typically represented by the school headmaster) to back them up during on-site supervision, so they could insist on fulfilling the architectural intention.

Table 4.70 Office buildings – summary of interview framework analyses

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design		ceiling heating/cooling systems often require suspended ceilings	ceiling ventilation outlets often require suspended ceilings	acoustic cladding on ceilings	
building systems	combined lighting	mechanical blinds (automatic)	mechanical ventilation necessary, especially in deeper layouts	recuperation/cooling units on roofs noise source for building itself and surroundings	sophisticated building systems require qualified maintenance
structural construction					
facade envelope	window and glazing sizes to achieve daylighting wall thickness influences daylight levels	glazed facades need shading to prevent overheating structures designed to meet standards and certifications		floor to ceiling glazing negatively affects spatial acoustics	
spatial layout	possibility of combined lighting in offices				
massing volume				recuperation/cooling units on roofs require acoustic barriers	
site context	shading towards surroundings typically addressed on city planning level			building systems on roofs → noise source for surroundings	

In the office buildings, the investors' relationship to the building made the biggest difference in terms of indoor environmental quality (this was also emphasized by Jiří Kott, the chief project engineer of Office building Konplan). There were three investor scenarios (of course, due to a very small sample, the findings cannot be generalized).

Developer building for sale or rent (represented Office Building THE BLOX)

The investor's goal was for the building to have good market value. The building performance standards were mainly determined by the requirements of a Green Building Certification (BREEM) and legislative requirements. Since the offices are often built as a shell-and-core and the interior is finished by the buyer or renter, some building performance requirements (such as room acoustics) are not addressed in detail.

The investor building for their own employees (represented by Office Building Konplan)

Since the building was designed for valuable employees ("there is not many such people on the market"), comfortable indoor environment was important to the investor and he specified quite a lot of indoor environmental quality requirements, especially for the building systems. It was also possible to convince the investor of some more expensive solutions, especially for spatial acoustics.

Government contract (represented by Prague 7 Townhall)

The main concern was meeting the legislative requirements for indoor environmental quality. It this particular case, the building systems were limited by the spatial options of the existing building.

4.4.2. Summary of the design process analyses

Several project stages were recognized:

- site analysis, pre-requisites
- competition proposal
- architectural study
- building permit
- construction documentation
- during building
- in-use feedback

Not all of them appear in every project, sometimes they are merged (for example, the site prerequisites were part of the architectural study design, the architectural study and competition proposal were merged, or in one case, architectural study and building permit were basically merged). But in the combined table, all those are mentioned.

The design process is very case-specific, but some frequently occurring themes are listed in the table bellow.

Table 4.71 Design process summary from case studies

	site analysis, pre-requisites	competition proposal	architectural study	building permit	construction documentation	during building	in-use feedback
interior design			acoustically reflective/absorbent materials considered		spatial acoustics calculated and refined		
building systems	need mechanical ventilation?	building systems to be refined later		building systems refined building systems on roof → noise study			sophisticated building systems require qualified maintenance
structural construction					specification and construction supervision critical for good result		noise carries through structures
façade envelope		window sizes to allow daylight and views natural ventilation (chimney effect if possible)		daylight study sometimes requested by authorities			shading sometimes added on clients' request
spatial layout	possibility of sunlight and daylight	cardinal orientation if possible natural ventilation (chimney effect if possible)	apartment mix	apartments not fulfilling requirement's → "ateliers"			
massing volume	basic footprint and height limited by city planning			building systems on roof require acoustic barriers			
site context	site morphology and orientation city-planning requirements: distancing, function outside noise air quality client requirements			building systems may be a noise source for surroundings important to pre-consult authorities (especially hygiene department)			

4.5. Non-project related parts of architect interviews

How do the architects define indoor environmental quality?

The primary definition given by the architect was in most cases occupant related. The architects spoke about people and making the indoor environment comfortable and pleasant for them, in the sensory perception kind of way. Most architects also mentioned that the indoor environment must be in harmony with the overall building concept, with the operational, spatial and aesthetic aspects.

The “building physics” definition of indoor environment, in terms of the four most commonly accepted components (light, thermal comfort, indoor air quality and acoustics) were only mentioned by seven of the architects. Three of the architects even implied that the indoor environmental quality (and building physics) concerns are mainly in the competence of the specialists and civil engineers, not architects (although their later answers revealed they actually do address the indoor environment in the conceptual design, which indicates it is more a matter of terminology then lack of consideration).

Most of the architects also include the energy efficiency and environmental concerns (in the sustainability sense) seamlessly when thinking about the indoor environment, as well as the legislative and standardization requirements.

Compromise in architectural design

When asked about the compromises they needed to make in the design, there were basically two answers, equally frequent. One indicated that the word “compromise” has strong negative connotations and the architects claimed they did not need to make any compromise. They further explained that when making some necessary trade-offs between requirements, they don’t consider it a compromise if they manage to resolve them successfully. The other group said than any building is a set of compromises and the architect’s job is to find the best possible solution.

These answers don’t seem to be in opposition and indicate more a semantics issue, but it is worth noting the necessity of being careful when using the word compromise, as to some, it may mean a solution no-one is satisfied with.

What do the architects think they need to know from building physics and IEQ?

All the architects agreed that some knowledge of building physics is important for an architect. However, they differed quite greatly in the scope of knowledge they consider necessary. Most commonly, they agreed that they need to be able to comprehend the calculations and assessments performed by specialists and understand whether they make sense. Several architects were wary of too deep knowledge of building physics, saying it may limit their creative freedom and distract them from focusing on other aspects of the architectural design, especially the operational, spatial and aesthetic ones. It was mentioned that blind following of standardized requirements may prevent the design of best possible spaces for the given purpose.

What role does education play in the necessary IEQ knowledge?

All the architects said they learned a lot more about the indoor environment in practice than at school. As the main shortfall of architectural education in the indoor environmental and building physics subjects, they mentioned the detachment from reality. While they learned how to perform building physics calculations, they were not taught to relate them to the specific building they were designing. Although the courses (not just on building performance, but also for example structural engineering) went quite in depth in the technological expertise, the architects felt they didn't provide them with basic principles and rules of thumb needed to approximately estimate the architectural means necessary to achieve the desired outcome. It was also mentioned that the technical drawings were sometimes merely an item on a checklist. This was also confirmed by the architects that have experience with teaching design studios at architecture schools, saying that their students are not capable of applying the theoretical knowledge to the design.

What design decision support do the architects use? (software tools, specialists, standardization)

The most common design decision support method, used by all the architects, were consultations with specialists, either in-house building engineers or external building physics specialists. Only three of the architects said they themselves used some kind of specialized software to verify some indoor environmental aspects (namely thermal properties of envelope structures and daylight). Some architects also use sunlight diagrams (which are taught in the building physics courses at architectural schools in the Czech Republic). Mostly, the architects said that prior to consulting specialists, they rely on their empirical experience and rules of thumb and are also inspired by examples of (mostly foreign) realized buildings.

When asked what software tools might make designing indoor environment easier for them, some architects mentioned the tool would, above all, need to be integrated in the CAD software they already use. They also stated that they do not necessarily need precise results from the software, but rather a verification of whether they are going in the right direction with their design.

This notion can actually be generalized to all methods of design decision support. The architects expressed the need to often make imprecise decisions with incomplete information early in the design process. From the specialists and the software tools, they often don't need to receive exact values of indoor environmental quality metrics, but rather to be pointed in the right direction, because they know they will refine the design in later iterations.

What do they consider important about collaboration between architects and building performance specialists?

Almost all the architects declared mutual respect as the most important thing for successful collaboration. Five of them even mentioned their specialists by name. Several expressed frustrations with specialists who regard architects as too impractical and concerned with aesthetics ("the architect is being difficult").

The second most important quality the architects appreciated in specialists was the ability to see the big picture in the project beyond their specialization (Tomáš Pilař formulated it as "stepping out of the shadow of their Excel spreadsheets"). The architects wish for the specialists to help them find alternative solution, rather than simply saying "that's not possible".

The role of legislation, standardization and authorities in architectural design

Almost all the architects expressed frustration with the current state of legislation and standards. The don't consider the standards to be helpful as guidance, but rather an obstacle course of nonsensical demands they have to pass through in order to get the project built. Some even stated that the blind following of standardized requirements may lead to a worse design in terms of spatial and aesthetic qualities. They especially abhor the sunlight duration requirements compulsory for residential buildings in the Czech Republic, claiming they make it impossible to build housing in the traditional urban structure.

In the residential building design, the architects freely admit the common practice of circumventing the requirements. This means that the apartments than do not meet the legislative requirements (most commonly on sunlight duration) are simply passed as so called "ateliers", which doesn't really lower their market values. Alternatively, some bedrooms with insufficient daylight levels are called "home gym" or "study" in the building permit documentation, which again does not affect the apartment price point.

Note: this summary is intended to be descriptive, rather than prescriptive. The author does not advocate for practices circumventing legislation, such as calling the apartments that fail to meet the standard requirements "ateliers", but merely wishes to point out their common occurrence.

The architects are also quite distrustful of quantifiable indoor environmental metrics, which to them don't really describe the qualities of the space. Labelling and classifying buildings according to certification schemes may seem arbitrary and unrealistic to the interviewed architects.

Several architects mentioned the necessity of pre-consulting the design with the authorities (in the case of indoor environmental quality, mainly the hygienic station).

5. SUMMARY AND DISCUSSION

The following chapter summarizes the findings presented in chapter 5, explains how they answer the research questions and objectives of this thesis and situates them in a wider context.

5.1. The connections between architectural design decisions and IEQ

Table 5.1 Combined framework from the general resources analyzed in parts 5.1 and 5.2

	Light	Thermal	Indoor air quality	Acoustics
interior design	interior surfaces - color, reflectance furniture layout (usable area)	wall surfaces (thermal conductivity)	building materials and finishes: insulation, plywood, paint, furniture (particle board), floor/wall covering material – pollutant sources adsorption/desorption capability → mold growth interior plants	surface materials (noise attenuation) – possibility of multiple reflections resilient floor finishing layer (carpet or rubber), noise absorbent surface materials glazed walls – sound reflective
building systems	shading devices - movable blinds (user scenarios) self-controlled solar screens (glare prevention)	heating and cooling systems designed according to comfort requirements easy heat recovery from mechanical ventilation internal heat sources local thermostatic controls fast response heating - lower base temperature	ventilation - mechanical, heat and moisture recuperation ventilation system components (filters, ducts, humidifiers) as pollutant sources moisture (washing machines…)	noise sources mechanical ventilation can be noisy, especially at low frequencies active noise control (powered system)
structural construction	floor height room sizes - height, ceiling span	construction system (load bearing structures) thermal mass → reduce temperature swings	floor height → room volumes	load bearing structure → impact noise conduction floor and walls composition → noise dampening (impact and airborne) floating floor or vibration dampeners to prevent construction vibrations
facade envelope	windows - size (height/width), placement on room wall, glazing, frame shading - balconies, overhang, fixed blinds wall thickness, color size and distribution of apertures solar-reflecting glazing reflectance of exterior finishes	structure composition (materials, thickness) glazing/wall ratio; wall + roof colors shading - balconies, overhang, fixed blinds windows - glazing, frame; air tightness	natural ventilation moisture and condensation - permeable structures air leakage – not a good way to ensure natural ventilation (uncontrollable)	structure composition (thickness, mass) window placement, properties, openability provide openable windows even towards noisy street
spatial layout	room geometry (depth, width, ceiling depth) orientation towards views circadian rhythms - shallow plan rooms	natural ventilation - cross ventilation, chimney effect user scenarios - number of occupants orientation of spaces for solar heat gains	occupants - number, group clean air supplied to the right places location of pollutant sources: smoking areas, laser printers, fireplaces (CO, PMs) washing machines, bathrooms (moisture)	noise sources within layout room geometry (height, width)
massing volume	shading obstacles (height, distance) to itself and surroundings facade orientation	shape façade/volume ratio façade orientation room angle and orientation		
site context	terrain shape, landscape, greenery surrounding buildings - height, distance, color (reflectivity) access to views	orientation to cardinal directions surroundings - shading, wind protection climate - sun, wind, heating/cooling hours	air quality (pollution, traffic) presence of radon in soil ventilation - consider wind direction, air quality outside	local sound pressure levels: noise sources - traffic, industry (existing and future) background noise levels vibrations

Table 5.2 General summary of interview framework analyses

	Light	Thermal	Indoor air quality	Acoustics	Other aspects
interior design	visual purity	ceiling cooling/heating systems require suspended ceilings	mechanical ventilation pipes and exhausts → strong visual element suspended ceilings	spatial acoustics and indoor materials: glazing, concrete, acoustic cladding	
building systems	(automatic) shading elements (exterior roller blinds) combined lighting in offices	heat recuperation automatically included in mechanical ventilation impact of heat and cold sources placements on occupants (ceiling vs. floor heating/cooling) acquisition cost often ruled out "green" building systems (automatic) roller blinds to prevent overheating	mechanical ventilation usually only when necessary	building system units on roofs → noise source for building itself and surroundings	aim for low operational cost sophisticated building systems require qualified maintenance
structural construction		thermal mass		noise carries through construction, especially in situ concrete	supervision during construction important to fulfill architectural intent
facade envelope	window sizes to allow daylight and views (contact with exterior) orienting windows to achieve insolation or, conversely, to avoid overheating	structures designed to meet standard requirements (often for passive buildings) glazed surfaces shaded to prevent overheating	openable windows also in mechanically ventilated spaces	when windows meet thermal requirements, noise reduction usually sufficient large glazed areas negatively impact spatial acoustics	fire safety affects possible window sizes and placements
spatial layout	cardinal orientation considered when possible sunlight requirements form residential layouts (or bypassed by "ateliers")	orientation to prevent overheating when possible cooling via natural ventilation	natural ventilation – openable windows, chimney effect	movable partitions → noise carries between rooms (airborne and impact though floating floors concrete layer) room height and shape → spatial acoustics distancing from exterior noise sources when possible	fire safety (fire escape routes, length of corridors)
massing volume	orienting facades toward daylight and sunlight (or away from the sun)	shading by overhangs and balconies to prevent overheating cardinal orientation to prevent overheating		building system units on roofs require acoustic barriers	
site context	availability of sunlight and daylight shading towards surroundings typically addressed on city planning level	district heating availability on site	poor exterior air quality may necessitate mechanical ventilation	building systems on roofs → noise source for surroundings noise levels outside may necessitate mechanical ventilation	investor participation important important to pre-consult with authorities (especially hygiene department)

The research questions related to the first objective, to find the connections and compromise solutions (or trade-offs) in the architectural design decisions that directly affect the lighting, thermal, aerial and acoustic qualities of the designed spaces, were answered by analyzing several resources using the framework described in chapter 3 Research strategy and methods.

The answers to the first research question (*Q1*: *Which architectural features determine the indoor environmental quality and which indoor environmental concerns act as form givers in the architectural design?*) derived from the general resources (IEQ metrics analysis and handbooks for architects) are compared to the answers from the architect interviews performed in the case studies. The main difference between the answers are outlined and possible explanation given.

The framework of connections derived from general literary resources (Table 5.1) and from the individual case studies, primarily the architect interviews (Table 5.2) are shown on the previous pages. In most areas, there was significant overlap. However, there are some notable differences.

The biggest difference between the architects answers and the general advice concerned standards and legislation, or rather that some of the issues don't need to be addressed in depth in the architectural design, because they are standardized – building materials and their safety from harmful substances; thermal resistance of envelope structures – those are default values that don't really differ on a case by case basis.

The investor's relationship to the building and willingness to pay for measures to improve the IEQ played a major role in the resulting solution. This was most prominent in the acoustic measures, where more expensive materials were often crossed out of the project, and in building systems, where "green" energy sources were sometimes vetoed by the client.

Note: the current energy efficiency requirements often rely on green technology solutions and make the achievement of desirable indoor environmental quality solely via natural means less and less possible, so a lot of the presented solutions would no longer be allowed by the current legislation.

The impact of the building on its surroundings it terms of limiting daylight and sunlight availability was typically already addressed by the distancing and height limitation in the city planning and zoning legislation. Most of the projects had to address the noise sources from the building systems (usually heat recuperation units on roofs) toward surroundings, where authorities often required a noise study and the units needed to be enclosed by acoustic barriers, which influenced the building silhouette and massing.

Massing was largely influenced by the need to reach the sunlight and daylight. In residential buildings and kindergartens, sunlight provision is made compulsory. In typologies, where direct sunlight provision is not legislatively required and undesirable due to possible overheating and subsequent need to obstruct the windows (meaning they cannot serve the intended purpose of providing daylight), mainly elementary schools, the massing and orientation was aimed towards northern light. However, the architects pointed out the other factors, mostly the organizational layout and site limitations, don't always allow them to reach the ideal orientation in terms of daylight. The cardinal orientation was most form-giving in the single-family housing projects, where the other factors are less limiting.

The need to orient rooms towards daylight and sunlight also formed the layouts, most notably in the residential buildings. The requirements on sunlight provision, valid at the time of design for all the studied residential buildings, meant the apartment mix and layout needed to be adjusted accordingly. Alternatively, some of the apartments were approved as so called "ateliers" or the possibility was at least considered.

The shape and height of the rooms (most notably classrooms and playrooms) was considered in terms of room acoustics, though the architects did say that a lot can be mitigated by the materials of interior surfaces.

Unsurprisingly, the building elements with the largest impact on the indoor environmental quality that all the interviewed architects considered to some extent was the sizing and placement of windows. They tried to orient them towards sunlight in the residential buildings, where sunlight provision is required by legislation, and away from overheating in the other typologies.

The impact of wall thickness on the daylight in interiors was only mentioned in one case (Prague 7 Townhall), where it necessitated the use of combined lighting in the offices.

The windows and envelope structures in terms of thermal resistance were considered by the architects in the sense of designing them in accordance with the valid standards and recommendations (often up to passive building standards). It was mentioned several times that when the structures and windows comply with the required U values, their airborne noise reduction is sufficient as well.

The impact of load bearing structure on the indoor environment was mostly mentioned in relation to noise transferring through the construction, although mostly as a retrospective remark than as a form-giving factor influencing their architectural decisions.

The composition of structures in terms of noise (both airborne and impact) was considered basic, not requiring specific consideration beyond designing them in accordance with the general standards (floating floors, vertical partitions complying with the R'w requirements).

The use of thermal mass for mitigating temperature swings was usually not mentioned. However, in one case (New Elementary School Pavilion in Líbeznice), the need for thermal mass to manage the internal heat gains actually led to a change of load bearing system from a wooden frame to in-situ cast reinforced concrete.

Exterior shading using automated roller blinds was discussed in several cases. The occupants' ability to control their environment by opening or shutting the blinds and regulating the temperature was mostly discussed for the office buildings. In single-family housing, the additional purpose of shading for safety (exterior wooden shutters) and privacy was mentioned.

The only indoor air quality aspect actually mentioned by the architects was ventilation, whether mechanical or natural, which was strongly linked with thermal comfort and use of ventilation for cooling.

When talking about mechanical ventilation, the architects used the terms "mechanical ventilation" and "(heat) recuperation" almost interchangeably, meaning they do not really consider the use of mechanical ventilation without heat recuperation. They automatically included the reverse running of the heat recuperation systems for cooling.

The use of mechanical ventilation tied into the need to have recuperation units placed on the roof and to solve the related noise issues. A noise study on the impact of these building systems on the surroundings was often requested by the authorities and acoustic barriers needed to be installed, which had an impact on the silhouette of the building.

The location of heating and cooling sources in the interior and its impact on occupants was often considered. When the heating system was used for cooling as well, placing the outlets on the ceiling was often deemed preferable to avoid the feeling of cold feet.

The architects didn't at all speak about possible pollutant emissions from the building and interior materials. Since the use of potentially harmful materials (that may release VOCs and other dangerous substances into the indoor air) is heavily controlled by authorities and legislation, it is possible that the architects don't feel the need to consider or mention the issue any further.

In terms of interior surface and finishes, the architects did speak mostly about the acoustic properties, noise reflectance and attenuation. There were some mentions of thermal conductivity of flooring in the school buildings, where the children spend time on the floor. The light reflectance of the interior surfaces was not mentioned explicitly, although there was of course attention towards the visual impact of the materials, in terms of visual purity and overall aesthetic concept.

5.2. Design decision support to facilitate IEQ considerations in the architectural design process

The decision support tools the interviewed architects use to inform their design decisions in regard of the indoor environmental quality could be summed up into four groups: standards and guidelines, examples of good practice, consulting specialists and software tools, including building performance simulation. Bellow, the interviewed architects' relationship to each of these decision supports options is discussed.

5.2.1. Standards and guidelines

Although the architects acknowledged the need to consider and comply with the standardized legislative requirements, they view some of them as obstacles to be dealt with. The design decision support tools should serve as a guideline that facilitates decision making, that makes the translation between the desired indoor environmental quality) and the architectural means necessary to achieve it by setting metrics and benchmarks. In some areas, the interviewed architects confirmed the standards are useful for their practice, for example for selecting structural compositions and windows in compliance with the standardizes heat transfers coefficient and sound reduction index values.

However, there is often a confusion between the end (a healthy and comfortable indoor environment) and means (standardized values of related IEQ metrics).

The most glaring example of this discrepancy is the architects' approach to daylight and sunlight requirements. The often don't view the set benchmarks for sunlight and daylight provision as a guide to create a well-lit indoor space, but rather a formal requirement they need to comply with to get the project approved by the authorities. The required sunlight duration in apartments is indeed seen as a pesky obstacle to designing the layouts they consider best for the occupants, the site and the investor's intent. The interviewed architects often seemed to have no qualms about bypassing the legislation, by passing the non-compliant apartments as "ateliers" and the non-compliant rooms as "home offices" or "gyms". While the author doesn't wish to advocate for such practices, their common occurrence indicates the need to reframe those requirements as a guidance rather than a one size fits all requirement.

Despite the interviewed architects pointing out the unnecessary strictness of Czech building regulations (as Jan Holna put it: "*This is a common practice of the Czech architect, where there are a number of things that we architects have to grapple with, and compromise I would say is our standard battlefield. It's also evident that when some architects from abroad come here, big names, they usually break their teeth because they are not able to work in those compromises.*"), the architects' skepticism towards building regulation is not a Czech specific issue.

A survey of British architects on the role of building regulations in their practice (Imrie, 2007) points to similar issues: the architects sometimes view the building regulation as too restrictive and detrimental to their creative freedom.

The architects do acknowledge the usefulness of standards as a counterweight of the cost-oriented limitations imposed by the investor, where legislative requirements may serve as an incentive for the investors to pay for more expensive measures to achieve healthy indoor environment. The architect also pointed out that complying with legislative requirements protects the designer and the

developer from later occupants' complaints which may result in litigation and demanding discounts from the developer (this is again confirmed by (Imrie, 2007).

5.2.2. Examples of good practice

The interviewed architects mentioned using examples of (mostly foreign) realized buildings as inspiration, especially in the early stages of the design process. They looked up how a certain indoor environmental issue was dealt with (for example ventilation of classrooms in the Elementary School Amos Psáry). A critical examination and interpretation of the realized buildings is necessary to extract the information relevant to the task at hand (as Alena Mičeková put it: "*…the experience that you have to constantly not only design, but at the same time examine other people's realizations and discover maybe some mistakes or things"*).

Some of the architects expressed certain frustration over the impossibility to implement the principles from abroad into the Czech context, due to legislative restrictions. Jiří Zábran remarked *"When I see a nice thing abroad, I think, wow, but it has to work here too. It snows there too, there are people like us there too, and if it works there, why can't we build it here?"*

The use of examples of realized buildings as an inspiration source is common in the architectural practice (Petersen & Purup, 2019). A study on postgraduate architectural student's information seeking behavior (Makri & Warwick, 2010) highlights the importance of visualizing, appropriating and interpreting the inspiration sources.

Since the relation between indoor environmental quality and architectural features is not immediately obvious from architectural drawings and photographs, the analytical framework and graphical interpretation of IEQ metrics presented in this thesis may serve as a useful tool to comprehensibly present refences to architectural students and architects.

5.2.3. Consulting specialists

The interviewed architects said they usually consult at least some building performance specialists early in the design process. This applied mostly to daylight and sunlight experts, where the requirements were form-giving even for the massing. Other specialists were often introduced to the project in the later design stages, such as the building permit documentation.

The architects wished for the specialists to be able to see the big picture of the project and think creatively, instead of just focusing on their area of expertise. They claimed that early in the design project, they know most of the architectural features and need to be refined later, but they need to know they are going in the right direction.

The collaboration between architects and building performance specialists is a current topic often discussed in literature, especially in connection with the integrated design process (for example (Engebø et al., 2020; Leoto & Lizarralde, 2019; Alsaadani & Bleil De Souza, 2016).

Beside the technical issues, addressed by BIM technologies, it also necessary to focus on the human side of architect- specialist collaboration (Alsaadani & Bleil De Souza, 2016). The collaborative process participants' attitude should be already addressed on the educational level.

The civil engineering students are accustomed to having a clearly defined assignment, focusing on one problem at a time. In contrasts, architectural design is open-ended, without a single right answer (Olsen & Mac Namara, 2014, p. 182; 184). When confronted with the iterative nature of architectural design, engineering students tend to become frustrated with the design changes and prefer to perform their analyses only after the design is well formed, which defeats the purpose of early collaboration (Simonen, 2014).

5.2.4. Software tools and building performance simulation

Most of the interviewed architects do not use any building performance simulation software in the conceptual design stage. The most cited reason for not incorporating software tools to verify indoor environmental quality aspects was lack of time, both to learn the tools and to incorporate them in the architectural study.

This is in line with literature, which lists that architects view the BPS tools as too complex, too expensive, their use is too time consuming and not integrated in the architects' workflow (possibly also due to the tools not being integrated in CAAD software used by the architects) (Kanters et al., 2014) and that the difference in geometry representation and design language used by architects and the building physics language of the BPS tools (Attia et al., 2012) may also act as obstacle to integrating BPS in the architectural design process.

The interviewed articles said that if they were to use a software tool for indoor environmental quality, it would above all need to be integrated in the CAD software they use and give them fast response (Jan Kalivoda:*"…if maybe some program that we're modeling the building in could already give you an outline of how it's going to work. In terms of lighting, acoustics, depending on the materials chosen."*)

A survey of Danish architects (Purup & Petersen, 2020) on how can BPS simulation tools be conformed to fit the architectural practice confirms the above-mentioned findings, while adding that the tools should not prescribe a specific workflow, but rather be usable for various design activities. The framework of iterative loops described in this thesis may serve as a useful basis for deigning such a software tool.

6. CONCLUSION

6.1. Fulfillment of the aim and objectives

The aim of this thesis was to closely link indoor environmental quality and building physics to the architectural design process. This meant regarding the building performance concerns through the lens of an architect, to "flip the script" from the separate areas of different specializations to the architectural elements.

This was done rather successfully by incorporating an original framework (developed by the author of this thesis) of "iterative loops", into which the architectural elements usually designed together are grouped. This framework worked well for addressing the objectives of the thesis.

The first objective, to find the connections and compromise solutions (or trade-offs) in architectural design decisions that directly affect the lighting, thermal, aerial and acoustic qualities of the designed spaces, formed two closely linked research questions:

Q1: Which architectural features determine the indoor environmental quality and which indoor environmental concerns act as form givers in the architectural design?

Q2: Which architects' decisions form the indoor environment and when are those decisions likely to be made in architectural design process?

These were answered via several resources, both general and case study related. The general framework combined from all the resources can be found in Chapter 5.1.

However, the generalization may not be ideal to present to the architects, since it strips the individual case from the analysis. Both the literature review and the case studies (especially the architect interviews) indicated that the indoor environmental issues are better graspable by the architects (and especially architectural students) in the context of a specific project, where they are illustrated by the real-life design scenario. Abstracting them from the particular building may lead to confusion and distrust from the architects.

Another objective of this research was to create a supplementary learning material for architectural students and practicing architects which will facilitate the consideration of the indoor environmental concerns in the architectural design process. The research question associated to this objective was *Q3: What should the design decision support for the conceptual stage of architectural design process look like to facilitate the achievement of good indoor environmental quality?*

The architect interviews confirmed the premise (derived from literature review) that demonstrating the indoor environmental principles on examples of real buildings is one of the best ways of explanation. Since such a publication is not currently available, at least in the central European environment, the results of this research are hopefully going to be quite useful as a teaching tool.

The framework developed by the author of this thesis flips the perspective from specialist, single discipline oriented to architectural, building elements-oriented and the case studies it has been applied to (and indeed, the framework itself) may serve as a very useful tool for guiding students through the process. Although some of the conclusions may (and actually should) appear banal to seasoned architects, who have learned to view the indoor environmental and other building performance concerns through similar lens, it can help the students situate themselves is the complicated plethora of requirements. It can help the students see which concerns raised, for example, in the site analysis stage may become form givers in later design stages.

For example, during the site assessment, if there are high noise levels or air pollution, this may indicate the impossibility to rely on natural ventilation, which influences decisions made about layout and façade. Later on, mechanical building systems. Since the architect already knows they will need to use mechanical ventilation, they can plan accordingly. (Although with the growing energy efficiency demands, mechanical ventilation with heat recuperation is already automatically incorporated in a growing number of building typologies even when the site conditions allow for natural ventilation). The architect can already predict the need for the heat recuperation units placed on roof. These become a noise source for the surroundings, and it can be expected they are going to need to be shielded by some sort of acoustic barrier. Such barriers, when added to an already designed building, can negatively influence the aesthetic form of the building, or cause undesirable compromise. If, however, the architect is already aware of this issue in the massing and spatial planning stage of design, they can seamlessly blend the necessary space into the building mass and layout, as well as the façade design.

6.2. Limitations and future work

The cases studies including architect interviews were all of buildings that are already built and in use for some time (having been completed in the decade between 2010 and 2020). This was decided so that the user feedback (as reported by architects) and the reception by public could be included in the assessment. However, since the design process, from first assignment through all the design stages and obtaining the necessary permits to the construction and implementation, takes several years, the design process was viewed by the architects in retrospective. While this may have served as a filter for the design concerns that were still fresh in the architects' minds, it is also likely some of the design decisions and iterations may have fallen through the cracks, so to speak.

This could probably be prevented by following a building project all the way through in real time, from first brief to several years after it had been in use. This project would however not be in scope for a doctoral research, especially if multiple cases were to be included, and it is questionable whether the information value would have been worth the effort.

The presented case studies and architect interviews are very specific in their national setting. The building process in the Czech Republic infamously has one of the longest durations, partially due to an involvement of a large number of authorities and legislation.

Another possible limitation may have been the fact the most of the case study interviews only included the architects' point of view (with the exception of the Office Building Konplan, for which both the architect and the main project engineer were interviewed upon the architect's suggestion). The other stakeholders' opinions (especially the investors'' requirements and the occupants' feedback) were therefore only mediated via the architects, whose view may be biased. Since the interviews ended up discussing the collaboration between architects and specialist quite heavily, it may be interesting in future research to engage the entire design team, including the building physics specialists and also other stakeholders, most importantly to interview the investors and the occupants. An analysis of a time-lapse following a project after its completion would undoubtedly provide further understanding into the indoor environmental considerations and architectural decisions that form the real indoor environmental quality in a building and therefore the health and wellbeing of the occupants. This, again, would have been difficult to carry out in the scope of case studies that have been included in this research, but is strongly recommended for future work.

In future work, the author suggests to develop design decision support tools that use the findings of this thesis, especially the architects' need for imprecise but early available information that points them to the right direction early in the design process. The analytic framework developed and used in this thesis could be a starting point for software tools, as well as teaching.

6.3. Recommendations emerging from this research

Recommendations for teaching

The building physics education in architectural schools is certainly not lacking in technical expertise. However, some modifications might be suitable to make the indoor environmental principles more comprehensible for students. One of them is relating the information to real life examples as much as possible (the author is not saying this is not done already, especially in lectures, merely wishes to emphasize the importance). The case studies compiled in this thesis will hopefully be useful for that.

Another crucial modification is closer integration of technical subjects with design studio teaching. This goes hand in hand with the contemporary trend of integrated design. The most promising method the author is aware of is the Project Based Learning (PBL). By allowing the students to discover in their own design studio project which indoor environmental aspects need to be addressed in which stage of the design process, this method puts the technical knowledge into perspective and also helps teach the students how to communicate with specialists in the context of architectural design scenario.

Recommendations for design decision support

The preferred method of design decision support are consultations with specialists. The traditional method of consulting specialist only after the building form has already been decided upon is no longer viable in the increasingly complex word of building design. The architects need to consult the specialists already in the conceptual stages of the project.

This may require a different approach to architect-specialist cooperation than both sides are accustomed to, since in those stages, the design is often not yet developed enough to allow for precise assessment and calculation in the indoor environmental quality metrics. Rather than providing the architects with numerical values (which the interviews indicate that they are quite distrustful of anyway), the specialist need have a wider overview of the project to be able to point the architect in the right direction or to recognize whether the conceptual approach selected by the architect is viable or not. Again, real-life examples of good practice, either from the specialist's own experience or from case studies and literature may serve as explanation tool.

Some modification may be necessary also in the education of building science specialists, who are perhaps more accustomed to clearly defined assignments where all the information necessary for calculation are already available (as is customary in the traditional route of assessing finalized building design projects).

Recommendations for software tools

For a software tool to be usable by architect, it needs to be integrated in the CAD software they already use. Otherwise, the hassle of importing or even remodeling the 3D model is too discouraging for architects. The software tool also needs to be capable of providing "imprecise results with incomplete information", meaning that the architect does not need to wait until all of the building elements have been designed – this would beat the purpose of using the tool for supporting design decisions, rather than merely verifying their correctness when it may already be too late to make any relevant change to the design.

6.4. The main contributions of this research

This research brought deeper understanding of the architects' approach to indoor environment and building performance in general and their attitude towards design decision support. It confirmed that architects are reluctant to accept the indoor environmental requirements that they see as disconnected from the entire architectural design and solidified the importance of presenting the technical requirements within the real-life context of an architectural design project.

The framework developed and tested by the author of this thesis clearly and concisely demonstrates where the requirements of each indoor environmental area fits within the context of the architectural design process. In the case studies, the framework highlights the connections between indoor environmental quality and the architectural design decisions. It provides a comprehensive overview of causal relations between the indoor environmental concerns and other elements of the architectural design, as well as between the individual areas of the indoor environment.

The complex indoor environmental and building physics issues are presented in an easily understandable visual form, with a focus on the simplified principles instead of precise numerical values. This way, the specialized problematic can be introduced and explained to architectural students and practicing architects in a way that informs their design decisions without limiting their creative freedom.

Literature and sources

Alberti, L. (1542). *On the art of building in ten books*. MIT Press.

Alsaadani, S., & Bleil De Souza, C. (2016). Of collaboration or condemnation? Exploring the promise and pitfalls of architect-consultant collaborations for building performance simulation. *Energy Research & Social Science*, *19*, 21-36. https://doi.org/https://doi.org/10.1016/j.erss.2016.04.016

Attia, S., Gratia, E., De Herde, A., & Hensen, J. (2012). Simulation-based decision support tool for early stages of zero-energy building design. *Energy and Buildings*, *49*, 2-15. https://doi.org/10.1016/J.ENBUILD.2012.01.028

Baker, N., & Steemers, K. (2019). *Healthy Homes: Designing with light and air for sustainability and wellbeing* (1st Edition). RIBA Publishing.

Bleil De Souza, C. (2012). Contrasting paradigms of design thinking: The building thermal simulation tool user vs. the building designer: The building thermal simulation tool user vs. the building designer. *Automation in Construction*, *22*, 112-122. https://doi.org/10.1016/J.AUTCON.2011.09.008

Bluyssen, P., Oliveira Fernandes, E., Groes, L., Clausen, G., Fanger, P., Valbjorn, O., Bernhard, C., & Roulet, C. (1996). European Indoor Air Quality Audit Project in 56 Office Buildings. *Indoor Air*, *6*(4), 221-238. https://doi.org/10.1111/j.1600-0668.1996.00002.x

Bluyssen, P. (2009). *The indoor environment handbook: how to make buildings healthy and comfortable*. Earthscan.

CIB. (1982). Working with the performance approach in building. *CIB Report Publication*, *64*.

CIE. (1999). CIE HISTORY 1913 - 1988. Commission Internationale de l'Eclairage.

Corbusier, L. (1943). *The Athens charter*. Grossman Publishers.

Engebø, A., Klakegg, O., Lohne, J., & Lædre, O. (2020). A collaborative project delivery method for design of a high-performance building. *International Journal of Managing Projects in Business*, *13*(6), 1141-1165. https://doi.org/10.1108/IJMPB-01-2020-0014

Fanger, P. (1970). *Thermal Comfort: Analysis and Applications in Environmental Engineering*. Danish Technical Press.

Folan, J. (2011). Exclusively Mutual. In *Performative Practices: Architecture and Engineering in the 21st Century, edited by William Braham & Kiel Moe. ACSA Teachers Conference. New York City*.

Guedes, M., Matias, L., & Santos, C. (2009). Thermal comfort criteria and building design: Field work in Portugal. *Renewable Energy*, *34*(11), 2357-2361. https://doi.org/10.1016/j.renene.2009.03.004

Hensen Centnerová, L. (2018). On the history of indoor environment and it's relation to health and wellbeing. *REHVA Journal*, *55*(2), 14-20.

Heschong, L. (1979). *Thermal Delight in Architecture* (1st Edition). The MIT Press.

Heschong, L. (2021). *Visual Delight in Architecture: Daylight, Vision and View* (1st Edition). Routledge.

Humphreys, M. (2005). Quantifying occupant comfort: are combined indices of the indoor environment practicable?. *Building Research & Information*, *33*(4), 317-325. https://doi.org/10.1080/09613210500161950

Imrie, R. (2007). The Interrelationships between Building Regulations and Architects' Practices. *Environment and Planning B: Planning and Design*, *34*(5), 925-943. https://doi.org/10.1068/b33024

Kaňka, J. (2014). Vitruvius o denním osvětlení a dnešní stavební předpisy = Vitruvius about daylight illumination and recent building regulations. *Tepelná ochrana budov*, *17*, 14-17.

Kanters, J., Horvat, M., & Dubois, M. (2014). Tools and methods used by architects for solar design. *Energy and Buildings*, *68*(), 721-731. https://doi.org/10.1016/J.ENBUILD.2012.05.031

Kittler, R. (2011). Daylight Prediction and Assessment: Theory and Design Practice. *Architectural Science Review*, *50*(2), 94-99. https://doi.org/10.3763/asre.2007.5014

KLEPEIS, N., NELSON, W., OTT, W., ROBINSON, J., TSANG, A., SWITZER, P., BEHAR, J., HERN, S., & ENGELMANN, W. (2001). The National Human Activity Pattern Survey (NHAPS): a resource for assessing exposure to environmental pollutants. *Journal of Exposure Science & Environmental Epidemiology*, *11*(3), 231-252. https://doi.org/10.1038/sj.jea.7500165

Knudstrup, M. (2004). Integrated design process in problem-based learning: Integrated design process in PBL: Integrated design process in PBL. In *The Aalborg PBL model: Progress, diversity and challenges* (pp. 221-234). Aalborg Universitetsforlag.

Larsen, T., Rohde, L., Jønsson, K., Rasmussen, B., Jensen, R., Knudsen, H., Witterseh, T., & Bekö, G. (2020). IEQ-Compass – A tool for holistic evaluation of potential indoor environmental quality. *Building and Environment*, *172*. https://doi.org/10.1016/j.buildenv.2020.106707

Leoto, R., & Lizarralde, G. (2019). Challenges for integrated design (ID) in sustainable buildings. *Construction Management and Economics*, *37*(11), 625-642. https://doi.org/10.1080/01446193.2019.1569249

Licina, D., Wargocki, P., Pyke, C., & Altomonte, S. (2021). The future of IEQ in green building certifications. *Buildings and Cities*, *2*(1), 907-927. https://doi.org/10.5334/bc.148

Long, M. (2014). *Architectural Acoustics* (2nd Edition). Elsevier. https://doi.org/10.1016/C2009-0-64452-4

MacLeamy, P. (2004). Collaboration, integrated information and the project lifecycle in building design, construction and operation. *WP-1202, The construction users roundtable*.

Makri, S., & Warwick, C. (2010). Information for inspiration: Understanding architects' information seeking and use behaviors to inform design. *Journal of the American Society for Information Science and Technology*, *61*(9), 1745-1770. https://doi.org/10.1002/asi.21338

Mujan, I., Anđelković, A., Munćan, V., Kljajić, M., & Ružić, D. (2019). Influence of indoor environmental quality on human health and productivity - A review. *Journal of Cleaner Production*, *217*, 646-657. https://doi.org/10.1016/j.jclepro.2019.01.307

Nabil, A., & Mardaljevic, J. (2005). Useful daylight illuminance: a new paradigm for assessing daylight in buildings. *Lighting Research & Technology*, *37*(1), 41-57. https://doi.org/10.1191/1365782805li128oa

Nicol, J., & Humphreys, M. (1973). Thermal comfort as part of a self-regulating system. *Building Research and Practice*, *1*(3), 174-179. https://doi.org/10.1080/09613217308550237

Nightingale, F. (1859). *Notes on nursing: what it is, and what it is not* (1970 ed.). Duckworth.

Olsen, C., & Mac Namara, S. (2014). *Collaborations in architecture and engineering*. Routledge.

Olsson, D. (2016). *History of Ventilation Technology: From a Western Perspective*. SWEGON AIR ACADEMY.

Ortiz, M., Kurvers, S., & Bluyssen, P. (2017). A review of comfort, health, and energy use: Understanding daily energy use and wellbeing for the development of a new approach to study comfort: Understanding daily energy use and wellbeing for the development of a new approach to study comfort. *Energy and Buildings*, *152*, 323-335. https://doi.org/10.1016/J.ENBUILD.2017.07.060

Palladio, A. (1570). *The four books of architecture* (1965 ed.). Dover.

Pallasmaa, J. (2012). *The eyes of the skin: Architecture and the senses*. Wiley-Academy.

Parpairi, K. (2004). Daylight perception. In M. Steane & K. Steemers, *Environmental Diversity in Architecture* (1st Edition, pp. 179-193). Routledge.

Patel, R. (2019). *Architectural Acoustics: A guide to integrated thinking* (1st Edition). RIBA Publishing.

Petersen, S., & Purup, P. (2019). Building performance simulation supporting typical design activities:: the case of 'reference pictures'. In *Proc. of the 16th IBPSA Conference Rome, Italy, Sept* (pp. 2-4).

Plowright, P. (2014). *Revealing architectural design: methods, frameworks and tools: methods, frameworks and tools*. Routledge.

Purup, P., & Petersen, S. (2020). Requirement analysis for building performance simulation tools conformed to fit design practice. *Automation in Construction*, *116*, 103226-103226. https://doi.org/10.1016/J.AUTCON.2020.103226

Rasmussen, S. (1957). *Experiencing architecture.* ([Second United States edition].). M. I. T. Press, Massachusetts Institute of Technology.

Rohde, L., Jensen, R., Larsen, O., Jønsson, K., & Larsen, T. (2021). Holistic indoor environmental quality assessment as a driver in early building design. *Building Research & Information*, *49*(4), 460-481. https://doi.org/10.1080/09613218.2020.1770051

Rohde, L., Larsen, T., Jensen, R., & Larsen, O. (2020). Framing holistic indoor environment: Definitions of comfort, health and well-being: Definitions of comfort, health and well-being. *Indoor and Built Environment*, *29*(8), 1118-1136. https://doi.org/10.1177/1420326X19875795

Rossing, T. (2007). A Brief History of Acoustics (pp. 9-24). Springer New York. https://doi.org/10.1007/978-0-387-30425-0_2

Sabine, W. (1900). *Reverberation*.

Schulzová, K., & Bošová, D. (2019). The Development of Indoor Environmental Quality Definition from Vitruvius to the Present. In *Architecture in Perspective 2019 / Architektura v perspektivě 2019* (pp. 38-42). Archiv VŠB-TUO.

Schulzová, K., & Bošová, D. (2020). Residential Architecture in Terms of the Indoor Environment. In *Architecture in Perspective 2020 / Architektura v perspektivě 2020* (pp. 255 - 260). Archiv VŠB-TUO.

Simonen, K. (2014). Iterating structures: Teaching engineering as design: Teaching engineering as design. *Journal of Architectural Engineering*, *20*(3), 05014003.

United Nations Environment Programme. (2021). 2021 Global Status Report for Buildings and Construction: Towards a Zero-emission, Efficient and Resilient Buildings and Construction Sector. https://www.unep.org/resources/report/2021-global-status-report-buildings-and-construction

Veverkova, Z., Kabele, K., & Dvorakova, P. (2022). Using HAIEQ methodology for holistic analysis of IEQ in modern family houses. *CLIMA 2022 conference*, -(-), -. https://doi.org/10.34641/clima.2022.384

Vitruvius, M. (1st century BC). *Vitruvius: ten Books on Architecture* (přeložil Ingrid D. ROWLAND, ilustroval Thomas Noble HOWE). Cambridge University Press.

Wargocki, P., Wei, W., Bendžalová, J., Espigares-Correa, C., Gerard, C., Greslou, O., Rivallain, M., Sesana, M., Olesen, B., Zirngibl, J., & Mandin, C. (2021). TAIL, a new scheme for rating indoor environmental quality in offices and hotels undergoing deep energy renovation (EU ALDREN project). *Energy and Buildings*, *244*, 111029-111029. https://doi.org/10.1016/J.ENBUILD.2021.111029

Webb, A. (2006). Considerations for lighting in the built environment: Non-visual effects of light. *Energy and Buildings*, *38*(7), 721-727. https://doi.org/10.1016/j.enbuild.2006.03.004

Wei, W., Wargocki, P., Ke, Y., Bailhache, S., Diallo, T., Carré, S., Ducruet, P., Maria Sesana, M., Salvalai, G., Espigares-Correa, C., Greslou, O., Zirngibl, J., & Mandin, C. (2022). PredicTAIL, a prediction method for indoor environmental quality in buildings undergoing deep energy renovation based on the TAIL rating scheme. *Energy and Buildings*, *258*. https://doi.org/10.1016/j.enbuild.2022.111839

Zeiler[1], W., Savanovic[1], P., & Quanjel[1], E. (2007). Design decision support for the conceptual phase of the design process.

Zmrhal, V. (2017). *Větrání škol v souvislostech* (1. vydání). Společnost pro techniku prostředí.

List of figures

List of tables

Appendix 1 - architect interviews

Apartment house Ostravská Brána

Interviewee: Tomáš Pilař

Interviewer: Kristýna Schulzová

Date and time: 5. 4. 2022 9:00

Online, MS Teams

Original interview with Tomáš Pilař in Czech:

Co pro vás znamená vnitřní prostředí budov?

(smích) Začínáte hodně těžkou otázkou, protože samozřejmě to může být strašně moc věcí, ale asi chápu, že se na to díváte spíš po té technické stránce. Samozřejmě architekta asi zajímá ne v té primární podobě ta technická stránka, ale obecně uspořádání toho prostředí, kvalita, harmonie, kompozice. To asi z mého pohledu je to podstatný. Jak vůbec ten prostor funguje? Jak z pohledu toho provozního, tak prostorového, tak i estetického.

Já se zaměřuju na vnitřní prostředí budov a zaměřuji se na architektonické navrhování z hlediska vnitřního prostředí, ale mimo jiné tam sleduju i ty kvantifikovatelné stavebně fyzikální parametry, to znamená denní osvětlení a proslunění, tepelnou pohodu a kvalitu vnitřního vzduchu a akustiku.

V souvislosti s tím s tím architektonickým návrhem.

Byly v zadání projektu Bytového domu Ostravská Brána nějaké konkrétní požadavky na kvalitu vnitřního prostředí, případně z jakých požadavků jste vycházeli, jestli spíš třeba z legislativních nebo?

Obecně v projektech, jako je tenhle, to znamená, že to staví nějaký investor nebo developer, bohužel většině těch investorů nejde o nic víc než jenom o splnění těch základních legislativních podmínek. V těch kvantifikovatelných parametrech. To znamená, aby se splnilo to, co je potřeba, ale nikdo se nesnaží udělat něco navíc.

To je možná spíš potom na nás, pokud si myslíme, že to je vhodný pro ten projekt, tak tam do toho dáváme něco víc, za tou čárou toho nutného, co vyžaduje ten investor.

A v tomhle projektu nebo klidně i obecně, v jaké fázi toho návrhu začínáte řešit vnitřní prostředí, klidně i po těch třeba jednotlivých oblastech?

V poslední době, protože určité parametry jako je třeba osvětlení, hodně limitují především stavby pro bydlení, už to musíme řešit v té úvodní fázi, to znamená ve studii. Podobná věc je i třeba s hlukem z venkovního prostředí, kde často hlavně v tom městském prostředí, se musí už od začátku navrhovat nějaká protihluková opatření a s tím souvisí potom i třeba požadavek na nucené větrání.

Takže už v té studii se tím musíme zabývat, protože dejme tomu to oslunění, osvětlení…Samozřejmě Praha už ten problém s osluněním nemá, protože Pražské stavební předpisy už se na to dívají trochu jinak. Ale jinde, kde platí obecně technické podmínky pro výstavbu, tam to pořád, takže to řešíme už při vytváření základního prostorového uspořádání nebo hmotového uspořádání, respektive umístění té stavby.

Vzpomenete si třeba konkrétně u projektu Ostravské brány co jste tam museli řešit za limity?

U té Ostravské brány díky orientaci, která je do ulice, a ještě navíc to ohnutí toho objektu do takového toho otevřeného Véčka, byl ten problém, kterém jsem teď mluvil.

To znamená, že některý byty, pokud by byly jednostranně orientovaný buď do ulice nebo do náměstí, tak právě nesplňovaly ty požadovaný hodnoty toho oslunění a denního osvětlení, takže se dlouho řešila skladba bytů. Ty dispozice jsou v některých případech poměrně hluboký, ale to je daň právě tomu, že jsme museli to sluníčko, do těch bytů to nějakým způsobem dostat, protože investor nechtěl tam mít jaksi nebyty, nějaký ateliéry nebo apartmány.

No a čím byla určená ta hmota toho domu?

Ta hmota domu vznikla … nebo ta základní půdorysná stopa byla daná územním rozhodnutím, který tam měl jiný investor už nějakou dobu. A ten nový investor, pro kterého jsme to dělali, to koupil už s tím vydaným územním rozhodnutím a chtěl s tím nějakým způsobem pracovat jo, takže jsme se museli vejít do té půdorysné stopy a jenom v nějakých nuancích, kde jsme zaoblili ten roh a udělali jsme tam tu konzolu, tak jsme s tím museli pracovat tímhle způsobem.

A stejně se nakonec ukázalo, že to územní rozhodnutí pro ty požadavky investora není úplně schopno naplnit to, co se chtělo, takže se ve výsledku se ta stavba stejně modifikovala a udělalo se potom společně územní rozhodnutí a stavební povolení.

Požadavky investora myslíte na podlaží plochu a počet bytů a tak?

Jednak, protože oni z toho chtěli vytěžit trochu víc a i potom během toho projednávání tak byly konzultace zejména s památkáři, protože pro ně to místo bylo jaksi tou polohou v centru města i to vlastně uzavírá to Kostelní náměstí, tak to pro ně jaksi byla důležitá diskuze. Takže se potom i řešily detaily návaznosti na ten objekt toho biskupství. Protože ten původní toho územního rozhodnutí tyhle věci … se tím vůbec nezabýval. To bylo spíš nějaký hmotový schéma, který mělo sloužit k tomu, aby se zhodnotil ten pozemek a ten kupec, jaksi zvýšil tu cenu toho pozemku.

Jo ale to nesouvisí úplně s tím, o čem se bavíme ale.

No vlastně souvisí, já jsem spíš se chtěla zeptat, co jste tam právě řešili z hlediska řekněme dopadu toho objektu směrem ven, ať už právě na tu památkovou zónu, nebo nastínění a podobně.

Dopad ve smyslu zhoršení… já nevím…osvětlení těch okolních objektů nebo oslunění, tak tam ten nebyl nijak výrazný, protože jediným objektem v té těsné blízkosti je právě ten objekt toho biskupství. Tam ale ty hodnoty, když se dělaly diagramy, tak vycházely dobře a potom na protější straně, tak tam v té době nestálo nic, takže jsme se tím nemuseli zabývat.

A i vlastně to parkoviště naproti směrem k náměstí k Masarykově a 28. října tak na to teda byla soutěž před několika lety, ale tehdy to byla taky proluka, takže vlastně to byla jakási naše výhoda.

Na druhou stranu, zabývali jsme se hlukem, protože se počítalo s tím, že ta 28. října bude do budoucna frekventovanější. Takže se dělala hluková studie a na základě ní se potom počítaly hodnoty na fasádě i v těch vnitřních prostorech.

Samozřejmě dělala se potom i hluková studie stacionárních zdrojů jak z okolních, tak potom těch našich a potom i se dělala hluková studie vnitřního prostředí z hlediska hluku parkingu na 1. a 2. NP to znamená vlastně na neprůzvučnost konstrukcí.

Takže tyhle věci jsme řešili už ve studii, kdy jsme si nastavili se stavaři nějakou skladbu konstrukcí a potom se prověřovalo vlastně, jaký jsou možnosti, protože samozřejmě investora zajímá, jaký opatření znamenají jaký peníze. Vždycky toto je věc, kdy se v tom dá utopit poměrně dost peněz, a to si investoři rádi hlídají.

Samozřejmě velké téma bylo potom uspořádání bytů, protože ta naše původní představa nebo představa investora investora byla nějaká, o tom flatmixu, o skladbě bytů a díky tomu, že jsme ty byty museli tahat napříč tou dispozici, se ty byty zvětšovaly.

Oni měli představu, že v těch spodních podlažích bude víc menších bytů. Nakonec se ukázalo, že i v 2. NP směrem do ulice budou nebytové prostory, to znamená komerční jednotky. Potom do ulice jsou mezonety, a to právě proto, že ty byty v tom 2 NP nebylo možný udělat.

Z hlediska požadavků na proslunění a denního osvětlení?

Ano.

Děkuji a na to navazuje další dotaz, který už jste částečně zodpověděl, s kterými specialisty jste spolupracovali ve fázi studie? Vy jste už mluvil o té akustické studii a o té světelně technické.

Ano.

A používáte v navrhování třeba klidně i teď nějaké další metody ověření třeba světelného prostředí a podobně? Ještě předtím, než začnete konzultovat s těmi specialisty, počítáte si třeba něco z toho sami, nebo spíš jdete cestou té konzultace.? A těch studií?

Co si děláme sami jsou diagramy na oslunění. Samozřejmě potom třeba to denní osvětlení, na to už je potřeba nějaký software, takže tam už používáme nějaké specialisty, to už jde mimo nás.

Ještě se zeptám, ale vy už jste mi na to vlastně částečně taky odpověděl, co jste tam na tom domě dělali, nebo v tom projektu dělali za kompromisy, abyste právě splnili požadavky legislativy a úřadů? Vy jste už mluvil o té skladbě bytů.

Já bych pravdu řekl, tak už si to moc nepamatuju, protože už je to nějakou dobu. Ale samozřejmě, když to zobecním, tak těch kompromisů musíte udělat hodně a mám pocit, že ta dnešní doba je jenom o těch kompromisech. Že vlastně ten prostor, ten kreativní, se čím dál víc zužuje. Vy se potom pohybujete v nějakým prostoru, teď myslím obecně ten kreativní prostor, který je vytvořený všemi těmi legislativními požadavky a nároky. A vy v něm musíte nějakým způsobem vybalancovat tak, aby se všechno splnilo.

A konkrétně třeba soutěž na tu zástavu té proluky proti té naší stavbě. Tak to vyhrál projekt, který se snažil co nejvíc vypořádat s tím sluníčkem, s denním osvětlením. A vypadá tak jak vypadá, že to není jakási pevná hmota, která ta dvě nároží uzavírá, ale je to taková, jakási vykotlaná kompozice právě proto, aby se to sluníčko do těch obytných místností dostalo. A to je typický příklad toho problému, o kterém mluvím, že potom vznikne cosi, u čeho laik ani třeba my často nechápeme, proč to takhle vzniklo, ale bohužel je to dané různými nároky legislativy.

Dělali se pak v pozdějších fázích projektu Ostravské brány ještě nějaké další změny, aby se vyhovělo třeba požadavkům úřadů?

Ne myslím si, že se během toho projednávání se příliš velké úpravy nedělaly, tam spíš byl problém s tím prostorem okolo, kdy město nebylo schopno říct, jak bude vypadat do budoucna parter toho náměstí. Většina investorů se snaží toho okolo těch projektů zbavit.

Město to tehdy nedokázalo řešit, protože památkáři měli nějakou představu, jak ten před prostor okolo kostela by měl vypadat. Skončilo to tím, že ta stavba se předá, zůstaly ty plochy investorovi a my jsme následně potom pro město udělali studii řešení veřejného prostoru celého náměstí, protože v té době se připravovala rekonstrukce části ulice 28. října a my jsme to materiálové a obecně koncepčně řešení těch ploch a posunuli jsme tady do toho prostoru Kostelního náměstí.

A to byl podklad potom pro další fáze rekonstrukce, bohužel ta rekonstrukce dopadla velkým kompromisem. Měla tam být nějaká výtvarná díla v tom prostoru, ale to se prostě nepodařilo. A je z toho spíš dopravní řešení, než nějaký kvalitní veřejný prostor.

Když se vrátím přímo k tomu domu, tak je něco, co tam dopadlo třeba jinak než jste čekali, nebo i když se na to podíváte zpětně teď po těch letech je něco, co na tom domě dokončeném dopadlo jinak, než jste plánovali? Nebo co byste třeba udělali jinak?

Myslím, že obecně jsme s tím spokojeni. Samozřejmě během té realizace se vždycky potýkáte s určitými těžkostmi ve smyslu toho, že třeba dodavatelé nejsou schopni úplně tak, jak si představujete zrealizovat určité věci, ale to je asi běžný průběh každé stavby.

Co mi přijde škoda, ale to je daný asi vůbec tím, jak funguje centrum Ostravy, je partner, kde pod tou konzolou v tom dvoupodlažním prostoru jsme měli kavárnu, která tam fungovala jenom asi půl roku a potom se to zavřelo. Nevím, co tam je teď a obecně pro ten partner, ne ten do náměstí, ale směrem do ulice, byl problém vůbec sehnat nájemce, kteří by dokázali z toho udělat opravdu nějaký funkční prostory. Takže tam si myslím, že se ta představa, která byla se úplně nepovedla, ale to je spíš problém toho, jak vůbec…

V Ostravě, nevím, jak to říct, ale na rozdíl od Prahy nebo Brna, Ostrava má trošku jiný režim toho, co je to centrum města a jsou to i diverzifikovaný části, a i to vlastně Masarykovo náměstí úplně teda nefunguje, tak by jak by mělo.

My jsme kousek dál, nějakých 200m od náměstí a tam už je to vlastně jakási trochu periferie a proto i ty prostory parterové v tom okolí vypadají tak, jak vypadají.

Ještě jste mluvil o vlastně větrání a případně třeba nuceným větrání. Je to i případ tohohle projektu, bylo tam?

Jednu dobu se s investorem diskutovalo použití rekuperace v těch bytech, ale nakonec se to zrušilo. Je to jenom v komerčních prostorech, jak v tom přízemí, tak i ve 2.NP.

Co je tam teda jedna zajímavá věc, ale to úplně nemá vliv na to vnitřním prostředí, že jsou tam asekundární domovní stanice teplo, kdy ten dům je napojen na dálkový rozvod tepla. Je tam předávací stanice, ale potom každý byt má ještě svou předávací stanici s takovým malým zásobníkem. To znamená, že vy se potom můžete na pár dní odpojit od toho hlavního přívodu do bytu a udržujte si teplo v tom zásobníku, což se mi zdá, že v dnešní době, kdy ta nejistota s dodávkami jakéhokoliv tepla může být, tak na pár dní ještě člověk je potom autonomní od toho primárního přívodu tepla do domu.

Co si myslíte, že jako architekt potřebujete znát a vědět, abyste byli schopni navrhnout budovu s dobrým vnitřním prostředím?

Obecně asi by architekt měl znát veškerou legislativu, ale to se mi zdá že už současně době není možný, protože těch zákonů, vyhlášek a různých metodik je tolik, že to se asi prostě nedá všechno vstřebat, a navíc neustále ta legislativa mění.

Takže spíš to funguje tak, že dostaneme zadání a teprve postupně se prokousáváme všemi opatřeními, která je nutný dodržet proto, aby ta stavba se schválila. A nedej bože potom v průběhu té stavby vznikaly nějaké požadavky, nebo spíš reklamace, hlavně u těch developerských projektů je to běžná věc, že klienti potom hledají v problémy tak, aby mohli uplatňovat nějaké slevy na ty developery.

Ale tam si myslím, že to je poměrně jasná věc u té bytové výstavby. Co všechno se musí splnit.

Ale jsou to často i formální věci, kdy se potom na chodbách měří výška zábradlí, přesahy zábradlí přes stupně, aby tam byly dodrženy všechny tyhle věci.

Transport nadrozměrného předmětu jak na chodbách, tak v bytě. Byť to samozřejmě nikdo nepotřebuje, ale je to prostě v těch normách. To jenom tak jako bokem, že i tyhle trošku absurdní věci je nutno dodržet a na to potom ti klienti často upozorňují.

Co si myslíte, že by vám usnadnilo navrhování domů z hlediska vnitřního prostředí, ať už z hlediska legislativy nebo z hlediska nástrojů, softwarových nebo jiných?

Bylo by dobré kdyby třeba ta legislativa se koncentrovala do několika vyhlášek, kdy dejme tomu by byla vyhláška pro obytné stavby, vyhláška pro nebytové stavby, třeba administrativu a tam byly všechny ty základní věci jasně dané. To znamená, aby se to nerozmělňovalo do jednotlivých dílčích vyhlášek a norem. Kdy potom, když děláte jakoukoliv stavbu s nějakou typologii, musíte hledat: vyhláška o schodištích, vyhláška o něčem dalším a je to je roztroušeno ve strašně moc dokumentech a často si potom člověk ani některé věci neuvědomí, že to má nějakou souvislost.

Takže tam ta roztříštěnost, to si myslím, že ten největší problém. To znamená koncentrovat základní požadavky na nějaký konkrétní typologický druh do jednoho dokumentu.

Ještě se zeptám na spolupráci se specialisty. Co je pro vás důležité, aby ta spolupráce probíhala hladce a vedla k dobrému výsledku?

V poslední době je ta spolupráce čím dál víc nutnější a intenzivnější, což je taky doklad toho, že nás všechny ty normy a vyhlášky čím dál víc svazují.

Myslím si, že teď je hodně aktuální i problém energetické úspornosti a obecně tepelně technických podmínek pro stavby. Protože tyto nároky taky zpřísňují.

A teď třeba řešíme jednu velkou administrativní budovu a první co, než začínáme vlastně pracovat, je to, že nějaký jako auditor přes tady tyhle věci spočte, kolik můžeme mít maximálně prosklených ploch a jak mají vypadat konstrukce a teprve potom můžeme sednout, a začít něco kreslit.

Tak to mi přijde, že to už jsme se dostali úplně někam jinam a nevím, jestli tedy za pár let pro architekta vůbec bude nějaký kreativní prostor. Jo a takže to je aspoň pro mě to trochu smutný příběh.

Já si myslím, že hodně důležité je, aby tito specialisti byli kreativní. Protože jinak a ono je to už i vidět, že potom pokud se to bere všechno hodně dogmaticky, tak se vám ten prostor strašně zužuje. To znamená, že je nutné, aby i ten specialista dokázal nějakým způsobem vykličkovat a pomoci vám.

Nemyslím ohnout nějak ten výpočet, ale říct, ano, tady vidím problém, ale když se udělá tohle a tohle, tak toho můžeme taky dosáhnout. To znamená, aby vám i pomáhal, dokázal poradit nějakým řešením, které vám úplně nezkazí, nebo nezmění ten původní návrh.

A jestli se jedná o oslunění osvětlení nebo o tepelnou techniku, nebo o nějakou akustiku, to je jedno. Ale aby ten specialista opravdu překročil svůj stín těch excelových tabulek, ale dokázal vás pochopit, co chcete a pomohl vám.

Myslíte si, že architekta na tohle může nějak připravit škola? Co z toho je člověk schopen se naučit ve škole, nebo jestli si myslíte, že je to až záležitost praxe?

Na to jsou dva pohledy, co vůbec by se na té škole a jak by se to mělo učit. Samozřejmě jeden pohled je ten, že nezatěžujme studenty tady těmito složitostmi a nechme je kreativně přemýšlet. V té praxi potom té kreativity už moc není, tak ať si to užijí na té škole. A aby měli co největší prostor.

Druhá věc, anebo druhý pohled je ten: ano, už je na to musíme připravit teď. To znamená, co nejvíc věcí je dostat do studentů na škole. Já sám nevím, ale přijde mi, že tím, kdy ten student tam přijde s nějakým nadšením, a teď vidí, jako ho to postupně omezuje, může trochu ztratit tu motivaci. A zjistí, že architektura už moc není tím uměleckým oborem, ale že musíte mít nějaké právní povědomí, a hlavně znát veškeré tyhle legislativní věci.

Nejsem si jistý, jestli to je dobře, to znamená, měla by být nějaká zdravá míra a naučit ty studenty ten základ. To znamená, pohybujeme se v nějakém právním rámci a je potřeba splnit určité věci, aby to prostředí, to vnitřní prostředí nebo jakékoliv prostředí splnilo nějaké základní kvalitativní parametry. Takže to asi je nutné, aby si ti studenti uvědomili.

Ale nějakými podrobnostmi, to si myslím, že nemá smysl se na té škole zabývat.

Napadá vás ještě něco, ať už k té Ostravské bráně nebo k navrhování obecně?

Ještě taková poznámka, s čím se v poslední době taky hodně setkáváme, zejména v tom developmentu, že při zadání těch projektů často už ti developeři, protože oni ví, co to znamená, splnit tady všechnu tu možnou legislativu, t už vám do toho zadávání dávají jakousi kuchařku, jak určité věci mají vypadat.

V poslední době ty kuchařky už jsou opravdu knihou, kdy to můžete vzít a jako lego z toho potom vytvořit cosi. A to si myslím, že je právě důsledek tady té obrovské byrokracie a toho zmenšování prostoru pro architekty.

My už si dokonce někdy říkáme, že nemá smysl se do těchto zadání vůbec pouštět.

Ale zase chápu ty investory, že je to asi pro ně nezbytné, aby měli jistotu, že to všechno dopadne dobře a že budou všechny tyhle věci splněny.

Tím teď nemyslím nějakého investora typu rodina, která si staví rodinný domek nebo něco menšího, ale takové ty klasické developerské firmy, které opravdu mají jakýsi design manuál, design brief, jehož součástí už jsou i půdorysy bytů, skladby konstrukcí, vzorový řez oknem a fasádou a vy to vlastně z toho máte celé seskládat.

Ale to není proto, že oni by to takhle vyžadovali, aby si zjednodušili práci, ale to je důsledek všech těch tlaků, které je na to stavění v poslední době jsou.

Končíme tak smutně.

English translation of interview with Tomáš Pilař:

What does the indoor environment mean to you?
(Laughs) You start with a very difficult question, because of course it can be so many things, but I guess I understand that you look at it more on the technical side. Of course, an architect is probably interested not primarily in the technical side, but in the general arrangement of the environment, the quality, the harmony, the composition. That's probably what's important from my point of view. How does the space work at all? From the point of view of the functional, the spatial and the aesthetic.

I focus on the indoor environment of buildings and I focus on architectural design in terms of the indoor environment, but I also look at those quantifiable building physical parameters, that is daylighting and sunlighting, thermal comfort and indoor air quality and acoustics, in relation to that architectural design.
Were there any specific requirements for the quality of the indoor environment in the assignment of the Ostravská Brána apartment building project, or what requirements were you based on, for example, legislative requirements?

Generally, in projects like this one, meaning that an investor or developer is building it, unfortunately most of those investors are not concerned with anything more than meeting the basic legislative conditions. In those quantifiable parameters. That is, to meet what is required, but nobody is trying to do anything more.
Maybe that's more up to us then, if we think it's appropriate for the project, then we put something more in there, beyond the line of what's required by the investor.

And in this project or even in general, at what stage of the design do you start to deal with the indoor environment, even in individual areas?
Recently, because certain parameters, such as lighting, are very limiting, especially for residential buildings, we have to deal with this in the initial phase, that is, in the study. A similar thing is the case with noise from the outside environment, where often, especially in urban environments, some noise protection measures have to be designed from the outset, and this is also linked to the requirement for mechanical ventilation.
So we have to deal with that already in the study, because let's say the glare, the lighting...Of course Prague doesn't have that problem with sunlight anymore, because the Prague building regulations look at it a bit differently. But elsewhere, where the general technical conditions for construction apply, it is still there, so we deal with it already when we create the basic spatial layout or the massing or the location of the building.

Do you remember, for example, specifically in the Ostravská Brána project what you had to deal with for limits?
With the Ostravská Brána, due to the orientation that is to the street, and in addition to that, the bending of the building into that open V, was the problem I was just talking about.
That is, some of the apartments, if they were one-sidedly oriented either to the street or to the square, just didn't meet the required values of the sunlight and daylighting, so the composition of the apartments was dealt with for a long time. The layouts are quite deep in some cases, but that's a tribute to the fact that we had to get the sunlight into the apartments somehow, because the investor didn't want to have any kind of non-apartments, so called ateliers.

Well, what determined the mass of the house?
The mass of the house was created ... or the basic footprint was determined by a zoning decision that another investor had had there for some time. And the new investor that we were doing it for had already bought it with that zoning permit and wanted to work with it in some way, so we had to fit into that footprint and just in some nuances where we rounded that corner and did that console there, so we had to work with it that way.
And anyway, in the end it turned out that the planning permission wasn't quite able to meet what was wanted because of those requirements of the developer, so in the end the building was modified anyway and then the planning permit and the building permit were done together.

By investor requirements do you mean floor area and number of apartments and such?
First of all, because they wanted to get a little bit more out of it and then during the negotiations there were consultations especially with the conservationists, because for them the site was sort of the location in the city centre and it actually closes off the Church Square, so it was sort of an important discussion for them. So then the details of the connection to the bishop's building were also dealt with. Because the original planning permission didn't deal with those things... at all. That was more of a kind of a massing scheme that was intended to be used to evaluate that site and that buyer, sort of increased the value of that site.
Yeah, but that's completely unrelated to what we're talking about though.

Actually, it is related, I wanted to ask what you have addressed there in terms of, say, the impact of the building outwards, either on the historic zone, or the shading and so on.
The impact in terms of the deterioration of... I don't know... the lighting of the surrounding buildings or the sunlight, it wasn't very significant because the only building in that close proximity is the Bishop's building. But the levels there, when the diagrams were done, they came out fine and then on the opposite side, there was nothing standing there at the time, so we didn't have to deal with that.
And actually the parking lot across from the square towards the streets Masarykova and 28. října, so there was a competition for that a few years ago, but it was also a vacant lot then, so it was actually kind of to our advantage.
On the other hand, we were concerned about noise because it was expected that the street 28. října would be busier in the future. So a noise study was done and then the values on the facade and in the interior were calculated on the basis of that. Of course, there was also a noise study of the stationary sources both from the surrounding area and then from ours, and then there was also a noise study of the indoor environment in terms of the noise of the parking lot at 1. and 2. NP, that is to say, the soundproofness of the structures.
So these things were already addressed in the study, when we set up with the building engineers some composition of the structures and then it was examined actually what the possibilities are, because of course the investor is interested in what measures mean what money. This is always the kind of thing where you can sink quite a lot of money into it, and investors like to keep an eye on that.

Of course, the arrangement of the flats was a big issue then, because our original idea or the investor's idea was some kind of composition of the apartments, and thanks to the fact that we had to stretch the apartments across the layout, the apartments got bigger.
They had the idea that there would be more smaller apartments on the lower floors. In the end, it turned out that even the second floor towards the street would be non-residential space, meaning commercial units. Then, facing the street, there are duplexes, precisely because it was not possible to make those apartments in the 2nd floor.

In terms of sunlight and daylighting requirements?
Yes.
Thank you and that is followed by another question, which you have already partially answered, which specialists did you work with in the study phase? You have already talked about the acoustic study and the lighting study.
Yes.

And do you use any other methods in the design, for example, even now, to verify the lighting environment and so on? Before you start consulting these specialists, do you calculate any of this yourself, or do you go down the route of consultation and studies?
What we do ourselves are diagrams for sunlight. Of course, then there's the daylighting, which requires some software, so we use some specialists there, that's beyond us.

I'll ask you again, but you've already partially answered this, what compromises did you make in this project to meet the requirements of the legislation and the authorities? You've already talked about the mix of apartments?
I honestly don't remember much about that because it's been a while. But of course, if I generalize, you have to make a lot of those compromises and I feel that these days it's all about those compromises. That actually the space, the creative space, is getting tighter and tighter. You are then moving in a certain space, now I mean generally the creative space, which is created by all these legislative requirements and demands. And you have to somehow balance within it so that everything is fulfilled.
And specifically, for example, the competition for the gap opposite our building. So that was won by the project that tried to deal with the sun as much as possible, with the daylighting. And the way it looks is that it's not a solid mass that encloses the two corners, but it's a kind of jutting composition just to get that sunlight into those living rooms. And this is a typical example of the problem that I am talking about, that something is then created that the layman and perhaps we often do not understand why it was created this way, but unfortunately it is due to the various requirements of legislation.

Were any other changes made in the later stages of the Ostrava Gate project to meet the requirements of the authorities?
No, I don't think too many changes were made during the negotiations, there was more of a problem with the space around the square, where the city was not able to say what the ground floor of the square would look like in the future. Most investors are trying to get rid of that around those projects. The city was unable to address that at the time because the preservationists had some idea of what the front space around the church should look like. It ended up that the building was handed over, those areas were left to the investor and we then did a study for the city on the solution of the public space of the whole square, because at that time the reconstruction of part of 28. října street was being prepared and we did the material and general conceptual solution of those areas and we moved it here to the area of Church Square.
And that was the basis for the next phase of the reconstruction, unfortunately the reconstruction ended up being a big compromise. There was supposed to be some artwork in that space, but that just didn't happen. And it became more of a traffic solution than a quality public space.

Returning to the house itself, is there anything that maybe turned out differently than you expected, or even looking back on it now after all these years is there anything about the finished house that turned out differently than you planned? Or maybe what would you have done differently?
I think in general we're happy with it. Of course, you always have some difficulties during the implementation in the sense that maybe the contractors are not able to implement certain things in the way you imagine, but that's probably the normal course of any construction.
What I find unfortunate, but it's probably due to the way the centre of Ostrava works in general, is the partner where we had a café under that console in that two-storey space, which was only there for about half a year and then it closed down. I don't know what's there now, and in general for that partner, not the one facing the square, but the one facing the street, it was a problem to find tenants who could really make it a functional space. So there I think the idea that was there didn't quite work out, but that's more of a problem of how to even...
In Ostrava, I don't know how to say this, but unlike Prague or Brno, Ostrava has a slightly different regime of what the city centre is and it's also diversified parts, and even Masaryk Square doesn't really work as it should.
We are a little bit further away, some 200m from the square and there it's actually a little bit of a periphery and that's why the ground floor spaces in that area look the way they do.

You also talked about ventilation and possibly mechanical ventilation. Is that the case with this project as well, was it there?
At one time there was a discussion with the investor about using heat recovery in the apartments, but it was eventually cancelled. It's only in the commercial areas, both on the ground floor and on the 2nd floor.
So what's one interesting thing there, but it doesn't completely affect the indoor environment, is that there are asecondary home heat stations where that house is connected to district heating. There's a transfer station, but then each apartment still has its own transfer station with a little storage tank. That means that you can then disconnect from that main supply to the apartment for a couple of days and keep your heat in that storage tank, which seems to me that in this day and age, where the uncertainty of any heat supply can be, for a couple of days still one is then autonomous from that primary heat supply to the house.

As an architect, what do you think you need to know to be able to design a building with a good indoor environment?
In general, I think an architect should know all the legislation, but it seems to me that this is no longer possible at the same time, because there are so many laws, decrees and various methodologies that it's probably just not possible to absorb it all, and the legislation is constantly changing.
So the way it works is that we get the assignment and only gradually work our way through all the measures that have to be followed in order for the building to be approved. And then, God forbid, in the course of that construction there were some claims or complaints, especially in those development projects, it is a common thing that clients then look for problems so that they can claim some discounts on those developers.
But there I think that's a fairly clear thing in that residential development. What all has to be met.
But it's often formal things as well, where they then measure the height of the railings in the corridors, the overhang of the railings over the steps, so that all those things are met there. Transporting an oversized object both in the hallways and in the apartment. Even though, of course, nobody needs it, but it's just in those standards. It's just as an aside that even these slightly ridiculous things have to be complied with, and then that's what these clients often point out.

What do you think would make it easier to design homes from an indoor environment perspective, either in terms of legislation or in terms of tools, software or otherwise?
It would be good if, for example, the legislation was concentrated in a few decrees, where let's say there was a decree for residential buildings, a decree for non-residential buildings, for example, administrative buildings, and all the

basic things were clearly stated there. This means that it should not be diluted into individual sub-decrees and standards. Then when you do any kind of building with a typology, you have to look for: the regulation on staircases, the regulation on something else, and it's scattered in an awful lot of documents, and then often you don't even realise that some things are related.
So the fragmentation there, I think that's the biggest problem. It means concentrating the basic requirements for a particular typology into one document.

Let me ask you about working with specialists. What is important for you to make sure that the cooperation goes smoothly and leads to a good result?
Recently, this cooperation has become more and more necessary and intensive, which is also proof that all these standards and regulations are binding us more and more.
I think that the issue of energy efficiency and thermal technical conditions for buildings in general is also very relevant now. Because these requirements are also getting stricter.
And now, for example, we are dealing with a large office building and the first thing we do before we actually start working is to have an auditor calculate how much glass area we can have and what the construction should look like and then we can sit down and start drawing something.
So it seems to me that we've gone somewhere else and I don't know if there's going to be any creative space for an architect in a few years. So it's a bit of a sad story, at least for me.
I think it's very important that these specialists are creative. Because otherwise, and you can see that already, then if you take it all very dogmatically, you narrow the space terribly. That means that it is necessary that the specialist is able to help you in some way.
I don't mean to bend the calculation somehow, but to say, yes, I see a problem here, but if this and this is done, we can achieve that too. That is, to help you as well, to be able to advise you with some solution that doesn't completely ruin or change the original design.
And whether it's sunlight, or daylighting, or thermal engineering, or some kind of acoustics, it doesn't matter. But for that specialist to really go beyond their shadow of those excel spreadsheets, but be able to understand what you want and help you.

Do you think that an architect can somehow be prepared for this by school? What is one able to learn in school, or do you think it's a matter of practice?
There are two perspectives on this, what should be taught in school in general and how it should be taught. Of course, one view is that let's not burden the students here with these complexities and let them think creatively. Then there's not much creativity in the practice, so let them enjoy the school. And give them as much space as possible.
The second thing, or the second view, is that, yes, we have to prepare them now. That means getting as many things as possible into the students at the school. I don't know myself, but it seems to me that by the student coming in there with some enthusiasm, and now seeing how it's gradually limiting them, they may lose that motivation a little bit. And they find that architecture is not really that much of an art discipline anymore, but you have to have some legal awareness, and especially know all this legislative stuff.
I'm not sure if that's a good thing, I mean, there should be some healthy moderation and teach those students the basics. That is, we're moving within some legal framework and there are certain things that need to be met in order for that environment, that indoor environment or whatever environment, to meet some basic quality parameters. So I think that's what you need to make those students aware of.
But some of the details, I don't think there's any point in going into that at school.

Can you think of anything else, either about the Ostravská Brána project or about designing in general?
One more remark, which we've also encountered a lot lately, especially in the development sector, is that when commissioning these projects, often the developers, because they know what it means to comply with all the possible legislation, already give you a kind of cookbook for how certain things should look.
These cookbooks are really a book nowadays, where you can take it and make something out of it like a lego. And I think that's just a consequence of the huge bureaucracy here and the shrinking space for architects.
We sometimes even think that there is no point in going into these assignments at all.
But again, I understand the investors, that it's probably necessary for them to make sure that it all goes well and that all these things are met.
Now I don't mean some investor like a family building a family house or something smaller, but those classic development companies that really have a kind of design manual, a design brief, which already includes floor plans of the apartments, compositions of the structures, a sample section of the window and facade and you actually have to assemble it all from that. But it's not because they require it that way to make their job easier, it's a consequence of all the pressures that have been put on building recently.

We are finishing so sadly.

Residential Block 4BLOK

Interviewee: David Chmelař

Interviewer: Kristýna Schulzová

Date and time: 4. 4. 2022 9:00

Online, MS Teams

Original interview with David Chmelař in Czech:

Co si představíte pod pojmem vnitřní prostředí budov?

My bychom popisovali z hlediska architektů a vy to asi myslíte z hlediska techniků?

Já to myslím spíš hlediska architektů nebo co pro vás to znamená?

My to bereme obecně, že musíme udělat prostory proporční, dobře nasvětlené, dobře na sebe navázané, aby to mělo nějakou logiku. Pak samozřejmě si hrajeme s nějakým širším měřítkem, aby ten dům urbanisticky zapadl a ty vnitřní prostory z toho tak nějak vyplynou, že prostě ten dům, když ho zakonfigurujeme do urbanismu, toho místa, vytvoří nějakou hmotu. A teďka vy s tou hmotou pracujete. Je trošku jakoby elastická, takže má to nějaký potenciál se měnit, rozvíjet.

A do toho si dáváte ty základní principy, to znamená, že jdeme od celku k detailu. To znamená, že nejdřív do místa, pak dům. Pak samozřejmě musíme myslet na to, že máme nějaké technické parametry, takže aby ty konstrukce byly dostatečně dimenzovaný, nechaný na ně dostatečný prostor. A k tomu se teprve další vrstvy doplňují podružné věci, nějaký zázemí a takový věci, který už vyplynou z toho místa, který tam na to zbyde.

Takže takhle z pohledu architektů a samozřejmě pak musíme do týmu dostat techniky, který nám začnou říkat: malá šachta, velká šachta, tady potřebuju únik, tady dveře a tak.

Téma toho, co dělám, je architektonické navrhování z hlediska vnitřního prostředí budov.

To znamená konkrétně u toho vnitřního prostředí se zaměřuji hlavně na ty kvantifikovatelné stavebně fyzikální parametry, to znamená denní osvětlení, proslunění, akustika, ať už stavební nebo prostorová, a tepelná pohoda a kvalita vnitřního vzduchu. Ale spíš mi jde o ty souvislosti s tím architektonickým návrhem a s tím, jak vy jako architekti řešíte, o čem tam přemýšlíte.

Zapomněl říct, že určitě potřebujeme to orientovat na světové strany, to hnedka úplně v tý první úvaze, když je to bytový dům, tak aby měl východní západní strany.

Když je to administrativa, tak může mít jih sever, aby už ta hmota už od začátku byla orientovaná dobře, že víme, že do každýho toho koutu dostaneme to slunce, který tam potřebujeme podle toho využití.

Byly už v zadání projektu 4BLOK nějak specifikované požadavky na vnitřní prostředí, ať už technický nebo nějaký jiný? Nebo jste spíš vycházeli třeba z normových a z legislativních požadavků?

Z normových, legislativních a potřebovali jsme splnit koeficientu hluku, protože je to dost namáhaný místo: tramvaj, čtyřproudá cesta.

V té době my jsme brali oslunění osvětlení. To znamená, že jsme hodně se jako prali s tím abychom neměli problém v těch rozích, který samozřejmě pro blokovou zástavbu, která tam z urbanistického hlediska byla potřeba dodržet, nebo chtěli jsme ji držet, protože jsme vlastně mezi Vinohrady a Vršovicemi, kde už je jakoby volná řádková zástavba, kdežto ty Vršovice jsou bloková zástavba, takže na pomezí. A proto jsem chtěl, aby ta hmota byla kompaktní v partneru, ale aby byla účelně probraná nebo zprostupněná a nebyl to uzavřený blok, ale aby tam byly díry do toho, protože víme, že samozřejmě nejhorší jsou ty rohy v těch v těch blocích. Anebo celá vlastně severní fasáda do dvora je úplně zabitá, to je vám k ničemu.

Takže to k tomu urbanismu, že je potřeba přemýšlet blokové zástavbě, která je efektivní pro města, to je jasný. Ale myslel bych si, že mají být trošku jinačí než někde za klasicismu nebo někde, kde se s tím přišlo jako s novinkou urbanistickou, tak od tý doby si myslím, že jsme zjistili, co to tam dělá za neplechu a potom ty dvorky jsou takový stinný, je tam mech, pak si tam dělají garáž, další garáž a najednou to zaroste takovým divným vnitřkem.

Tak to si nemyslím, že je pěkný jako proto, když jsou okolo byty, aby koukali na něco, co není jako pěkný uprostřed.

Takže a díky tomu, že to místo nebylo kdoví jaký, tak jsme chtěli právě ten dvůr, aby byl leitmotiv toho celého projektu a měl jsem myšlenku, že ty balkony zelený vlastně mají být symbol prorůstající zeleně skrz tím domem, že vlastně tím barákem prorůstají ty stromy, co jsou uprostřed, že je to vlastně březový háj uprostřed Vršovický ulice, která vlastně … teď tam možná zbourají Koh-i-noorku, nebo nechají tam důležitý stavby, ale většina přijde pryč, tak se to zase posune jakoby blíž k městu a bude to víc centrem než teď, kdy to byla periferie, kdy opravdu tam bylo hodně továren a bylo to takový jako neutěšený, ty Vršovice. Takže tenhle projekt byl další krůček, jak to tam změnit na pěknou čtvrť ve městě.

A kdybyste chtěla technicky, z toho posuzování, tak my rekuperujeme půlku toho projektu. My jsme to měli rozdělené, že to, co vede do Vršovický ulice, tak bylo rekuperovaný vzduch. V tý době to ještě nebylo tak obvyklý, jako už je teď, když jsme to projektovali, že jo, to bylo klidně 7 let dozadu. Tehdy ještě nebylo tak běžný, že se rekuperovaly domy. Teďka je to docela už jako běžná věc, že skoro každej druhej dům je už rekuperovaný, nuceně větraných, tak to tam byla novinka.

Vy jste mi teda částečně odpověděl, ale v průběhu toho návrhu, v kterých fázích jste řešili kvalitu vnitřního prostředí? Ať už světlo, nebo právě akustiku, větrání?

Ze začátku, od studie. Už na studii se necháváme dělat u světlotechnika posouzení, jestli je to v pořádku. Něco uděláme, tak jako nějak selským rozumem, že vlastně víme, že když je tam málo světla, tak musejí být větší okna. Navíc mi ty větší okna jako vyhovuji i z hlediska toho vnitřního prostředí, mám rád ten kontakt s venkem a naopak to proměňování venkovního počasí, aby mělo dopad do vnitřku, takže velký okna jsou pro mě důležitý a zároveň to ale odpovídá na to, že chceme aby to bylo dobře osvětlený.

Takže od studie.

S tím trochu souvisí, kdy a jakým způsobem to konzultujete se specialisty, jestli třeba ještě předtím, než přijdou specialisti používáte nějaký ať už třeba softwarový nástroj, abyste si ověřili množství světla, teplo a podobně, nebo jestli rovnou jdete spíš formou konzultací už ve studii?

Bereme to všechno jako ze zkušenosti, protože to už to nebyl první barák, děláme to dlouho, takže už víme, co čekat.

A většinou když jdete po srsti, tak dojdete k tomu řešení, který si pak necháte potvrdit technikem výpočtem. Takže světlotechnik nejdřív, potom hasič, abychom si zkontrolovali úniky a abychom si zkontrolovali délky chodeb a hadice, vždycky je na to nějaký názor, jak to má být.

Teďka evergreen současný době je elektromobilita, to znamená, že co se děje z hlediska ochrany proti elektromobilům, který by teoreticky mohly se vznítit. Je to si myslím úplně špatně uchopená věc, kde všechno by bylo vyřešený, když by automobilky daly prostě na baterku prvek, který dokáže rozpoznat, že se zvyšuje teplota ty baterky a odpojí ji. Johnson&Johnson to má vyrobený ten výrobek, jenže on stojí €1000. A teďka, kdo donutí automobilku, aby za 1000 € tam přidala nějakou věc, což jako si myslím, že v ceně elektromobilu je úplně zanedbatelná věc. A nám třeba konkrétní projekt, já nevím, třeba bytovka 170 bytů to prodraží suterény, opatření, který to vlastně mají vychytat. Ta pravděpodobnost je, že každá 1000. baterie může mít problém a vy kvůli tomu děláte opatření třeba za pětadvacet milionů.

Takže ten dům se nesmyslně pro ty klienty prodražuje. Samozřejmě to jako zaplatí lidi, co si tam kupují byt, protože budou mít zbytečně překombinovanou ochranu toho suterénu, kde vlastně může teoreticky jedno auto někdy vznítit, ale nikdy se to nestane, že?

To jsem odeběhnul, ale myslím si, že přehršel různých norem a všeho je… diskutabilní.

Jaký jste třeba v tomhle projektu dělali kompromisy, abyste naplnili požadavky právě úřadů a legislativy na to vnitřní prostředí? Nebo i jiný požadavky?

Asi bych si ani nemyslel, že byly jako kompromisy. Prostě jsme se snažili se vším tam se ctí se poprat. Takže bych neřekl, že byli kompromisy.

Nemyslím kompromisy vyloženě negativně, spíš co tam mělo zásadní vliv na formu toho domu?

Spíš ta městská část je taková složitější, když bych to porovnal s jinýma Praha, tak tady je to takový komplikovanější jednání. Tak to bylo celkově tak, že to trvalo dlouho.

Ale jinak bylo tohle, že jsme měli ateliéry a teď na ty ateliéry byla na to složitá tabulka, kdy je to ateliér kvůli osvětlení, kde je to ateliér kvůli tomu, že nedokážete zaručit oslunění, pak tam byl ateliér, co nevychází hlukově. Postupem času to dospělo až k tomu, že vlastně při vyprodání bytů se zjistilo, že vlastně nepotřebujeme úplně oslunění (protože se změnila legislativa), takže plno z těch ateliérů kvůli oslunění se rekolaudovalo na byty. Takže jsme dělali, já nevím třeba pro 5 bytů ještě projekty rekolaudce, že už není ten požadavek na oslunění, tak můžou být vlastně bytem.

To si myslím, že byl naprosto jako správný krok, že z těch pražských stavebních předpisů to vypadlo a bylo by fajn, kdyby to platilo celorepublikově. Jsem byl v pátek, nebo ve čtvrtek byl summit architektury v Obecním domě a tam to zaznělo, že prostě v Ostravě i v Brně nebo i v jiných městech, kde samozřejmě ta výstavba je větší, že by to taky chtěli, kdežto oni mají pořád normy, takže to si myslím, že je krok jako správným směrem. Že když bydlíte ve městě, plno lidí nemá rádo slunce, a navíc to ani nejde splnit. Ale to město má větší výhodu.

Pavel Hnilička vlastně upozornil na to, že Jižní město vychází skvěle, ale lidi chtějí bydlet víc v centru a že to je tím, že tam všechno je blízko, a to město je kompaktní.

Tak proto je potřeba k tomu přistupovat takhle, spíš velkoryse nebo nebýt úplně svázaný normami.

Museli jste teda potom v pozdějších fázích toho projektu dělat nějaké změny, abyste právě splnili požadavky úřadů?

Já si myslím, postupně, jak se ten projekt chystal, chystal se dlouho, tak to tak nějak postupně se vyvíjelo a nebylo nic, jako co by nás zaskočilo na konci. Spíš to bylo myslím, že se zpřísnila norma.

Co je problém, když jste u nějaký dopravy, třeba kolejiště nebo tramvajové tratě, tak máte vibrace. To znamená, že co jsme hodně řešili, byla vibroizolace. Jak a v jaké části ten dům izolovat proti šíření vlastně vibrací? Do poslední chvíle jsme zvažovali, jaký způsob zvolit, aby to prostě splnilo to, co se potřebuje, protože on to tady nikdo neumí moc počítat, aby to bylo efektivní, abyste prostě nemusela celý dům udělat dvojitou desku. Tak nakonec jsme tam zvolili, že jsou vlastně na zhlaví sloupů v suterénu vibroizolační, takový gumový izolační pásy. Byl problém to spočítat, kolik vlastně toho budeme potřebovat, aby to vyšlo u kolaudace, kdy to budeme měřit na přesno.

A pak ještě u oken. Tady na tom projektu mě překvapilo, že přišli dodavatelé s tím, že na šíření hluku jsou horší trojskla, i když jako zase na jiných stavbách mi řekli, že je to sporný. Že jsou lepší dvojskla, že tam není tolik hmoty, která může rezonovat, která se může chvět.

Tak to byly takový dvě věci, co vím, že se ladilo ještě při provádění, že to nebylo úplně v projektu.

Je potom u toho finálního domu něco, co třeba vás překvapilo, nebo dopadlo jinak, než jste plánovali, doufali?

Mně se to moc líbilo, dostali jsme ceny. Nic, co by mě negativně zaskočilo ani nebylo.

Spíš, že od té doby si dávám pozor na to, abych kontroloval techniky, kolik tam udělali šachet na střeše, protože pak to obcházíte, koukáte, co tam leze nad střechu a má to 3 metry a v tom je 1 trubka. A vy na to uděláte tu drahou konstrukci, lidem to tam překáží a tak.

Takže třeba na dalších projektech, spíš se soustředím na to, aby nám na těch střechách lezlo jenom potřebný minimum a nebylo tam jenom, že to někomu vyjde, tak to obkreslí a pak najednou zjišťujete, že to tam ani není úplně nutný, mít takový monstra.

Řešil se u tohohle projektu nějak dopad směrem ven, ať už právě třeba hluk z nějakých jednotek na střeše, nebo třeba zastínění?

Máme tam rekuperační jednotky na střechách, tak ty aby nehlučely do oken. A jestli tam byly akustické předstěny? Myslím si, že jsme to snad tam ani neřešili, akusticky jsme to neměli, jsme to vysunuli nad střechu. Neměli jsme tam ani zástěny žádný akustický.

Ještě k tomuhle domu, napadá vás něco i klidně k příběhu toho projektu?

Co mě strašně mile překvapilo, že jsem po 5 letech tam byl s jinými klienty jim to ukázat, jak projektujeme a ten dům vevnitř je vlastně nedotčený, nic není poškrábané, my jsme si na tom docela dali záležet. Nebo i investor požadoval a bylo to hrozně fajn, jako děláme spolu dlouho, takže to je takový standard, udělat i vnitřní prostory se ctí, aby to nebylo jenom vymalovaný bíle, že si to potom přetřou.

A ti klienti říkali: „No my to malujeme na bílo, aby se to dalo snadno vyměnit a pokaždé, když se nám tam lidi nastěhují, tak to zničí. Takže jdeme znova a celý chodby malujeme. No a my

tady máme tmavě zelený stěny, tmavě šedý, je tam pohledový beton. Ten prostor je hodně dořešen, vypracováván nadstandardně oproti jiným konkurenčním projektům a jediný takový zdůvodnění, co mě napadlo, že ty lidi, jak k tomu mají vztah kladný, že vidí, že něco dostali, tak se k tomu staví mnohem líp a mají to rádi. A že podle toho je i vidět, jak se k tomu domu stavě. My tam máme myčky na psy u vstupních dveří, tam jsem viděl ručníky na háčkách, takže to evidentně používají, když přijdou zvenku. Takže to byla moje radost, i když jsem viděl, že je to vyšlapaný od dětí, že hrají fotbal na tom dvorku. Že to tak, jak jsme si mysleli, že to má fungovat, že si sjedou výtahem, přijdou si do dvora, nemusí jít přes veřejný prostor, kde je tam plno aut, že to hezky ten dům funguje.

Dobře to stárne, což je pro mě důležité, abych viděl, že ty domy dobře stárnou. I co se týče použití materiálu na fasádu, tak to nesmí být po roce po první zimě různě rozklížený, upadlý. Občas to vidím, že se úplně nemyslí na to, jak budou ty materiály stárnout. Použije se něco na efekt, co vypadá hrozně super na fotce nasvícený, ale když to potom projde dvěma zimami, když uplyne nějaký čas, tak se zjistí, že to vlastně nebylo vůbec promyšlený, že do toho zatéká, že díky tomu, že do toho občas zateče, tak se to různě nabobtná. Anebo jsou hnedka ty fasády opršený, jsou špinavý, na to je potřeba myslet. Snažíme se na to dbát, aby ten dům stárnul dobře.

Co si myslíte, že jako architekt potřebujete znát a vědět, abyste byl schopen navrhnout budovu s dobrým vnitřním prostředím?

No pořád se vyvíjejí různé požadavky, různý názory. Teďka třeba ještě hit je, zase si myslím, že to patří do kategorie úplně jako nesmyslných věcí, které by se vůbec nemuseli řešit, že máte mít každou místnost akusticky chráněnou, zvyšují se nároky na prostup i v rámci bytu. Ale vy musíte ten pokoj vyvětrat. To znamená, že přes ty dveře, který byly dřív podříznutý a v pohodě to fungovalo, musíte dostat vzduch z místnosti ven. Vůbec nechápu, proč takovou nesmyslnost musíme řešit.

Když stejně většina těch bytů je otevřená, nezavírám doma dveře. Nevím, proč by to měl klient platit potažmo ti drobní investoři, který to kupují, dál se jim to projevuje do ceny. Musíme přidávat opravdu nemalý náklady na každý dveře v tom bytě, který budou mít zase nějaký super průvětrník, který se dával na okna. Zase, vyvětrám si oknem, vůbec nechápu ten princip, že musím mít průvětrníky. Ani na té nejobyčejnější stavbě už se neobejdete bez toho, aniž byste neměla v rámu průvětrník.

Zbytečně jimi táhne. Připadá mi, že to je postavený na hlavu, že ten barák tak utěsněním, že pak najednou zjistím, že vlastně nedýchá, tak ho musím zase proděravět.

Dobře, na plášti to ještě nějak chápete, že tam ty lidi třeba nebydlí. Ale proč by to mělo být v rámci bytu? A to jsou všechno věci, co laik neví, ale zbytečně se mu to zdražuje.

Pak se k tomu přidají ještě vlastně poplatky městským částem, a to všechno jsou náklady, které by ti lidi vůbec nemuseli platit. Mohly by být ty byty levnější.

Nejvíc mě potom fascinují texty typu, že jako to ten developer zaplatí. Nic nezaplatí. Proč by to dělal? Ten prostě to nechá zaplatit toho, komu to prodává. Takže to vždycky na tom koncovém zákazníkovi. Největší samozřejmě krkolomnost jsou úřady, kdy potřebujete těch 60, 70 vyjádření, každý má měsíc na odvolání, úplně nesmyslný proces, opravdu tragédie. To všechno zdražuje bydlení, takže si myslím, že to je úplně zbytečný a zbytečně si akorát taháme peníze z kapes. Takže kdyby se míň zamýšleli ty lidi a více se snažilo myslet selským rozumem, tak si myslím, že by to bylo ku prospěchu.

Ještě se zeptám na spolupráci se specialisty, co tam považujete za důležité, aby to fungovalo, aby to vedlo nějakým dobrým výsledkům?

Aby každý věděl, jaká je jeho role. Samozřejmě princip toho týmu je založen na tom, že jsou to profíci a dělají svoji práci dobře. A musí mít tah na bránu. Nedělat prostě někdo, že je chytřejší než druhej a dopravní inženýr vymýšlet nějaký nesmyslnosti v dopravním řešení, co mám teď živou zkušenost. Když to řeknu lidově, tak chtít ten projekt dokončit, hledat řešení, nehledat problémy. To je jako nejdůležitější a děláme se všemi velkými kancelářemi v Praze a většinou je to dobrý. Všichni vědí, co je jejich role a dělá se to s nimi moc pěkně.

Takový týmový duch, že prostě se chce něco udělat, každý má nějakou roli a bez někoho že to nefunguje. Prostě ten výsledek potom není tak dobrý.

Napadá vás ještě něco? Třeba právě k roli architekta v návrhu vnitřního prostředí.

Co bych zdůraznil je nepoužívat náhražky, nedělat něco, co je jako.

Takže vnitřně mám strašný problém s vinylovými podlahami, protože to považuju, že tam dáváte prostě plast. Takže si myslím, že i ty materiály samy o sobě mají nějaké vlastnosti, ne úplně třeba i změřitelné, který mají na to vliv. To znamená, že když máte dřevěnou podlahu, která hezky stárne, dřevo voní, má to prostě nějakou energii, to samý dřevěný okna versus plastový.

Plus nějaký jako imitace, když tam není beton, tak tam nedělám stěrku jako beton, nebo netvářím se, že to je beton, nebo když je to sloup ocelový, tak se netvářím, že je to dřevěný sloup, neobkládám ho. Jsou to takové vědecky nezměřitelné vlastnosti těch prostor, který ale na ty lidi nějak utváří, i to barevné pojednání, proporční má vliv a podle mého to ty lidi nějak ovlivňuje, vnímají to a pak jsou mnohem otevřenější. Takže já se snažím ty baráky dělat tak, aby to ty lidi bavilo, aby je to rozvíjelo, aby tam vždycky měli nějaký zážitek s každou denní dobou.

Roční dobou se ten dům proměňuje, zeleň, aby se proměňovala, osazovat to tak, aby v průběhu celého roku šlo vnímat, jak ta příroda běží.

Když jsou jehličnany, které jsou obrovsky praktický, ale ten pocit z toho je úplně tragický, jste jako někde na hřbitově, kde se to nemění, je to prostě konstantní, takže takový ty devadesátkový úpravy zeleně.

My jsme měli jednu vilu, tam si udělali zahradu, aby byla úplně super bezúdržbová, ale ona byla totálně statická. Koukala jste furt do jednoho stejnýho. Teďka samozřejmě nic pod tím neroste, protože ty jehličnany jsou kyselý, takže pod tím žádný podrosty. To jsou aspekty, které to prostředí hrozně ovlivňují. Že se tam na jaře vykvetou cibuloviny, pak vyraší traviny, pak začnou kvést nějaký další kytky, keře, obalí se stromy listama, vy vidíte, jak to dojde do nějakého bodu, pak začnou žloutnout a ten koloběh toho roku se tím krásně projevuje, dokládá a má to tu proměnlivost, že prostě ten život plyne.

V bytě se mají používat vlastně přírodní materiály, který jsou příjemný. Jasně, že mají zdá se kratší životnost než lino. No ale kdo chce bydlet jako Faradayově kleci, a ještě tam mít plast na zemi, plastový dveře, plastový okna … připadá mi, že to není úplně ono.

English translation of interview with David Chmelař:

What does the term indoor environment mean to you?
We would describe it from the point of view of architects and you probably mean it from the point of view of engineers?
I mean it more from the architects' point of view or what does it mean to you?
We take it in general terms that we have to make the spaces proportional, well lit, well related to each other, so that it has some logic. Then, of course, we play with some broader scale so that the house fits in urbanistically and the indoor spaces kind of come out of that, that just the house, when we configure it into the urbanism, the place, creates some kind of mass. And now you're working with that mass. It's a little bit elastic, so it has some potential to change, to evolve.
And you're putting the basic principles into it, which means that you're going from the whole to the detail. That means first the place, then the house. Then, of course, we have to think about having some technical parameters, so that the structures are sufficiently sized, leaving enough space for them. And only then the other layers are added to that, the secondary things, some facilities and things like that, which will already result from the space that's left there for it.
So that's the way from the architects' point of view, and then of course we have to get engineers on the team who start telling us: small shaft, big shaft, I need a fire escape here, a door here, and so on.

The theme of what I do is architectural design in terms of the indoor environment of buildings.
That is to say, specifically for the indoor environment, I focus mainly on those quantifiable building physical parameters, that is, daylighting, sunlight, acoustics, whether structural or spatial, and thermal comfort and indoor air quality. But I'm more concerned about those connections to the architectural design and how you as architects address that, what you're thinking about there.
I forgot to say that we definitely need to orient it to the cardinal directions, right off the bat in that very first consideration, if it's an apartment building, to have east west sides.
If it's an office building, it can have south north, so that the mass is oriented well from the beginning that we know that we're going to get the sun that we need in every corner of it based on the use that we have there.

Were there any requirements for the indoor environment, technical or otherwise, specified in the 4BLOK project brief? Or did you rather base it on the standard and legislative requirements?
From the standards, the legislation and we needed to meet the noise coefficient, because it's a pretty exposed place: a tram, a four-lane road.
At that time we considered insolation and daylighting. That means that we were struggling a lot not to have a problem in those corners, which of course for the block development, which from an urban planning point of view we needed to keep there, or we wanted to keep it, because we are actually between Vinohrady and Vršovice, where there is already a sort of free row development, whereas the Vršovice is a block development, so on the borderline. And that's why I wanted the mass to be compact in the ground floor, but to be purposefully penetrated or made more accessible and not to be a closed block, but to have holes in it, because we know that of course the worst are the corners in those blocks. Or the whole actually north facade into the courtyard is completely blocked off, it's no use to you

So the point about urbanism, the need to think block development that is efficient for cities, that's clear. But I would think they're supposed to be a little bit different than sometime in the classicism or sometime where they came up with this as an urban design innovation, so since then I think we've found out what a nuisance it makes and then the courtyards are kind of shady, there's moss, then they build a garage, another garage, and then all of a sudden it's overgrown with this weird stuff inside.
So I don't think it's nice like that because when there are apartments around to look at something that's not like nice in the middle.
So, and because of the fact that the place wasn't who knows what, so we wanted that courtyard to be the leitmotif of the whole project and I had the idea that the green balconies were actually supposed to be a symbol of the greenery growing through the house, that actually the trees that are in the middle are growing through the house, that it's actually a birch grove in the middle of Vršovická Street, which is actually ... now they might demolish the Koh-i-noor factory there, or they might leave the important buildings there, but most of it will come down, so it'll move back sort of closer to the city and it'll be more of a centre than it is now, when it was a periphery, when there were really a lot of factories there and it was sort of like a bleak, that Vršovice. So this project was another step in turning it into a nice neighborhood in the city.
And if you want to get technical, from that point of view, we're recuperating half of that project. We had it split, that the one that faces Vršovice Street, that was recirculated air. At that time it wasn't as common as it is now, when we were designing that, right, that was easily 7 years ago. It wasn't that common back then to recuperate houses. Now it's pretty much like a common thing that almost every other house is already recuperated, mechanically ventilated, so that was new there.

You answered me partly, but during the design process, at what stages did you address the quality of the indoor environment? Whether it was the light or perhaps the acoustics, the ventilation?
From the beginning, from the study. Even at the study we have the lighting engineer do an assessment to see if it's right. We'll do something, like some kind of common sense, that we actually know that if there's not enough light, there have to be bigger windows. Plus, I like the bigger windows from the point of view of the indoor environment, I like the contact with the outside and conversely the changing of the outside weather to have an impact on the inside, so the big windows are important to me but at the same time it responds to wanting it to be well lit.
So from the study.

A bit related to this is when and how do you consult with the specialists, do you use some kind of software tool to check the amount of light, heat and so on before the specialists come, or do you go straight to the consultation in the study?
We take it all from experience, because it wasn't the first house, we've been doing it for a long time, so we already know what to expect.
And usually when you go along, you arrive at a solution, which you then have the engineer confirm by calculation. So the lighting engineer first, then the fireman to check the escape routes and to check the lengths of the corridors for the hoses, there's always an opinion on how it should be.
Now the evergreen of the current era is electric mobility, that is, what is done in terms of protection against electric vehicles that could theoretically catch fire. I think it's a completely misconceived thing where everything would be solved if car companies just put an element on the battery that can detect that the temperature of the battery is rising and disconnect it. Johnson & Johnson has made that product, it just costs €1000. Now, who's going to get a car company to add a thing in there for €1000, which as I think in the price of an electric car is a

completely insignificant thing. And for us, for example, a specific project, I don't know, like a 170-apartment apartment building, it's going to make the basements more expensive, the measures that are actually supposed to catch it. The likelihood is that every 1,000th battery could have a problem, and you're doing a twenty-five million measure because of that.
So the house is getting ridiculously expensive for those clients. Of course, the people who are buying the apartment are going to pay for it, because they're going to have unnecessarily overbuilt protection for that basement, where theoretically a car could actually catch fire at some point, but it's never going to happen, right?
I digress, but I think the plethora of different standards and everything is...debatable.

What compromises did you make in this project, for example, in order to meet the requirements of the authorities and legislation for the internal environment? Or other requirements?

I probably wouldn't even think of them as compromises. We just tried to deal with everything there with honour. So I wouldn't say they were compromises.

I don't mean compromises in a negative way, but rather what was there that had a major influence on the form of the house?
The city district is more complicated, if I compare it with other Prague districts, it is more complicated here. So it was generally the case that it took a long time.
But otherwise it was this, we had ateliers and now there was a complicated spreadsheet on those ateliers, where it's an atelier because of the lighting, where it's an atelier because you can't guarantee the insolation, then there was an atelier that doesn't come out noise-wise. Over time it got to the point where actually when the apartments sold out, it was discovered that we didn't actually need full insolation (because the legislation changed), so a lot of those ateliers because of the insolation were re-approved as apartments. So we did, I don't know, maybe for 5 flats there were still projects of re-approvement, that there is no longer the requirement for insolation, so they can actually be apartments.
I think that was absolutely like the right move to get that out of the Prague building codes and it would be nice if that applied nationwide. I was at the Architecture Summit at the Municipal House on Friday or Thursday and it was mentioned there that just in Ostrava and Brno or other cities where obviously the construction is more extensive, that they would want that too, whereas they still have standards, so I think that's a step in the right direction. That when you live in the city, a lot of people don't like the sun, and you can't even meet that. But the city has a bigger advantage.

Pavel Hnilička actually pointed out that the socialms era neighborhoods meet the sunlight requirements well, but people want to live more in the centre and that it is because everything is close and the city is compact.

So that's why you need to approach it that way, more generously or not be completely bound by standards.

Did you then have to make any changes in the later stages of the project to meet the requirements of the authorities?
I think, gradually, as the project was going, it was going for a long time, it kind of evolved gradually and there was nothing like a surprise at the end. It was more, I think, that the standard tightened up.
What's the problem when you're near some traffic, like railroad tracks or tram lines, you get vibrations. That said, what we dealt with a lot was vibration proofing. How and in what part of the house to insulate against the propagation of vibrations? We were deliberating until the last minute about what method to choose to just meet what was needed, because no one here knows how to do the calculations very well, to make it effective so that you don't just have to double slab the entire house. So we ended up going with actually there are vibration isolation, kind of rubber isolation strips at the column headers in the basement. It was a challenge to calculate how much we would actually need to make it work out at the inspection, when we would measure it accurately.
And then with the windows. Here on this project I was surprised that the contractors came up with the fact that triple glazing was worse for noise propagation, although as again on other sites they said it was questionable. That double glazing is better, that there's not as much mass that can resonate, that can vibrate.
So those were kind of two things that I know were being tweaked as they were being done, that it wasn't quite in the design.

Is there anything about the final house that surprised you or turned out differently than you had planned or hoped?
I really liked it, we got some awards. There was nothing that surprised me negatively.
It's more that since then, I've been careful to check with the engineers how many shafts they've done on the roof, because then you go around, you look at what's going up above the roof and it's 3 metres and there's 1 pipe in it. And you're going to put this expensive structure on top of it, it gets in people's way and all.
So maybe on other projects, I'm more focused on making sure that we only have the bare minimum on those roofs and not just have somebody calculate it, then they trace it, and then all of a sudden you find out that it's not really necessary to have those monsters up there.
Was there any impact to the outside addressed on this project, whether it was just the noise from some units on the roof or maybe shading?
We've got rooftop heat recovery units, so they don't make noise in the windows. And were there acoustic barriers? I don't think we've even addressed that there, acoustically we haven't, we've put it up above the roof. We didn't even have any acoustic screens.

About this house, can you think of anything else about the story of this project?
What was a very pleasant surprise to me was that after 5 years I was there with other clients to show them how we design and the house inside is actually intact, nothing is scratched, we took a lot of care. Or even the investor requested it and it was awfully nice, like we've been doing together for a long time, so it's kind of a standard, to do the inside with honor, so it's not just painted white, that they'll repaint it afterwards.
And the clients were like, "Well we paint it white so it's easy to repaint and then every time we have people move in they ruin it. So we go again and paint the whole hallways." Well, we have dark green walls, dark grey, there's exposed concrete. The space is very much done up, worked out to a higher standard than other rival projects, and the only kind of justification that I can think of is that these people, as they have a positive relationship with it, they see that they've got something, they're much more positive about it and they like it. And that you can see by that how they feel about the house. We have dog washing facilities by the front door, I've seen towels on hooks there, so obviously they use that when they come in from outside. So that was my delight, also seeing that it was trampled by kids playing soccer in that courtyard. That the way we thought it was supposed to work, they take the elevator down, they come into the yard, they don't have to go through the public area where there's a lot of cars, that it works nicely for the house.

It's aging well, which is important for me to see that these houses are aging well. Even when it comes to using material for

the facade, it can't be crumbling, falling down after a year after the first winter. Sometimes I see that, that they don't think completely about how the materials are going to age.
Something is used for an effect that looks awfully cool in the photo lit up, but then when it goes through two winters, when some time has passed, you find out that it wasn't really thought through at all, that it leaks, that it swells up in various ways because of the occasional leak. Or the facades are immediately dusty, they are dirty, you have to think about that. We're trying to make sure that the house ages well.

As an architect, what do you think you need to know to be able to design a building with a good indoor environment?
Well there are always different requirements, different opinions. Now maybe another hit is, again I think it's in the category of completely nonsensical things that shouldn't have to be addressed at all, that you have to have every room acoustically protected, increasing the requirements for transmittance even within the apartment. But you have to ventilate that room. That means you have to get the air out of the room through that door that used to be undercut and it worked fine. I don't understand why we have to deal with this nonsense.
When most of these apartments are open anyway, I don't close the doors at home. I don't see why the client should pay for it, and the small investors who buy it, it's reflected in the price. We have to add a really significant cost to every door in that apartment, which will in turn have some super fan that they put on the windows. Again, I ventilate through a window, I don't understand the principle of having to have draught vents at all. Even on the most ordinary building you can't get by anymore without having a draught vent in the frame.
There's an unnecessary draft. I feel like it's so upside down that I'm sealing the house up, and then suddenly I find that it's not actually breathing, so I have to vent it again.
Okay, on the envelope you can still somehow understand that maybe those people don't live there full time. But why would it be within the confines of the apartment? And these are all things the layman doesn't know, but it's getting unnecessarily expensive.
Then you add to that actually the fees to the boroughs, and those are all costs that those people shouldn't have to pay in the first place. The apartments could be cheaper.
What fascinates me the most are the texts like that the developer will pay for it. They're not going to pay anything. Why would they? They' re just going to let the person they're selling it to pay for it. So it's always up to the end customer. Of course, the biggest contortion is the authorities, where you need those 60, 70 statements, everybody has a month to appeal, a completely pointless process, a tragedy really. It all makes housing more expensive, so I think it's completely unnecessary and it's just taking money out of our pockets unnecessarily. So if these people thought less and tried to think more with common sense, I think it would be to the best advantage.

Let me ask you about the cooperation with the specialists, what do you think is important there to make it work, to lead to some good results?
Everyone should know what their role is. Of course, the principle of that team is based on the fact that they are professionals and they do their job well. And they have to have drive to the goal. Don't just pretend someone is smarter than the other and a traffic engineer making up some nonsense in a traffic solution, which I now have live experience of. To put it in the language of the people, wanting to get the project done, looking for solutions, not looking for problems. That's like the most important thing and we work with all the big construction offices in Prague and most of the time it's good. They all know what their role is and it's done very nicely with them.
Such a team spirit that you just want to do something, everyone has a role and without someone it doesn't work. It's just that the result then isn't as good.

Can you think of anything else? Perhaps on the role of the architect in the design of the indoor environment?
What I would stress is not to use substitutes, not to do something that is just pretend.
So internally, I have a terrible problem with vinyl floors because I think you're just putting plastic in there. So I think even the materials themselves have some properties, maybe not entirely measurable, that have an effect on that. That is, if you have a wood floor that ages nicely, the wood smells nice, it just has an energy to it, same with wood windows versus plastic.
Plus some kind of imitation, if it's not concrete, I don't trowel it in like concrete, or I don't pretend it's concrete, or if it's a steel column, I don't pretend it's a wood column, I don't clad it. It's such scientifically immeasurable qualities of those spaces, but it shapes those people somehow, even the colour scheme, the proportion has an effect and I think it affects those people somehow, they perceive it and then they're much more open.
So I try to make the buildings in such a way that people enjoy it, that it develops them, that they always have an experience with every time of the day.
With the seasons, the house to change, the greenery to change, planting it in a way that you can feel the nature flowing throughout the year.
When there are conifers, which are hugely practical, but the feeling of it is completely tragic, you're like somewhere in a cemetery where it doesn't change, it's just constant, so that kind of 90s greenery treatment.
We had one villa, they did a garden there to make it totally maintenance free, but it was totally static. You were always looking at the same thing. Now, of course, nothing grows underneath it because the conifers are acidic, so no undergrowth. Those are the aspects that are affecting the environment terribly. That the bulbous plants come up in the spring, then the grasses come up, then some other flowers, shrubs start to bloom, the trees get wrapped in leaves, you see it come to a point, then they start to turn yellow, and the cycle of that year is beautifully manifested by that, and it demonstrates and has that fluidity that just the life goes on.
You should actually use natural materials in the apartment that are pleasant. Sure, they seem to have a shorter life span than linoleum. But who wants to live in a Faraday cage and have plastic on the floor, plastic doors, plastic windows... it doesn't seem quite right.

Villa Houses Krásnopolská

Interviewee: Tomáš Bindr

Interviewer: Kristýna Schulzová

Datum a čas: 25.03.2022 12:30

Online, MS Teams

Original interview with Tomáš Bindr in Czech:

Jak chápete ten pojem vnitřní prostředí v budovách nebo kvalita vnitřního prostředí v budovách?

Protože budovy děláme pro člověka, pro toho, kdo je bude užívat, tak pro mě kvalita vnitřního prostředí znamená kvalita životního prostředí pro člověka, který tu budovu bude užívat.

Se vším všudy, to znamená prostor … ještě zevšeobecním, ať jsou to kvantifikovatelné hodnoty a samozřejmě ale i ty emoční, nekvantifikovatelné.

V těch případových studiích se zaměřuji hlavně na stavebně fyzikální aspekty vnitřního prostředí, na ty kvantifikovatelné aspekty z hlediska světla, hlavně denního osvětlení z hlediska akustiky a z hlediska tepelného komfortu a kvality vzduchu.

Byly už v zadání projektu viladomů Krásnopolská nějaké specifické požadavky na kvalitu vnitřního prostředí, případně z jakých požadavků jste při tom projektování vycházeli, jestli jenom z těch, co jsou závazný v legislativě, nebo jestli tam byly i nějaký další?

Co se týká oslunění osvětlení, tak se dělala studie na obě dvě části, jak na oslunění, tak na osvětlení. Ale až v rámci stavebního povolení, to si vyžádal stavební úřad speciálně, protože jsme na hraně odstupových vzdáleností. na

Ten pozemek je relativně malý, primárně byl určený k zástavbě rodinnými domy, byť z jedné strany máme technologický park vysoké školy Báňské a z druhé strany rodinné domy. Takže si myslím že ten mezistupeň bytovek je dobrý. Nicméně už to, že to byla jenom podmíněně přípustná stavba, vedlo k tomu, že si stavební úřad úplně všechno hodně hlídal.

My jsme tam šli na hranu, na decimetry čtvereční zastavitelnou plochou jedním objektem, na metry čtvereční zastavitelnou plochou celého pozemku.

V Praze platí pražské stavební předpisy a je to tam mírnější, co se týká odstupových vzdáleností obytných budov a jejich oken. V Ostravě platí, že to musí být sklopená fasáda toho vyššího z těch objektů, když v jedné z nich jsou okna obytných místností, takže to je centimetr přesně. Takže stavební úřad v zbystřil, nechal nám dělat studii oslunění. Studie oslunění vyšla, protože posuzujeme jednotku, byt, takže to bylo v pohodě. Nebyli spokojeni, takže se dělalo ještě osvětlení a došli jsme k tomu, že se u jednoho bytu spodního v té severní části nám nevyšlo u dvou obytných místností denní osvětlení. Takže se to akorát prodávalo jako nebytový prostor.

Ale nemůžu říct, že by ty byty byly stinné, nemáte tam pocit úzkosti. Tím, že jsme používali většinou francouzská okna, do toho hlavního obytného prostoru jsou to velkoprosklené okna, si na to nikdo nestěžoval.

Další věc, tepelná pohoda? Víte, ono ještě ta Ostrava opravdu je specifická v tom, že vy umíte prodat metr čtvereční hrubé užitné plochy bytu za mnohem míň peněz než třeba v Praze. A kromě pozemku, který v Praze je násobně dražší, tak ta výrobní cena vlastního domu je skoro stejná v Praze jako v Ostravě, protože zájem o výstavu mají firmy s celorepublikovou působností, takže tam ty ceny jsou plus mínus stejné, takže defakto opravdu musíte řešit ve všech fázích toho projektu cenu.

Co se týká vytápění, naštěstí se nám alespoň aspoň povedlo investora přesvědčit, aby to bylo podlahové topení, aby tam nebyly radiátory. Tady už nám nesahá teplovod, který je v Ostravě hodně rozšířený díky hornické pozůstalosti, takže je to na plynových kotlích s centrálním vytápěním. A říkám chválabohu za to podlahové topení, protože jestli se bude přeměňovat třeba na tepelná čerpadla, tak je to opravdu vítězství.

Co se týká další věci, ať je to klimatizace nebo rekuperace, tak opravdu ten požadavek na Ostravsku, a to jsem teďka počítal, že už máme vyprojektováno na 1000 bytů asi zhruba necelá polovina je z toho postavena, nikdy nebyl vznesen ten požadavek u výstavby na prodej, aby tam byla rekuperace, nebo aby tam byla klimatizace, nebo nějaký takovýto standard navíc.

Ve všech oknech ale jsou umístěné kastlík, nebo příprava na venkovní žaluzie, ale zase kvůli ceně se tam při prodeji bytů ty žaluzie neosazovaly. Byla příprava, jenom kastlíky a přivezená elektřina, což je samozřejmě pro autory špatně, protože jeden si to osadí takovýma žaluziemi, druhý onakýma žaluziema. Což se taky stalo, ne všechny jsou stejné, na fotkách to máme ještě nezatažené a těsně po dokončení.

Takže samozřejmě potom je ponecháme z důvodů financí toho investora na tom, ať si tu tepelnou pohodu už řeší investor sám.

Akustiku, když máme ty měřitelné věci. Akustika jak u tohohle domu, tak u ostatních projektů je jednou z věcí, kterou investoři řeší hrozně moc. Na to si dávají pozor.

A tady jsme na normových záležitostech, nebylo to zase nic, co by se mělo řešit nadstandardním způsobem, ale je to u těchto developerských projektů hodně hlídané, aspoň co my jsme se setkali.

V které fázi návrhu jste vlastně kvalitu vnitřního prostředí řešili? Které fáze návrhu jste o tom začali nějakým způsobem uvažovat?

Ten koncept už člověk řeší od studie, protože tomu přizpůsobuje dispozici, rozmístění zařizovacích předmětů, jaký bude nosný systém.

Tam je to kombinace monolitu, monolitické stropy, monolitické sloupy uprostřed dispozice a vyzdívané obvodové stěny. A na co si tam stěžují je hluk přenášený v konstrukci. Což je zajímavé, protože nevím, jak se to může dít, jak se to té konstrukce dostává, protože samozřejmě máme, už jenom tím, že tam je podlahové topení, je to na kročejové izolaci a nemělo by se to vlastně do těch stěn dostávat. Ten monolit má tu nepříjemnost, že vodí dobře zvuk, což jsme si tu vyzkoušeli a popravdě řečeno, že nevíme, kudy se do té konstrukce dostává a nepřišli jsme na to.

A potom horní část toho objektu je ale dřevostavba.

To je dřevostavba. Tam to bylo z důvodu dvojích; jednak legislativního, protože jsme měli předepsané maximálně u podmínečně přípustných bytových domů 3 nadzemní podlaží plus podkroví. A definice podkroví na stavebním úřadě byla taková, že to musí být dřevěné.

Ale zároveň ten důvod byl i to, že vlastně uskakujeme od obvodových stěn a ta dřevostavba je samozřejmě lehčí, takže staticky tam nemáme ty obvodové stěny nad sebou, takže byl to i vlastně tento důvod. Ale nahoře se nachází tři byty. Zase ty vnitřní stěny, které od sebe oddělují ty byty, jsou zděné. Tam je to kombinace, že vnitřní stěny jsou zděné, ty dělící, co dělí byty a ten obvod je teda dřevostavbou se střechou. Takže tam není

problém přenášení přes dřevěné konstrukce, Byť vím, že tady u těchto staveb je to problém vždycky u stropních konstrukcí, ne dělících stěn mezi byty tam to i v tom akustickém sádrokartonu už taky máme zvládnuté dobře, tam problém není, ale bývá tam problém u konstrukcí u lehkých konstrukcí stropů, co se týká akustiky.

Přizvali jste už ve fázi studie nějaké specialisty? Ať už na tepelnou techniku nebo světlaře?

Vždycky už ve studii, protože nás je 15, takže my máme i vlastní profesanty. Vždycky už se to řeší se statikem ve fázi studie, a principiálně se řeší topení ve fázi studie a principiálně samozřejmě se řeší i rozvody veškerých technologií. Abychom měli nadimenzovaná dostatečně jádra, abychom to potom někde v podhledu netahali. Takže to jsou už věci, které řešíme ve fázi ve fázi studie, zvlášť když víme, že by se nám to vrátilo jako bumerang v dalších fázích.

Nedej bože, ještě když je investor nedočkavý a prodává byty po studii a prodává metry čtvereční a pak je všechno jinak. Takže ano, profesanty zapojujeme už ve fázi studie, topení, statika, TZB. Elektrikáři většinou ne, protože umělé osvětlení, pokud jsou to bytové domy, není nějaké specifické a dráty se dají rozvést všude.

Ale akustiku já jsem vzpomněl, že teďka měl tu schůzku s panem ředitelem, to jsme dělali rekonstrukci prvního železobetonového skeletu v Olomouci, obchodní dům, a tam se spolupracovalo se speciální firmou na akustiku samozřejmě.

A tam ta stavební akustika, docílit právě to odhlučnění těch nahrávacích studií a vysílacích studií bylo samozřejmě složitější. Tam ta konstrukce je na to odhlučnění dost široká, ale u těch u těch bytových domů ne, tam se nic takového neřeší, nebo neřešíme my teda tady v regionu.

Stalo se vám, i třeba klidně u jiného projektu, že jste pak v další fázi museli dělat na tom projektu, na té studii nějaké změny, abyste vyhověli požadavkům úřadům?

Jo, děje se to často bych řekl. I vlastně i tady na tomto projektu se předělávaly, jihovýchodní rohy se museli víc otevírat, prosklívat, protože třeba to tam nevyšlo. Potom, po studii. A s úřady bojujeme teda často.

Samozřejmě na jedné straně máte investora, který … a já tomu rozumím, ta ekonomika je na první stránce, on by to nestavěl, neprodukoval, kdyby na tom nevydělal, nebyly by byty, takže já tomuto rozumím a nějakým způsobem ten pozemek chce vytěžit. Architekt samozřejmě tu míru musí zná, kolik.

Ale vlastně si vás najímá k tomu, abyste jako řidič formule 1 jel na hranicích na toho pádu a někdy ten pád opravdu nastává. Teďka myslím vzhledem třeba k legislativě, k útvaru hlavního architekta, ke stavebnímu úřadu. To je ve fázi, kdy my už studie takovéhoto typu my konzultujeme v průběhu na útvaru hlavního architekta, ale i teď se nám stává, že se v průběhu legislativy nad projektem pro stavební povolení se musí dělat změny, že nastanou.

Konkrétně u tohoto projektu byla nějaká doba, asi rok a půl mezi studií a mezi startem na projektu dál. Kde investor, toto není developer v pravém slova smyslu, je to soukromá osoba, takže řešil financování. Řešil, jestli to bude družstevní bydlení, nebo to bude prodávat sólo byty, řešil, jestli do heliportu nevezme nikoho jiného, takže asi rok a půl po studii to stálo.

Součástí studie bývá to, že máme předběžné nezávazné vyjádření z útvaru hlavního architekta, že to je v souladu s územním plánem a že to je v pořádku. Nicméně bylo tam upozornění, že bude platit nový územní plán, zhruba za rok. A on udělal změnu na to území a my jsme dělali studii vlastně úplně znovu celou tady na toto území. Původně jsme měli navržený jeden dům. Byl terasový, z jedné strany rozpuštěný po svahu, a to už potom nebylo možné.

Dělali jste u tohohle projektu nějaký kompromisy, abyste splnili požadavky právě toho vnitřního prostředí nebo stavební fyziky?

Myslím si, že ne, nenapadá mě nic. Kromě toho, jak jsem říkal, že jsme v tom jihovýchodním rohu museli zvětšovat prosklení. Ale jinak vlastně nic.

A poté, co jsem říkal, nevyšlo osvětlení denní, tak v těch obytných místnostech byly přejmenovány na posilovnu, pracovnu, knihovnu.

Překvapilo vás potom něco na té na té dokončené stavbě? Dopadlo tam něco jinak, než jste buď to plánovali, nebo než jste čekali.

Vždycky na stavbách dopadají věci jinak. Tady nám nějak nechtěli platit autorské dozory, takže jsme bohužel byli voláni, až když si s něčím nevěděli rady, co a jak, takže jsme nebyli na stavbě tak, jak bychom si představovali, že bychom měli být.

Takže došlo ke změnám. My jsem třeba měli zábradlí prosklené bezrámové, nicméně aspoň jsem designoval potom typ zábradlí, když řekli, že to peníze do toho nedají. A v průběhu stavby se to měnilo vlastně na kovové, tak to jsem třeba designoval já.

Takže úplně něco, že by bylo udělané jinak? To ne, musím říct, že se to udělalo vlastně relativně přesně podle naší prováděcí dokumentace. Nedošlo tam k zásadním změnám.

Jedna trošku úsměvná věc, šetřili trošku na statice, takže předělávali sloupy a jejich umístění u krytého stání, co tam je. Nějaké byty si pronajali právníci a ti si vždycky hned všechno měří a zjišťují.

My jsme měli navržené kruhové sloupy nebo eliptické sloupy, měli jsme na hraně na centimetry normové stání, ale oni tam dali obdélníkové a větší, protože šetřili železem. Ale už si neuvědomili, že pak budou mít o 5 cm užší stání, takže pak to mělo nějakou dohru na slevách, protože na ně právníci vystartovali. Oni většinou jezdí ve větších autech, nestačí ani normové stání, natož ještě o 5cm užší.

Ale to nešlo za námi, naštěstí. Já jsem vytiskl na A4 velikost toho sloupu, jak měl být a s tím jsem tam přišel a tím to pro nás jako projektanty skončilo.

Je něco, co v těch bytech vypadá jinak, třeba z toho hlediska toho vnitřního prostředí, než jste si v projektu mysleli, že bude?

Vytápění dopadlo podle projektu, klima jednotky, když někdy zvláště v horních bytech si lidé dodatečně dávají, zatím se neobjevily nikde na fasádě bílé boxy, což mě těší.

Nejsem si vědom, že by se udělalo něco jinak, jo, a nebavíme se o tom o ta dispozice umožňovala určité variability tím, že prostě máme sloupy.

Tentokrát jsme, je tam 21 bytů, nedělali jsme ani u jednoho Interiér, neoslovil nás ani jeden ten klient s interiérem a vím, že se tam individuálně dodělávali ty byty, takže jsou i jinak třeba dispozičně udělány. Někdo si nechal přiznané stropy železobetonové.

Protože primární investor nechtěl, že se to tolik neprodává, ale je tam i byt takový. Pak je otázka, jakou má akustiku, myslím prostorovou akustiku, ne stavební, ale jinak si nejsem vědom, že by se něco výrazně proměnilo.

Co si myslíte, že jako architekt potřebujete vědět a umět, abyste navrhli budovu s dobrým vnitřním prostředím?

Když vezmu sebe těsně po škole, v tomto ohledu mě škola tímto nevybavila vůbec. V podstatě řekl bych, že nic.

Já opravdu musím říct, že až díky praxi, kdy vás vycvičí i v podstatě investor. A poznáváte jednotlivé profese a zjistíte, že opravdu musíte s nimi spolupracovat už ve fázi studie.

Takže to bych doporučil určitě všem začínajícím. To se do toho vrhne, že už potřeba s těmi specialisty, co to ovlivňují počítat a diskutovat a konzultovat už v průběhu studie určité věci a opravdu toto si myslím, že to je v podstatě až to téměř už dneska čtvrt století praxe a téměř vlastně těch 1000 bytů navržených a téměř 500 zrealizovaných, takže myslím si že to je to je ta věc, kdy je toto naučila vlastně postupně praxe, kdy vím, co a jak je potřeba vlastně řešit. A vnitřní prostředí staveb je jeden z těch aspektů parametrů, které by měly měli a mají ovlivňovat už ten vlastní návrh.

Myslíte si, že vás na to škola mohla připravit líp? Nebo že bylo něco, co vás už ve škole mohli naučit, nebo je to spíš tak, že se to pak naučíte v praxi?

Abych byl objektivní, tak možná, že jsem se na škole zajímal jenom o některé předměty a některé jsem si myslel, že jsou jenom sranda. Protože když si vzpomenu, tak určitě předměty týkající se byť letmým škrábnutí na škole jsou všechny architektury na technice, vyučují i vnitřní prostředí staveb. Takže možná jsem jenom špatně poslouchal, nechtěla. Zabýval jsem se věcma jinýma a toto jsem si říkal, že nebudu potřebovat. I to je možné, jo, ale abych neříkal, že by se toto mělo víc vyučovat do té škole, jo. To zase nechci

Možná jenom jinak?

Ještě navíc, já jsem ještě 11 let učil na katedře architektury na báňské návrhové ateliéry. Byť interně jsem byl na půl úvazku, takže ateliéry.

A taky jsem nevnímal, že by studenti měli, a to bylo na stavební fakultě, ponětí o určitých věcech, které se teďka bavíme, byť v magisterském stupni, že by ty znalosti přenášeli do návrhů. Ale zase na druhou stranu, abych byl upřímný, tak jsem to ani až tak moc nevyžadoval. Jsem si říkal, že je to stejně je jedno, a naučí se to a v podstatě to, co v té praxi už potom čas nebudou mít, tak musí dostat pod kůži, aby to tvořili přirozeně, prostor, kompozice, forma.

Samozřejmě potom měli nějaké povinné výkresy, ať už na bakalářským nebo magisterským pracím diplomovým, takže taky tam je řeší jenom TZB. Ale když jsem viděl, co z nich tam vypadává, tak jsem to bral jenom jako výkres, který se odfajfkuje. Nevím, jak to máte v Praze, co je součástí třeba diplomové práce. V Brně vím, co mají, protože tam jsem občas zván. Takže řekl bych, že ty fakulty architektury toto možná i podceňují.

No ale možná že na to není jenom čas a stejně se to naučíte v té praxi, donutí vás to a horší by bylo, kdybyste toto uměla a neuměla ty věci, co tvoří ten prostor a ten dům.

Používáte ve svojí praxi nějaký nástroje, ať už softwarový nebo nějaký jiný k ověření, nebo k tomu, abyste nějakým způsobem řešili ty parametry vnitřního prostředí, třeba ještě předtím, než přijdou profesanti?

Tím že jak jsem říkal, my máme open space a já tu mám pět metrů ode mě třeba TZBáka, vlastně si to ověřím tímto způsobem.

Ale dělali jsme třeba obytný soubor do Ostravy, který je zatím ve fázi projektu pro územní řízení, ale už ve studii, protože jsme věděli, že jsme hodně jakoby na knap, zadávali jsme studii oslunění, abychom vymezili všechny takové problémy, a to v rámci toho bloku i v rámci naší výstavby směrem ven. Takže to jsme po domluvě s investorem zadali přes nás, ale v jakém softwaru se to dělá, to nevím samozřejmě.

Je to speciální, třeba tato profese. A už i akustiku často řešíte a teďka myslím akustiku směrem ven, že můžete způsobit hluk, už třeba v té fázi studie, protože budete mít nějaké jednotky, které vytvářejí hluk a budou na střeše na někde v prostoru, tak i toto už ve fázi studií předběžně třeba řešíme, aby nenastal problém. Ale že bychom pracovali se speciálním softwarem, to ne.

Teď jsem si vzpomněl na zajímavý moment, co se týká klienta na rodinný domek, kdy máme prosklený obývák a sám klient si vzpomněl, že by to nemuselo být akusticky dobré. Takže už třeba ve fázi studie.

Nevím, jestli bychom to dokázali, kdybychom nedělali třeba s tou AV Technikou ten Český rozhlas. Oni nám poradili, jak třeba to vyřešit akusticky principiálně, aby nám to fungovalo, abychom potom ve fázi, kdyby nastal problém už někdy na stavbě a dodatečně se něco dělalo a zničilo nám určité principy, které jsme tam chtěli, tak by samozřejmě byl problém. Takže i toto, třeba už jsme řešili ve fázi studie prostorovou akustiku.

Stavební asi ne, protože stavební si řekneme, že OK, tak jsou určité materiály a určité věci, které víme, že to třeba uděláme, postavíme. Ale tu prostorovou už jsme řešili i u obytné budovy.

Takže dá se říct, že i v té fázi studie to řešíte spíš formou konzultací se specialisty nežli tím, že byste se pokoušeli, jste to ověřit nějakým způsobem sami?

Ano.

Je něco, ať už z hlediska legislativy, stavebního prostředí nebo právě nějakých nástrojů, co si myslíte, že by vám jako architektům pomohlo v návrhu v navrhování vnitřního prostředí? Nebo co by vám v tomhle směru nějak usnadnilo život?

Co by nám určitě usnadnilo život je oslunění, které prostě je dneska nastavené tek, že…. dám zase příklad z praxe. Dneska už je to druhé volební období v Ostravě je ANO ve vedení, nicméně v prvním volební období měli, a správně, že vrátí lidi do města do centra Ostravy, protože v 90. letech se spoustu těch bytových domů se předělalo na kancelářské prostory a Moravská Ostrava je bloková struktura.

Dělali jsme pro ně dva domy, které jsou z konce 19. století, byly kdysi bytovými domy, pak byly předělané v 90. letech na jednotky kanceláře, což je velké neštěstí a teď jsme zpátky z toho dělali byty. A jeden z těch domů byl v severním nároží blokové struktury, to znamená okna měl severovýchodní stranu.

A nejste schopná tam docílit oslunění. A protože bohužel byl rekolaudovaný na kanceláře, tak vlastně stavební úřad nám to shodil ze stolu, takže musela až na úrovni samosprávy a státní správy probíhat jednání v uvozovkách za zavřenými dveřmi, protože by se tam vlastně nedalo vůbec zpátky vrátit bydlení.

Protože my v podstatě díky těmto normám, co se týká odstupových vzdáleností u obytných budov, co se týká oslunění, tak nejsme schopni už udělat normální město, nejsme schopni udělat blokovou strukturu. Takže to si myslím, že je chyba a je to špatně. Sice se nedělají nová města, že bychom prostě dělali nové město, to asi naše generace už nezažije, ale stejně děláte vestavby na nějakých proluk, třeba v blokové struktuře a tam opravdu může nastat tento problém.

V Praze jste zrušili oslunění, správně, takže i odstupy se počítají jinak, jo, takže je to tam mírnější, je to lepší, ale toto si myslím, že je obrovský problém, protože pořád si myslím, ze zkušenosti že se člověk nejlíp cítí v uličkách ve městě, kdy hodím po nějaké street, mám tam parter, mám ulice, mám náměstíčka, tak tam se cítím prostě dobře. No a to vlastně ta legislativa neumožňuje.

English translation of interview with Tomáš Bindr:

What is your understanding of the term indoor environment or indoor environmental quality in buildings?
Because we make buildings for people, for the people who will use them, so for me the quality of the indoor environment means the quality of the environment for the people who will use the building.
With everything, that means the space ... I'll generalise even more, let it be quantifiable values and of course the emotional, non-quantifiable ones.
In the case studies I focus mainly on the physical aspects of the indoor environment, on the quantifiable aspects in terms of light, especially daylighting in terms of acoustics and in terms of thermal comfort and air quality.
Were there any specific requirements for the quality of the indoor environment in the project specification for the Krásnopolská villas, or what requirements did you base your design on, were they only those that are binding in the legislation, or were there any others?

As far as the lighting is concerned, a study was carried out for both parts, for both sunlight and daylight. But only as part of the building permit, the building authority specifically requested this, because we are on the edge of the spacing distances.
The site is relatively small, it was primarily intended to be developed with single-family houses, although we have the technology park of the Báňská University on one side and single-family houses on the other side. So I think that the in-between multi-family housing is good. However, just the fact that it was only a conditionally permitted development led to the building department being very protective of everything. We went to the edge there, to the decimetres per square buildable area of one building, to the square metres buildable area of the whole site.
In Prague, the Prague building codes apply and it's more lenient there in terms of spacing of residential buildings and their windows. In Ostrava, the rule is that it has to be the tilted facade of the taller of the buildings when there are windows of the living rooms in one of them, so it is exactly up to centimentres. So the building authority has stepped up, had us do a study of the insolation. The insolation study came out fine because we're assessing a unit, an apartment, so that was fine. They weren't satisfied, so they did another daylighting assessment and we concluded that the daylighting for the one apartment downstairs in that northern section didn't comply for the two rooms. So it was just sold as non-residential space.
But I can't say that the apartments are dark, you don't feel anxious there. By the fact that we used mostly floor-to-ceiling French windows, there' s big glass windows in that main living area, nobody complained about that.
Another thing, thermal comfort? You know, Ostrava is really specific in that you can sell a square meter of gross floor area for much less money than in Prague. And apart from the plot of land, which is many times more expensive in Prague, the production price of the house itself is almost the same in Prague as in Ostrava, because companies with a nationwide presence are interested in construction, so the prices there are plus or minus the same, so defacto you really have to deal with the price at all stages of the project.

As far as heating is concerned, fortunately we at least managed to convince the investor that it should be floor heating so that there are no radiators. We don't have a district heating system here, which is very widespread in Ostrava thanks to the mining heritage, so it's on gas boilers with central heating. And I say thank goodness for the floor heating, because if it's going to be converted to heat pumps, for example, that's a real victory.

As far as the other thing is concerned, whether it's air conditioning or heat recovery, really the requirement in Ostrava, and I've counted now that we've got about 1,000 apartments designed, probably less than half of that is built, there's never been that requirement made in the development for sale that there be heat recovery, or that there be air conditioning, or some such extra standard.
However, there are boxes in all the windows, or preparations for outside blinds, but again, because of the cost, those blinds were not installed when the apartments were sold. There was a preparation, just the boxes and the electricity brought in, which of course is wrong for the authors, because one of them will fit such and such blinds, the other one will fit such and such blinds. Which is what happened, not all of them are the same, in the photos we have it still unmounted and just after completion. So, of course, we'll leave it up to the investor to sort out the thermal comfort for financial reasons.
Acoustics, when we have those measurable things. Acoustics, both in this house and in other projects, is one of the things that investors deal with an awful lot. That's what they pay attention to.
And here we are on normal issues, again, it wasn't something that should be addressed in a super standard way, but it's very much watched over in these development projects, at least from what we've seen.

At what stage of the design process did you actually address the quality of the indoor environment? At what stage of the design process did you begin to consider this in any way?
The concept has been addressed since the study, because you adjust the layout, the placement of furnishings, what the support system will be.
There it is a combination of in-situ cast concrete, in-situ cast concrete ceilings, in-situ cast concrete columns in the middle of the layout and masonry perimeter walls. And what they are complaining about there is the noise transmitted in the structure. Which is interesting, because I don't know how that can be happening, how that's getting into that structure, because of course we have, just by the fact that there's floor heating, it's on the step insulation and it shouldn't actually be getting into those walls. The concrete monolith has the inconvenience of conducting sound well, which we've tested here and frankly we don't know where it's getting into the structure and we haven't figured it out.

And then the upper part of the building is a wooden building?
It's a wooden building. It was there for two reasons; one was legislative because we had a prescribed maximum for conditionally permitted dwellings of 3 storeys plus attic. And the definition of an attic at the building authority was that it had to be made of wood.
But at the same time, the reason was that we were actually stepping away from the perimeter walls and the wooden building is of course lighter, so structurally we don't have those perimeter walls on top of each other, so that was actually the reason as well. But there are three apartments upstairs. Again, the internal walls that separate those flats from each other are brick. So there's a combination of that, the internal walls are brick, the dividing ones that separate the apartments and then the perimeter is a wood frame building with a roof. So there's no problem of transmission through the wooden structures, Although I know that here in these buildings it's always a problem with the ceiling structures, not the dividing walls between the apartments there, even in the acoustic plasterboard we've already got it well managed, there's no problem there, but there tends to be a problem with the lightweight ceiling structures in terms of acoustics.

Have you brought in any specialists during the study phase? Whether thermal engineers or lighting engineers?
Always in the study, because there are 15 of us, so we have our

own specialists. It's always already addressed with the structural engineer at the study stage, and in principle the heating is addressed at the study stage, and in principle of course the installation of all the technology is also addressed. So that we have oversized enough cores so that we don't have to drag it somewhere in the ceiling. So these are things that we are already dealing with in the study phase, especially when we know that it would boomerang back on us in later phases. Heaven forbid if an investor is impatient and sells apartments after the study and sells square footage and then everything is different. So yes, we involve professionals at the study stage, heating, statics, sanitary installation.
Electricians mostly don't because artificial lighting, if they are apartment buildings, is not some specific and wires can be run everywhere.
But the acoustics I remembered, I just had that meeting with the director of the radio, we were doing the reconstruction of the first reinforced concrete skeleton in Olomouc, a department store, and there they were working with a special company for acoustics of course.
And there the building acoustics, to achieve just that soundproofing of those recording studios and broadcasting studios was of course more difficult. There the construction is wide enough for that soundproofing, but not for the apartment buildings, there is nothing like that, or we don't deal with it here in the region.

Did it happen to you, even with another project, that you had to make some changes to the project, to the study, in order to meet the requirements of the authorities?
Yes, it happens a lot, I would say. Even actually here on this project they redesigned, the southeast corners had to be opened up more, more glazed, because maybe it didn't work out there. Then, after the study. And we struggle with the authorities a lot.
Of course, on the one hand you have an investor who ... and I understand that, the economics are number one, he wouldn't build it, he wouldn't produce it, if he didn't make a profit on it, there wouldn't be any apartments, so I understand that and he wants to use the land somehow. Obviously, the architect has to know that rate.
But he's actually hiring you as a Formula One driver to drive on the edge of that crash, and sometimes that crash does occur.
Now I think in relation to, for example, the legislation, the Chief Architect's Department, the Building Authority. This is at the stage where we already consult studies of this kind we consult in the course at the Chief Architect's department, but even now we find that in the course of legislation over the project for building permits we have to make changes that occur.
On this particular project there was some time, about a year and a half between the study and between starting on the project on. Where the investor, this is not a developer in the true sense of the word, it's a private entity, so they handled the financing. He was dealing with whether it was going to be cooperative housing or whether he was going to sell solo apartments, he was dealing with whether he was going to bring somebody else into the heliport, so it was about a year and a half after the study.
As part of the study, we usually have a preliminary, non-binding statement from the Chief Architect's office that it' s consistent with the zoning and that it's okay. However, there was a caveat that there would be a new zoning ordinance in place in about a year. And he made a change to that area and we did a study actually all over again for this area. We originally had one house proposed. It was terraced, one side of it was dissolved down the slope, and that was not possible after that.
Did you make any compromises on this project to meet the requirements of just the internal environment or the building physics?
I don't think so, I can't think of any. Except, as I said, we had to increase the glazing in the south-east corner. But other than that, nothing really.
And then, like I said, the daylighting didn't work out, so those rooms were renamed the gym, the study, the library.

Did anything surprise you then about the finished building? Did anything turn out differently there than you either planned or expected?
Things always turn out differently on construction sites. Here, they didn't want to pay for the author's supervision somehow, so unfortunately we were only called in when they didn't know what to do or how to do something, so we weren't on site as we imagined we should have been.
So there were changes. For example, we had a frameless glass railing, however, at least I was designing the type of railing afterwards when they said they weren't going to put the money into it. And during the course of the construction it was actually changed to metal, so I designed that.
So anything that was done completely differently? No, I have to say that it was actually done relatively accurately according to our design documents. There were no major changes.
One slightly amusing thing, they skimped a little bit on the statics, so they redid the columns and their placement at the covered parking that's there. Some of the apartments were rented by lawyers and they always measure everything right away and figure it out.
We had designed circular columns or elliptical columns, we had borderline to centimeter standard parking stalls, but they put in rectangular and bigger because they were saving iron. But they didn't realise that they would then have a 5cm narrower stand, so then it had some repercussions on the discounts because the lawyers came out at them. They usually drive bigger cars, not even a standard stall is enough, let alone 5cm narrower.
But that didn't go our way, thankfully. I printed out on A4 the size of the column as it was supposed to be and that's what I came up with and that was the end of it for us as designers.

Is there anything that looks different in those apartments, perhaps in terms of the interior environment, than you thought it would in the project?
The heating turned out according to the project, the air conditioning units, although sometimes, especially in the upper apartments, people put additional, so far there are no white boxes anywhere on the facade, which makes me happy.
I'm not aware of anything being done differently, and we're not talking about the layout allowing for some variability by just having columns.
This time we've, there's 21 apartments, we didn't do interior design on any of them, we didn't approach any of those clients with interior design and I know that they've done individual finishes on those apartments so they're done differently maybe in layout. Someone kept exposed reinforced concrete ceilings. Because the primary investor didn't want that, it didn't sell that much, but there's an apartment like that. Then the question is acoustics, I mean spatial acoustics, not structural acoustics, but otherwise I'm not aware that anything has been significantly changed.

As an architect, what do you think you need to know and be able to do to design a building with a good indoor environment?
Considering myself just out of school, school didn't equip me in this regard at all. Basically, I would say nothing.
I really have to say that it's only through practice that you get trained and basically by the investors.
And you get to know the different professions and you find that you really have to work with them at the study stage.
So I would definitely recommend that to anyone starting out. It throws into it that you need to already count and discuss and consult with those professionals who are influencing it already during the study certain things and really this I think is basically

up to almost today a quarter of a century of practice and almost actually the 1000 apartments designed and almost 500 realized, so I think that's the thing where this is actually taught gradually by practice, where I know what and how you need to actually solve. And the indoor environment of buildings is one of those aspects of parameters that should and do influence the actual design.

Do you think school could have prepared you better? Or that there was something they could have taught you in school, or is it more that you learn it in practice?

To be objective, maybe I was only interested in some subjects at school and some I thought were just for fun. Because if I think back, certainly the subjects related to even a cursory scratch in school are all architecture in engineering, they teach the indoor environment of buildings as well. So maybe I was just listening the wrong way, I was involved in other things, and this was something I figured I wouldn't need. That's possible too, yeah, but not to say that this should be taught more in that school, yeah.

I don't want that.

Maybe just in a different way?

On top of that, I still taught in the architecture department for 11 years in the mine design studios. Although in-house, I was part-time, so studios.

And I also didn't perceive that the students had, and this was in the civil engineering department, a clue about certain things that we're talking about now, albeit at the master's level, that they were transferring that knowledge into the designs. But then again, on the other hand, to be honest, I didn't really require it that much. I was like, it doesn't matter anyway, and they're going to learn it, and basically what they don't have time to do in that practice afterwards, they have to get it under their skin so they can create naturally, space, composition, form.

Of course then they had some compulsory drawings, either for bachelor or master thesis, so also there they only deal with HVAC. But when I saw what was coming out of them there, I just took it as a drawing to be checked off. I don't know how you have it in Prague, what's included in, say, a thesis. In Brno I know what they have, because I am sometimes invited there. So I would say that those faculties of architecture maybe underestimate this.

But maybe there's just not time for it and you learn it anyway in the practice, it makes you do it, and it would be worse if you know this and you don't know the things that make up the space and the house.

Do you use any tools in your practice, software or otherwise, to verify or to address those indoor environmental parameters in some way, perhaps before the specialists come in?

Because, as I said, we have open space and I have an HVAC guy five meters away from me, I'm actually going to check this way. But we were doing, for example, a residential complex to Ostrava, which is still in the design phase for the planning permission, but already in the study, because we knew we were in a very tight space, we commissioned a sunlight study to delineate all those issues, both within that block and within our development outwards. So we commissioned that through us in consultation with the developer, but what software it's done in I don't know of course.

It's special, like this profession. And acoustics are often dealt with and now I mean acoustics outwards, that you can cause noise, for example, already in the study phase, because you will have some units that create noise and they will be on the roof somewhere in the space, so we also deal with this already in the study phase, for example, in advance, so that there is no problem. But that we would work with special software, no.

Now I remembered an interesting moment regarding a client on a family house, where we have a glass living room and the client himself remembered that it might not be acoustically good. So maybe already at the study stage.

I don't know if we could have done it if we hadn't done the Czech Radio thing with AV Technica, for example.

They advised us on how to solve it acoustically in principle, so that it would work, so that if there was a problem somewhere in the construction phase and something was done afterwards and destroyed certain principles that we wanted there, then of course there would be a problem. So even this, maybe we have already addressed the spatial acoustics in the study phase. Building probably not, because building we say OK, so there are certain materials and certain things that we know that maybe we'll do, we'll build. But we've already addressed the spatial one for the residential building.

So it's fair to say that even at that stage of the study you're dealing with it in terms of consulting with specialists rather than trying to, you're verifying it in some way yourself?

Yes.

Is there anything, either in terms of legislation, the built environment or just some tools that you think would help you as architects in designing in the indoor environment? Or what would make your life easier in that respect?

What would definitely make life easier is the glare, which is just set up today that.... I'll give you an example again from practice. Now it's the second term in Ostrava that ANO (a political party) is in charge, however, in the first term they had, and rightly so, that they would bring people back to the city centre of Ostrava because in the 90s a lot of those apartment buildings were converted into office space and Moravian Ostrava is a block structure.

We did two buildings for them that are from the late 19th century, they used to be apartment buildings, then they were converted in the 90's to office units, which is a great misfortune, and now we're back to making apartments out of it. And one of those houses was on the north corner of the block structure, meaning the windows were on the northeast side. And you're not able to get the sunlight in there. And unfortunately, because it had been relicensed for offices, it was actually knocked off the table by the building department, so it had to go all the way up to the local government and state government level to have closed-door negotiations, in quotes, because you couldn't actually put housing back in there at all. Because basically, thanks to these standards, in terms of spacing distances for residential buildings, in terms of sunlight, we are no longer able to make a normal city, we are no longer able to make a block structure. So I think that's a mistake and it's wrong. I mean, you don't make new cities, that we just make a new city, I don't think our generation will see that anymore, but you still do build-ins on some of the gaps, like in a block structure, and that's where you can really have this problem. In Prague, you've done away with the glare, right, so even the setbacks are calculated differently, so it's more moderate there, it's better, but I think this is a huge problem because I still think, from experience, you feel best in the alleyways in the city, where I throw down a street, I've got a parterre, I've got streets, I've got squares, so I just feel good there. Well, the legislation doesn't actually allow that.

Terraced Houses Zruč

Interviewee: Jiří Zábran

Interviewer: Kristýna Schulzová

Datum a čas: 25. 2. 2022 12:00

Online, MS Teams

Original interview with Jiří Zábran in Czech:

Mám nějaké dotazy k tomu projektu řadových domů ve Zruči s tím, že se to zaměřuje hlavně na stavební fyziku. V tom v tom projektu to znamená na hlavně na denního osvětlení, na akustiku a vlastně na tepelnou techniku, plus případně kvalitu vzduchu.

Co vy jako architekti toho projektu jste řešili právě v souvislosti tady s tou stavební fyzikou a kvalitou vnitřního prostředí mám teda postupně nějaký dotazy konkrétnější?

To je si spíš na toho inženýra, ne, který potom dělá ten projekt. My jsme to asi nerazítkovali. Já si myslím, že jsme dělali jenom ten návrh.

Obecně, my se věnujeme hlavně tomu návrhu a tahle zodpovědnost jde za někým, kdo toho razí. Já samozřejmě razítko mám, ale nepoužívám ho, nestíhám to. Takže u nás v projekci je skupina inženýrů, který to dělají. Samozřejmě s nimi jsou jakési třenice, protože oni chtějí, aby se to nepřehřívalo, aby to izolovalo. Já bych chtěl zase nějaký hezký detail nebo velké okno, takže si to někam musí sednout.

Takže úplně nevím, jestli jsem schopen odpovídat nějaké dotazy, nevím, výměna vzduchu nebo takové věci, to je asi standardní. Nebo tenkrát byla, on ten projekt je taky poplatný době, ono se to mění.

Ty dotazy jsou spíš k té architektonické studii. Protože co jsem zkoumala ten projekt, četla tu autorskou zprávu, tak takovýma věcma jako prosluněním, denním osvětlením jste se zabývali už v rámci té studie? Vím, že ta autorská zpráva zmiňuje i, že jste tam řešili odclonění hluku z dopravy.

Zásadní je samozřejmě urbanismus, takže ty domy jsou natočeny tak, aby byly bokem k té hlavní ulici a potom v tom patře to vytváří atria a ta jsou zase odcloněná, z podstaty věci jsou prostě bokem.

To byl zásadní moment, rozhodnout se, jestli ty domy budou mít západní zahradu nebo jižní a jestli budou čelem k té silnici, anebo bokem.

Nám to vyšlo lepší bokem, protože jak jde sluníčko, tak díky tomu zprostředkujeme vlastně tu fasádu, která je v patře a která je odskočená vždycky od toho sousedního domu. V tom druhém podlaží. A proto je tam i zvolený ten úhel té střechy. Já myslím, že to v nějakém schématu máme někde nakreslené.

Je tam hrozně zajímavý moment, že vlastně v tom patře, kde se spí a bydlí, vlastně za zdí nemáte toho souseda, což je u té řadovky docela zajímavý moment a nikde jinde jsme to ještě nějak neviděli. Myslím si, že i psychologicky, když spíte a za zdí v bytovce v noci dělá někdo neplechu, je to prostě nepříjemné a tady se to nestane.

Na sluníčko jsme si udělali takový jednoduchý diagram, ono to v podstatě jedno, jestli to bude v srpnu nebo v červnu, prostě přes ty šikmé střechy prosluníme krásně i koupelnu. To je u řadovky taky něco neskutečného, protože klasická řadovka nemá okno, to nejde, to je prostě drahý a nebo je to na úkor prostě té fasády, která je vzácná. Takže tady okno až na zem, ale obrovský, to je skvělý, ne?

Pak tam byl i zajímavý moment, co se týče toho prosluňování. Já měl strach z toho rohového okna na jihozápad. Všude jsou tam dvojskla, jako tenkrát asi všuse. A myslím si, že kvůli úspoře k naší velký nevoli tam je plastový okno.

A mám tam takovou zajímavou historku, že se vybral dodavatel a ten řekl, že to nejde. No a já jsem k němu jezdil do té dílny nebo továrny. A to je taková stolice a tam se svařují ty plastový rámy do pravého úhle. Já jsem chtěl, aby to spařili do tuhého úhle on tam není totiž pravý úhel, a oni mi tvrdili, že to nejde. No a když jsme stáli u té stolice, tak jsem říkal, no ale to to by přece mělo jít ne, když by se tady tohle natočilo. No a pak se přiběhl nějaký technik a říkal: „Jé, tak už vidíme, proč to tady je.“ Ta stolice se prostě dá otočit a přivařit. A oni od té doby to vlastně umí. Tak mi přišlo docela vtipný.

Takže vždycky to byla taková doba před 10 lety, kdy Plzeň je vlastně region a my jsme tak vždycky někoho naučili něco dělat, to mi přišlo docela dobrý. To se jmenuje strukturální roh, prostě roh bez sloupku a tenkrát to tady taky nikdo neviděl, nechtěl to udělat a měli jsme z toho strach. A je to tam a není s tím žádný problém. Bohužel do dneška nám to nikdo nechce dělat, protože řekne „my to už umíme, ale my k tomu nedáme záruku.“ Takže tím to dost často padá. Nicméně to máme na dalších 3 bytovkách v Plzni, tak ten strukturální roh tam prostě je. Jo jasně, tak se tam udělá kaplička v zimě. No a co?

Samozřejmě jsou počítačové modely, to určitě máte na ČVUT, těch tepelných mostů a kondenzace, těch křivek, to vůbec nevychází a rozhodně to je zakázaný tím pádem. Prostě to nevyjde. Ale to přece není důvod to nedělat, že jo? Prakticky s tím problém není.

Tak tam prostě v extrémním mrazu to utřu, no, ale prostě celou životnost té stavby tam je parádní detail, kdy ten obyvatel sedí na tom parapetu a kouká do tý zahrady ničím nerušený.

Zvenku je to taky pěkný, tam vlastně přechází to sklo, který zrcadlí oblohu přímo zpátky do té oblohy. A není to přeťaté tím rámem u toho plastu, by to byla tragédie, že jo? Rohový sloupek no.

Tak to si myslím, že bylo takový jeden velký boj, který je pořád aktuální a technicky a výpočetně to prostě nevyjde, ale my to pořád prosazujeme s tím, že u rodinného domku ten člověk je poučený. U bytovky prostě bude muset být poučený, až když to koupí. Tam je problém v tom, že když nastoupí ta firma, řekne, my nebereme záruky a já to přinesu tomu majiteli, tak u toho rodinného domu on řekne jasně. Ale u bytovky si to nemůžou dovolit, protože kdo to koupí a kdo se na ně jak vyspí, protože v té chvíli je to velmi sporné se zárukou.

No, děkuji, tím jste mi možná odpověděl i na tu další věc, kterou jsem se vás chtěla zeptat, což bylo právě, jestli jste museli dělat nějaké kompromisy v rámci návrhu mezi právě vnitřním prostředím, respektive spíš stavební fyzikou a architektonickým záměrem?

Je to určitě je tohle, to bude to velké okno.

Pak byla zajímavá věc. Proběhla tam soutěž o projekt, který prostě za úplně pár korun odevzdal nějaký místní projektant a mě to bylo vlastně jedno, protože ty lidi šetřili. Hrozně zajímavý, v podstatě mimo záznam jo, tohle bylo dělaný pro dva lidi, který nikdy nedělali žádný development. A ale jako mají rádi hezký věci, přišli za mnou a já jim nakreslil dřevěnou řadovku. No a oni říkali, to si tu nikdo nemůže koupit? Ne vždyť to drahý a já jsem je nějak přesvědčil. a oni se jmenovali petrželka klouček, takže jsme jim říkali „peklo“ jde bylo při peklo, no a oni šetřili a jedno co bylo tak ušetřili za projekt.

A ten projekt byl odevzdaný normálně třeba detail okapu byl převzatý z detailů Bramac, prostě přesah, kulatý okap a taška. No a takhle to šlo na úřad a já jsem říkal, no ale takhle to přece

být nemůže, my ho chceme skrytý a hranatý okap a tak a bude to opláštění dřevem, takže já jsem pak na tu stavbu párkrát dojel. Velmi dobře jsme se domluvili, byl vynikající tesař no a dopadlo to skvěle.

Takže pak si člověk říká, jestli náhodou ta péče na stavbě není důležitější než nějak složitý stavební povolení, nebo vlastně ta prováděčka. Prováděčka dneska samozřejmě musí být, kreslíme detaily, ale kolikrát si to stejně uleví na té stavbě, takže tam prostě, když chceme, aby to dobře dopadlo, tak já tam prostě musím být.

Což mě trochu vede k dalšímu dotazu. Jestli se vlastně v průběhu dalších fází projektů, ať už potom třeba prováděčky nebo na stavbě něco měnilo od studie. Právě třeba kvůli tomu, abyste vyhověli požadavkům úřadů a tak dále?

No ono už je to delší dobu, já si to nepamatuju. Myslím, že tam byly zajímavý boje s tou zástavbou, tam byl požadavek na 6 řadovek. Já bych tam viděl tak 4, nakonec jich je tam 5.

A potom jsem nechtěl garáže v řadovkách, protože už jsme nějaký dělali a ty lidi tam neparkujou. Prostě tam mají basu s pivem a kola a tam se prostě nedá pak zaparkovat. takže já jsem chtěl, aby ta nástupní fasáda toho domu byla pěkná, aby tam prostě nebyla plastová garáž, takže tam je normálně pracovna, nebo někdo tam má kde zaparkovat motorku nebo kočárek, nebo kolo. A ty auta jsou bokem, což by bylo pro ten stavební úřad něco úplně nového.

Takže i tím vlastně ta řadovka je taková jako výjimečná? Ten koncept je běžný třeba na předměstí Amsterdamu, ale ne tady na vsi. A taky tomu tady říkali, bibione resort ti místní. No a celý se to začalo pláštit tím dřevem, čím jsme všichni všechny tenkrát šokovali, to jako na to, jak je to starý, tak opravdu to nebylo běžný tady.

Ty dřevostavby prostě teprve tady vznikají jako v zahraničí jsou docela dost jako konzervativní, když se třeba podíváte nějakou mapu současné architektury, tak vlastně tady toho moc není. No a ještě je zajímavej takovej příběh, ono je to spíš takový jako pohádka, příběh, než technické řešení.

Ale to s tím souvisí.

To s tím souvisí, já ty příběhy mám rád, tak jak se to začalo stavět. Oni začali inzerovat a nikdo se nehlásil, vůbec nikdo. To bude průser, to nikdo nechce. No mimochodem to prodávali asi za 2 a půl milionu tenkrát, nebo za 3 prostě hrozně málo vlastně v dnešní době. A pak se dodělaly hrubé stavby s tím, že to oni budou prodávat, a ať si tam interiér dodělá, jak kdo chce, jako to bylo docela sympatický. No a nikdo to nechtěl.

A já jsem říkal, no to je proto, že si ty lidi nedokážou představit, jak v tom bydlet, tak pojďme udělat jednu vzorovou a tam budete přijímat ty potenciální klienty. Dobře, takže my jsme navrhli, a to je možná i na tom webu, udělali jsme žlutou koupelnu, udělali jsme takovou zavěšenou kuchyň z překližky. Koupil se nějaký nábytek, kytky. No a měli jsme tam, myslím, že den otevřený architektury v rámci nějakého happeningu, byli tam i nějaký novináři a druhý den se to prodalo. Okamžitě. Tam přijela nějaká starší paní a hned to koupila.

Tak oni teď neměli kam vodit ty klienty. Takže si udělal druhý řadový dům vzorový a okamžitě se prodal. Taková zajímavá zkušenost, že vlastně když je něco nového, tak ty lidi si to nedokážou představit, ale když je to hotový, tak je to prostě skvělý a všichni to pochopí. Tak to je jako pro mě to bylo docela jako takový, taková zajímavá zkušenost a hrozně se nám všem ulevilo, že se to prodalo.

A k tomu možná se vztahuje, jestli když to bylo hotové, jestli vás vlastně něco překvapilo u toho projektu, že to třeba dopadlo jinak, než jste si ve fázi studie představovali právě i třeba z hlediska toho vnitřního prostředí?

Ne. Když jsme si stoupli třeba na tu terasu, tak to bylo opravdu příjemný. Ten prostor byl úplně správně, tak, jak jsme chtěli. Úzká škvíra na sever, široké rozevření do zahrady.

Měli jsme tam několik velkých stromů, který jsme tvrdošíjně prostě zanechali. To bude asi v tom modelu. V průběhu té stavby se chránili nějakou konstrukcí. Dům se postavil, pozemek se prodali i s těma stromama a majitel to okamžitě pokácel. Jako dobře, byly to břízy, ty nemají velkou životnost. Ale ty obrovský stromy tomu dávají docela atmosféru. A tak stromy zase vyrostou. Z toho jsme byli trošku špatný.

Ale jinak výborná zkušenost a to se nejenom u toho projektu, ale stává se to často, že když se chytře šetří, tak to dopadne kolikrát líp, protože oni přemýšleli nějakou drahou fasádu a já nemám rád ty výrobky, my vždycky se snažíme to udělat trošku jinak.

Třeba používám různě široké prkna a náhodně se tam dávají, různě hluboké prkna. Pokaždé se to snažíme trošku vymyslet jinak a oni přišli s tím, že ta fasáda je prostě drahá. No tak jsem říkal, koupíme obyčejný prkna a necháme je tlakově naimpregnovat.

A tak oni poptali modřín, to bylo samozřejmě drahé, tak tam jsou smrkový. A vlastně to dopadlo skvěle, protože ten smrk hezky stárne. A teď už je to takový hnědý a když to zmoklo, tak je to černý a mám z toho děsnou radost, protože když by to bylo takový to třeba thermowood anebo nějaký jako dražší dřevo, nebo nedej bože exotický, což vůbec nechceme používat kvůli ekologii, tak vlastně ta fasáda nemá takový grády, jako když je to prostě ten obyčejný smrk, který v dešti zčerná. Tak z toho mám radost,e ještě to tam tak jako hezky zapadlo a myslím si, že už na to ani nikdo nenadává.

A mluvil jste třeba v nějaké poslední době s někým, kdo tam bydlí, nebo máte nějaký reference o tom, jak se tam třeba lidem žije?

Já myslím, že jsou úplně v pohodě a naopak, jsou rádi, že to tam je, že prostě jak pokročila doba, tak ten dům je vlastně trochu nadčasový. Takže oni teď mají super bydlení. To všichni chtějí, ono to časem tak jako doběhne. Je to hrozně zajímavé. Já bydlím ve vesnici kousek vedle a tady se třeba udělal přístřešky pro popelnice s úplně stejným tvaroslovím. Jo, a vlastně když si tady někdo něco udělá na zahradě, tak začíná používat to neošetřené dřevo a ty latě a vlastně mají pocit, že mají něco dobrého, že mají něco lepšího. Je vlastně hrozně zajímavý, že časem to bude standard, ale když jsem to dělal, všichni z toho byli úplně špatný. Proč? Jako že to shnije, to je jasný. Ale ono to neshnije, ono z hlediska té stavební fyziky. Když dobře vymyslíte ten detail, u okapů, rohů u soklu u parapetů u nadpraží tak to dřevo tady bude dlouho. Já mám nafoceno spoustu stoletých stodol, kde to tam prostě je.

Pro jistotu se zeptám, jestli jste vlastně už třeba u studie měly nějaký profesanty nebo specialisty, právě třeba světlaře nebo někoho na akustiku, nebo jestli se to pak řešilo až v těch pozdějších fázích?

To vůbec, děláme to jako citem. Těžko říct, jak to bude do budoucna, protože teď jsem to zrovna udělal úplně obyčejný domek a údajně nevyšel PENB, že má moc velký okno prostě úplně pro mě za mě to je úplně úlet. Protože jak cestujete po světě, tak vidíte, že prostě ostatní tohle vůbec neřeší, a proč tam nemůžu mít velký okno? No, protože nám to nevyjde v tom výpočtu. Aha? No a to dřív nebylo.

Takže mi dodneška to dělám spíš citem, prostě otevřu dům na jih do zahrady. Dáváme si pozor na zastínění, to je velký problém, to je jako šikovný, prostě to na jih zastínit, to se úplně nabízí, to je vlastně nejlevnější ekologické řešení. Když udělám markýzu na jih, tak v létě, je tam chládek, v zimě horko, to se úplně nabízí.

No a akustiku, to bylo taky zajímavý. Tam si vymínili, že nechají ty betony pohledový. Já jsem na tom netrval, říkal jsem proč ne. Ta mě, když neřeknete, že tam budou pohledové betony, tak se to povede. Když to vyžadujete, většinou se to nepovede, protože všichni si na to tak soustředí, že prostě se to nepovede. Ale když ten strop má tak jako takovou patinu jako plynulou to je vlastně, když se na to nikdo nesoustředí, tak jsou ty kaverničky všude, tak je to krásný. Takže tam jsou všude teď pohledové betony.

Ale v tom rodinném domku si myslím, že není důvod to řešit, protože máte závěsy, koberce, sedačky, měkký materiál. Je to v pohodě.

To je to velký téma teď v administračce, že jo? Dělali jsme, teď to dostal nějakou cenu za nejlepší interiér mimo pražský a tam jsme udělali heraklit. Je to skvělý.

V rodiném domku neřešíme takhle akustiku.

Odvahou a citem, my nic nepočítáme. A většinou to dopadne dobře, teda. Máme štěstí na klienty, říkáme jim hele, když je to teda levný ale nikdo to ještě nikdy nevyzkoušel, co se kdyžtak může stát? No tak když tak, přes to dáme ten drahý Hunter Douglas. Takže oni jako nám věří jo, že když bych třeba dělal nějakou větší společnost, byl jsem se podívat třeba do těch administrativních budov v Praze. Tam asi dát zodpovědnost je jiná a ty náklady by pak šli třeba za mnou na výměnu toho stropu.

Tak tak jako zas má jako tím, že jsme regionální architekti, tak si tak máme vlastně štěstí asi na klienty a se všema potom většinou jako si tykáme a pijeme a tak. Mám vlastně štěstí na lidi.

Takže to jsou ty příběhy? No tak já mám k těm číslům tý tepelný fyziky moc neřeknu.

Ty dotazy nesměřovaly úplně k těm číslům, a k tomu, kdo to pak počítá, ale spíš co vy jako architekti tam vlastně řešíte a kdy to řešíte v tom projektu?

Já třeba když vidím nějakou pěknou věc v zahraničí, tak tak si říkám, ty jo, ale vždyť to musí fungovat i tady. Tam taky sněží, taky tam jsou tam lidi jako my, a když to funguje tam, tak proč bychom to nemohli postavit tady? Jasně, že to asi nejde masově, ale na 2 stranu mě mrzí, že ty český normy mi to vlastně zakazuju udělat jako atyp a třeba i pokus, přece je i důležitý udělat třeba nějakou věc a zjistit že tudy cesta nevede, ale bez toho neuděláme žádný pokrok.

Já jsem prostě spíš rebel, než aby bylo všechno v cajku. Jenže já to pak si pak inženýrovi aby to porazil.

No jasně tam potom. Myslíte si, že by se třeba dalo to konzultovat? Vlastně s tím inženýrem už jakoby ve chvíli, kdy Jako ve snu ve chvíli, kdy dává razítko, ale už ve chvíli, kdy to projektujete nebo že je? Vám je to spíš jako na nechci říct na překážku. No ale.

Ne já mám kolegu Josefa Houška, máme spolu tu firmu PRO STORY i ateliér já vedu architekty on profesanty. A on vlastně je výborný, rozumí tomu, ale on má myšlení architekta trávil já bych, aby to jako blbě, abychom ho vysvětlil, já vůbec nemám problém se stavebními inženýry.

Ale se spoustou z nich se pořád dohaduji, protože tady existuje, určitě cítíte mezi architekty a stavaři takovej jako názorový boj, jo dokonce prostě, že ta stavba nejdřív jako musí fungovat bezvadně a pak architekt dodělá třeba tu fasádu a tak.

No ale to takhle není, že jo? Já věřím v to, co napsal Vitruvius, že těch 3 věcí, že to má být funkční, pevný a esteticky v pořádku, takže to má být vyvážený. No a my děláme třeba masově, rodinný domky a stavby. Tak ti většina toho mainstreamu je, že to je pevný, možná funkční, no ale esteticky to je takový jako napůl. A zase některý architekti, to je prostě výtvarné řešení, super. Trošku to v krajním. Hmm, tak to taky není úplně, že jo dobře, ale jakože by to mělo být fakt vyvážený a málokdo z architektů to jako chápe. Ale spíš víc architektů.

Ale z těch stavebních inženýrů už moc ne a míchají do toho emoce. Třeba tuto je ošklivý, tu to není. Já říkám, no a líbit se není estetická kategorie, že?

Takže ten dům prostě já mám ke stavařům respekt a jsou stavaři a naštěstí můj kolega je, že prostě oni řeknou, no ale hele, ty jo, to jsem viděl někdy lepší řešení, tak to zahodíme celý a vymyslíme to ještě úplně nějak jinak.

Jo že si jako nebolí, tak i experimentovat nebojí se trochu jít s kůží na trh, že jo? To prostě i ta stavební fyzika. Já vím, že já udělám bytovku a oni pak s tím mají strašně starostí. Lidi jsou schopní, si tam měřit, si tam brát nějaký přístroje na měření hluku na příčky v rámci bytu na to, se sousedem, řeší se akustika vstupních dveří, pak, že chtějí slevu, kondenzuje tam vlhkost v rohu někde. Takže se řeší detaily.

Pořád vím, že ta naše stavební sekce tohle řeší a obdivuji ho, že prostě má furt se mnou trpělivost.

Vím, že v současnosti třeba vedeme dva tři soudní spory, kdy došlo k nějaké velké kondenzaci vody.

No jo, ale oni zaklopili ten sádrokarton v době, kdy druhý den přišel fakt mráz, asi o 20 stupňů se ochladilo. A něco tam shnilo, ale pak to zase vyschlo. Ale někoho napadlo to otevřít a byly tam ty plísně, takže se nechali otevřít všechny ty řadovky.

A my si myslíme, že to je tím, že tam prostě to zaklopili po omítkách rychle, a ještě tam teda ta smůla, že se ochladilo prudce. Oni si myslí, že jsme navrhli špatnou difúzní fólii, už se 3 roky soudíme a je to jako vlastně nepříjemný.

Já tu stavební fyziku chápu, že to není sranda.

Já se naštěstí můžu věnovat té architektuře, protože mám za sebou toho dobrého stavebního inženýra. Já si myslím, že jako důležitý vypíchnout, že si moc dobře uvědomuju, že ty úspěchy architektonický jsou právě díky tomuto.

K čemu by mi to bylo udělat pěknou skicu. Takový mám taky šuplík pěknej, no tam toho je.

Co si myslíte o tom, co by se vlastně architekti měli naučit ve škole? Co všechno by architekt měl umět? Právě třeba ze světla, akustiky.

Já jsem se toho ve škole vlastně moc nenaučil a potom, když jsem přišel do praxe, tak jsem si toho tolik prošel, že teď můžu říct, že? A stejně mi vždycky něco překvapí, jo, to je úplně jedno. No a zrovna včera jsem byl právě na té porotě Druhé kůže (studentská soutěž na FA ČVUT) online, ale naštěstí to proběhlo.

Jako že jsem byl úplně až jako šoku. Já jsem konsternovanej, protože ty projekty lidi sněmovny a já jsem říkal, ty jo, to je, ale to mi třeba na tom děláme ve 2 lidech půl roku a tady je bytový soubor, kterej prostě má.

Evidentně všechno v pořádku tam nebyly chyby. Tam byl urbanismus v pořádku. Dispozici byly v pořádku. Bylo to vykreslený všechno a ani si nedokážu představit, že by je tam potom někdo nějak na to nachytal, že když by se to začalo rozkreslovat z hlediska nových norem, takže tam bude všechno v pořádku?

No a oni mi řekl, já jsem říkal na to, že to je 3. Ročník a oni mi říkali, ne, to je 2. Ročník a který chvíli jsem si uvědomil, že na ty žáky je kladený strašný tlak, prostě že tohle vyklikat za ten semestr no to je neskutečný.

A už jsem to slyšel od víc lidí, co tam učí, že vlastně k tomu stihnout jo, jak můžu udělat ostatní věci? Jo, to prostě je neskutečně náročný. A pak to trochu spěje k tomu, že se začnou přebírat, prostě, že se to nestíhá. Začnou se přebírat prostě věci a já to chápu tak tu architekturu, že tam by měla bejt taková ta vůle zkoušet ty nové věci a dělat ty inovace? No a tímhle tempem to prostě se nedá stihnout.

Architekt by podle mě měl chápat ten celek. A ten nadhled ale přece nemusí všechno jako řešit.

Já jasně, no, já jsem z toho byl úplně hotovej. Já jsem přišel na stavbu a byl kontrolní den a vzal si mě tam kameník říkal, hele,

já tady nevím, jak to mám ukončit. Jak to mám uříznout, kameník.

To samé chtěl po mně sklenář. Potom klempíř, jak to má udělat u toho okna, teda když je kulatý to okno. Pak si mě vzali stranou z toho vzduchotechnikou, že jim to tam nevejde.

A takhle projdete tu stavbu a říkáš zdvihem vlastně o ničem nevím nic je hrozný. Vůbec o ničem nic nevím a od každýho trochu, ale ono to jako časem dá celý smysl.

A vlastně důležitý, strašně důležitý je neztratit ten nadhled a zjistit, co je důležitý. Je to jsem třeba tohle není vůbec důležitý.

No tak od toho máme ty inženýry a ty znova. Ten inženýr musí být v tom oboru mít takovej nadhled, aby řekl: "Hele, to není důležité, to je důležité". Mě prostě hrozně štvou jako projekty. Kde přijdu na stavbu a oni tam bazírujou na detailu a ten celek prostě stojí za prd.

A říkám, třeba už tohle vůbec není publikovatelný, tak proč tady buzeruješ ty obkladače, že jim nevyšly dlaždičky? To je úplně jedno.

Koukají na mě, „a my chceme, aby to bylo hezký." No ale teď máte hnusnou dispozici? Ne, to je úplně špatně. Tak to přece nebudeme řešit teď spárořez.

A to samé čekám prostě od těch inženýrů, aby prostě se, aby měli ten nadhled, aby prostě neřešili jeden detail na úkor toho, že to prostě bude celý jako úplně jinak vypadat.

No jako těžko popisuje. My jsme vlastně včera taky trošku zabředli na tu debatu a zjistili jsme s těmi architekty, s profesantamy, co tam byli. O smyslu té práce a jak učit a co je důležitý no.

Jako určitě je to respekt k tomu oboru navzájem.

Když já jenom dělám barák a pak mi přijde za mnou někdo, kdo tam navrhuje tu vzduchotechniku. A já úplně žasnu taky to jako složitý a promakaný, aby to fungovalo. No a zjistil jsem, že v tom v tom našim v tej naší skic jsem s tím vůbec nepočítáme, že jo skoro nikdo z architektů neřeší střechu do střechy. Dneska tak složitá, co všechno se tam odehrálo na ty střeše za ty technologie, tak to je vlastně další patro plnohodnotný, že jo? No, a to nikdo ve studii neřeší.

Tak prostě asi, asi by to měla být spíš taková jako pokora, no bych řekl.

Jakou si myslíte, že v tom hrajou roli legislativní požadavky, jak vám třeba vstupují do toho procesu navrhování? Normové požadavky nebo potom požadavky třeba stavebního úřadu, hygienické stanice.

Já vždycky žasnu. Uděláme přístavu vikýře a musí to jít na hygienu.

No pak mi vadí, že vznikají ošklivé stavby a mají strašně složitý projekt. No ale to je otázka asi úplně na jiný téma. Ale konkrétně co mně vadí, tak to jsou ty nový tepelný předpisy a požadavky. Protože jednak trošku vím, že to je lobby. Je to prostě dost zbytečný z praxe.

Teď konkrétně, já jsem projektoval obyčejný rodinný dům a bez vzduchotechniky mi bylo řečeno, že to nevyjde. Ale ta vzduchotechnika je drahá, to tepelné čerpadlo v podstatě, který tam být musí, tak je elektrokotel.

K tomu musíte dát, je jako to elektroauto, který aby ta baterka, když auto zrychluje se chladila, tak se musí zapnout klimatizace a je to v tom vůbec není započten, i když vám prodává někdo to elektroauto. V zimě topí taky baterkou, takže to vlastně nejede a podobně funguje ten rodinný domek, prostě ten rodinný domek je vlastně v pořádku, ale abychom docílili nějakého čísla, tak ho musíme narvat předraženou technologii, kterou byl nutný vyrobit a která se může rozbít a v té chvíli si člověk říká vlastně, jestli to jako nutný.

Tak já pořád vlastně navrhuji stejný ty rodinné domy, ale pak to dostanu do ruky ten stavební inženýr a ten řekne, hele, ale nám už to nevyjde bez tohohle a tohohle. A ty lidi to koupí jako navíc, aby ten dům vůbec mohli postavit a mně to prostě přijde zbytečný.

No a vždycky se mi ptají ale. Tady dělá ten prostor třeba přes 2 patra, vám to bude hrozně drahý na vytápění a já říkám, ne, tak si to spočtěte vy. To je tak předimenzovaný, že za to vytápění už nezaplatíte skoro nic. Vy budete platit za elektriku ročně, ale na vytápění tam nebude skoro žádná část.

Takže je to jako přehnaný. Bez toho je to vidět, že to je přehnaný a bere mi to, bere mi to tu svobodu udělat ten dům třeba s hezkým výhledem na sever. No to už jsi skoro nemožný, že jo? Prosklít ten dům a ty Čechy jsou taková malebná, různorodá krajina a ideální parcely by došly jako svah na. Jejich toho tož tady skoro není. No a my si tím trošku jako bereme tu svobodu.

Jo no tak zase vždycky dobrý, nejdřív to vyzkoušet na sobě, než to cpát dalším lidem, ne?

Já to prostě chápu, že to nechci udělat někdo pro třeba v té bytové výstavbě, protože tam často se stává, že narazíte na někoho, kdo se v tom prostě šťourá a chce ty výpočty a bere si svoje znalce a soudní a tak. To je taky zajímá zkušenost, jak jsme prošli těmi soudy a znalci, tak že ty výpočty se dost liší. Není to samozřejmě hodně, ale většinou už jste na hraně a tu hranu vidí každý jinak.

Ne nevím, ale jako nedělám do toho oboru, nerozumím tomu, nepočítám to. Ale vím, že ty lobby tady prostě jsou na to zateplování to vím y výrobcích prostě tím, ty jsou rádi, že?

No asi architekti byli měkký, oni to dost pozastavili. Já si myslím, že ty termíny takových těch zásadních požadavků se odsouvaly, že jo.

No tak já prostě jenom bych si chtěl dělal, co chci.

Pracujete s nějaký softwarem?

Koupili jsme teď nějaký prográmek na světla, protože děláme interiéry do těch bytovek, což je hrozně zajímavý, že nás nechávají dodělat ty vstupní haly, materiál na chodbách, zábradlí, detaily. No a samozřejmě světla a ty světla v té bytovce nejsou neznamená nezanedbatelná položka a mě baví třeba nějaký úplně obyčejný světlo a pak jich tam je rozhodím, jako je rozprskne třeba po stropě. No ale v té chvíli ho potřebujete vědět, jak to svítí, že jo? Že používáme nějaký prográmek.

A to je vlastně taky zajímavý pro vás, že já vlastně úplně z ničeho. Už jsem z toho vypadl, tak najednou si otevřu Kaňku. A koukám do těch do těch do toho programu a pak to stejně za hodinu dám to někomu jud, protože já si nemůžu dovolit, aby to nesvítilo málo, no anebo naopak moc a těch světel tam bylo zbytečně.

A takže ty zdroje všecky jsou třeba jak jsme měli tu administrativní budovu, tak jsme se taky dost dělali, že jo, to já jsem třeba vůbec nevěděl, že jsou důležitý hodnoty Ugr a ty rozptyly všechny. A že to světlo z té Číny je úplně stejný, ale nemá to Ugr. Na té stavbě vás třeba i ošidí, že jo? Protože to dodají, „hele my tady máme stejný světlo a bude o půlku levnější", tak super, hurá. A pak zjistíte, že nemáte parametry. No a to na té stavbě má šanci zjistit jenom ten poučený, třeba architekt, že jo? Protože ten elektrikář, který to zná a počítá, tak on nechodí na kontrolní dny a nevšimne si toho.

Možná dozor, jenže ten dozor, to je jako architekt. Mimochodem vážím si dobrých dozorů. Dozor vlastně taky musí znát od každého oboru něco.

No, takže vlastně to celoživotní vzdělávání za pochodu.

English translation of interview with Jiří Zábran:

I have some questions about this project of terraced houses in Zruč, with focus mainly on building physics. In that project, that means mainly daylighting, acoustics and actually thermal engineering, plus possibly air quality.
So what did you as the architects of that project address in relation to the building physics and indoor environmental quality here, I have some more specific questions as time goes on?
That's more for the engineer, no, who then does the design. We probably didn't even put a stamp on it. I think we just did the design.
Generally, we're doing the design and that responsibility goes to the person who's doing the design. I have a stamp, of course, but I don't use it, I don't keep up with it. So we have a group of engineers in design who do that. Of course, there's sort of friction with them because they want it not to overheat, they want it to insulate. I want some nice detail or a big window, so it has to fit somewhere.
So I don't quite know if I'm able to answer any questions, I don't know, air exchange or things like that, that's probably standard. Or it was at the time, he project is also charged to the times, it changes.

The questions are more about the architectural study. Because since I've been researching the project, reading the author's report, did you deal with such things as sunlight, daylighting in the study? I know that the report also mentions that you addressed traffic noise shielding.
Of course, the urbanism is essential, so the houses are turned so that they are sideways to the main street, and then on that floor it creates atria and they are again shielded, by definition they are just sideways.
That was a critical moment, deciding whether those houses were going to have a west-facing garden or a south-facing garden and whether they were going to face that road or be sideways.
It worked out better for us sideways, because as the sun moves, it actually mediates that façade, which is upstairs and which is always set back from that neighboring house. On the second floor. And that's why the angle of the roof is chosen. I think we have that drawn in a diagram somewhere.
It's a very interesting moment there, that actually on the floor where you sleep and live, you don't have the neighbour behind the wall, which is quite an interesting moment in that terraced house and we haven't seen it anywhere else. I think that also psychologically, when you're sleeping and there's somebody making mischief behind the wall in the apartment building at night, it's just unpleasant and it doesn't happen here.
We made a simple diagram for the sun, it doesn't really matter if it's August or June, we'll just illuminate the bathroom over the sloping roofs. That's also something incredible with a terraced house because a traditional terraced house doesn't have a window, you can't do that, it's just expensive or it's at the expense of just that facade which is scarce. So here, a window all the way to the ground, but huge, that's great, isn't it?
Then there was also an interesting moment in terms of the sunlight. I was worried about the corner window to the southwest. There's just double glazing everywhere, like everywhere back then. And I think to save money, much to our chagrin, there's a plastic window.
And I have this interesting story that a contractor was chosen and he said it couldn't be done. Well, I used to go to his workshop or factory. And it's a kind of a bench and that's where they weld the plastic frames at right angles. I wanted them to weld it at an obtuse angle, because it's not a right angle, and they said it couldn't be done. Well, when we were standing at the stool, I said, well, that should work, shouldn't it, if you turn this around. Well then a technician came running up and said, "Gee, now we can see why it's here." The stool can just be turned around and welded on. And they've actually been able to do it ever since. So I thought it was kind of funny.
So it was always a time 10 years ago when Pilsen is actually a region and we always taught someone to do something, I thought that was pretty good. It's called a structural corner, just a corner without a post and back then nobody saw it here either, they didn't want to do it and we were scared of it. And it's there and there's no problem with it. Unfortunately, to this day, nobody wants to do it for us because they'll say "we can already do it, but we're not going to put a warranty on it." So that's pretty much where it falls down. However, we have it on 3 other apartment buildings in Pilsen, so the structural corner is just there. Yeah, right, so there' s a drop in the winter. So what? Of course there are computer models, I'm sure you have that at the CTU, those thermal bridges and condensation, those curves, it doesn't work out at all and it's definitely forbidden that way. It just doesn't work. But that's no reason not to do it, is it? In practice, there's no problem with it.
So I'll just wipe it down there in extreme cold, well, but just for the life of the building there's a nice detail where the occupant sits on that parapet and looks out into that garden undisturbed by anything.
It's nice from the outside too, there's actually that glass that goes over there that mirrors the sky right back into that sky. And it's not cut through by the plastic frame, that would be a tragedy, wouldn't it? Corner post, no.
So I think that was kind of the one big struggle that's still going on and technically and computationally it just doesn't work out, but we keep pushing that with the single family home the person is informed. With an apartment building, he's just going to have to be briefed when he buys it. The problem there is that when the company comes in and says, we don't take warranties and I bring it to the owner, for the single-family home he will say sure. But with an apartment building, they can't afford it because who's going to buy it and who's going to sleep on it because at that point it's very questionable with the warranty.

Well, thank you, that may have answered the other thing I wanted to ask you, which was whether you had to make any compromises in the design between the indoor environment, or rather the building physics, and the architectural intent?
It's definitely this, it's going to be the big window.
Then the interesting thing was. There was a competition for a design that was just submitted for absolutely pennies by a local designer and I didn't really care because these people were saving money. Terribly interesting, basically off the record yeah, this was done for two people who had never done any development. But like they like nice things, they came to me and I drew them a wooden rowhouse. And they were like, can't anybody buy this? No, it's expensive, and I somehow convinced them. They were pretty thrifty, and they saved money on the project.
And the project was handed in normally like the gutter detail was taken from the Bramac detail, just the overhang, the round gutter and the tile. Well that's how it went to the authorities and I said, well it can't be like that, we want it hidden and square guttering and stuff and it's going to be timber cladding, so then I went to the site a couple of times. We got on very well, there was an excellent carpenter, well it turned out great. So then you wonder if by any chance the care on the site is more important than some complicated building permit or actually the execution. Of course, nowadays, we have to be there, we draw the details, but a lot of times it's still a relief on the construction site, so I just have to be there if we want it to turn out well.

Which kind of leads me to my next question. If anything has actually changed from the study during the other phases of the projects, whether it be the implementation or the

construction. Just maybe to meet the requirements of the authorities and so on?
Well it's been a long time, I don't remember. I think there were some interesting fights with the development, there was a requirement for 6 terraced houses. I would have liked to have seen about 4, in the end there are 5.
And then I didn't want a parking garage in the terraced houses because we've done some and those people don't park there. They just keep their beer and their bikes in there and then you can't park there. So I wanted the front facade of that house to be nice, so it's not just a plastic garage, so there's a home office or somebody has a place to park a motorcycle or a stroller or a bike.
And the cars are off to the side, which would be a whole new thing for the building department.
So that makes the terraced house kind of special as well? The concept is common in the suburbs of Amsterdam, but not here in the village. And it's also called Bibione resort by the locals.
And it was covered in wood, which shocked us all at the time, it was like, for how old it was, it wasn't really common here.
The wooden buildings are just just coming up here like abroad they're pretty much like conservative, if you look at like a map of contemporary architecture there's not really much here. And then there's the interesting story, it's more like a fairy tale, a story, than a technical solution.

But that's related.
It's related, I love the stories. As they started to build, they started advertising and nobody came forward, nobody at all. That's going to be a bummer, nobody wants that. Well by the way it sold for about 2 and a half million back then, or 3 just awfully low actually nowadays. And then they finished the rough construction with the idea that they would sell it and let them finish the interior as they wanted, like it was quite sympathetic. And nobody wanted it.
And I said, well that's because these people can't imagine living in it, so let's make one model one and that's where you're going to take those potential clients. Okay, so we designed, and this is maybe on the website, we did a yellow bathroom, we did a sort of suspended plywood kitchen. We bought some furniture, some flowers.
And we had, I think, an open architecture day there as part of some happening, and there were some journalists there, and the next day it sold out. Immediately. An elderly lady came and bought it right away.
So now they had nowhere to take the clients. So he made a second terraced house as a model and it sold immediately. Such an interesting experience that actually when something is new, those people can't imagine it, but when it's done, it's just great and everybody gets it. So it's like for me it's been quite like that, such an interesting experience and we're all terribly relieved that it sold.

And maybe related to that is, when it was finished, did anything actually surprise you about the project, that maybe it turned out differently than you imagined in the study phase, maybe even in terms of the indoor environment?
No. When we stood on the terrace, for example, it was really nice. The space was exactly right, the way we wanted it. Narrow gap to the north, wide opening to the garden.
We had a couple of big trees there, which we stubbornly just left. I think that's in the model. They were protected by some sort of structure during the course of that construction. The house was built, the lot was sold with those trees and the owner immediately cut it down. Like okay, they were birch trees, they don't have a long life span. But the huge trees give it quite an atmosphere. And so the trees will grow back. We were a bit sad about that.

But otherwise a great experience, and not just with that project, but it happens a lot of times when you're smart about saving money it turns out a lot of times better because they were thinking some expensive facade and I don't like those products, we always try to do it a little bit differently.
Like I use different width planks and randomly put in, different depth planks. Every time we try to do it a little bit different and they came up with the fact that the facade is just expensive. So I said, well, we'll buy regular boards and have them pressure impregnated.
And so they asked for larch, which of course was expensive, so there's spruce. And it actually turned out great, because the spruce is aging nicely. And now it's kind of brown and when it's wet it's black and I'm really happy about that because if it was like thermowood or like a more expensive wood, or God forbid exotic wood, which we don't want to use at all because of the ecology, then actually the facade doesn't have the same charm as if it's just that regular spruce that turns black in the rain. So I'm happy about that, that it's still kind of blending in nicely and I don't think anyone's even complaining about it anymore.

And have you talked to anyone who lives there recently, or do you have any references about how people live there, for example?
I think they're totally fine and in fact, they're glad that it's there, that just as time has progressed, the house is actually kind of timeless. So they've got a great place to live now. That's what everybody wants, it'll kind of catch up over time. It's very interesting. I live in the village just down the road and here, for example, they've done outhouses for garbage cans with exactly the same form. Yeah, and actually when someone does something in their garden here, they start using that untreated wood and those slats and they actually feel like they've got something good, they've got something better. It's actually terribly interesting that over time it's going to be the standard, but when I was doing it, everybody was scared of it. Why? Like it's gonna rot, that's for sure. But it's not rotting, it's not rotting in terms of the building physics. If you get the detail right, the eaves, the corners of the baseboard, the sills of the lintels, the timber will be there for a long time. I've photographed a lot of century-old barns where it's just there.

Just to be sure, I'll ask you if you actually had any specialists, like a lighting engineer or someone for acoustics, or something like that, or was it dealt with in the later stages?
We do that at all, we do it like by feel. It's hard to say how it's going to be in the future, because I've just done a completely ordinary house and supposedly it didn't pass PENB (energy performance certificate), it's got a window that's too big just completely off the wall for me. Because as you travel the world you see that just other people don't address that at all and why can't I have a big window in there? Well, because it doesn't work out in the calculation. Oh, yeah? Well, it didn't before.
So I still do it by feel, I just open the house to the south into the garden. We're careful about shading, that's a big problem, that's like handy, just shade it to the south, that's quite an obvious one, that's actually the cheapest eco-friendly solution. If I make an awning to the south, in the summer, it's cool, in the winter it's hot, that's quite obvious.
And the acoustics, that was interesting too. They chose to leave the concrete exposed. I didn't insist, I said why not. If you don't tell me it's going to be exposed concrete, it's going to work. When you require it, it usually doesn't get done because everybody is so focused on it that it just doesn't get done. But when the ceiling has like a patina like a flowing it's actually, when nobody's focused on it, the caverns are everywhere, it's beautiful. So there's exposed concrete everywhere now.

But in that family home, I don't think there's any reason to worry about acoustics, because you have curtains, carpets, sofas, soft material. It's fine.

That's the big topic now in the admin, isn't it? We did, now it's got some award for best interior outside of Prague and we did heraclite there. It's great.
We don't do acoustics like that in the family home.
So actually that kind of experience, courage and feeling, we don't calculate anything. And it usually turns out well, I mean. We're lucky with clients, we're like hey, if it's so cheap but nobody's ever tried it, what could possibly happen? Well, if they do, we'll put that expensive Hunter Douglas over it. So they're like trust us yeah, if I was like doing some bigger company, I've been to like these office buildings in Prague. There I guess to give the responsibility is different and then that cost would go to me to replace that ceiling for example.
So like again, it's like by being regional architects, so we actually get lucky I guess with clients and then we usually like chat and drink and stuff with everybody.
Those investors that were building those townhouses, I was designing a single family home for each of them as well.
I did some house on, where he lives and I think it got house of the year or something like that, I totally watched that some magazines picked that as a solution? I said at the time hey those row houses are great well your house can actually do better.
No, it's obvious, right? So...
So I actually had a free hand there, well I'm still so lucky with people.
So those are the stories? Well, I don't have much to say about the thermal physics numbers.

That's not really where I was directing my questions. You told me an awful lot, the questions were not really directed to the numbers, and who does the calculations, but rather what do you as architects actually address there and when do you address it in the project?
Well, I just think, for example, when I see a nice thing abroad, I think, wow, but it has to work here too. It snows there too, there are people like us there too, and if it works there, why can't we build it here? Sure, it's probably not possible to do it on a mass scale, but on the other hand, I'm sorry that the Czech standards actually forbid me to do it as an atypical and maybe even an experiment, after all, it's important to do some things and find out that this is not the way, but without that we can't make any progress.
I'm just more of a rebel than I am a do-it-all-good guy, but then I want the engineer to put his stamp on it.
Do you think that maybe you could consult with the engineer when you're designing it or is it more of a stumbling block?
No, I have a colleague Josef Houšek, we have a company PRO STORY and a studio together, I lead the architects and he leads the engineers.
And he's actually excellent, he understands it, but he has the mindset of an architect, to explain it, I have no problem with civil engineers at all. But I argue with a lot of them all the time, because there's, I'm sure you can feel like between architects and civil engineers there's just like a, like a battle of opinion, yeah even just that the building first like has to work perfectly and then the architect will finish like the facade and stuff.
Well, it's not like that, is it? I believe in what Vitruvius wrote, that those 3 things, that it's supposed to be functional, solid and aesthetically right, so it's got to be balanced. Well, and we do, like, mass, single family homes and buildings. So you get most of that mainstream stuff that it's solid, maybe functional, but aesthetically it's kind of like halfway. And again, some architects, it's just an artistic solution, great. It's a little bit in the extreme. Hmm, so it's not quite that either, right, but like it's supposed to be really balanced and not a lot of architects like get that. But more architects do.
But not many of the civil engineers do and they mix emotion into it. Like this one's ugly, this one's not. I say, well, and liking is not an aesthetic category, is it?
So the house is just I have respect for the structural engineers and they're structural engineers and fortunately my colleague is they're just going to say, well hey, gee, I've seen better solutions sometimes, let's throw the whole thing away and come up with something else.
Yeah that like doesn't hurt, so even experimenting they're not afraid to go a little bit with the skin on the market right? It's just the physics of building too. I know I'm gonna make a condo and then they're gonna have so much trouble with it. People are able to, you measure there, you take some noise measuring instruments to the partitions within the flat to do that, with the neighbour, they deal with the acoustics of the front door, then they want a discount, condensation in the corner somewhere. So the details are being sorted out.

I still know that our building section is dealing with this and I admire him for just being patient with me.
We've got, like, 2, 3 lawsuits going on right now where there's been some major condensation. Yeah, but they covered the drywal up when it got really cold the other day, like 20 degrees colder. And something kind of rotted in there, but then it dried out again. But somebody thought to open it up and there was all this mold, so they had all these rows opened up.
And we think it's because they just knocked the plaster on the wall quickly and then the bad luck of it cooling down so quickly. They think we designed the wrong diffusion film, we've been litigating for 3 years and it's like actually annoying.
I understand the building physics, it's not fun.
Luckily, I can do the architecture because I have that good structural engineer behind me. I think as an important point to highlight, I'm very aware that the architectural successes are because of that.
What good would it do me to do a nice sketch. I've got a nice drawer like that, too.

What do you think about what architects should actually learn in school? What should an architect know? Light, acoustics, for example.

I didn't really learn much in school and then when I came into practice I went through so much that now I can say, right? And I always get surprises anyway, yeah, whatever. Well, just yesterday I was just on that Second Skin jury (student competition at the FA CTU) online, but luckily it went through. Like, I was completely, like, shocked. I'm consternated because these projects people are doing and I was like, wow, it is, but it's like, we've been working on this in 2 people for six months and here's a housing ensemble that just has.
Obviously all right there were no mistakes. There was the urban design right. The layout was fine. It was all plotted out and I can't even imagine that somehow somebody caught them on that then when they started plotting it out in terms of the new standards so everything would be okay there?
Well and they said to me, I said to them, it's Year 3 and they said, no, it's Year 2 and which moment I realised that there's an awful lot of pressure on these pupils, just to have to plot this out in that term well it's unreal.
And I've heard it from more than one person who teaches there, that actually to do that, yeah, how can I do the other stuff? Yeah, it's just incredibly challenging. And then it kind of comes down to the fact that they start taking over, it just doesn't keep up. Things start to get taken over and I understand the architecture that there should be that willingness to try these new things and do these innovations? Well, at this rate, it just can't be done.
I think an architect should understand the whole. And that perspective doesn't have to solve everything.
I mean, yeah, well, I was just so done with it. I came to the site and it was an inspection day and the stonemason took me there saying, look, I don't know how to finish here. How do I cut it off, the stonemason.
The glazier wanted me to do the same thing. Then the plumber, how do you do it on the window, I mean, if it's a round window. Then they took me aside from the HVAC, they said it wouldn't fit.
And you go through the building like that and you say by lifting I don't really know anything about anything is terrible. I don't know anything about anything at all and a little bit from everybody, but it's like over time it all makes sense.
And it's actually important, terribly important not to lose that perspective and figure out what's important. It's like, I don't think this is important at all. Is it completely knives, those joints or all straight. It doesn't really matter.

Well, that's what we got the engineers for. The engineer has to have the insight to say.
Hey, that's not important, that's important. They're just so annoying as projects. Where I go to a site and they're based on detail and the whole thing just sucks.
And I'm like, maybe this isn't publishable anymore, so why are you bugging these tile guys that their tiles didn't come out right? It doesn't matter.
They're not looking at me, and we want it to be pretty. Well, now you have an ugly layout? No, that's totally wrong. Well, we're not gonna deal with the tile jointer now.
And I expect the same thing from the engineers to just, to just, to have that perspective, to just not address one detail at the expense of just making the whole thing look like a completely different thing.
Well like hard to describe. We actually got a little bit bogged down in the debate yesterday too and we found out with the architects, the professors that were there about the point of the job like and how to teach and what's important well.
Like definitely it's respect for each other's field.
If I'm just doing a house and then I have somebody come to me and design the HVAC. And I'm amazed too, like, the complexity and the intricacy of making it work. Well, and I found out that in ours in that sketch I didn't account for that at all, that yeah almost none of the architects do roof to roof. Nowadays so complex, what all has happened on that roof in those technologies, so that's actually another full floor, right? Well, and nobody addresses that in the study.
So just probably, I guess it should be more of a humility, well I guess.

What role do you think any legislative requirements play in this or how do they enter into the design process for you, for example? Some kind of standard requirements or then the requirements of, say, the building authority, the health authority.

I'm always amazed. We make some sort of dormer port and it has to go to the health authority. Why, that's such a systemic thing.
But then it bothers me that ugly buildings are built and they have a very complicated project. Well, that's a whole other issue. But specifically, what bothers me is the new heat codes and requirements. Because I know a little bit that it's a lobby. It's just pretty unnecessary in practice.
Recently, I designed a regular single-family home and without air conditioning I was told it wouldn't work. But the air conditioning is expensive, the heat pump basically, which has to be there, is an electric boiler.
You have to put that, it's like that electric car, which in order to keep that battery cool when the car accelerates, the air conditioning has to come on and it's not factored in at all, even if somebody sells you that electric car. In the winter it heats with the battery too, so it doesn't actually run, and similarly, the family home, just the family home is actually fine, but to achieve a number we have to cram it with overpriced technology that was necessary to make and that can break and at that point you wonder actually if it's like necessary.
So I'm still actually designing the same single family homes, but then I get this structural engineer and he says, hey, but we can't do without this and this. And these people will buy it as extra to even build the house and it just seems unnecessary to me.
Well, they always ask me, but. Here's the space over two floors, it's going to be very expensive to heat, and I say, no, you do the math. It's so oversized, you'll pay next to nothing to heat it.
You're going to pay for the electricity a year, but there's going to be next to nothing for heating.
So it's like an overestimate. Without that, you can see that it's exorbitant and it takes away, it takes away the freedom to make that house, for example, with a nice view to the north.
Well, that's almost impossible, isn't it? Glass up that house and the Bohemian countryside is such a picturesque, diverse landscape and the ideal plots would run out like a hillside on. There's hardly any of it here. Well, we're kind of taking away that freedom.
Yeah, well, it's always good to try it out for yourself before you push it on other people, isn't it?
I can just understand not wanting to do it for somebody in, say, the housing construction, because a lot of times you run into somebody who is just tinkering and wants to do the calculations and get their own experts and forensics and stuff.
That's an interesting experience too, as we've gone through those courts and experts, so those calculations vary quite a bit. It's not a lot, of course, but usually you're already on the edge and everybody sees that edge differently.
No I don't know, but like I don't do that business, I don't understand it, I don't calculate it. But I do know that the lobbies here just are on it insulating it I know y the products just by, you are happy, right?
Well I guess the architects were soft, well, they put it on hold a lot. I think they've been pushing back the deadlines for those sort of like major requirements, haven't they.
Well, I just want to do what I want to do.
Are you working with any software?
Like, we bought some lighting software now because we're doing the interiors for the condos, which is so interesting, they're letting us finish the lobbies, the hallway stuff, the railings, the details. And of course the lights, and the lights in that apartment building are not an insignificant item, and I enjoy maybe some very ordinary lights and then I'll throw them in there, like scatter them across the ceiling. Well but at that point you need to know how it's lit, right? That we're using some kind of a program.
And that's actually interesting for you too, that I actually made it out of nothing. I'm already out of it, so suddenly I open a tab. And I'm looking into those into that program and then I'm going to give it to somebody else anyway in an hour because I can't afford to have it not shining enough, well, or too much and the lights are there for nothing.

And so the resources are all like when we had the administration building, we were also doing a lot of work, right, I didn't know that.
That the importance of that Ugr and those distractions all. A that the light from China is exactly the same but it doesn't have the Ugr. You might even get ripped off on the job, right? Cause they say: „hey, we got the same light here will be half the price“, so super, yay.
And then you find out that you don't have the parameters, and only an educated person, like an architect, has a chance to find that out on that site. Because like the electrician who knows and calculates it, he doesn't go on inspection days and notice it. Maybe the supervisor, when like, the supervisor is like the architect. By the way, a supervisor, I totally appreciate a good supervisor. Actually, a supervisor has to know something from every industry.
Well, so it's basically lifelong learning as you go.

Family House Prokop

Interviewee: Karolína Falladová Jiroušková

Interviewer: Kristýna Schulzová

Date and time: 7. 3. 2022 9:30

Online, MS Teams

Original interview with Karolína Jiroušková in Czech:

V zásadě to směřuje k tomu, abych zjistila, jaká jste jako architekti dělali rozhodnutí ohledně kvality vnitřního prostředí.

Co jste ve fázi studie řešili, co jste neřešili. Obecně, co jako architekti u vás v ateliéru považujete za váš úkol jako architektů a co třeba potom necháváte specialistům, co řešíte, co neřešíte a tak.

Byly v už v zadání toho projektu nějaké konkrétní požadavky na kvalitu vnitřního prostředí. Mluvíme teda hlavně o světle, denním osvětlení, samozřejmě proslunění, akustice, tepelná technika a případně kvalita vzduchu. Vycházeli z nějakých konkrétních požadavků, nebo jestli jste vycházeli třeba jenom z norem a jenom z předpisů?

Návrh domu Prokop začal v roce 2016, což zahrnuje i přístup k tomu vždycky ateliéru. Navrhujeme v souladu s předpisy, s průkazem energetické náročnosti budovy, to je samozřejmost. Ale i spoustu dalších věcí už v návrhu považujeme jako samozřejmost, i když si o ní klient sám vyloženě neřekne, tak jí do toho přidáváme jako přidanou hodnotu. Takže třeba denní osvětlení u rodinných domů je pro nás jeden z hlavních cílů návrhů to, aby ho tam bylo dostatek a během celého dne.

V domu Prokop víceméně všechny místnosti jsou přirozeně větratelný. Až na toaletu samozřejmě, ale prostě nějak se dispozice udělat musí, ale vlastně tam využíváme všech světových stran pro to, aby bylo zaručené přirozený větrání domem třeba jako k tomu vzduchu.

Rekuperace v tomhle domě není. Většinou se snažíme u rodinných domů i teď.

ten návrh udělat tak, aby jako dostačovalo přirozené větrání, ale samozřejmě tam je to s těma číslama zase jinak. Snažíme se jít naproti tomu, aby tam těm klientům bylo nějak tak běžně příjemně uživatelsky zároveň, aby to nebylo zbytečně překombinovaný a aby právě spoustu toho už tam dosáhl návrh.

Dům Prokop je vlastně hodně orientovaný k světovým stranám. Je otevřený na jih, jednak to šlo souladu i s výhledem, ale zároveň jsme chtěly takhle velkou terasu orientovat na jih.

Takže tam je velký HS portál, kterým vlastně se počítají i přirozený pasivní zisky tím, že částečně je zastřešený, takže v létě tam zase nedochází k přehřívání, které je zároveň řešeno i těmi posuvnými okenicemi v celém domě a na té jižní terase to má asi největší vliv proti tomu jižnímu slunci se nějakým způsobem chránit.

Ale i všechny ty ostatní okenice, které mají jednak tedy bezpečnostní charakter, protože dům Prokop není obýván úplně trvale. Zatím ale používá se jako chata, ale přesto je navržen jako rodinný dům a ty okenice vlastně tam udržují nějaký vnitřní klima, když tam klienti nejsou, takže po dlouhé době tam třeba přijdou a ten interiér není přehřátý.

Myslím si, že ze zkušeností z jiných projektů dokážeme říct, že opravdu to na to vliv má. Už jen ty posuvný mechanický okenice.

Možná to u tohohle projektu nebude úplně relevantní, vzhledem k tomu, že v zásadě drží půdorysnou stopu toho původního domu co tam stál. Ale jestli usazení toho domu na pozemek nějak řešili orientaci vůči buďto světlu nebo třeba hluku z okolí a podobně?

On sice stojí jako z velký části ve stopě původního domu, la hlavní hmota vlastně je otevřený L, původní byla L dvoupatrový, klasický pravoúhlý.

A vlastně ta zadní část byla velká bariéra pro ten pozemek, který není úplně velký. Sice k tomu přiléhá potom dál výhled dozadu, takže na tom pozemku není stísněný pocit, který může být vidět třeba z plánku, ale přesto bylo důležitý tu severní zahrádku otevřít a ona tam bývala úplně odkloněná, tímhle křídlem, které vlastně majitelé ani nevyužívali.

Oni si koupili ten domek, mysleli si, že ho jenom přestaví a časem se tam nastěhují, ale prostě zjistili se statikem, že úplně ten technický stav neodpovídá tomu, aby tam mohli bydlet.

Ale přitom my jsme jako cítili povinnost, protože ten dům je součástí klasický návsi, je orientovaný do návsi, takže jsme tam tu hmotu chtěli ctít minimálně v tom štítu, přistoupit k tomu tradičně, aby tam ta severní fasáda zůstala.

Do jihu už je to takový otevřenější i tím, že jsme už dál od návsi a zároveň to v tomhle případě dobře vyšlo. Orientaci ke světovým stranám samozřejmě bereme v úvahu vždycky a dokážu si představit, že kdyby to nefungovalo takhle hezky, že ten dům mohl dopad dopadnout úplně jinak, protože až bych řekla, že je to pro nás skoro nadřazenější, nebo vždycky hledáme nějaký konsensus, aby to fungovalo. Ale obytný prostor potřebuje slunce, takže je hezký, že to tady vyšlo zároveň i s tím hotovým uspořádáním.

Můžeš mi možná ještě říct trochu víc k orientaci k těm světovým stranám? Jestli jste to řešili i z hlediska účelu místností a podobně?

Celý ten stavební program vychází vždy z toho, co klient si představuje. Někdy to v průběhu ještě třeba nabobtná.

Původně zadání bylo, aby dům neměl zbytečně velký objem. Takže my jsme ho měli navržený s klesající střechou, nad obytným prostorem byl navržený převýšený prostor. Teď je tam další ložnice navíc, která původně neměla být, proto bychom ji primárně neorientovali na jih. Já to vysvětluju takhle od konce do začátku.

Ale když se podíváš na přízemí, tak tam je vlastně úplně nejvíc na Jih orientovaná světnice, kde je jednak jídelní kout a nějaký prostor s posezením a ten přímo navazuje na terasu a ta terasa vlastně spojuje ještě další objem, kde je docela velká dílna a sklad lodí. To byl separátní blok, který jsme někam potřebovali dát, ale ono opravdu to funguje tak, že ta terasa, ona je i prosklená, takže tam je přirozený světlo i do té terasy a fakt to funguje tak, že jednak když seš na terase, tak je to propojka mezi tou severní a jižní zahradou. Takže ona není jako bariéra, i když tam zůstalo půdorysně to elko, ale vlastně je to spíš pojítko. Vnímáme to jako pojítko, který propojuje ty dvě zahrady.

A když se uzavře, zvětší se ten obytný prostor, který je primárně orientovaný na jih, ale zároveň se tam myslí na to, aby se tam pod tím člověk nepekl, nepřehříval.

Uprostřed půdorysu máme vertikální komunikaci, logicky, a nějaký zázemí. A úplně na sever je orientovaná ložnice s vlastní šatnou a koupelnou, která původně měla být ložnice majitelů a je navržená jako bezbariérová.

A takhle jsme ji orientovali, ta ulice není nijak hlučná, ale hlavně kvůli tomu, že ložnice nepotřebuje úplně to přehřívání, takže dostala tuhle pozici. V druhém patře jsou navržené ještě další dva pokojíčky takhle na sever.

Jsou to ložnice, ale teďka to funguje jako pokoje pro děti, ale počítá se do budoucna, že by to mohly být potom rekreační ložnice pro starší děti. A přibyla tam právě orientovaná na jih velká ložnice, kde teď manželé bydlí nebo přespávají s další terasou ven, protože když jsme byli na tom místě, tak tohle je třeba zrovna to místo, kde ten výhled a pozice dala přednost dala přednost umístění ložnice před asi tím, kde bychom to přirozeně orientovali.

Museli jste v tom návrhu nebo v pozdějších fázích dělat nějaké kompromisy, buď, abyste vyhověli požadavkům na kvalitu vnitřního prostředí nebo na stavební fyziku anebo právě kompromisy mezi architektonickým záměrem a třeba vnitřním prostředím v budově?

Kompromisy. My jsme tady v tomhle ohledu museli udělat kompromis cestou ke klientovi, který se rozhodl pro vytápění, který nevychází potom v PENB až tak dobře. Původně tam bylo navržený tepelný čerpadlo, ale s ohledem na to, že to klient využívá jako chatu, je tam normálně kotel na tuhý paliva zvětší plus dohřev elektrickým kotlem, který ale skoro nepoužívají. Obálka domu je samozřejmě zateplená tak, že by to vycházelo na energetickou třídu A, ale vzhledem ke zdroji tepla ten energetický štítek nevycházel tak hezky, jak jsme to původně uvažovali Takže v tomhle ohledu by se dalo říct, že je to nějaký ústupek klientovi.

Původně jsme jim tam navrhli ten převýšený prostor s tím, že už tam ta ložnice vůbec nebude, ale nebyl tak výrazně převýšený, ta střecha klesala. A vlastně když to klienti viděli, tak říkali, že ten prostor nebudou vytápět, že je to zbytečný, že je to škoda tam mít převýšený prostor.

Takže asi jo, asi jsme udělali ten úkrok toho, že my jsme si představovaly ještě větší vzduch, ale on ho tam má, protože furt tam jsou ty dva schody, on ten hlavní prostor je dvouúrovňový, takže vlastně kuchyně je výš než to sezení a nezdá se to, ale on vlastně celý ten pozemek potom za terasou klesá, takže i ty dva schody udělají hrozně moc, že když stojíš v té kuchyni, koukáš dolů, tak je tam takový ten vzduch.

Tohle by se dalo říct jako ústupek, ale nemyslím si, že ke špatnému, protože ten výhled, co mají z ložnice za to stojí. Je to spíš řekla bych proces než kompromis nebo ústupek. To je prostě proces a klienty je vždycky spoluautor.

Přizvali jste už ve fázi studie, nebo konzultovali jste projekt už ve fázi studie s nějakými specialisty? A právě z hlediska vnitřního prostředí nebo z hlediska stavební fyziky?

Máme v týmu stavebního inženýra, takže takový ty první úvahy vždycky už řešíme s ním, ale pak máme spoustu spřízněných profesí, se kterými jdeme už na úrovni studie často docela do detailů, že i třeba vypracováváme feasibility study, když si to klient objedná, tak tu možnost máme. Takže vlastně už dostává studii TZB rovnou se studií. To je takový menší projekt prostě, který slouží jako vodítko v těch dalších fázích projektu.

Tady klient byl taky snad stavební inženýr, takže do těch technologií už měl do všeho vlastní vzhled. On si zároveň dělal sám i stavební dozor, takže tam asi nebyl tak moc potřeba náš vhled. Ale když to klient potřebuje, vždycky jsme tady jako podpora, a zároveň to potřebujeme skloubit vždycky s tou naší architekturou. To, kde ta trubka povede prostě nemůže jen tak vyjít. Musíme vědět, jestli budeme řešit vestavěný nábytek, nebo máme posunout rovnou celou ložnici, abychom se pak nedivili.

Tím pádem je asi skoro zbytečná další otázka, jestli jste v průběhu dalších fází toho projektu museli něco měnit, abyste vyhověli právě třeba legislativním požadavkům nebo požadavkům ať už stavební fyziky nebo čehokoliv jinýho?

No já si myslím, že už jsem ti asi řekla všechno, co k tomu vím, že tam byl jenom měněný hlavní zdroj tepla, to byl největší rozdíl od úvah.

Ale to bylo daný spíš požadavky klienta, než legislativně?

No, to bylo daný požadavkem klienta. Legislativně bychom to udělali tak, aby to vycházelo s lepším energetickým štítkem. Ono to vychází i tak dobře, ale mohlo to být ještě lepší.

Je něco, co vás potom třeba překvapilo u toho dokončeného projektu, co třeba dopadlo jinak, než jste si v době projektování představovali?

Z hlediska architektury nebo hlavního objemu, nebo jak to vnímáš, to ne? Tím, jak pracujeme ve 3D to nebylo nijak překvapivé, ale do tohohle asi největší vidle hodila stavební firma.

My jsme zvyklí kreslit i prováděcí projekt hodně do detailů, do všech návazností všeho, aby to bylo přesně pod kontrolou.

A tahle stavební firma si některý detaily vzala trošku po svým, tak jako ne, že by to bylo úplně dramatický, ale když máme ten projekt úplně v oku, tak prostě někde si tam udělali svůj přístup.

To taky myslím není úplně jako prohra, ale prostě jsou tam některé detaily, které bychom třeba řešili architektonicky jinak.

Jinak vyřešili úrovně terénu, ale to jsou vlastně drobnosti. Na to asi nebyla úplně cílená ta otázka.

Některý povrchy v interiéru samozřejmě architekti nemá šanci si pohlídat fakt až do konce, protože klient ve chvíli, kdy si přebírá už interiér, což se často stává u rodinného bydlení, je to naprosto přirozený, do toho vstupuje se svými názory o materiálu i o mobilním nábytku. U Prokopa spíš v těhle detailech, že třeba jsme to neměli až do úplného konce pod kontrolou, ale vestavěný nábytek a tak myslím, že to dopadlo všechno dobře.

Používáte třeba nějaký softwarový nebo výpočtový nástroje právě ve fázi studie? Když si chcete ověřit něco z toho vnitřního prostředí.

Sami si to nepočítáme. Když řešíme skladby, většinou se snažíme vycházet z nějakých typových skladeb, třeba od DEKu, s nějakým zaručeným součinitelem prostupu tepla, ale ve chvíli, kdy jsme si třeba navrhovali skladbu, tak vím, že kolega i počítal třeba tohle, ale většinou tohle interně neděláme, pouze hodně okrajově a spíš pro představu.

Spíš když tušíme, že by tam třeba mohlo něco nevyjít, přehodíme to rovnou na ty specialisty, než že bychom si to sami úplně ověřovali.

Co si jako architekt myslíš, že by architekt měl umět ze stavební fyziky, z akustiky, z denního osvětlení, tepelné techniky, z kvality vnitřního vzduchu. Co by se měl naučit ve škole nebo co by měly být nějaký základní znalosti architekta?

Jestli tě třeba to, co ses naučila ve škole na to připravilo?

Mně tohle vždycky zajímalo, takže možná, že jsem si to v té škole hledala víc, každý si na té škole najde to, k čemu inklinuje.

Ale když teď říkáš celou tu škálu toho, co patří do té stavební fyziky, tak vím, že určitě k některým těm oblastem já se přirozeně obrací mnohem častěji, že pro mě je strašně důležitý třeba to denní osvětlení, proslunění, průběh slunce, to je jako jeden z hlavních bodů návrhů.

Bereme to tak, že furt vzduch zaručujeme tím přirozeným větráním, takže se zpravidla snažíme o nějaký přirozený provětrání příčný.

Akustiku nějak beru, jako že navrhneme konstrukce, který to ochrání. Že bych tu akustiku vyloženě nějak do svého architektonického návrhu odrážela, to si třeba neuvědomuju. Někdy třeba nějakou zeleň třeba jako ochranu nebo takovýhle věci. Ale že bych si třeba řekla, že kvůli tomu, aby to bylo dál od silnice, že bychom to navrhli nějak jinak, asi vlastně ano, když někam orientujeme ložnici, tak zase asi přemýšlíme, aby to bylo dál od toho zdroje hluku. Takže vlastně je to tam nějak přirozeně.

A co by se ve škole měli učit? Já si myslím, čím víc příkladů z praxe ve škole dokážeš pojmout, nebo si z toho něco vzít, tak tím je to lepší.

Protože se to všechno hodí a myslím si, že víc než nějaký čísla, že ze školy mám v hlavě spoustu čísel, který vlastně vůbec nevím, co znamenají. Už je tam ani nemám, ale měla jsem je tam. A že chybí takový to propojení s tím, co to reálně udělá po tom když k tomu přijdeš.

Fakt je, že z té školy a jako obecně, je prostě jako kvanta dat, se kterýma pak co?

Co spolupráce s dalšími profesemi, které do toho vstupují? Jednak co na ní považuješ za důležité a jednak jestli by se dala učit už nějak na škole, nebo jestli si myslíš, že by to pomohlo?

Tak na to začala moje dizertace, jako ta myšlenka toho jako propojení architektury s technologií nebo s profesí už rovnou od začátku taková ta spolupráce už jako úplně od počátku.

Jako myslím si, že u nás ateliéru k tomu máme docela dobře nakročeno a je to rozhodně o tom mít ty spolupracující osoby už třeba v kontaktu déle, abys věděla, co od nich čekat a zároveň jako dá se to tam někde furt vysledovat, aby jako ten vzájemný respekt tam byl, aby to nebylo prostě v nějaké při. Taky už jsme s pár specialisty museli rozvázat spolupráci, protože prostě to třeba neviděli tak jako my.

Aby to nebylo „architekt si vymýšlí“, ale prostě každý do toho vstupujeme s nějakým názorem a musí se z toho najít funkční výsledek, který jednak bude nějak vypadat a hlavně bude fungovat, je to o té spolupráci.

Narážíme na to, že máme ambice na BIM, a najít specialisty, kteří by v tom BIMu fungovali se nám zatím moc nedaří. Ještě v tom měřítku rodinných domů, které děláme docela často, ti profesanti často v BIMu vůbec nepracují. Ono to zase má nějaký svoje důvody, finanční a tak, ale vidím, že by to mohlo fakt fungovat, vidět všechno v tom BIMu.

Takže spíš, než na té lidské úrovni vidím v současnosti limity v tom softwaru, kde se často zdržíme úplně zbytečně. A tohle by to mohlo ulehčit, ale je to všechno proces. Myslím, že tam cílíme snad.

Zdržíte se proto, že vás limitují ty nástroje, které teď máte k dispozici a používáte?

My už třeba máme ten 3D model, ale když dělá specialista v Autocadu, 2D čárové výkresy, je to prostě o něčem úplně jiném. My už si to tam představujeme ve 3D. Třeba prostup nějaký nad schodištěm, kde potřebuju udělat odvětrání kanalizace, které má jít kolmo. A není to, že bychom dělali naschvály, že to nevyšlo přímo nad sebou. Tam to má zase nějaký svoje provozní návaznosti.

Takže v tom 3D si tohle všechno představíš líp, jak to tam má procházet, kudy to má větrat a zase najít ten limit, aby neřekli prostě jo, musí to jít přesně všechno 90 stupňů a hotovo.

Vždycky se tam dá hledat nějaký ústupek, aby to fungovalo, protože my ten ústupek taky děláme. Nebo jasně, že tam ta trubka musí být, ale nepotřebuju ji mít uprostřed postele, někde se tam musíme najít.

A musí to být dialog, když není, je to pak prostě těžká práce.

English translation of interview with Karolína Jiroušková:

The interview is to find out what decisions you as architects have made about the quality of the indoor environment. What did you address in the study phase, what did you not address. In general, what do you as architects in your studio consider to be your task as architects and what do you perhaps then leave to the specialists.

Were any specific requirements for the quality of the indoor environment in the brief for that project already? We're talking mainly about light, daylighting, of course sun lighting, acoustics, thermal and possibly air quality. Were you basing it on any specific requirements or were you basing it on maybe just the standards and just the regulations.

The design of the Prokop house started in 2016, and that always includes the studio approach. We design in accordance with the regulations, with the energy performance certificate of the building, that's a given. But we also take a lot of other things already in the design for granted, even if the client doesn't explicitly ask for it themselves, we add it in as an added value. So, for example, daylighting for houses, one of the main design goals for us is that there's enough of it and throughout the day.

In the Prokop house more or less all the rooms are naturally ventilated. Except for the toilet of course, but just somehow the layout has to be done, but actually we use all cardinal points there to guarantee natural ventilation through the house like for example for the air.
There's no heat recovery in this house. Usually we try to make the design in family houses even now so that natural ventilation is sufficient, but of course the numbers are different there.
We're trying to go towards making it normally user-friendly for those clients at the same time, so that it's not unnecessarily overcomplicated and just a lot of that is already achieved by the design there.
Prokop House is actually very much oriented to the cardinal points. It's open to the south, but at the same time we wanted to orient the terrace this big to the south.
So there's a big HS portal, which actually counts for natural passive gains by being partially covered, so there's no overheating in the summer again, which is also solved by the sliding shutters throughout the house, and on that south terrace it probably has the biggest effect to protect against that southern sun.
But also all the other shutters, which have a security character, because the Prokop house is not permanently occupied. It's used as a holiday cottage for now, but it's still designed as a family house and those shutters actually maintain some kind of indoor climate when the clients are not there, so that after a long time they come in and the interior is not overheated.
I think we can say from experience from other projects that it really does have an effect on that. Just the sliding mechanical shutters.

It may not be entirely relevant to this project, given that it basically follows the footprint of the original house that stood there. But as part of the positioning of the house on the site, have you addressed the orientation to either light or perhaps noise from the neighborhood and so forth?

While the house stands largely in the footprint of the original house, the main mass is actually an open L, the original was an L two-story, classic right-angled.
And actually the back part of it was a big barrier for the site, which isn't exactly large. Admittedly, it's adjacent to the further view to the rear then, so there's not the cramped feeling on that lot that you might see from, say, a plan, but still, it was important to open up that north garden and it used to be completely blocked off there, by this wing that the owners didn't actually use.

They bought the house, they thought they were just going to refurbish it and eventually move in, but they just found out with the structural engineer that the condition was completely inadequate for them to live there. But at the same time, we felt obliged, because the house is part of a classic village, it is oriented to the village, so we wanted to respect the mass at least in the gable, to approach it traditionally, to keep the northern facade there.

It's kind of more open to the south now, also because we're further away from the village square, and at the same time it worked out well in this case. Obviously we always take the orientation to the cardinal points into consideration and I can imagine that if it didn't work out that nicely that the house could have turned out very differently because I would go so far as to say it's almost superior to us or we're always looking for some consensus to make it work. But living space needs sun, so it's nice that it worked out here at the same time with the massing.

Can you maybe tell me a little bit more about the orientation to the cardinal points? If you've addressed that in terms of the purpose of the rooms and things like that?

The whole building program is always based on what the client envisions. Sometimes it gets a little bit bigger as it goes along. The original brief was that the house shouldn't have an unnecessarily large volume. So we designed it with a sloping roof, with an elevated space above the living area. Now there's an extra bedroom that wasn't originally going to be there, so we wouldn't have primarily oriented it to the south. I'm explaining it like this from end to beginning.

But if you look at the ground floor, there's actually the very most south-facing room, where there's both a dining area and some seating area, and that directly connects to the terrace, and that terrace connects to yet another volume where there's a fairly large workshop and boat storage. That was a separate block that we needed to put somewhere, but it really works in that the terrace, it's also glazed, so there's natural light into the terrace as well and it really works in that way that when you're on the terrace, it's a link between that north and south garden. So it's not like a barrier, even though it's still there in terms of the floor plan, but it's actually more of a link. We see it as a link that connects the two gardens.

And when it's closed off, it increases the living space, which is primarily south-facing, but at the same time, there's a consideration of not having people baking under there, not overheating.
In the middle of the floor plan we have vertical communication, logically, and some facilities. And to the very north is the master bedroom with its own walk-in closet and bathroom, which was originally intended to be the owners' bedroom and is designed to be wheelchair accessible.
And that's how we oriented it, the street isn't very noisy, but mainly because the bedroom doesn't quite need the overheating, so it was given that position. There's two more bedrooms on the second floor designed to face north like this. They're bedrooms, but right now they're functioning as children's rooms, but it's envisioned in the future that they could then be recreational bedrooms for older children. And they added a south-facing large bedroom where the couple now lives or sleeps, with another terrace out, because when we were on that site, this is perhaps the very place where the view and the position gave priority to the location of the bedroom over where we would probably naturally orient it.

Did you have to make any compromises in the design or in the later stages, either to meet the requirements of the quality of the indoor environment or the building physics, or just compromises between the architectural intent and the indoor environment of the building?

Compromise. We have had to compromise here in this respect towards a client who has opted for a heating system that doesn't come out so well in the PENB afterwards. Originally there was a heat pump proposed, but given that the client uses it as a holiday cottage, there is a regular solid fuel boiler plus electric boiler supplementary heating, but they hardly use that. The envelope of the house is of course insulated so that it would come out to an A energy rating, but given the source of the heat the energy label didn't come out as nicely as we had originally thought So in that respect you could say it's something of a concession to the client.
We had originally designed the elevated space for them with the idea that the bedroom wouldn't be there at all, but it wasn't that significantly elevated, the roof was sloping down. And actually when the clients saw that, they said that they weren't going to heat that space, that it was unnecessary, that it was a waste to have an elevated space there.

So I guess, yeah, I guess we did the stumbling block of the fact that we envisioned even more air, but he's got it because there's still those two stairs, he's got the main space that's two levels, so actually the kitchen is higher than the seating area and it doesn't seem like it, but then the whole site slopes down behind the terrace, so even those two stairs do an awful lot of that when you're standing in that kitchen, looking down, there's that air.

You could say this is a concession, but I don't think it's a bad one because the view they have from the bedroom is worth it. I would say it's more of a process than a compromise or a concession. It's just a process and the clients are always a co-creator.

Did you invite or consult with any specialists at the study stage? In terms of indoor environment or building physics?

We have a structural engineer in our team, so we always deal with those first considerations with him, but then we have a lot of allied professions with whom we often go into quite a bit of detail at the study level, that we even do a feasibility study when the client orders it, so we have that option. So they're actually getting the HVAC study right along with the architectural study. That's kind of a smaller project just to guide the other phases of the project. The client here was also a civil engineer, so he already had his own look into the technology.

He was also doing his own construction supervision, so I guess our insight wasn't needed as much there. But when the client needs it, we're always there as support, and at the same time, we always need to reconcile that with our architecture. Where the pipe is going to go just can't just happen. We need to know if we're going to do built-in furniture or if we're going to move the whole bedroom right away so we are not surprised.

Therefore, it is probably almost unnecessary to ask whether you had to change anything during the other phases of the project to meet the legislative requirements or the requirements of building physics or anything else?

Well I think I've probably told you everything I know on that, that there was only the main heat source changed, that was the biggest difference from the considerations.

But that was determined by the client's requirements rather than legislation?

Well, it was determined by the client's requirement. Legally, we would have done it in a way that it would have come out with a better energy label. It still works out well, but it could have been better.

Is there anything that surprised you about the finished project, that perhaps turned out differently than you had imagined at the time of design?

In terms of the architecture or the main volume or how you perceive it, no. The way we work in 3D it wasn't surprising.

I think the construction company made the most havoc with it. We're used to drawing and executing the project in a lot of detail, all the connections of everything, so that it's exactly under control. And this construction company took some of the details a little bit out of their own way, like not that it's totally dramatic, but when we have the project completely in sight, they just took their approach somewhere in there.

I don't think that's a total loss either, but there are just some details that maybe we would have handled architecturally differently. They've solved the terrain levels differently, but those are actually minor things. I don't think that's what the question was really aimed at.

Of course, some of the interior finishes, the architects don't have a chance to really follow through, because the client, the moment they take over the interior, which is often the case with family housing, it's perfectly natural, they come in with their opinions about the materials and the mobile furniture. With Prokop it was more in these details, that maybe we didn't have control of it until the very end, but the built-in furniture and so I think it all turned out well.

For example, are you using any software or computational tools right now in the study phase? If you want to verify something from the indoor environment.

We don't calculate it ourselves. When we are dealing with structural compositions, we usually try to base it on some reference compositions, for example from DEK, with some guaranteed heat transfer coefficient, but at the moment when we were designing a composition, I know that a colleague has calculated this, but we usually don't do this internally, only very marginally and more for an overview.

If we suspect that something might go wrong, we'll pass it straight on to the specialists rather than verifying it completely ourselves.

As an architect, what do you think an architect should know about building physics, acoustics, daylighting, thermal engineering, indoor air quality. What should they learn in school or what should be some basic knowledge of an architect? If maybe what you learned in school prepared you for that?

I've always been interested in that, so maybe that's what I was looking for more at school, everybody finds what they gravitate towards at school. But now that you're talking about the whole range of what goes into that building physics, I know that certainly some of those areas I naturally turn to much more often, that the daylighting for example is terribly important to me, the sunlight, the path of the sun, that's one of the main design points. We take it that we guarantee air still by natural ventilation, so we generally try to get some natural cross ventilation.

I kind of treat acoustics as we design structures to protect that. That I would reflect that acoustics somehow in my architectural design, I don't realize that, for example. Sometimes maybe some greenery like protection or things like that.

But that I would think, for example, that because it would be further away from the road, that we would design it differently, I guess actually, when we orient the bedroom somewhere, again, I guess we think about keeping it away from the noise source. So it's actually kind of naturally there.

And what should they be learning at school? I think the more practical examples you can take from school, or take something from it, the better it is.

Because it's all useful and I think more than any numbers, I think I have a lot of numbers in my head from school that I don't really know what they mean. I don't even have them in there anymore, but they were there. And that there's a lack of that connection to what it actually does after you get to it.

The fact is that from that school and like in general, there's just like a quantum of data and then what?

What about collaborating with other professions that come into it? First of all, what do you think is important about it, and secondly, if there's something that could be taught already at the school, or if you think that would help?

That's what my dissertation started on, like the idea of connecting architecture with technology or with the profession right from the beginning, like the collaboration right from the beginning. I think that in our studio we are quite well on our way to that and it's definitely about having those collaborators already in contact longer, so that you know what to expect from them and at the same time it's like you can still trace it somewhere, so that there is like mutual respect, so that it doesn't conflict.

We've also had to break up with a couple of specialists because they just didn't see it the way we did.

So that it's not "the architect is making stuff up", but we all come into it with an opinion, and we have to find a workable result that looks good and works, it's about the cooperation.

What we're running into is that we have ambitions for BIM, and finding specialists that work in BIM hasn't been very successful so far. More so at the scale of the single-family homes that we do quite often, those specialists often don't work in BIM at all.

Again, there are reasons for that, financial and all that, but I can see that it could really work, seeing everything in BIM.

So, rather than at that human level, I see the limits in the software at the moment, where we often get held up completely unnecessarily. And this could make it easier, but it's all a process. I think that's where we're aiming perhaps.
Are you holding back because you are limited by the tools you have and use now?

For example, we already have the 3D model, but when a specialist is using Autocad, doing 2D line drawings, it's just a different story. We're already imagining it in 3D. For example, a passageway above a staircase where I need to do a plumbing vent that's going to go perpendicular. And it's not like we're doing it on purpose that it didn't come out right on top of each other. It's got some functional continuity there.
So in that 3D model you can get a better idea of all that, how it's supposed to go through there, which way it's supposed to vent and again finding that limit so they don't say it has to go exactly 90 degrees and that's it.
There's always a concession you can make to make it work because we make that concession too. Or sure, the pipe has to be there, but I don't need it in the middle of the bed, we have to find a happy medium somewhere.
And it has to be a dialogue, and if it's not, it's just hard work.

Family House in Jinonice

Interviewee: Jiří Weinzettl

Interviewer: Kristýna Schulzová

Date and time: 9. 6. 2022 11:00

In person, in Atelier 111

Original interview with Jiří Weinzettl in Czech:

Co pro vás znamená pojem vnitřní prostředí budov?

Máte nějaký hrozně těžký otázky, ne?

Ty další jsou jednodušší.

Jo ještě, pro jakej účel vlastně ten rozhovor děláme?

Já v rámci doktorátu zpracovávám téma vnitřní prostředí budov nebo architektonický návrh z hlediska vnitřního prostředí budov. To znamená vlastně to, co architekti řeší zejména ve studii nebo v těch úvodních fázích návrhů, aby potom ta výsledná budova dobře dopadla z hlediska vnitřního prostředí, jak teda stavebně fyzikálních parametrů světla optiky a tepelného komfortu a kvality vzduchu, tak i nějakých třeba hůř kvantifikovatelných parametrů…

Pojďte teda na ty konkrétní otázky, tohle se mi nechce definovat takhle zpatra.

Ta otázka směřuje jenom, abychom si jako se dohodli na to, o čem o čem mluvíme.

No to jste mi vysvětlila, tak…

Byly v zadání rodinného domu v Jinonicích třeba od klienta nějak specifikované požadavky na vnitřní prostředí, případně, z jakých požadavků jste vycházeli, jestli pouze z legislativních?

To vám rád řeknu. To byla tenkrát taková malá soutěž architektonická, že ti klienti neoslovili jenom nás, ale ještě asi další dva ateliéry. My jsme tu soutěž vyhráli, takže jsme měli možnost pak celý ten dům vyprojektovat. A samozřejmě na začátku existovalo nějaký zadání, abyste mohli něco vymýšlet, tak se vždycky musíme toho hodně od klienta dozvědět, takže ten prvotní rozhovor je klíčovej, abychom definovali stavební program. Takže určitě v zadání je podrobnej stavební program, kterej není jenom o počtu místností a vyjmenování činností, ale i o nějakém diagramu, jak ty místnosti mají na sebe navazovat. Takže to je první nějaká vstupní informace.

V Jinonicích, tam byl určitě strašně moc specifický ten pozemek, stísněná kompaktní zástavba. Hodně složitý zakládací podmínky, ke všemu svah, vlastně severní, takže to slunce šlo přesně od svahu. To taky hodně věcí předurčilo.

V jaké fázi toho návrhu jste uvažovali, nebo řešili ty jednotlivé aspekty vnitřního prostředí?

No, pokud se bavíme o interiéru jako takovým, tak o tom interiéru rozhodně musíme přemýšlet od začátku. Přece jenom vycházíme ze zadání, jestli se jedná o rezidenční stavby, tak vytváříme prostředí, někdo bude žít, takže od samého začátku se ten dům formuje podle toho, jak lidi chtějí žít.

A od začátku neformujeme jenom prázdné prostory, ale místnosti, které se nějak zařídí. Od začátku prověřujeme, že se jsou zaříditelný, takže světlo, slunce, to je taky jeden aspekt, a druhé je ta samotná dispozice. Jak jsem zmínil, kde bude stůl, kde bude postel, kde bude skříň, aby to všechno dohromady nějak fungovalo. To je hned na začátku.

Jaký byly třeba nějaký specifický požadavky od klienta u tohohle projektu?

Já si nemyslím, že v projektu byli nějaký extra zvláštní specifický podmínky. Já si myslím, že se jednalo o klasické zadání, ničím výjimečné. Ta parcela byla výjimečná, ale stavební program bych v žádném aspektu nevypíchl, že by byl něčím výjimečnej.

V jaké fázi třeba toho projektu jste začali spolupracovat s nějakými profesemi, ať už se specialisty se světlo nebo s někým na tepelnou techniku, z TZB a tak?

Ono je to u těhle projektů stejný, nebo podobný, ve fázi projektu pro územní a stavební řízení to je ten moment, kdy do toho vstoupí profese.

Ať už kvůli úředníkům a nebo potom kvůli prováděcí dokumentaci, aby všechno odpovídalo normám, hygienickým požadavkům na kvalitu a podobně.

A je něco právě třeba se stavební fyziky, co si tedy v ateliéru počítáte sami, ještě než se to dostane do ruky těm specialistům, ať už světlo nebo?

Heleďte, my jsme malej ateliér. Takže nás tady sedí tak maximálně 5 - 6 lidí, převažují architekti, ale součástí našeho týmu kmenových zaměstnanců jsou stavaři.

Takže tohle považuju za hodně důležitou věc, že existuje nějaká symbióza mezi stavařem a architektem. Výměna informací od počátku, od konceptu až po nějakou prováděcí dokumentaci. A samozřejmě že stavař, stavební technik, specialista na pozemní konstrukce je schopný většinu věcí do fáze územního rozhodnutí spočítat a určit.

A co je pro vás na té spolupráci architektů se stavaři nebo s nějakými dalšími specialisty podstatné, aby to fungovalo, aby to vedlo k dobrému výsledku? Třeba i podle čeho si vybíráte ty spolupracovníky a tak?

Určitě jde o dobré vztahy, o respekt k té druhé profesi.

Pokuď architekt nerespektuje stavaře a stavař architekty, tak to fungovat nemůže a nemám nejlepší zkušenost s externí firmou, která potom zpracovává podobný projekt na základě studie od architektů. To je vzájemné, architekti pak leckdy něco zanedbají, nejsou včas upozorněni na nějaký konstrukční detail, nebo na nějaký moment, který pak je mimologický z hlediska stavební dokumentace, z hlediska konstrukce, takže to je strašně důležitý. To už jsem v podstatě zmínil, ta výměna názorů a ta snaha architektů, aby nepřemýšleli jenom o hmotě, o prostoru, ale aby si rovnou uvědomovali konstrukci. K tomu ten stavař může dát dobrou nápovědu od začátku.

Napadá vás nějaký konkrétní kompromis nebo změna v konceptu, kterou bylo nutný udělat?

Zrovna u tohohle si myslím, že jsme žádný kompromisy dělat nemuseli a hlavně nechtěli, neradi slyšíme slovo kompromis. Tam v architektuře snad k žádnému kompromisu nedošlo. Musím chvíli přemýšlet

Nenapadá mě nic zásadního, co bych teď hrozně rád změnil, že bych chtěl mávnout kouzelným proutkem a říct, „Tohohle kompromisu bych se rád zbavil“.

Bylo tam třeba něco z požadavků ze strany úřadů nebo ze strany hygieny, co jste museli v tom návrhu zohlednit? Třeba v pozdějších fázích projednávání, nebo tak?

Zrovna v Jinonicích si myslím, že nenastalo, i když tam existuje kompaktní zástavba. My říkáme, že Jinonice je taková vesnice uprostřed Prahy, ale není památkově chráněna, takže z hlediska památkářů žádné požadavky nevznikly a z hlediska hygieny to,

co máme splnit jsme splnili, aniž by nás k tomu úředníci nutili, aniž by nás něčím překvapili. To jsou nějaký standardy, z hlediska osvětlení, oslunění, případně hluku, pokud jsou někde tepelný čerpadla, což není případ Jinonic, to nás provází na každé stavbě, to jsou samozřejmosti.

Řešili jste tam nějak dopad hmoty toho domu směrem ven? Ať už z hlediska stínění nebo něčeho takového? Říkal jste, že hluk vlastně tady ne, ale něco dalšího?

To je vždycky oboustranné. Jednak řešíme tu kvalitu vnitřních prostor a zrovna ta musíme řešit, abychom nenarušili tu kvalitu života lidí, kteří žijí ve stavbách okolních. To samozřejmě jsme museli řešit a řešili, a když se ptáte na úřady, v takový kompaktní zástavbě je vždycky limitující požár. Požárně nebezpečný prostor, odstupy.

To jsou určitě věci, který nás možná nějakou chvíli omezovaly. Tam možná musely vzniknout nějaký kompromisy ve velikosti otvorů, abychom nenarušili kvalitu okolních staveb. Respektive jejich bezpečnost.

A když jste řešili dispozici toho domu, vstupovala tam ať už třeba orientace ke světovým stranám nebo orientace k ulici?

To je úplně vždycky, to je v každém domě, kdybychom tohle neřešili tak (smích) to by bylo asi hodně špatný.

Tady právě ten prudký svah a jih za tím svahem něco znamenal. Celý přízemí prakticky nebylo možný naslunit, takže ten koncept vychází z tohohle faktu, že jsme se potřebovali dostat z toho zádveří o patro výš, abychom se mohli o patro výš rozevřít obytným prostorem, který jednak má nějakej průhled do ulice, kontakt s ulicí, ale ten už je nasvětlený, nasluněný, ale hlavně má i přímý kontakt opticky i fyzicky se zahradou. Tohle se mohlo odehrát v druhém patře, to není úplně obvyklý.

V této úloze navíc byla skvělá příležitost, že vlastně i z toho třetího nadzemního podlaží, ona je otázka, jestli je to první bude brát jako nadzemní nebo podzemní, to je asi jako možný chápat tak i tak. Ale když se dívám z ulice, tak mám pocit, že mám přízemí a 2 patra, ale to že z toho druhého patra, v podstatě z podkroví té zadní věže můžu taky vyběhnout přímo na terén a žádnou lávkou, ale přímo na terasu. To je ještě víc specifický než že tam vyběhnout z druhého patra.

A je to skvělý jo, jako mít možnost vyběhnout do druhého patra, do dětských pokojů, a být překvapený, že tam mám francouzský okno, vyběhnu rovnou do zahrady. Nemůžu říct, že se povedlo, ale že tam byla ta příležitost, že to nabídlo.

Bylo tam potřeba nějak řešit tepelné zisky? Tam vlastně to největší okno do té pracovny to je na sever, takže tam asi problém se solárními zisky nebyl?

Tam vůbec ne, ale samozřejmě ty velký HS portály jsou i na jih do zahrady a máme tam prosklený strop v jakési hale, takže tam je to asi nejcitlivější hlediska tepelných zisků. Ale ta věžovitá hmota s těmi dětskými pokoji a s ložnicí do značné míry ten prosklený strop zastiňuje, takže to částečně pomáhá.

Došlo tam na to, že to třeba potom někdo počítal, nebo jste to vzali podle zkušenosti?

Nevzpomínám si, neumím říct, musel bych přizvat stavaře a hlavního inženýra projektu, kdo všechno se na tom podílel, jakýma výpočtama, neumím odpovědět, špatně bych odpověděl.

Ale na té architektonické koncepci se nic zásadního měnit nemuselo?

Nic zásadního se měnit nemuselo. Ten dům je přirozeně větraný, přirozeně stíněný. Není tam žádná klimatizace, nebylo nutné ani dodatečně klimatizaci instalovat. Dodatečně jsme řešili stínění z jižní strany těch velkých HS portálů u těch velkých oken, tam jsme dodatečně dávali nějaký plachty, což si klient vyžádal nejenom kvůli stínění těch vnitřních prostor, ale asi hlavně kvůli stínění těch navazujících venkovních prostor.

A to mi trošku nahrává na dotaz, jak jakou máte zpětnou vazbu od majitelů? Teď když to ten dům pár let používám, nebo jak se jim tam bydlí, jestli třeba vás nebo je něco překvapilo?

To je otázka na ně. To já si můžu jenom domýšlet a nechci na ně odkrývat víc, než oni sami by se chtěli odkrýt. Ale myslím, že jsou spokojeni.

Napadá vás tady k tomu domu ještě něco, ať už jako k příběhu toho návrhu, nebo právě k tomu vnitřnímu prostředí, co bylo zajímavé?

Už je to pár let, nějakých šest sedm let nazpátek. Mám teď hlavu zaplněnou těmi projekty, který máme na stole, takže ono určitě těch zajímavostí bylo spousta, jenom je teď odkrýt, třeba se mi něco vybaví.

Náročný zakládací podmínky, bílá vana, celý ten svah se musel stabilizovat dokonce, tam jako opravdu otázka založení byla hodně komplikovaná, náročná. Ale mohlo by to být ještě horší, nakonec ta břidlice, co tam je, byla vrstvená tak, že ten sesun nehrozil zase tolik, než kdyby byla nakloněná na opačnou stranu, to nám asi všem pomohlo.

Tak co si myslíte, že jako architekt potřebujete vědět, abyste navrhli nebo znát, umět, abyste navrhli budovu s dobrým vnitřním prostředím?

To je strašně moc informací.

Případně co z toho vás může, nebo mohla naučit škola nebo naučila?

To je takový komplex informací a souvislostí, které člověk si musí uvědomit, že si neumím představit ani ten soubor informací sepsat do druhého dne, je toho strašně moc a jenom část těch informací člověk může se naučit a nějak získat ve škole.

On pak teprve v praxi člověk na spoustu věcí přichází, každým rozhovorem se zákazníkem, každým stanoviskem od úřadů, každou zpětnou vazbu od stavební firmy jsme o něco bohatší a ten soubor informací je zase trošku širší. S čímž vstupujeme do další úlohy.

A škola … pojďme nějak rozvinout školu, protože na školu rád vzpomínám a měl jsem teď možnost, ten semestr který právě teď skončil absolvovat jako neoficiální poradce, jako konzultant v ateliéru pane profesora Stempela. Protože jako rodák z Trhových Svinů jsem chtěl jednu úlohu, protože město koupilo faru, dostat na akademickou půdu dřív, než město bude vytvářet oficiální zadání a než projde nějakou architektonickou soutěží anebo výběrovým řízením na architekta, tak jsem si přál a to se mi splnilo, aby taková úloha byla akademickou a aby nějaká akademická debata nad možnou dostavbou a rekonstrukcí památkově chráněné fary v centru.

No a říkám to asi proto, že ve škole považuju za zásadní předmět ateliéry, tedy navrhování. A to je strašně právě důležitý, aby studenti nepodcenili tenhle předmět a tvorbu od začátku do konce.

Já se ve škole vzpomínám, že jsme se naučili pracovat s hmotou, pracovat s okolím, možná pracovat s kontextem, tenkrát, to už je pár let, to může být všechno jiný, tenkrát jsme se nenaučili přemýšlet o interiérech, přemýšlet o tom vnitřním prostředí. Tam jsem cítil hendikep ze strany školy, ze strany výuky, ale to je hodně dávno, to tam všechno bude určitě jinak.

Částečně ano, částečně se ještě pořád snažíme jako lépe integrovat nějaké ty technické věci do té výuky, aby to nebylo jenom nutný zlo.

Technický věci jsou strašně důležitý, ale zrovna tak ten interiér samotný, já úplně nerozumím tomu, že se někteří architekti rozdělují na ty kteří si říkají interiéroví designéři a na ty, kteří si říkají architekti, a ty interiéry už je nezajímají, podle mě jsou to spojité nádoby. A nejde to takhle, když se to odtrhuje tak si myslím, že to nemůže nikdy úplně dobře dopadnout.

Co by vám jako architektovi usnadnilo projektování právě z hlediska kvalitního vnitřního prostředí, ať už z hlediska třeba nějakejch nástrojů softwarových nebo jinejch z hlediska třeba legislativy, specialistů, čehokoliv?

Tak určitě jednoznačná legislativa. Nemám pocit v dnešní době, že legislativa jednoznačně určuje všechno, co bychom potřebovali určit. Jsou lokality v památkových zónách, kde není jednoznačně legislativně dáno, co má vlastně přednost, jestli památková ochrana anebo ekologické aspekty domu, tam se zákony trošku rozchází.

A jako vlastně asi by nám pomohlo, kdyby zákony byly jednotný, ale na druhou stranu někdy je to vlastně výhoda že můžeme lavírovat v tom prostoru mezi a připojit se na jednu nebo na druhou stranu. Takže asi to beru zpátky (smích).

Software, tak samozřejmě, že přechod na programování v BIM má budoucnost, dává smysl a všichni postupně zřejmě u toho skončíme. To je určitě nějakej směr a samozřejmě v tom BIMu můžou potom můžou být víc a víc integrovaný nějaký technický knihovny, aby to všechno do sebe zapadalo.

Pak ten tým, který není složen jenom z architektů a stavařů, který je daleko širší a myslím, že to už je o externistech, tak aby ten tým se orientoval ve stejném softwaru, dělal ty věci stejně. To tak dneska není, protože co mezi ještě tací, kteří využívají příložník a pak tací, kteří jsou softwarově někde vpředu a to se někdy v té rychlosti špatně kombinuje.

A vy teda v ateliéru už přecházíte, nebo se to nějak částečně přešli na BIM?

No, postupně.

Máte pocit, že ty nástroje, které používáte, jsou uživatelsky vlídný pro vás jako pro architekty, nebo že to umí to, co byste potřebovali?

Já jsem v tomhle asi hodně skromný, takže já si nestěžuju. Ale já nejsem ten hlavní, který tráví čas u toho softwaru, o kterém se bavíme, takže to je spíš otázka na všechny mé kolegy techniky a stavaře, já už jako v tomhle moc nejsem.

Napadá vás ještě něco, ať už k těm Jinonicích, nebo obecně k tomu vlastně vnitřnímu prostředí budov?

Ne, nenapadá

Případně jestli vás nenapadla nějaká odpověď na tu první otázku, co pro vás to vnitřní prostředí budov vlastně jako je?

Já si myslím, že to vyplynulo z těch odpovědí, že jsem kladl důraz na tu spojitost interiéru jako takového s tou architekturou, na tu zařiditelnost, na tu příjemnost, na tu pobytovost, ty domy se snažíme samozřejmě, aby pracovaly s kontextem, který je na ulici, který je vedle domů.

Ale stejnou měrou, aby pracovaly s interiérem, aby vycházely z toho interiéru, aby ta hmota se co možná přizpůsobila tomu vnitřnímu prostředí, a ne aby se vnitřní prostředí přizpůsobovalo hmotě.

S tím mě napadá jedna konkrétní věc k těm Jinonicích, jak jste tam řešili, třeba i s klientem, soukromí při pohledu zvenčí?

Z ulice, velký okno…

No, když je to někde na webu, tak většinou jsou k tomu komentářů tohohle znění.

Každý máme nějakou míru a hladinu co nám je příjemný a co už nám není příjemný.

Já nemůžu mluvit za Jinonický, ale řeknu vám jiný, podobný příklad … když se kouknete na naše stránky, tak dům, který je Jinonockýmu domu poměrně příbuzný a je ještě o něco novější je dům na Kozině, to je dům v Trhových Svinech, ve kterém žiju já a moje žena, také architektka, tam jsme řešili podobnou otázku.

Když se na ten dům kouknete, tak jsme měli nějakou historickou přízemí hmotu domu, do který jsme umístili hlavně obytný prostor a v místě kamenných portálů, kde původně byly vrata průjezdu, tak jsme vložili bezrámový neotvíravý sklo.

To sklo má velikost 2,20 na 2,20, je v přízemí a za tím sklem z jedné strany obývací místnost a z druhé strany Kozí plácek, náměstíčko, klidný náměstíčko, prostor, ulice.

A tu otázku jsme si pokládali, jestli nám v tom bude dobře, jestli budeme řešit problém narušení soukromí. Obdivovali jsme holandskou architekturu a říkali jsme si, když to v Holandsku běžný, proč bychom něco podobného nemohli mít?

A zpětně po roce, co v tom domě žijeme, tak musím říct, že jsem za ten optický kontakt rád. On je hlavně kvůli orientaci domu, to byla jedna z mála možností, jak jsme do obytného prostoru mohli dostat slunce. Právě ta uliční fasáda je jižní. Takže to nebylo, že jsme se chtěli jako vystavit ulici.

Ale ono to funguje tak, že když je venku větší světlo vevnitř, tak krásně vidíme ven, ale dovnitř prostě vidět není. A když se sešeří, setmí a my si rozsvítíme, tak se naučíme stáhnout roletu a je hotovo. Tou roletou si určíme, kdy chceme, abychom viděli a bylo nás vidět, anebo naopak dosáhli úplného soukromí.

Děkuju já myslím, že tím jste mě na tu otázku dokonale odpověděl.

Ono to v Jinonicích je totiž úplně stejný. Tam je taky roleta, akorát my jí máme na tu šňůrku a oni jí mají na ten spínač. Neslyšel jsem jedinkrát zpětnou vazbu od investora, že by toho velkého okna litoval, naopak. Mám pocit, že je rád, za ten přehled, který mu to velký okno dává.

Takže nemá potřebu mít zataženo pořád?

Jak často zatahuje, nevím. Když jezdím okolo tak někdy je zvednutá, někdy je zatažená.

Ten intimní prostor máte ještě oddělený těmi posuvnými dveřmi, že?

Tak, přímo za tím oknem je vlastně pracovní část, která se nechá úplně vydělit. Ale vyděluje se ani ne tak proto, aby z ulice nebylo vidět až někam do nitra dispozice, ale spíš proto, že tu pracovnu chceme někdy oddělit od toho obytného prostoru. Teda ti, co tam žijí.

Děkuju moc. Myslím, že to bylo úplně skvělý.

Tak já vám taky děkuju, nás těší že jste náš ateliré a naši stavbu vybrali jako jednu z realizací která vás nějaký způsobem snad pozitivně oslovuje a chcete ji zařadit do nějaké databáze

English translation of interview with Jiří Weinzettl:

What does the term indoor environment mean to you?

You have some awfully tough questions, don't you?

The other ones are easier.

Also, what's the purpose of this interview?

I'm doing my PhD on the subject of the built environment or architectural design from the point of view of the built environment. This means actually what architects deal with especially in the study or in the initial stages of the design, so that the final building turns out well in terms of the indoor environment, both in terms of building physical parameters: light, acoustics and thermal comfort and air quality, as well as some less quantifiable parameters...

So let's get to the specific questions, I don't want to define this on the spot.

The question is just to get a handle on what we're talking about.

Well, you explained that, so...

Did the client specify any requirements for the interior environment in the specifications for the family house in Jinonice, or what requirements did you base them on, if only legislative ones?
I would be happy to tell you. It was a small architectural competition at the time, so the clients didn't just approach us, but also about two other studios. We won the competition, so we had the opportunity to design the whole house. And of course there was a brief at the beginning, so you have to learn a lot from the client to be able to come up with something, so that initial conversation is key to define the building program. So there's definitely a detailed building program in the brief that's not just about the number of rooms and listing the activities, but also some kind of diagram of how the rooms should relate to each other. So that's the first bit of input.
In Jinonice, there was certainly an awful lot of specificity to the site, tight compact development. Very difficult foundation conditions, a slope, actually north slope, so that the sun was coming exactly from the slope. That also predetermined a lot of things.

At what stage of the design process did you consider or address the various aspects of the indoor environment?
Well, if we're talking about the interior as such, we definitely have to think about the interior from the beginning. After all, we're starting from a brief, if it's a residential building, we're creating an environment, someone is going to live there, so from the very beginning the house is shaped by how the people want to live.
And from the beginning we are not just creating empty spaces, but rooms that are going to be furnished in some way. We check from the beginning that they are furnishable, so light, sunlight, that's one aspect too, and the other is the layout itself. As I mentioned, where the desk is going to be, where the bed is going to be, where the closet is going to be, so that it all works together somehow. That's right at the beginning.

What were some specific requirements from the client for this project?
I don't think there were any extra specific requirements in the project. I think it was a classic assignment, nothing special. The site was exceptional, but I wouldn't single out the building programme as being exceptional in any aspect.
At what stage of the project, for example, did you start to work with any professions, either lighting specialists or someone in thermal engineering, HVAC or whatever?
It's the same or similar with these projects, at the design stage for planning and the building permits, that's when the specialities come in.
Whether it's for the authorities or then for the construction documents, to make sure that everything meets the standards, the hygienic quality requirements and so on

And is there anything in building physics, for example, that you calculate yourself in the studio before it gets into the hands of the specialists, whether it's light or?
Look, we're a small studio. So there's about 5 or 6 of us sitting here at the most, mostly architects, but part of our core team are civil engineers.
So I think that's a very important thing, that there's a symbiosis between the civil engineer and the architect. There is an exchange of information from the beginning, from the concept to some detailed documentation. And, of course, the civil engineer, the building technician, the structural engineer is able to calculate and determine most of the things up to the planning decision stage.

And what is essential for you in this cooperation between architects and builders or other specialists to make it work, to lead to a good result? For example, what do you choose the collaborators and so on?
It's definitely about good relationships, respect for the other profession.
If the architect doesn't respect the builder and the builder doesn't respect the architects, then it can't work, and I don't have the best experience with an outside firm that then does a detailed project based on a study from the architects. It's mutual, the architects then often neglect something, they're not alerted in time to some design detail or some moment that is then illogical in terms of the construction documents, in terms of the design, so it's terribly important. That's basically what I've already mentioned, the exchange of opinions and the effort of architects not to think only about mass, about space, but to be aware of the construction. That's what the civil engineer can give a good clue about from the beginning.

Can you think of any particular compromise or change in concept that had to be made, either for this project or for some other project?
For this one in particular, I don't think we had to make any compromises and especially we didn't want to, we don't like to hear the word compromise. There was no compromise in the architecture. I'll have to think about it for a minute.
I can't think of anything fundamental that I'd like to change right now that I'd like to wave a magic wand and say, "I'd like to get rid of this compromise."

Were there any requirements from the authorities or from the hygiene authorities that you had to take into account in the design? Maybe in the later stages of consideration or something?
In Jinonice in particular, I don't think there was, although there is a compact development there. We say that Jinonice is such a village in the middle of Prague, but it is not protected as a heritage site, so from the point of view of the conservation authorities, no requirements arose, and from the point of view of hygiene, what we have to comply with, we have complied with without being forced by the authorities, without being surprised by anything. These are some standards, in terms of lighting, sunlight, possibly noise, if there are heat pumps somewhere, which is not the case in Jinonice, that accompanies us on every building, these are obvious.

Did you address the outward impact of the mass of the house there? Whether in terms of shading or anything like that? You said the noise wasn't really an issue there, but something else?

That's always two-sided. First of all, we're dealing with the quality of the interior space and that's what we have to deal with so that we don't interfere with the quality of life of the people who live in the surrounding buildings. Obviously, we have had to address that and have addressed that, and when you ask the authorities, in a compact development like this, fire is always a limiting factor. Fire hazard space, spacing.
Those are certainly things that may have limited us for a while. There may have had to be some compromises in the size of openings so that we didn't compromise the quality of the surrounding buildings. Or rather, their safety.

And when you were dealing with the layout of the house, did orientation to the cardinal points or orientation to the street factor in?
That's absolutely always, that's in every house, if we didn't address that then (laughs) that would probably be really bad. This is where the steep slope and the south behind the slope meant something. It was practically impossible to get sun on the whole ground floor, so the concept is based on this fact that we needed to get out of the vestibule one floor up, so that we could open up one floor up through the living space, which on the one hand has some kind of a view to the street, contact with the street, but it is already lighted, sunny, but most importantly it has direct contact visually and physically with the garden. This could have taken place on the second floor, that's not quite usual.
Moreover, in this assignment there was a great opportunity that actually from the third floor, the question is whether the first floor will be taken as above ground or underground, it can probably be understood either way. But when I look from the street, I feel like I have a ground floor and 2 floors, but the fact that from that second floor, basically from the attic of that back tower I can also run out directly onto the ground and not by a footbridge, but directly onto the terrace. That's even more specific than running up there from the second floor.
And it's great to be able to run out to the second floor, to the kids' rooms, and be surprised that I have a floor to ceiling window there, I'll run out right into the garden. I can't say that we did that, but that there was that opportunity that it presented.

Was there any need to address heat gains? Actually, the largest window in that study is north facing, so I guess there was no solar gain problem there?
Not there at all, but of course the big HS portals are also to the south into the garden and we have a glass ceiling in the sort of hall, so that's probably the most sensitive in terms of heat gain there. But the tower-like mass with those kids' rooms and the bedroom pretty much shades that glass ceiling, so that helps partly.

Was there any calculation that maybe somebody did then, or did you take it from experience?
I can't remember, I can't say, I would have to bring in the civil engineer and the chief engineer of the project, who all was involved in that, what calculations, I can't answer, I would be wrong.

But the architectural concept didn't have to be changed?
Nothing major had to change. The house is naturally ventilated, naturally screened. There is no air conditioning, there was no need to install additional air conditioning. We additionally dealt with the shading on the south side of the large HS portals at the large windows, we put some additional canvas there, which the client requested not only to shade the interior spaces, but probably mainly to shade the adjacent exterior spaces.
And that kind of leads me to ask, what kind of feedback have you gotten from the owners? Now that they've been using the house for a couple of years, or how they've been living there, if maybe something surprised you or them?
That's a question for them. I can only assume that and I don't want to reveal more about them than they would like to reveal themselves. But I think they're satisfied.

Can you think of anything else about the house here, either in terms of the story of the design or just the indoor environment that was interesting?
It's been a few years, something like six or seven years ago. I have my head full of the projects that we have on the table now, so I'm sure there were a lot of interesting things, just to uncover them now, maybe something will come to mind.
The challenging foundation conditions, the white tub, the whole slope had to be stabilized even, really the foundation issue was very complicated, challenging. But it could have been worse, after all, the shale that's there was layered so that the slump wasn't as much of a threat than if it was tilted the other way, I think that helped us all.

So what do you think you need to know as an architect to design, or know how to design, a building with a good indoor environment?
That's an awful lot of information.
Alternatively, what is it that school can or could teach you or has taught you?
That's such a complex set of information and context that one has to be aware of that I can't imagine even writing that set of information down until the next day, it's an awful lot and only some of that information one can learn and somehow acquire in school.
It is only in practice that you find out a lot of things, with every conversation with a client, every opinion from the authorities, every feedback from the construction company we are a little richer and the set of information is a little wider. With that we enter the next task.

And the school... let's kind of expand on the school, because I have fond memories of the school and I had the opportunity now, the semester that just ended, to serve as an unofficial advisor, as a consultant in Professor Stempel's studio. Because as a native of Trhové Sviny, I wanted to get one assignment, because the town had bought the vicarage, into academia before the town would create an official assignment and before it would go through any architectural competition or selection process for an architect, so I wanted, and I got it, to have such an assignment be academic and to have some academic debate over the possible completion and reconstruction of a heritage-listed vicarage in the center.
Well, and I say that, I guess, because at school I consider studios, or designing, to be the essential subject. And it's terribly important that students don't underestimate this subject and design from start to finish.
I remember in school we learned to work with the material, to work with the environment, maybe to work with the context, back then, that was a couple of years ago, it can be all different, back then we didn't learn to think about interiors, to think about the interior environment. There I felt a handicap from the school side, from the teaching side, but that was a long time ago, it will all be different there for sure.

Partly yes, partly we're still trying to better integrate some of the technical stuff into that teaching so that it's not just a necessary evil.
The technical stuff is terribly important, but so is the interior itself, I don't quite understand the division between some architects who call themselves interior designers and those who call themselves architects, and they don't care about the interiors anymore, they're conjoined vessels in my opinion. And it doesn't go like that, when it breaks off I don't think it can ever quite work out.

What would make it easier for you as an architect to design in terms of a quality indoor environment, whether in terms of some software tools or other in terms of legislation, specialists, whatever?
Clear legislation. I don't feel nowadays that legislation clearly determines everything that we need to determine. There are sites in heritage zones where there is no clear legislative definition of what actually takes precedence, whether it is heritage protection or the ecological aspects of the house, where the laws diverge a bit.
And as a matter of fact it would probably help if the laws were uniform, but on the other hand sometimes it is actually an advantage that we can manoeuvre in that space between and join one side or the other. So I guess I take that back (laughs).
Software, so obviously the move to BIM programming has a future, it makes sense, and we'll probably all end up with that over time. That's certainly a direction and of course there can then be some more and more technical libraries integrated into that BIM to make it all fit together.
Then the team that's not just made up of architects and engineers, which is much broader and I think it's already about outsourcing, so that that team is navigating the same software, doing those things the same way. That's not the case today, because what's in between the ones that are still using the drawing board and then the ones that are somewhere ahead of the curve software-wise, and sometimes that doesn't mix well at that speed.

And so are you guys in the studio already transitioning, or is it sort of partially transitioning to BIM?
Well, gradually.
Do you feel like the tools that you're using are user-friendly for you as an architect, or do you feel like it does what you need it to do?
I'm probably very modest about this, so I'm not complaining. But I'm not the main one who spends time on the software we're talking about, so that's more of a question for all my fellow engineers and builders, I'm not really into that anymore.
Anything else you can think of, either on the Jinonice project, or just generally on the actual indoor environment of the buildings?
No, I can' t think of anything.

Alternatively, have you thought of an answer to the first question, what does the indoor environment actually mean to you?
I think it came out of those answers that I was emphasizing the connection of the interior as such with the architecture, the furnishability, the pleasantness, the livability, the houses we try to work with the context that is on the street, that is next to the houses.
But equally, to work with the interior, to come out of that interior, to make the mass adapt as much as possible to that interior environment, and not to make the interior environment adapt to the mass.

With that said, I can think of one specific thing about Jinonice, how did you deal with privacy there, even with a client, when viewed from the outside?
From the street, big window...
Well, when it's on the web somewhere, there are usually comments like that.
We all have a measure and a level of what we're comfortable with and what we're no longer comfortable with.
I can't speak for the people in Jinonice, but I'll give you another, similar example ... if you look at our site, the house that is quite related to the Jinonice house and is even a little bit newer is the house on Kozina, that's the house in Trhové Sviny where I live and my wife, also an architect, we dealt with a similar issue there.
If you look at that house, we had some historical ground floor mass of the house, and we put mainly living space in that, and in place of the stone portals where the passage door was originally, we put frameless non-opening glass.
That glass is 2.20 by 2.20, it's on the ground floor and behind that glass on one side is the living room and on the other side is Goat Square, a quiet square, a space, a street.
And the question we were asking ourselves was whether we would be comfortable in that, whether we would address the issue of invasion of privacy. We admired Dutch architecture and we thought, if it's common in Holland, why can't we have something like that?
And in retrospect, after a year of living in that house, I have to say I'm glad for the optical contact. It's mainly because of the orientation of the house, it was one of the few ways we could get the sun into the living space. It's the street facade that's south. So it wasn't that we wanted to like expose the street. But the way it works is that when there's more light outside we can see out beautifully, but you just can't see in. And then when it gets dark and we turn the lights on, we learn to pull down the blind and we're done. We use the blind to determine when we want to see and be seen, or, conversely, to achieve complete privacy.

Thank you, I think you've answered my question perfectly.
It's exactly the same in Jinonice. There's a roller shutter there, too, except we have it on the cord and they have it on the switch. I haven't heard a single feedback from the investor that he regretted the big window, on the contrary. I get the feeling he's glad for the perspective that the big window gives him.
So he doesn't need to have it up all the time?
How often he rolls it down, I don't know. When I drive around, sometimes it's up, sometimes it's down.
You've still got that intimate space separated by that sliding door, haven't you?
Right, just behind the window there' s actually an office area that can be completely separated. But it's separated not so much so that you can't see from the street into the interior of the layout, but rather because sometimes we want to separate the office from the living space. I mean, the people who live there.
Thank you very much. I think that was totally great.
Well, thank you too, we're pleased that you've chosen our studio and our building as one of the projects that hopefully appeals to you in some way and you want to include it in some database.

Kindergarten Sedlejov

Interviewee: Jiří Ondráček

Interviewer: Kristýna Schulzová

Date and time: 30. 3. 2022 16:00

Online, Google Meet

Original interview with Jiří Ondráček in Czech:

Já začnu takovou obecnou otázkou k tomu, co pro vás vlastně znamená vnitřní prostředí budov, nebo co si představíte pod pojmem vnitřní prostředí budov?

Aby tam bylo světlo, teplo a dalo se tam něco poslouchat. Filozofický věci po mě nechtějte.

Já teda to mám vlastně definovaných dost podobně jako říkáte vy právě s ohledem na ty stavební fyzikální aspekty čili hlavně denní osvětlení proslunění právě akustika, tepelná pohoda a kvalita vzduchu.

A když se zaměřím konkrétně na tu mateřskou školku, byly už v zadání toho projektu nějaký specifický požadavky na kvalitu vnitřního prostředí, nebo s jako.

Ne, žádný.

A vycházeli jsme teda z normových nebo z legislativních požadavků?

Ne, spíš jsme to chtěli udělat dobře. Prakticky dneska uděláme všechny nebo snažíme se dělat všechny domy tím moderním způsobem, v pasivním standardu. Ona vlastně na tom není nic moc složitého.

Takže z toho to vycházelo. V zadání to nebylo, tím, že to je malá vesnice, Sedlejov, jsme chtěli udělat školku, která bude tím, že je z dotací možná bude trošku stát víc v základu, to znamená v pořizovacích nákladech. Ale v těch provozních bude co nejmenší.

Děkuji. A v jaké fázi návrhů jste řešili kvalitu, vnitřní prostředí, nebo jste začali uvažovat o tom, jaký vlastně uvnitř…

Od začátku. Musíte o tom přemýšlet od začátku. Chtěli udělat z toho vesnický barák, to byla první věc. Můj cíl bylo udělat to takové, aby to bylo nenápadné, aby se to moc neuplatňovalo při pohledu z vesnice, protože ta vesnice je relativně zachovalá.

A naopak jsem chtěl, abych z toho vnitřního pohledu ten barák byl jiný a moderní, nebo spíš současný.

Když jste umisťovali ten dům na pozemek, tak zabývali jste se tam nějak ať už třeba hlukem z okolí nebo přístupem slunce, světla, fasádě a podobně?

Ne, ta možnost tam prakticky nebyla.

Tak ten pozemek byl relativně dobrý. A vlastně nebyla jiná možnost než ten barák umístit takto. To bych řekl, že by udělali skoro všichni stejně.

Spolupracovali jste už ve fázi studie s nějakými profesanty? Ať už teda jednak na stavební fyziku, jednak i třeba. Na TZB. Do konzultovali jste to? Konzultovali jsme to už takhle s nějakým specialistou?

Popravdě moc ne. Tím, že ten barák je v pasivním standardu. Tak samozřejmě o stavební fyzice něco málo víme, umíme si spočítat spoustu věcí.

A tím, že ten barák už uděláte v tom nízkoenergetickém standard, tak vlastně ta otázka vytápění a chlazení je jednodušší pro ty profesanty.

Samozřejmě ta koncepce byla dána námi. A v té fázi, když jsme opustili tu studii, už jsme ji začali řešit s profesantama, to je jasný. Ale základní myšlenka koncepce byla prakticky bez profesí.

A co používáte za nástroje? Když si právě chcete ověřit už ve studii ještě před tím, než přijdou profesanti nějaký fyzikální vlastnosti tý budovy.

Papír a tužku, na ten koncept, na to, aby ten dům nějak vypadal, aby to mělo nějakou hmotu. Pak používáme SketchUp na začátku. To je dobrej nástroj na takový základní informativní vymodelování a pak používáme, když už se chcete přesunout do toho tepelně technického třeba, tak používáme Deksoft, na nějaký základní návrh těch konstrukcí.

Když přemýšlíte dejme tomu o světle, vycházíte spíš ze zkušenosti, nebo používáte nějaký software na výpočty?

Tam jsme používali ten výpočtový software na osvětlení od Veluxu. Tam si stanovíte intenzity osvětlení, kolik chcete mít na jakém stolku, a pomocí toho nástroje ve SketchUpu a Veluxu jsme si toho simulovali. Samozřejmě ten prvotní nástřel byla ta ideová koncepce a jedno okno jsme tam doplnili díky výpočtu té světelné techniky.

Dělali jsme v tom projektu nějaký kompromisy, právě architektonickým konceptem a požadavky buďto pasivního standardu nebo na světlo nebo něco takového? Nebo třeba i mezi množstvím světla a přehříváním, nebo něco podobného?

Ne. U pasivního domu ten barák začne fungovat takovým tím zdravým rozumem. To třeba jako větrání tam bezvadně funguje komínový efekt těch střešních oken nahoře.

Dá se tím ta školka relativně dobře vychladit přes letní období. Ne, že by k tomu docházelo, ale je to možný vychladit.

Školka je vytápěna tepelným čerpadlem a jde zapnout i v reverzním chodu. To znamená, že se dá případně ochlazovat.

A vychladit tedy myslíte spíš tím komínovým větráním, nebo pomocí mechanického chlazení?

Přirozeně, myslím si, že dokonce se vůbec nepoužívá to reverzní chlazení. Když jsem naposledy mluvil se starostou, říkal, že to vůbec nezapínali, to reverzní chlazení.

A když se ten projekt dostal do pozdějších fází, jednak potom do rukou profesantů a jednak úřadu, museli jste dělat nějaký změny, abyste vyhověli jejich požadavkům? Opravovat tu studii?

Ne, máme dobrý profesanty (smích).

Ne, je to tím, že ten barák je relativně jednoduchej, je to vlastně velká hala. Ono už je to navrhovaný s tím, že to takhle má fungovat, ta dispozice tomu odpovídá, to znamená rozvržení těch odtahových větví pro vzduchotechniku a těch přívodů pro vzduchotechniku, kdy už jsme s tím počítali dopředu, že to bude výtvarný prvek tam vzduchotechnika v té hale. Specialisté nebo profesanti prakticky pouze a dopočítali technicky potvrdili, ale už ty prvotní skicy takhle vypadaly.

Takže na tom základním dimenzování se nic moc nezměnilo?

Možná, že my jsme měli trubku ve SketchUpu namalovanou dvoustovku a je tam dvěstěpadesátka, to nevím, ale prakticky tak, jak jsme měli tu představu od začátku, tak se to podařilo dotáhnout do konce.

Ve výtvarné stránce jsme jenom doplňovali okno mezi tu herničkou a tou šatničkou, kterou jsme v projektu neměli a

v rámci stavby jsme se na tom dohodli se starostou. Takže to se doplnilo ke spokojenosti všech.

Řešili jste tam nějak prostorovou akustiku, nebo to potom řešil až projekt?

Jsou tam všude akustický pohledy, protože dozvuk v téhle školce by asi byl bez těch pohledů velký.

Je něco, co vás na tom domě překvapilo, nebo co dopadlo jinak, než jste očekávali, nebo navrhli, když byl hotovej?

V zásadě ne. Dneska bychom asi byli trošku radši, kdybychom tu zahradu ztvárnili my, jako náš tým, protože to jsme už v ruce neměli, ale to už se netýká domu samotnýho. Ale nicméně ona funguje dobře. Já vím, že ty děcka tam jsou spokojený na zahradě, ale z toho výtvarného hlediska bychom ji možná řešili jinak.

U nás je důležitý v architektuře, aby ten barák měl ksicht a byly tam výtvarné prvky, Ono je to v tom doufám vidět, ty ramenáty, to byl výtvarný prvek od začátku. To, že to je vlastně docela chytrá konstrukce, k tomu jsme dospěli, až v rámci dokumentace, kdy i statik byl překvapen, jak je to jako relativně subtilní konstrukce na relativně velké rozpětí, a hlavně je relativně úplně jednoduchá na montáž.

Napadá vás ještě k tomuhle projektu něco? Něco se tam bylo třeba specifického?

Specifický bylo, když to rostlo, když tam byly takový ty ramenáty uprostřed vesnice, byla velká reakce místních, že tam stavíme. Ale postupně, jak se to zakomponovalo do té klasické střechy, myslím že to i místními bylo docela pozitivně přijato, minimálně z toho venkovního prostoru. A myslím si, že i ty děti, co tam jsou ve školce, jsou relativně spokojený, aspoň po tom, co jsem to několikrát navštívil.

A vy když jste byl uvnitř, tak vám to jako v té dokončené budově tak taky dobrý?

Taky dobrý, já jsem tam při realizaci chodil obden. Naštěstí se to podařilo vybrat výbornou stavební firmu. Což asi není dneska standard. A tady ta stavební firma odvedla úplně neskutečný výkon.

Děkuju a ještě obecná otázka, co si jako architekt myslíte, že potřebujete vědět nebo umět, abyste navrhl budovu s dobrým vnitřním prostředím nebo jako zásadě znalost stavební fyziky? Považuje to za nutnou pro architekta, případně, jestli jste se to naučil spíš ve škole nebo v praxi?

V praxi.

Pro architekturu je důležité světlo, což pro mateřskou školku taky. My chceme, aby byla hodně silná ta výtvarná stránka prostoru. K tomu fungují i ty věci, co se týče osvětlení, protože ty prostory se dají dobře nasvětlit, to světlo k tomu potřebujeme, aby ten prostor byl zajímavý. Ty technické věci, to dneska všichni víme, co je U, dneska víme všichni, co je tepelný odpor, co je to, ale důležitější je umět s tím pracovat, než vědět, jestli je to 1,2 nebo 1,1.

Ještě mě napadá, je něco, co by vám třeba usnadnilo navrhování budov z hlediska vnitřního prostředí, ať už z hlediska nějakých nástrojů, buďto softwarových nebo jiných, nebo z hlediska toho, co by se třeba mohlo změnit v legislativě nebo takhle? Něco co třeba není a chtěl byste, aby tak bylo?

Je to beru, že to tak je a musíte se tomu přizpůsobit. To nejde asi ovlivnit.

To, že se staví nové baráky a jsou na ně požadavky takhle dobré, co se týče parametrů tepelné stavební fyziky, prostupu tepla a tak, s tím není v zásadě žádný problém. Samozřejmě to tu stavbu prodražuje, ale aspoň v těch provozních nákladech se to snad někdy vrátí.

Co se týče naší práce, tak je bezvadný, že se teďka už pracuje, v tom BIMu. Alespoň my si myslíme, že tam je velká budoucnost projekce.

Můžu se zeptat, v jakým pracujete softwaru BIMovém?

V Revitu.

No a využíváte něco z těch nástrojů, co je v Revitu vestavěný pro spotřebu energie a podobně?

Ne. Ne že bychom to neuměli, ne že jsme s tím nechtěli pracovat, ale ne všichni naši specialisté dělají v Revitu. A to je ten kámen úrazu.

Takže se dá říct, že v tom Revitovém modelu nemáte dost informací?

Informace tam máme, můžeme je i dál předat. Ale ne vždy je komu. V tuhle chvíli u specialistů ta tendence se učit těmto novým věcem není. V tom regionu, kde my pracujeme, tak ty projektanti jsou zruční v tom, co umí. Umí to v tom posoudit, navrhnout, vypočítat, ale dělají to klasickou metodou 2D a dopočítávají si třetí rozměr. Ne všichni, ale většina.

I když tam ty hodnoty máme, nevím, jestli úplně všude, ale určitě jsme schopní tam dát úplně všude, zatím je nejsme schopni přenést na další specialisty, protože je tady nemáme.

Ale zároveň si myslím, že to, že člověk dělá v sofistikovaném Revitu, neznamená, že udělá dobrý barák, může udělat daleko lepší ve SketchUpu. Anebo v ruce na šmíráku, což je úplně nejčastější.

English translation of interview with Jiří Ondráček:

What does the indoor environment mean to you, or what do you think of as the indoor environment?

To have light and warmth and to be able to listen to something. Don't expect philosophical stuff from me.

I have defined it quite similarly to what you are saying, with respect to the building physical aspects, mainly daylight, sunlight, acoustics, thermal comfort and air quality.

Were there any specific requirements for indoor environmental quality in the brief for the kindergarten project?

No, none.

So were you basing it on standard or legislative requirements?

No, it's more that we wanted to do it right. Practically today we do all or try to do all houses in the modern way, in the passive standard. There' s actually nothing too complicated about it.

So that's where it came from. It wasn't in the brief, by the fact that it's a small village, Sedlejov, we wanted to do a kindergarten, which, since it is being subsidized, will maybe cost a little bit more in the base, that is in the acquisition cost. But it will be as cheap as possible in the operating costs.

At what stage of the design process did you address the quality of the indoor environment?

From the beginning. You have to think about it from the beginning. We wanted to make it a village house, that was the first thing. My aim was to make it so that it was unobtrusive, so that it didn't assert itself too much when viewed from the village, because the village is relatively well preserved.
And on the other hand, I wanted the interior to be different and modern, or rather contemporary.

When you were placing the house on the lot, did you address things like noise from the neighborhood or access to sunlight, light, facade, etc.?

No, that option was practically not there.

The site was relatively good. And there was really no choice but to put the house this way. I'd say almost everybody would have done it the same way.

Have you collaborated with any professionals during the study phase? Either for building physics or maybe for HVAC? Have we consulted with any specialists in this way?

Not much, actually. Because the house is passive standard. Of course, we know a little bit about building physics, we can do the math.
And by making the building already in that low energy standard, the question of heating and cooling is actually easier for the professionals.
Of course, the concept was given by us. And at that stage, when we left the study, we of course started to collaborate with specialists, but the basic idea of the concept was practically without specialists.

And what tools do you use? When you want to verify some physical properties of the building in the study before the specialists arrive?

Paper and pencil, for the concept, to make the house look something, to give it some mass. Then we use SketchUp at the beginning. That's a good tool for kind of basic informative modeling, and then we use, if you want to move into the thermal engineering stuff, for example, we use Deksoft, for some basic design of those structures.

When you think about, say, light, do you base it more on experience, or do you use some software for calculations?

There we used that lighting calculation software from Velux. That's where you set the illumination levels, how much you want on what table, and we simulated that using that tool in SketchUp and Velux. Of course, the initial sketch was the conceptual design and we added one window in there by calculating the daylight.

Did we make any compromises in that project, between the architectural concept and the requirements of either passive standard or light or something like that? Or maybe even between the amount of light and overheating or something like that?

No. In a passive house, the house starts to work in a commonsense kind of way. The chimney effect of the skylights upstairs works perfectly as ventilation.

It cools the kindergarten relatively well over the summer. Not that it's happening, but it can be cooled. The kindergarten is heated by a heat pump and can be turned on in reverse.

That means it can be well cooled.

And by cooled, do you mean by chimney ventilation or by mechanical cooling?

Naturally, I don't even think that reverse cooling is used at all. Last time I spoke to the mayor, he said they didn't turn it on at all, the reverse cooling.

And when the project got to the later stages, both in the hands of the specialists and the authorities, did you have to make any changes to meet their requirements? Adjust the study?

No, we have good specialists (laughs).
No, it's because the building is relatively simple, it's actually a big hall. It's already designed to work like that, the layout corresponds to that, that is, the layout of those exhaust branches for the air conditioning and those intakes for the air conditioning, when we already counted on that in advance, that it would be an artistic element, the air conditioning in that hall. The specialists basically just did the math and confirmed it technically, but the initial sketches already looked like that.

So nothing much has changed in the basic dimensioning?

Maybe we had the pipe drawn in SketchUp as a 200 and it's a 250, I don't know, but practically the way we had the idea from the beginning, we managed to follow through.
In terms of the design, we only added a window between the playroom and the dressing room, which wasn't in the design, we agreed with the mayor on that during the construction. So that was completed to everyone's satisfaction.

Did you address the spatial acoustics, or was that addressed by the project?

There are acoustic ceilings everywhere because the reverberation in this kindergarten would probably be too much without them.

Is there anything about the house that surprised you, or that turned out differently than you expected or designed when it was finished?

Not really. Nowadays we would probably be a little bit happier if we, as a team, had done the garden, because we didn't have that in our hands anymore, but that doesn't apply to the house itself. But nevertheless, it works well. I know the kids are happy in the garden, but from an artistic point of view, maybe we would have handled it differently.
For us, it's important in architecture that the house has a face and there are artistic elements, I hope you can see that in it, the

arches, that was an artistic element from the beginning. The fact that it's actually quite a clever structure, we didn't come to that until the documentation, when even the structural engineer was surprised at how it's like a relatively subtle structure for a relatively large span, and more importantly it's relatively completely simple to assemble.

Do you have any other thoughts on this project? Anything specific that needed to be addressed there?
What was specific was when it was growing, when there were these arches in the middle of the village, there was a big reaction from the locals that we were building there. But gradually, as it was incorporated into that classic roof, I think it was quite positively received by the locals as well, at least from the outdoor space. And I think the kids that are in the kindergarten there are relatively happy as well, at least after seeing it a few times.

And when you were inside, did you find it good as a finished building?
It was good too, I went there every other day when it was being built. Fortunately, it was a great construction company that was chosen. Which I guess isn't standard these days. And the construction company here did an incredible job.

Thank you and a general question, as an architect, what do you think you need to know or be able to do to design a building with a good indoor environment or as a principle knowledge of building physics? Do you consider it necessary for an architect and did you learn it more in school or in practice?

In practice.
Light is important for architecture, as it is for a kindergarten. We want the visual aspect of the space to be very strong. That's where the lighting stuff works, because you can light those spaces well, we need that light to make the space interesting. The technical stuff, we all know today what U is, we all know today what thermal resistance is, what it is, but it's more important to know how to work with it than to know if it's 1.2 or 1.1.

Is there anything that would make it easier for you to design buildings in terms of the indoor environment, either in terms of some tools, either software or otherwise, or in terms of what might change in legislation? Something that maybe isn't and you'd like it to be?

I accept that it is and you have to adapt to it. I guess you can't control that.
The fact that new buildings are being built and the requirements are this high in terms of thermal building physics parameters, heat transfer and so on, there's no problem with that in principle. Of course, it makes the building more expensive, but at least in terms of operating costs it will hopefully pay for itself at some point.
As far as our work is concerned, it's great that it's being done now, in the BIM. At least we think there's a great future in building design.

What BIM software do you work with?

Revit.

Do you use any of the tools that are built into Revit for energy consumption and such?

No. It's not that we can't do it, it's not that we don't want to work with it, but not all of our specialists work at Revit. And that's the stumbling block.

So is it fair to say that you don't have enough information in the Revit model?

The information is there, we can pass it on. But not always to whom. At the moment, there's no tendency for specialists to learn these new things. In the region where we work, the designers are skilled at what they know. They know how to assess it, design it, calculate it, but they do it in the classical 2D method and figure out the third dimension. Not all, but most. Even though we have the values there, I don't know if they're absolutely everywhere, but we're certainly able to put them there, we're not able to transfer them to other specialists yet because we don't have them here.
But at the same time, I think just because you work in sophisticated Revit doesn't mean you can make a good house, you can make a much better house in SketchUp. Or in hand on a sketchpad, which is absolutely the most common.

Kindergarten Přístavní Stříbro

Interviewee: Barbora Burýšková

Interviewer: Kristýna Schulzová

Datum a čas: 1.4.2022 10:00

Online, MS Teams

Co pro Vás znamená pojem vnitřní prostředí budov?

To je to, kde se Ti lidé nachází, pohybují a tráví v tom čas, tudíž kvalita toho prostoru, tak jak je zpracovaná, musí být opravdu jako na žádoucí úrovni, aby vytvářela dostatečné kvality pro ty uživatele.

Můj projekt se zaměřuje na architektonické navrhování z hlediska vnitřního prostředí. Sleduju právě ty kvantifikovatelné stavebně fyzikální aspekty, to znamená to denně osvětlení, proslunění akustiku, ať už stavební nebo prostorovou vlastně tepelnou pohodu a kvalitu vnitřního vzduchu. Ale samozřejmě se to nedá omezit jen na tomhle tyhle věci. takže když vás napadne cokoliv mimo, budu ráda.

Byly v zadání projektu nějaké specifické požadavky na ať už vnitřní prostředí nebo techniku prostředí, případně z jakých požadavků jste vycházeli, jenom s legislativních, nebo jestli tam bylo něco specifického?

V zásadě to zadání bylo dost skromné. My máme už na kontě víc těch školek a porovnám-li to mezi sebou, tak tam to bylo opravdu docela okleštěné. Na začátku byla soutěž, kde bylo zadání jasně specifikované, ale na vnitřní prostory mám pocit, že to nebyli specifikovány žádné požadavky, takže my jsme se řídili pouze legislativou. V dnešní době ve všech aktuálně realizovaných nebo projektovaných budovách se třeba počítá s rekuperací a podobně. Tam se to nepožadovalo ani zadáním a ani později, vlastně v průběhu toho projektu ani potom později nebyl vznesen tento požadavek.

Bbylo takové hodně zvláštní, že ve Stříbře do toho projekčního procesu vůbec nevstoupili zástupci školy, respektive tam potom vstupovali až v těch vyšších fázích, kdy už nemohli do toho příliš zasahovat, což byla škoda.

Třeba aktuálně, zrovna minulý týden proběhlo po poklepání na základní kámen naší nové školky ve Fulneku, která se teď začne stavět, tam ten proces opravdu jiný. Myslím si, že je lepší právě v tom ohledu, že od začátku se to projektovalo s paní ředitelkou. Prostě ty požadavky byly vyššího standardu.

Tady ve Stříbře to proběhlo opravdu udělat to pouze na základě standardních legislativních požadavků.

Co se týče, potom třeba nějakého interiéru, to jsme si celé vymysleli v podstatě sami, protože nikdo nic neřekl, nikdo nic nepožadoval.

Které fázi návrhů spolu vlastně začalo řešit vnitřní prostředí budovy? Můžeme to vzít po těch jednotlivých oblastech, takže třeba jak jste řešili světlo? Kdy, nebo jak jste řešili tepelnou techniku, přehřívání, akustiku?

Osvětlení oslunění se musí už podchytit v té studii, i s ohledem na orientaci budovy a osazení na pozemku. Z hlediska umístění oken, velikosti, rovnoměrnosti a podobně, už je strašně důležité to ovlivnit a ukotvit to ve studii, takže tam se to určitě nijak neodkládalo.

S akustikem to potom řešíme až v té vyšší fázi, pokud nemáme vysloveně nějaký specifický požadavek, tak to většinou počká až po studii do toho navazujícího stupně, což v tomhle případě bylo zpracování dokumentace pro společné územní a územní rozhodnutí a stavební povolení. Takže tam do toho vstupoval akustik a to samé i vlastně specialista na teplo a větrání.

Tyto dvě profese vlastně navazují až po studii. Na později už se nic neodkládá, později už je to opravdu pozdě.

A tohle řešíte spíš formou konzultace rovnou se specialistou nebo používáte třeba nějaký softwarový nástroje na začátku ve studii pro ověření?

Softwarové nástroje úplně nepoužíváme nějaký specifický. Z hlediska osvětlení oslunění, tak tam existují takové ty nápomocné grafy, které ukazují jako hladinu.

Když si nejsme jistí tak potom vlastně spolupracujeme vysloveně už se specialistou se specialistkou v tomhle případě paní Klepalovou, určitě znáte. No, takže ten nám potom zpracovávala vlastně studie denního osvětlení, no.

No a dělali jsme v tomhle projektu nějaký kompromisy, třeba mezi architektonickou koncepcí a technickými požadavky?

V každém projektu se klasicky kouká na peníze. A tady konkrétně v případě tohohle projektu byl hodně limitující samotný pozemek, který byl strašně zvláštní, v tom ohledu, že byl malý a ještě ke všemu svažitý.

Tudíž jako my jsme neměli moc možností, jak tu budovu umístit. Nemohli jsme ani si hrát s tou formou, takže z ekonomických i z tady těch situačních podmínek vyšel vlastně úplně základní tvar.

Ta budova je relativně malá a úsporná, a tomu vlastně odpovídaly i všechny ty vnitřní prostory, byly okleštěné co do velikosti, což je možná trochu škoda, že někde bychom mohli i přidat, ale prostě nebylo kam. Školka má nějaké limity, co se týče podlažnosti, ten pozemek nám neumožňoval se rozlétnout do stran, takže jako v tomhle ohledu řekněme, že jako byl kompromis, mezi vnitřními prostory a venkovními prostory. Neříkám, že jsou ty vnitřní prostory malé, to ne. Ale jsou úplně hraniční, prostě zase, co nám dovolila norma. To jsme dodržel, ale ani o metr čtvereční navíc jsme tam nepřidávali. Ale jinak si neuvědomuju, že bychom tam dělali nějaká jiná kompromisní řešení.

Také s ohledem na to, že tam nebyly požadavky na nějaké specifické technické vybavení, který bychom museli zapracovávat a řešit.

V pozdějších fázích projektu, museli jsme dělat nějaký změny na architektonické koncepci s tím, jak se dovyvíjelo ty technické řešení, nebo abyste potom splnili požadavky úřadů a tak?

Nemuseli. Co si vzpomínám tak na úřadech to prošlo velice snadno, vlastně v zásadě k tomu tématu, kterému vy se přibližujeme, je klíčovým úřadem je hygiena a tam to šlo velice hladce, tam vlastně nebyly žádné připomínky. S požární bezpečností jsem se trochu dohadovali, ale nemuseli jsme dělat žádné zásahy, které by měnily zásadně ten dům nebo tu koncepci, to ne naštěstí.

A je potom něco, co u té u té stavby vás třeba překvapilo nebo dopadlo jinak té u finální stavby, než jste plánovali, navrhli nebo očekávali.

Já bych řekla, že nedošlo k takovému odchýlení, že opravdu od doby, co se to navrhlo si ten dům v podstatě furt držel ty rysy. Měnily se jenom marginálie, tím pádem výsledek splnil očekávání, která byla na začátku.

Co si myslím a co je pro některé lidi pořád diskuze ohledně tohoto domu a týká se to vnitřního prostředí, ale ne vysloveně toho technického, ale spíš toho interiérového, je třeba barevnost, protože my jsme potom v interiéru zvolili takový koncept, že každá třída má svoji barvu, což mělo pomáhat i těm dětem s orientací a podobně.

A to třeba jako to v okamžiku, kdy se ta budova dokončila, ale ještě tam nebyly nastěhované ty děti a jejich vybavení ve smyslu hraček a podobně, takový ten jejich nepořádek, ty barvy byly vidět opravdu čistě. Oranžová třída, zelenkavá třída, modrá třída a někteří lidi se toho trochu obávali, ale jakmile došlo k zabydlení toho domu, tak najednou ty barvy šly hodně do pozadí, protože tam byl ten nános a ten to dost utlumil.

Co se týče paní učitelek tak ty s tím, jako jsou normálně v pohodě, neměli s tím nějaký problém. A my jsme potom navštěvovali tu školku i později, jenom abychom viděli nějakou zpětnou vazbu a abychom viděli, jak ten dům prostě funguje v provozu a nikdy nebylo vyřčeno, že by tam byl nějaký problém z tohoto hlediska.

Jak jste v Přístavní řešili proslunění a osvětlení versus přehřívání?

Ten dům byl docela chytře orientovaný. V zásadě žádná ta třída není orientovaná nebo exponovaná na tu kritickou západní stranu. Vždycky je tam osvětlení ze dvou stran.

Orientací té budovy jsme se vyhnuli docela výraznému přehřívání. Investor vysloveně v tomhle případě nechtěl rekuperaci. Což je otázka, jestli je vhodné nebo není. V současnosti bych se ho snažila přesvědčit, ale tehdy byl jednoznačně vznesen požadavek, že prostě rekuperace nebude, takže nebyla. My jsme pro to prostě jenom doplnili okna o stínění.

V zásadě si myslím, že asi nejzásadnější byla opravdu ta orientace s tím, že prostě plocha oken, když to tak řeknu, je tak nějak jako rovnoměrně, že jo? Tam je takový ten grid na fasádě plus vždycky v každé třídě je to jedno velké okno.

Tak jak je to navržené, z uživatelské zkušenosti víme, že k přehřívání nedochází a prosvětlení je dostatečné s ohledem na to, co nám tehdy ještě spočítala paní Klepalová.

Myslím si, že by to bylo asi lepší, kdyby tam ta rekuperace byla, bylo by to řízené. Ale funguje to naštěstí i bez toho.

Co si myslíte, že jako architekt potřebujete vědět nebo znát, byla schopná navrhnout kvalitní vnitřním prostředí v budově? Jsou jaké znalosti třeba ať už stavební fyziky, nebo obecně techniky prostředí považujete za nezbytné?

Jako je pravda že za tu dobu, co projektujeme nějaké ty domy, my se nespecializujeme na rodinné domy, ale právě spíš na typologii občanské vybavenosti, což jsou větší domy, vnitřní prostředí se tam navrhuje trošičku složitěji, komplikovaněji, jsou tam vyšší požadavky, tak s těmi zkušenostmi a přibývajícími návrhy, jako je vidět že už máme přece jenom větší znalosti, co se týče právě třeba akustiky jako takže jako už v té studii umíme podchytit, že si navrhneme rozumné konstrukční výšky a světlé výšky těch vnitřních prostor.

Vždycky, když vám dá investor nějaké zadání, tak samozřejmě klade velký důraz na ekonomický aspekt toho návrhu.

To znamená, že my se snažíme být úsporná co do velikosti, ale zase to nesmí právě na úkor technologií, protože to byl vždycky kámen úrazu, něco navrhneme a potom zjistíme, že se tam nevejdou nějaké trubky, nebo se nám tam nevejdou dostatečné podhledy, dostatečné mezery nad těmi podhledy a podobně, takže s každým projektem jsme se něco naučili.

Dimenzování vnitřních prostor co do velikosti je asi docela zásadní, protože něco vám říká norma, ale ona vám už potom neřekne, jakou dostatečnou rezervu si tam máte nechat, aby se tam vešlo všechno, to ostatní. Samozřejmě nepodcenit osvětlení ale zároveň do té míry, abychom se zase vyhnuli přehřívání, to je taky těžký vybalancovat.

Někdy ale to už si myslím, že většinou už právě v té studii vždycky jako konzultujeme prostě s profesionály, protože to opravdu jako není jednoduché navrhovat tak, aby jsme se strefili tudíž …. No nějakou tady představu taky už máme jako po těch zkušenostech, ale tady většinou každým projektu hledáme tu pomocnou ruku toho profesanta. Prostě abysme to měli jako přece jenom podchycené a nestalo se nám později ve fázi kdy už bysme neměli ten měnit, že by prostě mělo dojít právě nějakým razantním změnám.

Děkuju. A ještě když se teda vrátím k tomu, co vlastně umíte, potřebujete umět jako architekt, tak mám ten pocit, že vás na to nějak připravila škola, nebo že vás na to mohla připravit líp?

Nevím, jestli tohle dokážu odpovědět, už si vůbec nevzpomínám, co jsme se přesně učili. Jak jsme se neučili.

Navíc já jsem dost migrovala mezi školami, bakaláře s manželem oba dělali v brně. Já jsem potom částečně ještě studovala v Lublani, potom jsme magistra dodělávali tady v Praze. Vím, že v Praze ta výuka probíhá jinak, vlastně v takových těch typologických základech.

Ale neumím to přesně posoudit, protože jsem nepodstoupila vysloveně tu výuku. Já jsem viděla jenom ty podklady nebo ty pomůcky, která využívají studenti k tomu, aby se tady něco naučili a myslím si, že nejsou úplně špatný. Nicméně já jsem studovala na základě jiných podkladů.

Jako na škole se nedá podchytit úplně všechno, to je prostě neskutečný a holt ta praxe to se prostě musí nějak naučit.

Já si myslím, že když začíná absolvent, čerstvý absolvent, který jde tou cestou, kdy hned po škole začne pracovat sám na sebe a má možnost navrhovat nějaké jako i větší domy, třeba složitější zadání. Tak je jako výhodou, když se nebojí i nějaké finanční zátěže v tom ohledu, že když se obklopí těmi profesanty, kteří mu můžou pomoci, ale za nějakou cenu samozřejmě, tak je to jedině na výhodu, protože takhle se to velice rychle naučí, pochopí to, a vždycky se to samozřejmě zaplatí.

Nebo naopak jít tou cestou prostě po škole nastoupím do už nějakého etablovaného ateliéru a tam to vidím tu praxi, protože přece jenom škola je škola, ta nám dá základ, ale určitě ne všechno a prostě jako učit se to praxí.

My jsme se učili praxí no jako tak nějak jsme to… jakože šlo to přes nějaké jako kotrmelce, ale jako bylo to, jako všechno se to zvládlo. No takže nevím, no ta škola jako já to opravdu už asi fakt nevzpomínám přesně jako jak jsme se my učili. Proboha to už je fakt tolik let že už…nevím, no ale myslím si, že ta pražská technika jako na tom není, jako že fakt jako vysloveně ty prváci, jaký mají ty přednášky jako v nauce o stavbách. Tak jako jsou dobře jako nastavené. Jo je tam ten dobrý, kvalitní základ no takže.

No já to vidím i vlastně na našich studentech potom vlastně oni, když u nás dělají nějakou praxi, nejsou úplně mimo. Takže hádám, že ta škola něco jim přináší.

Co by vám jako architektům usnadnilo návrh ale vnitřního prostředí budovy, ať už z hlediska softwarových nástrojů, hlediska spolupráci se specialisty nebo z hlediska legislativy.

No tak z hlediska legislativy by bylo jako naprosto krásné, kdyby prostě normy fungovaly nějakým jiným způsobem, než fungují. Protože v normách je obsaženo neskutečný jako množství požadavků, kterými ne vždycky jsme schopni vlastně jako až jako dohledat jo.

Takže kdyby jako normy, jednak kdyby byli jako přístupnější, kdyby byli digitalizovaný, prostě , kdyby se v nich snáz vyhledávalo, tak by to bylo velice k užitku všem ku prospěchu. A z hlediska nějakých softwarových nástrojů já nevím. No já si myslím, že netuším, možná že něco takového existuje, ale třeba právě to oslunění, kdyby jako existoval nějaký software, který

my jsme si mohli sami jako aspoň základně ověřit nějaký požadavky na budovy, tak by to bylo opravdu výborný.

Jo a jako možná, že něco takovýho je, já nevím , my to nevidíme teda jako když pominu takové ty klasické grafy, jo. Kdyby prostě se nějak jednoduše dalo prostě prohnat nějaký úplně základní koncept nějakým softwarem, ve kterém uvidíme, jako jestli jdeme správnou cestou či nikoliv, tak by to bylo ku prospěchu.

Z hlediska nějakého vytápění ho přehřívání podobně, a tak si myslím, že asi jako to to asi není nějak….to si myslím, že už je potom jako na tý další jako spolupráci, nicméně už s tím profesantem tam si to asi neusnadníme.

Co si myslíte že je důležité pro spolupráci a komunikaci mezi architektem a specialistou?

Zapojit je včas (smích). My už jako máme takové ty dlouhodobě spolupracující kolegy profesanty, s nimiž se známe.

Když se třeba přistupuje k rekonstrukci, kdy už jsou jasně dané nějaké limity, tak tam třeba topenáře a vzduchotechnika v 1 osobě, v našem případě, zapojujeme taky většinou už ve studii, abychom si byli jistí že ty prostory na TZB se nám tam vůbec nejdou.

No, protože tady to je taky taková ta věc, že to si pamatuju ještě jako z dob já nevím studentských, když jsme dělali nějaké soutěže, takže jsme si řekli, tady technická místnost dobré 4 * 4 m, hotovo, no. Dneska jsou samozřejmě ty požadavky úplně jiné, bývají mnohem větší, takže to většinou ověřujeme

Abychom byli prostorově dobře nadimenzovaní, ale to je jenom v podstatě o nějaké konzultaci. Přistupuje se třeba k těm alternativním způsobům vytápění, což je taky zase samozřejmě nějaká teorie, která jde mimo nás, takže tam většinou potřebujeme nějakou pomocnou ruku, ale taky to je prostě o konzultacích, který když jsou včas podchycené, nenastane nějaký problém. Ale včas znamená už většinou v té studii.

A můžu se ještě zeptat, co používáte za softwary, když jako k modelování nebo pro výkresy?

Všichni v ateliéru rýsují v programu Autocad.

Tak my jsme dlouho zvažovali, jestli bychom měli přejít jako na nějaký ten jako software typu ArchiCAD nebo Revit, který samozřejmě jsou výhodou jako v tom ohledu 3D prostorovým zpracování toho návrhu. Ale došli jsme k názoru, že se na to vykašleme, protože když děláme menší projekty a spolupracujeme na nich s našimi profesanty, tak tito lidé nejsou kompatibilní potom softwarově a to by znamenalo velký zádrhel.

Když naopak navrhujeme velkou budovu, tak my si prostě tu studii nakreslíme v tom audiu a potom to celé prostě předáme našemu projekčnímu partnerovi, to dělá většinou velká projekční firma, která si jede v tady těch 3D softwarech. A ta už si to všechno včetně svých vlastních profesí zpracuje v tom a my jsme spokojení, jo a vlastně nemusíme se učit ani jako žádné nové, prostě jako přeškolit celý ateliér, nikdo v našem ateliéru bohužel prostě jako nepracuje v tady těchhle nástrojích nevyužívá je a úplně se mi nechce řešit, že 10 lidí budu učit něco nového, kupovat, vlastně nový software je taky jako finančně to dost problematický, takže jako my jsme jako fakt po dlouhých zvažování jako došli k tomuhle modelu, který si myslím, že jako není nějak kolizní jo a takže, takže vlastně Autocad nás zatím jako zůstává a vlastně pro 3D využíváme různé nástroje, převážně Rhino, nebo Sketchup no.

English translation of interview with Barbora Burýšková:

What does the term indoor environment mean to you?

It's where people are, move around and spend time, so the quality of that space, as it's designed, has to be really at a desirable level to create sufficient quality for those users.

My project focuses on architectural design in terms of the indoor environment. I'm looking at the quantifiable physical aspects of the building, that is, the daylighting, the acoustics, whether structural or spatial, actually thermal comfort and indoor air quality. But of course you can't limit it to just those things. So if you can think of anything outside of that, I'd be happy to.
Were there any specific requirements in the brief for either the indoor environment or the environmental technology, or what were you basing the requirements on, just the legislative requirements, or was there anything specific?

Basically, the brief was pretty modest. We've had more of these kindergartens, and if I compare it to each other, it was really quite limited. There was a competition at the beginning where the brief was clearly specified, but for the indoor spaces I feel like it wasn't specified, so we were just following the legislation. Nowadays, in all the buildings that are currently being built or designed, for example, they are counting on heat recovery and so on. It was not required there by the specification and neither later, in fact, during the project or later on, was this requirement brought up.

It was very strange that in Stříbro the school representatives did not enter the design process at all, or rather they entered it only at the higher stages, when they could not interfere much, which was a pity.
For example, just last week, after the tapping of the foundation stone of our new kindergarten in Fulnek, which will now start to be built, the process was really different there. I think it is better just in the sense that it was designed from the beginning with the headmistress. Just the requirements were of a higher standard.
Here in Silver, it was really done just based on the standard legislative requirements.
As far as, for example, some of the interior design, we basically came up with that all by ourselves, because nobody said anything, nobody demanded anything.

At what stage of the design process did you actually start to address the interior environment of the building? We can take it one area at a time, so for example, how did you address the lighting? When, or how did you address thermal, overheating, acoustics?

The lighting of the glare must already be covered in the study, also with regard to the orientation of the building and the location on the site. In terms of window placement, size, uniformity, etc., it's already terribly important to influence that and anchor it in the study, so there's certainly no delay there. We then deal with the acoustician at later stage, unless we have a specific requirement, so it usually waits until after the study until the follow-up stage, which in this case was the preparation of the documentation for the joint planning and zoning decision and the building permit. So there was an acoustician involved and the same with actually the heat and ventilation specialist. These two professions actually follow on after the study. You don't put anything off until later, it's really too late

And do you handle this more by consulting directly with a specialist or do you use maybe some software tools early on in the study to verify?

We don't use any specific software tools at all. In terms of daylight and sunlight, there are those helpful charts that show like a level.

If we are not sure then we actually work with a specialist in this case, Mrs. Klepal, you know. Well, so she then did the daylighting study for us, well.

Well, did we make any compromises in this project, for example between the architectural concept and the technical requirements?

Every project is classically about money. And here, in the case of this particular project, the land itself was very limiting, which was very strange, in the sense that it was small and sloping. So we didn't have a lot of options as far as how to site the building. We couldn't even play with the form, so the economic and situational conditions here actually resulted in a very basic shape.
The building is relatively small and economical, and all the internal spaces actually corresponded to that, they were cut down in size, which is maybe a bit of a shame, we could have added somewhere, but there was just nowhere to go. The kindergarten has some limits in terms of number of floors, the site didn't allow us to spread out sideways, so like in that respect let's say like there was a compromise, between indoor spaces and outdoor spaces. I'm not saying that the indoor spaces are small, no. But they're completely borderline, just again, what the standard allowed us. We complied with that, but we didn't add an extra square meter. But other than that, I don't realize that we made any other compromises there. Also, given that there were no requirements for any specific technical equipment that we had to incorporate and address.

In the later stages of the project, did you have to make any changes to the architectural concept as the technical solutions evolved, or to meet the requirements of the authorities and so on?

We didn't have to. As far as I can remember it went very easily at the authorities, in fact basically to the topic that you are approaching, the key authority is the sanitary authority and it went very smoothly there, there were actually no comments. There was a little bit of arguing with fire safety, but we didn't have to do any interventions that would fundamentally change the house or the concept, fortunately.

And then there is something that may have surprised you or turned out differently in the final construction than you planned, designed or expected.
I would say that there was no such deviation, that really since it was designed the house has basically kept those features. Only the marginals have changed, so the result has met the expectations that were there at the beginning.
What I think, and what I think is still a discussion for some people about this house and it relates to the interior environment, but not explicitly the technical one, but more the interior environment, is for example the colour scheme, because we then went for a concept in the interior that each classroom has its own colour, which was to help the children with orientation and so on.
And it was like when the building was finished, but the kids hadn't moved in yet and their equipment in terms of toys and stuff like that, their clutter, you could see the colours really clearly. The orange classroom, the greenish classroom, the blue classroom, and some people were a little bit worried about that, but once the building was occupied, all of a sudden those colours went very much into the background because there was that clutter and it muted it quite a lot.
As far as the teachers were concerned, they were like normally fine with it, they didn't have a problem with it. And then we visited the nursery afterwards just to see some feedback and to see how the house just worked in operation and it was never expressed that there was any problem in that respect.

How did you deal with sunlight and lighting versus overheating?

The house was pretty cleverly oriented. Basically, none of the classrooms are oriented or exposed to that critical west side. There's always lighting on two sides.
By orienting the building, we avoided quite significant overheating. The investor specifically did not want heat recovery in this case. Which is a question of whether or not it's appropriate. At the moment I would try to convince him, but at that time the demand was clearly made that there would simply be no heat recovery, so there wasn't. We just added screening to the windows to make up for it.
Basically, I think probably the most important thing was really the orientation with just the window area, so to speak, being kind of like even, right? There's kind of that grid on the façade plus there's always that one big window in each classroom.
The way it's designed, we know from user experience that there's no overheating and the light is sufficient given what Ms. Klepalova calculated for us at the time.
I think it would probably be better if the heat recovery was there, it would be controlled. But fortunately it works without it.
As an architect, what do you think you need to know or be able to design a quality indoor environment in a building? What knowledge of, for example, either building physics or general environmental engineering do you consider necessary?

Like it's true that in the time that we've been designing some of these houses, we don't specialize in single family houses, but just more in the amenity typology, which are larger houses, the indoor environment there is a little bit more complicated, more complicated to design, there are higher requirements, so with the experience and the increasing designs, as it is seen that we have more knowledge in terms of acoustics, so we can already support in the study that we design reasonable structural heights and clear heights of the interior spaces.

Of course, when an investor gives you a brief, they always put a lot of emphasis on the economic aspect of the design.

That said, we try to be economical in size, but again, it can't be at the expense of technology, because that's always been a stumbling block, we design something and then we find out that we can't fit some pipes in there, or we can't fit enough soffits, enough gaps above the soffits and so on, so we've learned something with every project.

Sizing up the internal spaces is probably quite crucial because the standard tells you something, but it doesn't tell you then how much margin to leave to fit everything else in there. Obviously not to underestimate the lighting, but at the same time to the extent that we avoid overheating again, that's also a difficult balancing act.

But sometimes I think that's usually already in the study we always just like consult with professionals because it's really like not easy to design to meet therefore .... Well we have some idea here too, like after those experiences, but here we usually look for that helping hand of that professional every project. Just so that we have it under control and it doesn't happen to us later on at the stage when we shouldn't change it anymore, that there should be some drastic changes.

Thank you. And then, going back to what you actually know, need to know as an architect, I get the feeling that somehow school prepared you for that, or could have prepared you better?

I don't know if I can answer that, I don't even remember exactly what we learned. How we didn't learn.
Plus I migrated a lot between schools, my husband and I both did our bachelor's degrees in Brno. I then studied partly in Ljubljana, and then we finished my master's degree here in Prague. I know that in Prague the teaching is different, actually in such typological basics.
But I can't judge it exactly, because I didn't really undergo the teaching. I've only seen the materials or the tools that students use to learn something here, and I think they're not completely bad. However, I have studied based on other handouts.
Like you can't cover everything in school, it's just unreal and gosh the practice just has to be learned somehow.

I think that when a graduate starts, a fresh graduate, who goes down that path where right out of school they start working on their own and have the opportunity to design some like bigger houses, maybe more complex assignments. So it's like an advantage if he's not afraid of some financial burden in the sense that if he surrounds himself with those professors who can help him, but for a price of course, it's only to his advantage, because that way he learns very quickly, he understands it, and it always pays of course.
Or on the other hand, to go that way, just after school I'll join an already established studio and there I can see the practice, because after all, school is school, it gives us the foundation, but certainly not everything and just like learning by doing.
We learned by doing, it went through some like stumbling blocks, but it all worked out. So I don't know, well the school like I don't really remember exactly how we learned. God it's really been so many years that it's been...I don't know, but I don't think that the Prague Tech is like, like really like the freshmen, like the lectures that they have in like construction science. Like they're well like set up. Yeah, there's that good, quality foundation.
Well I can see that in our students actually then actually they, when they do some practice with us, they're not completely out of it. So I guess the school is giving them something.

What would make it easier for you as architects to design the interior environment of a building, whether in terms of software tools, in terms of working with specialists or in terms of legislation?
Well, from a legislative point of view, it would be like absolutely beautiful if the standards just worked in some other way than they do. Because there's an incredible like amount of requirements in the standards that we're not always able to actually like keep up with yeah.
So if, like, the standards, if they were, like, more accessible, if they were digitized, just, like, easier to search through, that would be very beneficial to everybody. And in terms of some software tools, I don't know. Well, I think I have no idea, maybe there is something like that, but maybe just the glare, if there was like some software that we could like at least basically check some building requirements ourselves, that would be really great.
Yeah, and like maybe there is something like that, I don't know, we don't see it like aside from like the classic charts, yeah. If we could just somehow just run some very basic concept through some software where we can see like whether we're going the right way or not, that would be beneficial.
In terms of sort of heating it up overheating it like that, and so I think probably like it's probably not somehow....then I think it's like on to the next one like working with that specialist, we're probably not going to make it easy there.

What do you think is important for cooperation and communication between architect and specialist?
Involving them early (laughs). We already have those long-standing specialist colleagues that we know.
For example, when we approach a renovation where there are already some clear limits, we also involve the heating and air conditioning engineer in 1 person, in our case, usually already in the study to make sure that the HVAC spaces don't go there at all.
Well, because here it's also the thing that I remember from I don't know when I was a student, when we did some competitions, so we said, here technical room good 4 * 4 m, done, well.
To make sure that we're well oversized in terms of space, but that's just basically some consultation. We are also looking at alternative heating methods, which is of course a theory that goes beyond us, so we usually need some help there, but it's also just about consultation, which if it's caught in time, there won't be a problem. But early usually means already in the study.
And can I ask what software do you use, for modelling or for drawings?
Everybody in the studio draws in Autocad.
So we've been considering for a long time whether we should switch to like ArchiCAD or Revit software, which of course are an advantage in terms of the 3D spatial processing of that design. But we came to the conclusion that we're going to pass on that because when we do smaller projects and we work with our professionals on them, those people are not compatible then software-wise and that would be a big setback.
On the other hand, when we design a big building, we just draw the study in that studio and then we just hand it all over to our design partner, that's usually done by a big design firm that runs the 3D software here. And they've already processed everything including their own professions in it and we're happy, yeah and we don't actually have to learn like any new ones, just like retrain the whole studio, nobody in our studio unfortunately just like doesn't work in these tools here doesn't use them and I don't really want to deal with teaching 10 people something new, buying, actually new software is also like financially it's quite problematic, so we've like really after a lot of deliberation like we've come up with this model which I think is like not a clash yeah and so, so actually Autocad is like staying with us for now and actually for 3D we use different tools, mostly Rhino, or Sketchup well.

Kindergarten Nová Ruda Vratislavice

Interviewee: Alena Mičeková

Interviewer: Kristýna Schulzová

Datum a čas: 16. 6. 2022 17:00

Online, MS Teams

Original interview with Alena Mičeková in Czech:

Co pro vás znamená pojem vnitřní prostředí budov? Co si pod tím pojmem představíte?

Já možná budu mluvit v množném čísle, protože jsme tak s kolegou spjati, co se týče naší tvorby, že to vnímáme dost podobně, symbioticky.

Pro nás je nejdůležitější prostorový zážitek, který můžeme připravit v rámci naší tvorby. Snažíme se vždycky nějakým způsobem překvapit nebo připravit něco nového. Co může ty lidi někam posunout v rámci jejich prostorové zkušenosti. Takže i takhle hledáme kompozici.

Samozřejmě není to na úkor funkčnosti, samozřejmě je ten základní provoz a tohle je pro nás taková třešnička nebo nadstavba. Ale chceme ty věci skloubit.

V tomhle projektu se zabývám architektonickým navrhováním z hlediska kvality vnitřního prostředí budov a mimo jiné tam jsou zahrnuté ty kvantifikovatelné, stavebně fyzikální parametry světla, akustiky, tepelné pohody a kvality vzduchu. Co pro tyhle aspekty může architekt udělat a kdy o nich přemýšlí, aby to potom vedlo k dobrému výsledku?

Byly už v zadání projektu školky ve Vratislavicích nějak specifikované požadavky na kvalitu vnitřního prostředí, respektive z jakých požadavků jste při tom projektování vycházeli, jenom z legislativních nebo i z nějakých dalších?

Nebyly konkrétně specifikovaný. To zadání bylo naprosto pragmatický, že prostě potřebovali školku pro děti pro přetlak dětí nebo převis počtů počtu dětí v městském obvodu.

A tam bylo prvotní to, že chtěli původně dřevostavbu. Ale v té možnosti, co nám nabízel ten pozemek, bychom se museli pustit do vícepatrové budovy. která má takhle. Tak nám tam vycházely taková opatření normová omezení, co se týče veřejné budovy, ještě mateřské školky, ze dřeva, že jsme nakonec vyhodnotili s panem starostou, že to není úplně efektivní, takže jsme zůstali ve standardu, klasice zděné budovy.

A tyto jednotlivý aspekty, který jste uváděla, co se týče světla vzduchu, akustiky, tak my jsme tam vznášeli ty opatření nebo ty přístupy velmi intuitivně, že vycházejí z nějaké naší zkušenosti, nebo jak to odečítáme z projektů, ve kterých se inspirujeme. Třeba co se týče toho světla, nebo použití oken v podstatě v tomhle případě, tak to vycházelo z naší osobní zkušenosti z projektu ZEN houses, který sami obýváme. Takže ta zkušenost byla velmi osobní. Ona se tam hodně propisuje, co se týče toho světla a propojení exteriéru s interiérem.

Co se týče akustiky, nevyužíváme úplně konzultace s profesantem, který je takto zaměřen, protože samozřejmě ta akustická opatření kolikrát jsou nám vyškrtnuta z projektu. Jsou třeba drahá, komplikovaná, ale snažíme se nějakým způsobem intuitivně vždycky nějaký akustický materiál tam dostat, aby tam byla vyvážená plocha těch materiálů, které jsou odrazivé a které ne. To se nám ve školce podařilo a myslím si, že to tam funguje příjemně.

Co se týče vzduchu, tam zase tam jsme šli přirozenou cestou, že jsou tam navržena otevírací okna. Není tam žádná speciální vzduchotechnika, nebo rekuperace. Že my jsme schopní příčně provětrat ten dům, i nějakým efektem propojení horního dolního patra a takhle to tam používají. Jediné, co je tam odvětrání v podstatě řízené ve smyslu jídelny, kde tam je jednoduchá vzduchařina a výměna vzduchu.

Z tepelného hlediska jsme zase opět ze zkušenosti zvolili zateplenou cihlu, která v sobě má již tu minerální vatu v dostatečné šířce. Takže využíváme toho, že zase nemáme komplikovaný objekt na technologie, ale je to o investici, zateplený objekt, který není náročný na vytápění.

V jaké fázi toho návrhu jste různé aspekty vnitřního prostředí řešili, nebo co je třeba první? O čem jste kdy uvažovali?

Myslím si, že to začínáme formovat už ve fázi ve fázi toho navrhování architektonické studie, kdy my už stejně musíme vědět, jak to bude, když něco navrhujeme, už musíme znát tu konečnou odpověď. Samozřejmě se tam ty věci během toho navrhování ještě nějakým způsobem dopřesňují, ale ten základ jsme v podstatě už věděli ve studii. Základní věci byly takhle nastavené od téhle fáze.

Už jste o tom trošku mluvila, ale spolupracovali jste v koncepční fázi nebo ve studii s nějakými profesanty, s nějakými specialisty na něco z těchto aspektů?

To bylo podle mě až třeba ve stavebním povolení. Někde v téhle fázi jsme začali řešit ty technické věci podrobněji.

A opravdu tam záleží na těch lidech, se kterými se potkáte na tom projektu, co jste schopný vykřesat, protože spíš sázíme na chytrá, ale jednoduchá řešení.

A ve studii ještě předtím, než dojde na profesanty, používáte nějaký nástroje na to, abyste si cokoliv ze stavební fyziky ověřili, ať už nějaké diagramy, nebo nějaký software?

Ne, spíš ze zkušenosti. Tak nějak jsem, jak jsem říkala, jakože že tam to konzultujeme z požární specialistou.

Byly v tom projektu nějaká kompromisní řešení, ať už právě mezi technikou a architektonickou koncepcí nebo nějaké protichůdné požadavky, které jste museli vyvážit?

Právě, že nebyly vůbec. Díky tomu, že se snažíme tu věc zjednodušit a mít to řešení připravené už od začátku, tak musím říct, že ten projekt se ve velké míře postavil tak, jak se naplánoval.

Velmi jsem kvitovala pak v rámci dodávky stavby, že i přes to, že ta firma, která zvítězila a dodávala tu stavbu, díky samozřejmě nejnižší ceně, nakonec i přesto, že tam nacenili mnohem levnější výrobky, nám dodali to, co jsme požadovali.

Co se týče pak závěrečné kompletace, povrchy, dveře, sanitární vybavení, že všechno nakonec dodrželi, ale bylo to skvělý tým. To teda musím říct, že lidi na postu z toho vedoucího a přípravářky stavby nám hrozně fandili, jinak by to takhle nedopadlo.

Byly nějaké specifické požadavky ze strany úřadů, museli jste něco později měnit, abyste jim vyhověli?

Jediné, co jsme tam nakonec museli přepracovat, byla kompletní bezbariérovost stavby, protože jsme původně měli ještě v rámci stavebního povolení jenom částečně bezbariérovou stavbu, ale díky tomu, že městský obvod na to žádal dotaci z nějakého IROPu, byly ty podmínky takové, že musíme zajistit komplet bezbariérovou stavbu.

Dělali jsme tam vnitřní výtahy mezi odděleními. A na fasádě je takový ten ochoz, tam jsme jedny schůdky měnili na rampu. Ale nemělo to zásadní vliv na celkovou koncepci nebo vzhled toho

výsledku. My jsme to tam tak implementovali, že to ani nebylo poznat.

Když se teď podíváte na tu dokončenou stavbu, je něco, co tam dopadlo jinak, než jste si představovali, nebo než jste navrhli? Překvapilo vás něco na tom na tom domě, když se teď používá, je hotový?

Díky tomu, že jsme měli zkušenost těch ZEN housů, tak jenom jsme pozorovali to, že se tam lidi učí žít tak, jak jsme objevili my, a že dochází ke stejné zkušenosti, nebo k velmi podobné zkušenosti.

Děti to začaly využívat velmi intuitivně už od začátku, první, kdo měl trošku odmítavou reakci byli dospělí a paní ředitelka nakonec prozradila, že jsem musela speciálně vybírat tým, který tu stavbu přijmul, což se podařilo.

Ten dům velmi citlivě využívají, že ho pochopili a nechávají i ty děti. Oni razí takovou filozofii svobody a osobní zodpovědnosti. A takhle ty děti vychovávají. Nejdřív je naučí ten dům používat a pak jim dají tu svobodu. Takže to je velmi příjemný sledovat.

A co se týče nějakých dodatečných úprav nebo nějakých změn nebo tak, tak to jsou opravdu drobnosti, někde doplnit nějakou vybavenost. Na střešních terasách si udělali kontejnerové záhonky, že chtějí učit pěstovat rostlinky.

Řešili jste tam nějak stínění nebo prevenci přehřívání?

Teď budeme instalovat nějaký textilní sluneční clony. Mysleli jsme, že nám to odfiltruje ten vnější plášť, kde jsme ty otvory trošičku i posouvali, aby tam došlo k překrytí té vnější fasády a těch vnitřních otvorů.

Ale nakonec jsme při přistoupili k tomuto řešení, takže teď tam máme navržené textilní sluneční clony, které vestaví do meziprostoru té montované fasády. To vyžadovali, protože si dělají promítání s dětmi, takže chtěli i větší stínění. Dělali jsme vnitřní rolety v přízemí. A ty používají na spaní, že si tam přistiňují některá místa na spaní.

Co si myslíte, že potřebujete jako architekt vědět a znát a umět, abyste navrhli budovu s dobrým vnitřním prostředím?

Asi ty zkušenosti, že musí člověk neustále nejenom tvořit, ale zároveň zkoumat realizace ostatních a odhalit třeba nějaké chyby nebo věci. V tomhle vnímám to permanentní vzdělávání sebe sama.

Samozřejmě víme, že jsou nějaké dostupné metody. Jak jste zmiňovala diagramy nebo modelace prostoru? Ale většinou v tom kalupu na tyhle věci není moc času. Ani princip BIMu se ne vždy ještě uplatňuje. Zatím jsme nezačali žádnou veřejnou stavbu, která by byla takhle zpracovávaná. Spousta lidí, kteří s námi spolupracují jako tým na tom projektu, ani tohle nedělají, je to ještě postaru.

Je něco, co by vám usnadnilo navrhování kvalitního vnitřního prostředí v budovách, ať už z hlediska legislativy nebo právě nějakých nástrojů, spolupráce se specialisty a tak?

Nejvíc asi bojujejme s normami. Stále se to mění, dalo by se říct i k horšímu, že to je všechno přenormované. Hlavně teď mluvím o věcech, které úplně nesouvisí s bezpečností nebo neovlivní nějak zásadně bezpečnost lidí.

Pak třeba ve výsledku vidíme, že to nefunguje. Zrovna na těch dětech to byl jeden z příkladů: normálně zábradlí, kde je vyžadováno v mateřské školce mít madlo pro děti. Ono skvěle funguje jako stupačka, že se opravdu na to vyšplhají na to dětské madlo a ukazují paní učitelce, že jsou vyšší než tu zábradlí. Tak jsem říkala, že to asi odděláme, protože to jsou opičky.

Protože nás nebaví studovat ty normy, ty výtisky, hodně často používáme Google. A odečítáme ty věci rychle z kreslených diagramů. Tohle třeba pro mě je rychlá pomůcka, když hledám věci. Už ani nelistuju v Neufertovi a rychle Googluju a odečítám ty věci z nějakých diagramů, který třeba provázejí vysvětlování těch norem.

Velmi rádi používáme taková připravovaná řešení od VELUXu. Mají to moc hezky zpracované, někdy to je až příliš pro laiky, ale mají to skvěle připravené. Samozřejmě chápu, že to je velká firma, která si tohle může dovolit. I servis těch lidí, kteří se o vás starají, když vás někdo dobře od servisuje, posunete se, nebo objevíte nějaký nový materiál, který vyřeší ten váš konkrétní problém.

Co považujete za podstatný z hlediska spolupráce architektů s profesanty nebo se specialisty, aby to vedlo k dobrému výsledku?

U nás se osvědčily velmi osobní vazby. Když máme toho partnera, který je na naší stejné vlně, a je profesně zdatný, tak ty projekty postupují velmi rychle dopředu.

Člověk se nezvrhne na nějakém přemlouvání, jak třeba myslet jinak, nebo jak se na ten problém podívat jiným způsobem. To za mě je asi nejdůležitější, mít toho spoluhráče, který vás podporuje.

Myslíte si, že do nějaké míry vás může na navrhování vnitřního prostředí v budovách připravit škola?

Úvod do problematiky je asi v dostačující, že se lidi s tím seznámí, co všechno dům je, co všechno obsahuje a pak samozřejmě musí studenti nebo absolventi stavět dál na těch znalostech nebo na zkušenostech. Škola asi není úplně schopna to obsáhnout.

Máme zkušenosti i s výukou a to, co nám třeba úplně nesedí, nebo myslíme si, že nefunguje, je právě přenos teorie do praxe. U studentů se nám velmi často stává že to neumí použít ve svých projektech. Oni se něco dozví poměrně erudovaně, a nejsou schopni to zařadit do svého myšlení při navrhování.

Takže oni ví, jak přesně nakreslit schody. Ale neví, jak je nakreslit třeba ve svém projektu. Znají veškeré zásady, ví, kde se dělá řezová čára a tak, ale jak uvažovat o vytápění, o řešením základu nebo odvodu vody, nebo nakládání s vodou už moc ne. To znají na tom vzorovém projektu, který třeba zpracovávají v rámci předmětů TZB. Ale ve svých projektech jsou ztracení.

Napadá vás ještě něco, ať už k tomu projektu nebo k tomu vnitřnímu prostředí obecně?

Myslím si, že s jejich řešením těchto věcí se setkáváme při zpracování veřejných budov, nebo máme ještě záběr do toho vzdělávání, kde se to musí řešit víc komplexně. Třeba u rodinných domů už ani není šance, nebo ten investor o to nemá moc zájem. Nebo myslí si, že to nebude problém.

Ale zase tím rozsahem ty věci nejsou tak komplikovaný, u toho rodinného domu. Těchto problému se dotkneme až při tom, když děláme nějakou veřejnou stavbu.

Asi nejvíc zkušeností jsme získali při stavbě kulturního centra. Tam se řešila vzduchotechnika ve větším rozsahu, protože tam byl vnitřní společenský sál. Řešilo se tam akustika, protože se tam měla provozovat hudba a tak, což jsme taky museli vyřešit dost intuitivně, protože se tam v projektu veškerý akustické řešení, který bude ve studii. Oholilo se to na takový minimum, že jenom díky nějakému jednoduchému nápadu se nám tam podařilo vytvořit skvělou akustiku. Jenom těma chytrýma řešením se nám tam podařilo vnitřní prostředí nějak posunout, že je příjemný, že se tam můžete dobře pohybovat, neruší vás lobby nebo foyer během představení? Přitom je to dost otevřená stavba. Měli jsme štěstí na to, že se nám podařilo protlačit do té veřejné stavby, která se staví většinou za nejnižší finance, dost kvalitní materiály.

English translation of interview with Alena Mičeková:

What does the term indoor environment mean to you? What do you think of it as?

I may be speaking in the plural, because my colleague and I are so connected in terms of our work that we perceive it quite similarly, symbiotically.
The most important thing for us is the spatial experience that we can provide within our work. We always try to surprise or come up with something new. What can bring these people somewhere within their spatial experience. So that's how we look for composition as well.
Of course it's not at the expense of functionality, of course it's the basic flow and this is kind of a cherry on top or a topping for us. But we want to blend those things together.

In this project, I am focusing on architectural design in terms of the quality of the indoor environment of buildings, and among other things, there are those quantifiable, building-physical parameters of light, acoustics, thermal comfort and air quality. What can an architect do for these aspects and when do they think about them so that it then leads to a good result?

Were there any requirements for the quality of the indoor environment specified in the design brief for the kindergarten in Vratislavice, or what requirements did you base your design on, were they only legislative requirements or were there other requirements as well?

They were not specified. The brief was entirely pragmatic, that they simply needed a kindergarten for the overflow of children or the overhang of numbers of children in the district.

And there was an initial point that they originally wanted a wooden building. But in the option that the site offered, we would have had to go with a multi-story building. We had such standard limitations coming out there in terms of a public building, especially a kindergarten building, of wood that we ended up deciding with the mayor that it wasn't quite efficient, so we stuck with the standard, the classic brick building.

And these individual aspects that you mentioned, in terms of light, air, acoustics, we have brought up those considerations or those approaches very intuitively, that they are based on some of our experience, or how we read it from the projects that we are inspired by. For example, in terms of the light, or the use of windows basically in this case, it was based on our personal experience from the ZEN houses project that we ourselves inhabit. So that experience was very personal. It' s very much in there in terms of the light and the connection between the exterior and the interior.
As far as acoustics are concerned, we don't really consult with a professional who is specialised in that way, because of course the acoustic measures are often taken out of the project. For example, they are expensive, complicated, but intuitively we always try to get some acoustic material in there so that there is a balance of which materials are reflective and which are not. We've managed to do that in the kindergarten and I think it works nicely there.
As far as air is concerned, again, we went the natural route of designing the windows to open. There's no special air conditioning or heat recovery.
That we are able to cross ventilate the house, even by some effect of connecting the upper lower floor and that's how they use it there. The only ventilation there is basically controlled in the sense of the dining room, where there is simple ductwork and air exchange.
From a thermal point of view, again from experience, we opted for insulated brick which already has that mineral wool in it in sufficient width. So we are taking advantage of the fact that again we don't have a complicated building on technology, but it's about investment, an insulated building that is not demanding on heating.

At what stage of the design process did you address different aspects of the indoor environment, or what needs to be addressed first? What did you consider at what point?

I think we start shaping it at the design phase of the architectural study, when we have to know how it's going to be anyway, when we design something, we have to know the final answer.
Of course, there are still some refinements during the design process, but we already knew the basis in the study. The basic things were set up that way from that stage.
You've already talked about this a little bit, but did you work with any professionals, any specialists in any of these aspects in the conceptual phase or in the study?
I think that was only in the building permit. Somewhere in that phase we started to deal with the technical stuff in more detail. And it really depends on the people you meet on the project what you are able to come up with, because we are more inclined to rely on clever but simple solutions.

And in the study, before you get to the specialists, do you use any tools to verify anything in building physics, whether it's some diagrams or some software?

No, from experience. Though we do consult with a fire specialist there.

Were there any compromises in the project, either between technology and architectural concept or some conflicting requirements that you had to balance?
Actually, there were none at all. Thanks to the fact that we are trying to simplify the thing and have the solution ready from the beginning, I have to say that the project was largely built as planned.
I was very complimentary then in terms of the delivery of the construction that even though the company that won and delivered the construction, because of the lowest price of course, in the end even though they priced much cheaper products there, they delivered what we asked for.
In terms of then the final completion, the finishes, the doors, the sanitary fittings, they delivered everything in the end, but it was a great team. I mean, I have to say that the people in the position from the superintendent and the preconstruction person were cheering us on tremendously or it wouldn't have turned out this way.

Were there any specific requirements from the authorities, did you have to change anything later to accommodate them?

The only thing we had to rework in the end was the complete accessibility of the building, because originally we had only a partially wheelchair accessible building within the building permit, but thanks to the fact that the municipal district applied for a subsidy from some IROP, the conditions were such that we had to provide a complete wheelchair accessible building.

We did internal lifts between the wards. And there's this walkway on the facade, and we changed one of the steps into a ramp. But it didn't have a major impact on the overall concept or the look of the result. We implemented it in such a way that you couldn't even tell.

When you look at the finished building now, is there anything that turned out differently than you imagined or than you

designed? Was there anything that surprised you about the house now that it's being used, is it complete?
Having had the experience of those ZEN houses, we've just observed that people learn to live there as we discovered, and that the same experience, or a very similar experience, occurs. The children started using it very intuitively from the beginning, the first ones who had a bit of a negative reaction were the adults and the head mistress eventually revealed that I had to specially select a team to embrace the building, which was successful.
They've been very sensitive in using that house, they've understood it and they've let the children in. They have this philosophy of freedom and personal responsibility. And that's how they're raising these kids. First they teach them how to use the house and then they give them that freedom. So it's very nice to watch.
And as far as making any additional modifications or any changes or anything, it's really small things, adding some amenities somewhere. They've made container beds on the roof terraces that they want to teach how to grow plants.

Have you addressed any shading or overheating prevention there?
Now we're going to install some fabric sun screens. We thought the outer shell would filter it out, where we moved the openings a little bit to overlap the outer facade and the inner openings.
But in the end, we went with that solution, so now we have fabric sun screens designed in there that will be built into the interspace of that prefabricated façade. They required that because they're doing movie projections with the kids, so they wanted more shading as well. We did interior blinds on the ground floor. And they use those for the sleeping area.

As an architect, what do you think you need to know and be able to do to design a building with a good indoor environment?
Probably the experience that you have to constantly not only design, but at the same time examine other people's realizations and discover maybe some mistakes or things. That's where I see the continuous education of oneself.
Of course we know that there are some methods available. You mentioned diagrams or space modelling? But usually in the rush there's not much time for these things. Even the principle of BIM is not always applied yet. We haven't started any public building that has been processed in this way yet. A lot of the people who are working with us as a team on that project aren't even doing that, it's still old-fashioned.

Is there anything that would make it easier for you to design quality indoor environments in buildings, either in terms of legislation or just some tools, collaboration with specialists and so on?

I think the biggest thing is fighting with standards. It's changing all the time, you could say for the worse, that it's all over-standardised. Especially now I'm talking about things that are completely unrelated to safety or don't affect people's safety in any fundamental way.
Then, as a result, we see that it does not work. Just on the children, that was one example: normally the handrails where it is required in the kindergarten to have a handrail for the children. It works great as a stepladder, that they actually climb up on that child handrail and show the teacher that they're taller than that handrail. So I said, I guess we'll take that away because they're little monkeys.

Because we are not into studying those standards, those printouts, we use Google a lot. And we read these things off the schematics quickly. This, for example, is a quick reference for me when I'm looking for things. I don't even go through Neufert anymore, and I'm just quickly Googling and subtracting those things from some diagrams that maybe accompany the explanation of the standards.
We are very happy to use such upcoming solutions from VELUX. They have it very nicely worked out, sometimes it's a bit too layman friendly, but they have it very well prepared. Of course, I understand that this is a big company that can afford this. Even the service of the people that take care of you, if you get serviced well, you'll advance, or you'll discover some new material that will solve that particular problem of yours

What do you consider essential in terms of architects working with specialists to produce a good result?
For us, very personal relationships have proven to be very successful. When we have that partner who is on our same wavelength and is professionally proficient, the projects move forward very quickly.
You don't get bogged down on some persuasion about how to maybe think differently, or how to look at the problem in a different way. That's probably the most important thing for me, to have that teammate that supports you.

Do you think that to some extent school can prepare you for designing indoor environments in buildings?
An Introduction to the subject is probably enough to acquaint people with what a house is, what it contains, and then of course students or graduates have to build on that knowledge or experience. The school is probably not quite capable of covering that.
We have experience in teaching as well, and what maybe doesn't quite fit, or we don't think works, is just the transfer of theory into practice. Very often we find that students don't know how to use it in their projects.
They learn something quite expertly, and they are not able to incorporate it into their design thinking.
So they know exactly how to draw stairs. But they don't know how to draw them, for example, in their project. They know all the principles, they know where to make the cut line and all that, but how to think about heating, or how to think about the foundation design, or water drainage, or water management, not so much. They know that on that sample project that maybe they do in the HVAC courses. But they are lost in their projects.

Can you think of anything else, either about the project or about the indoor environment in general?
I think we're dealing with these things in the design of public buildings, or we're getting into the education side of it, where it has to be dealt with more holistically. Maybe with single-family houses there is not even a chance or the investor is not very interested in it. Or they think it's not going to be a problem. But again, the scope of these things is not so complicated, for the single-family house.
We only touch on these issues when we're doing a public building.
Probably the most experience we've had is building a community centre. There, the HVAC was dealt with on a larger scale because there was an indoor assembly hall. There were acoustics to deal with because there was going to be music and stuff, which we also had to deal with pretty intuitively because all the acoustics that were going to be in the design were going to be in the study. It was shaved down to such a minimum that just by some simple idea we were able to create great acoustics there.
Just with those clever solutions, we've somehow managed to advance the indoor environment there, that it's comfortable, that you can move around, you're not disturbed by the lobby or the foyer during the performance? It's quite an open building. We've been lucky enough to get good quality materials into this public building, which is usually built at the lowest cost.

Jára Cimrman Elementary School Lysolaje

Interviewee: Jan Kalivoda

Interviewer: Kristýna Schulzová

Date and time: 28. 4. 2022 14:00

Online, MS Teams

Original interview with Jan Kalivoda in Czech:

Co pro vás znamená pojem vnitřní prostředí budov, co si pod tím pojmem představíte?

Všechno, co je spojený s pobytem člověka uvnitř nějaké budovy, to znamená kvalita toho prostoru jako celku. Prostorová, světelná a akustická, vnímání všemi smysly.

Myslím, že na to se docela zapomíná v poslední době, že člověk nevnímá jenom očima, ale i hapticky a třeba cítíte teplotu materiálu, které jsou použity vevnitř. Akustika hraje hroznou roli v tom, jak vnímáte ten prostor, jaká je doba dozvuku, to už je teda potom, když je třeba nějaká přednášková místnost. Ale celkově to spoluutváří ten dojem, jaký z toho máte.

Takže všemi smysly vnímání toho, co utváří ta architektura nebo ta obálka vnější.

Já se v tom v té studii, kterou dělám, zaměřuji především na ty kvantifikovatelné, stavebně fyzikální parametry vnitřního prostředí. To znamená vlastně osvětlení, hlavně denní, akustika jak stavební, tak prostorová, tepelná pohoda a kvalita vnitřního vzduchu. Jejich souvislost s ostatními aspekty architektonického návrhu a s tím, co architekt může udělat pro to, aby ta budova dobře dopadla z hlediska vnitřního prostředí.

To polu souvisí, část těch věcí, o kterých se bavím, je kvantifikovatelná, tím se dá měřit nebo zajistit nějaká přiměřená kvalita toho prostředí. Část je o nějakém pocitu, ale to, co jste řekla, tak to všechno se toho dotýká.

My hodně pracujeme právě se světlem, s denním nebo s umělým. Jak do toho prostoru dopadá a jak mění to vnitřní prostředí. To, jaká je denní doba, od rána do večera a vlastně i v průběhu roku. Aby to mělo různý nálady a objevily se tam třeba momenty, který se objeví jenom párkrát do roka. A třeba u rodinných domů nebo u rezidenčních staveb je to fajn, že pak ty lidi každý den tam objevují třeba něco nového, nebo je něco překvapí.

Princip toho světa, co je kolem slunce, planeta se točí a tak dále, se vám promítne do toho interiéru.

Děkuju a teď bych se chtěla zaměřit konkrétně na ten projekt té základní školy v Lysolajích. První otázka je, jestli v zadání projektu už byly nějaký specifický požadavky na kvalitu vnitřního prostředí, respektive z jakých požadavků jste vycházeli? Jestli jenom z těch povinných legislativních, nebo jestli tam bylo i něco dalšího?

V zadání byly v podstatě jenom limity dané normou, od investora jsme neměli nějaký speciální požadavek. Ale jelikož máme nějakou zkušenost právě s tím vnitřním prostředím, s ergonomií pohybu člověka nebo sezení a pracovního místa. A škola je místo, kde vlastně trávíte dost času, měla by být ergonomická a měla by dobře fungovat v tom, abyste se mohla teda soustředit na to, co tam máte dělat. A s tím souvisí všechno, co jste říkala akustika, osvětlení, čerstvý vzduch.

Tak jsme se snažili dát na to větší důraz třeba, než by bylo potřeba.

Je tam například učebna chemie fyziky, která tu akustiku má napočtenou na parametry přednáškového sálu, což není úplně běžné, ale je to velký prostor a my jsme chtěli, aby se tam pedagogům dobře mluvilo, aby se neunavili za 10 minut, aby mohli přednášet celou hodinu. A když se tam bude dělat nějaký experiment a bude tam hluk a víc dětí bude mluvit, tak aby si rozuměli, tak jsme se snažili to posunout trošku dál a vlastně tu akustiku jsme řešili i v těch ostatních prostorech.

Snažili jsme se pracovat i s denním světlem tam, kde to šlo, tak jsme pouštěli horní světlo severní tak, aby mohly ty otvory zůstat otevřený, i když svítí sluníčko. Velká část té přístavby je jak podkrovním prostoru, tak jsme se snažili to udělat tak, aby vždycky byla nějaká možnost, mít nějaký otvory a přístup denního světla, rozptýleného, difuzního, a přitom nepřehřívat ten prostor, protože ta jižní okna se musí stínit v létě.

To je další věc, tepelná pohoda, kterou jsme hodně řešili. Na té škole už byla jedna přístavba realizovaná v minulosti a v některých místech tam nebyly úplně dobře technicky zvládnuté stavebně technické detaily a ty učebny svým přehřívaly. A musím říct, že zatím co my máme zpětnou vazbu, tak ty naše prostory, přesto, že tam není žádný chlazení navržený, fungují dobře i v létě.

V jaké fázi návrhu jste řešili, nebo uvažovali o těch jednotlivých aspektech toho vnitřního prostředí.

Jak v tom návrhu jdete čím dál do větší podrobnosti, tak na začátku je nějaký koncept. Tam je už trošku potřeba myslet na to světlo a na otvory, což se snažíme dělat vždycky, to je zásadní. Proto vlastně pracujete s fasádou a i modelujete tu hmotu tak, abyste třeba dosáhla na to světlo, v některých místech, kam byste jinak nedosáhla. Jak jsem hovořil o tom nasvětlení severním světlem, taky dispozici jsme trošku jsme k tomu přizpůsobovali. Takže na tom se snažíme myslet od první chvíle.

Předtím jsou ty zásadní věci, jako že nechceme stavět do zahrady, protože zahrada by měla zůstat dětem, takže budeme opravovat to, co se tam udělalo úplně ne šťastně, třeba v posledních letech, kde jsou nějaké poruchy a snažíme se zahustit a využít ten prostor. To je základní motto a napojení na tu starou budovu.

No a speciálně u těch učeben je potřeba opravdu pár hodin na to osvětlení a snažili jsme se to dělat tak, aby se minimálně musel přisvětlovat umělým osvětlením.

Ty další věci jdou potom v těch dalších krocích.

Třeba akustiku, tam víme, že budeme potřebovat nějakou plochu, kde bychom použili nějaký akustický materiál, ale dá se to zpracovat různě, takže to pak se vytváří spolu s tím vnitřním prostorem. Které plochy se použijí, dělají se akustické výpočty, to pak ještě zpřesní. Třeba když nám to někde nevycházelo, doplňovali jsme to ještě nástěnkami z akustického materiálu, v úrovni výšky, kde člověk mluví, tam to má největší efekt. Plus množství toho materiálu, celkově rozprostřeného do toho prostoru. Takže to se vyvíjí dál.

Stejně tak to osvětlení, kdy ten základní koncept je daný a pak se dopočítává kombinace s umělým osvětlením. Aby to vycházelo, trochu jsme upravovali třeba velikosti oken a tak dále. Takže bych řekl, že od toho základního pak toto zpřesňování dál a dál.

Snažili jsme se trošku přemýšlet i o větrání a ideálně všechny věci, aby fungovaly přirozeně, protože já osobně zastávám, že pokud to jde udělat přirozenou cestou a je tam míň technologie a funguje to, je to fajn. Protože tam hrozí samozřejmě mnohem míň věcí, které to můžou zhatit. Ta technologie může být

perfektní, ale může jí někdo špatně ovládat, může mít nějakou poruchu a tak dále.

Inteligentní systémy jsi ještě myslím že mají určité rezervy, že ta chytrost je někdy moc chytrá, když to tak řeknu.

To přirozené větrání jsme se tam snažili dělat, že máme sice elektricky otvíravá okna nahoře u hřebene, ale jenom díky tomu tam vzniká přirozené proudění vzduchu a ty učebny se dají provětrávat. Takže to je třeba, co se týče větrání.

No a pak dál a dál to jde do dalšího jako detailu už potom, kdy počítáte opravdu jako počet luxů na tabuli a tak dále. No to už je velká podrobnost potom.

V které fázi jste začali spolupracovat se specialisty a s profesanty? Je něco z těch výpočtů a z těch simulací, co jsi děláte sami? Obecně jaké používáte nástroje?

My se snažíme už v rámci té studie, máme takový okruh lidí, kteří si myslíme, že umí trochu uvažovat jako s nadhledem, což je hrozně důležité. Protože když se vrhnete hned na začátku do počítání, tak to jako nemusí vést k výsledku, nebo jako neposouvá vás to dál, že se člověk tak jako zacyklí. Takže je fajn mít někoho, kdo tomu rozumí, akustice, osvětlení ale je schopen vám říct tak, aby to fungovalo, tak by to mohlo být zhruba takhle nebo takhle a vy si vyberete nějakou cestu. Respektujete požadavek na to, že tam musí být zhruba takové množství toho pohltivého materiálu, nebo že to světlo musí mít nějaký parametr vzdálenosti.

Ale v tom prvním kole, které v podstatě podle mě nejdůležitější, tak je potřeba to dělat trošku takhle s nadhledem.

A to už děláme ale opravdu i v těch studiích, jako konzultace se specialisty na osvětlení. To je buď přímo dodavatelé osvětlení nám zajišťuje tento support, nebo máme nezávislý laboratoře, když potřebujeme nějaký jako měření zajistit.

Stejně tak akustiku, máme výborného akustika, který má zkušenost se spoustou velkých prostor, má jako takový to ucho, že vlastně do toho prostoru přijde a řekne, to by potřebovalo trochu víc přidat na strop a nemá žádný výpočet, ale má hodně zkušeností a umí to říct, takže toho využíváme.

Je tam ještě letová dráha, a chráněné vnitřní prostředí učeben, takže my jsme museli počítat akustiku, aby ten hluk neovlivňoval to vnitřní prostředí. Takže i okna a obálka musely projít tímhle tím výpočtem.

To je to první kolo a potom samozřejmě už jak se postupuje dál v tom projektu, dělá se projekt pro stavební povolení, tam už se dělají nějaké výpočty a v prováděcí dokumentaci už je to přesně všechno specifikované, včetně výměr, typu materiálu. Samozřejmě se porovnává ten materiál, jako jaký má efekt, odolnost, takže se vyberou nějaké varianty, kombinace těch materiálů tak, aby to splnilo to, co to má.

A pak ten výstup je přesně specifikovaný návrh, který by realizační firma měla dodržet. Což mimochodem je hrozně důležité, protože u veřejných zakázek, kde vyhrává dodavatel s nejlevnější cenou, je specifikace projektu klíčová pro to, aby to dobře dopadlo. Tam jsme měli konflikt v některých oblastech, a měli jsme se o co opřít a investor stál za námi, byli jsme v jednotě i s technickým dozorem a povedlo se to dotáhnout tak, jak to bylo zamýšlené. No a jakmile tam je nějaká nejasnost, tak tak je to opravdu pak hodně těžké.

A potom poslední věc jste se ptala, jestli si děláme výpočty sami? My si děláme vlastně na začátku, což možná bude znít nezvykle, ale děláme si modely fyzické. A ony ledacos napoví, minimálně co se týče práce se světlem. A když si vezmete ten model, je dost velký a uděláte si tam ty otvory, tak vlastně máte představu o tom, jak to světlo denní, nastavíte si ho na světové strany a můžete to pozorovat jako, co to dělá. Tak to si myslím, že jako první zpětná vazba je fajn, že to je jako vlastně jednoduchý. Zase je to bez jakékoliv technologie, je to vlastně otisk toho světa, je to zmenšený, funguje to stejně.

Pak děláme ve 3D model ve Sketch Upu a když si zapneme jako generování třeba stínů a tak, tak si simulujeme, kam padá sluníčko, v jakou dobu. Jestli se ty prostory budou nebo nebudou přehřívat, třeba u sportovních hal jsme to hodně využívali. Jak moc, kdy a co je potřeba stínit, ale i tady vlastně v té škole. My jsme věděli, jestli někdo nebude oslňován.

Pak používáme software na stavební techniku, ale to je spíš jako co se týká třeba rosných bodů v konstrukci. Ale napoví to i něco o teplotách konstrukcí, třeba v interiéru.

No a akustiku, tu necháváme počítat tam to je tam to děláme po té konzultaci nějak citem a pak to zpřesňujeme.

Museli jste nějak řešit dopad té nové přístavby na tu původní budovu, z hlediska prostředí, stínění a tak?

Určitě, museli jsme. Naštěstí ta orientace byla vhodná. Když jsme o tom konceptu uvažovali, tak to je jedna z prvních věcí, kterou si musíte říct, jo tam naštěstí jsou chodby otočené na tu stranu, takže jsme nemuseli tolik dávat pozor, co by se tam dělo a učebny jsou orientované do zahrady na druhou stranu. Už na začátku bylo jasné, že neubližujeme žádnému prostoru, který je důležitý v té staré části.

Při realizaci jsme museli mít naplánované, jak se bude stavět, když tam bude probíhat normálně provoz školy vedle a nebylo to úplně jednoduché. V některých místech, speciálně v těch, kde jsme se napojovali do stávajících prostor chodeb, probourávaly se tam stěny. To se týká i prašnosti. Když stavíte jako na tom pozemku, kde je pro provoz dětí, bezpečnost a tak dále, tak je to určitě komplikovanější. Vám to třeba definuje to, odkud můžete používat stavební techniku a museli jsme použít jiný jeřáb, než by byl nejlevnější, protože tam musel podávat panely z jiné strany.

Jaké jste v tom projektu museli dělat kompromisy? Ať už třeba mezi architektonickou koncepcí a nějakou technickým řešením, nebo jakékoliv, abyste právě splnily požadavky vnitřního prostředí?

Já to nevnímám jako kompromis. Já si myslím, že to je jedna z těch nejdůležitějších věcí, aby to vnitřní prostředí mělo nějakou kvalitu a přijde mi, že se to formuje navzájem zvenku zevnitř a že to vlastně dává i výraz tomu objektu.

Nejsme typ ateliéru, který má nějakou myšlenku, nějakou prostě vizi a pak se to nějak snaží jako implementovat na ten vnitřní prostor. Ale naopak se snažíme jako během toho vývoje pečlivě naslouchat všem indiciím, který nám tam vznikají. A to nám ten návrh utváří.

Takže myslím si, že kompromis vlastně tam žádný nebyl. A že tam, kde to vypadalo, že třeba by mohl být, tak jsme si uměli technicky poradit.

Nad tělocvičnou jsme stavěli jednu část, kde není žádná podpora, tak jsme museli vyvinout systém takových ocelových rámů, který dosedají až na obvodové stěny, které se tam umisťovaly jeden vedle druhého. Ty nám vynesly celou tu konstrukci nahoře, takže to byla řekněme nestandardní konstrukce, ale je to nějaké technické řešení ve spolupráci se statiky. Které vlastně nám úplně osvobodilo dispozici a umožnila nám pracovat jako svobodně, s tím vnitřním prostorem i s osvětlením s otvory a tak dále.

Cesta se vždycky najde, pokud je nějaké omezení, a jinak si určitě myslím, že je to jedna věc vevnitř a venku. A vypadá tak, jak by měla vypadat, protože v ní je něco, co tam má být.

Je něco, co se v průběhu toho projektu měnilo, abyste vyhověli třeba požadavkům, úřadům, ať už ve studiu, nebo v pozdějších fázích?

Hodně jsme tam bojovali s kapacitou parkování. Lysolajská škola vlastně má hodně zahraničních studentů, kteří tam jsou hlášeni a chodí tam jenom na přezkoušení, což ale český systém neumí rozlišit. Nakonec jsme přidávali jenom družiny a speciální učebny, abychom nenavyšovali tu kmenovou kapacitu.

Jinak jen drobnosti, jako že hygiena chtěla někde doložit větrání, tak jsme to počítali. Měnily se třeba motory nebo, ale to už jsou drobnosti technického rázu. Ale co se týče architektury, tak tam ten koncept zdá se byl stanoven správně a nikdo s tím neměl žádný problém.

My již v rámci toho projektu se to snažíme předkonzultovat. Spolupracujeme se specialisty v rámci té studie, snažíme se po studii obejít jako ty důležitý dotčený orgány. Pak se vyhnete tomu, že na konci se dozvíte něco, co může být dost zásadní, a je to složitý a drahý přepracovávat.

Tam kde je vůle, to slouží k prospěchu oběma stranám, protože my můžeme do projektu zapracovat to, co tam má být. A druhá strana je obeznámena s tím projektem a ví, že se na něm jako pracovalo a vlastně může to dát dohromady. A když někdy se setkáte s tím, že ta vůle není, že prostě ta konzultace neproběhne a řeší se to pak jako nějakým dopisováním se stanovisky, a to mi přijde jako škoda.

Když se teď podíváte na to dokončenou stavbu, tak je něco, co tam dopadlo třeba trochu jinak, než jste čekali, nebo než jste plánovali, nebo to dopadlo tak, jak jste to navrhli?

Myslím si, že ty části, které jsou nově stavěné, celkem přesně odpovídají tomu návrhu, jako jsme se pak dívali na ty vizualizace a na fotografie realizací, tak tam je minimálně změn.

Ale na každé stavbě, ještě když je to rekonstrukce, vás vždycky něco může doběhnout. Tady se stalo například to, že když se odkryla ta horní část, stavba ne úplně dobře zakryla tu střechu, než tam přišla konstrukce, tak propršela pod tím ta tělocvična došla. Promokly podhledy, parkety byly pod vodou, takže to všechno se dávalo pryč a my jsme dopracovali ještě projekt tělocvičny. Vymysleli jsme tam akustické obklady, osvětlení, akustický podhled a dřevěné obklady stěn. Pojišťovna to platila jako pojistnou událost, tak se možná dalo dosáhnout i něčeho, co původně nebylo v plánu, nebo bylo moc drahé.

A zrovna ta tělocvična si myslím, že je taková bolavá pata spousty škol, kdy tam ta akustika není řešena nijak. A samozřejmě, když vám tam jako 30 dětí dribluje s basketbalovým míčem, tak je to strašný mazec a nese se to celou tou budovou. Takže my jsme i navrhovali nezávislé konstrukce, podlahy versus strop tělocvičny, aby jim ani mechanicky jako tím chvěním se tam nepřinášelo to dunění.

Tohle bylo něco, s čím jsme nepočítali, ale čeho jsme vlastně využili jako v průběhu té práce.

Jinak i materiály si myslím, že tam zůstaly. My jsme se snažili používat materiály přiznané, jednoduché, pravdivé. A myslím si, že to skvěle funguje v kombinaci s tím, že pak je tam vrstva jako toho života, jsou tam děti, je tam spousta barevných věcí, hraček, obrazů, máme třeba tu nerezovou síť nataženou místo zábradlí mezi schodiště a oni na to věší obrázky, tím je ta jednoduchost, nebo přísnost té oceli kontrastu zjemněná. Dohromady to krásně funguje a přijde mi, že to právě dává jako prostor, to je možná ještě jedna věc, jak jsme se bavili o tom vnitřním prostředí, že jsme se snažili nepředurčit jako ten děj, co se tam bude dít. Ať si to zabydlí sami tím životem, ty děti, učitelé, svýma aktivitama, takže jsme se snažili jemně, ale použít třeba materiály, který opravdu něco vydrží.

Jsou tam podlahy z broušeného betonu, což v podstatě vypadá jako terrazzo, dřív se používalo, vydrží 100 let, i v těch činžácích beze změny. A je to hrozně hezký materiál se svojí strukturou. A můžete ho použít v učebně chemie stejně jako v družině. Tam jsme pak na to dali nějaký solitérní koberce, aby tam děti mohly být na zemi.

A schodiště je betonové, protože z betonu taky vydrží. A nepřijde mi, že ti to působilo nějak jako studeně v tom výsledku. Doplnili jsme to třeba v šatnách jsme dávali místo lavičky jsme tam dali kládu stromu, prostě dřevěnou, velikánskou, která vážila tunu. A nesli to tam chudáci chlapi v rukách, protože tam žádný jeřáb nemohl zajet. Ty děti to využívají, sedí na tom, lozí po tom. Že to je škola neznamená, že to musíte udělat úplně infantilní, ty třídy a namalovat je pestrými barvami.

Napadá vás k tomuhle projektu ještě něco ať už vnitřního prostředí nebo k příběhu toho domu.

Vyzdvihnul bych spolupráci s městskou částí. Byl tam tah na bránu ze všech stran. I přes všechny problémy, co pak na té stavbě byly, se starosta vždy postavil za ten projekt, takže nakonec kvalita provedení byla dobrá i od stavební firmy.

Zpracovávali jsme i projekt interiéru, neskončili jsme jenom tou stavbou. V učebnách jsou dubové stoly. Jasně, tak dub je dražší než dřevotříska, dubová deska, když poškodíte, tak ji přebrousíte a může sloužit 50 let úplně v pohodě. Ty levné stoly vydrží 3 roky a pak se vyhodí. Takže i z hlediska obnovy, recyklace a ekologie mi to dává smysl, použít ten dražší materiál, který vydrží přírodní, když to jde a kde to jde. Máme i docela dobrou zpětnou vazbu od pana ředitele, od učitelů i od dětí.

Ještě jestli se můžu obecně zeptat, co si myslíte, že jako architekt potřebujete vědět a umět, abyste byl schopnej navrhnout budovu s dobrým vnitřním prostředím?

Je to vlastně docela hodně. Kromě toho, že je tam potřeba nějaká, teda aspoň základní technická erudice v těch jednotlivých oblastech. Není potřeba aby to architekt uměl počítat, ale aby měl na to trošku odhad, aby prostě se snažil od těch specialistů se tohle naučit.

Když navrhujete konstrukci, tak taky zhruba víte třeba jak ten nosník bude velký, aby vás pak nepřekvapil třikrát větší nosník, který vám zhatí celý koncept.

Tak je dobrý trochu myslet i na to, jak to bude prosvětlený, jaká tam bude akustika, na tohle mít trošku odhad. A zajímat se o to, co se děje i v těch jednotlivých oblastech, jaké jsou možnosti, co se děje nového.

A mít trošku nadhled nad těma věcmi, protože ten architekt vlastně spojuje specializací, když ta stavba je složitější a nedá se úplně třeba vyhovět všemu, musíte mít jasnou představu o tom, co je priorita. A za tím jít a dělat i nějaký kompromisy mezi těma jednotlivými aspekty, snažit se to vést jakoby tím směrem, protože když si prostě na začátku řeknete z nějakých důvodů, z nějakých analýz, pocitu, co je důležité, tak by se pak k tomu jako opravdu mělo to přizpůsobit. Nejde prostě vyhovět úplně všem.

Leckdy ten specialista má úzký pohled na tu svoji část, dělá perfektně, ten svůj obor má zmáknutý, rozumí tomu, ale už nevidí třeba o dvoje dvířka jako vedle a ten architekt to musí mít jako nějak v hlavě.

Proto si myslím, že by měl rozumět všemu trochu, ale jenom v tom konceptu. Když mi přijde třeba nějaký podklad od specialisty, tak já se snažím v tom přečíst, o co jde rychle a selským rozumem si řeknu, to prostě není možný. To je dvakrát tolik, než jsme čekali a pak řešíme, proč.

A díky tomu pak to můžete jako poskládat do sebe a leckdy to jako dlouho nejde. Jo je tam spousta věcí samozřejmě. Řešíte provoz, řešíte to, jak to prostě bude vypadat, jaký je budou materiály, dispozice a často prostě ta skládačka je někde zaseklá. Někde to jde rychle, někdy později. A pak je ten

okamžik, kdy víte, že si to sedlo. A říkáte jo, tak teď je to ono, a pak se často stane to, že ty věci, které nešly, se začnou navzájem pomáhat, že se něco změní a najednou se to podpoří. Tohle s tímhle. Aha, tohle by fungovalo a pak to zase jakoby zacvakne pěkně všechno dohromady. Že vlastně si to neklade překážky navzájem, ale že dohromady ta synergie pak je mnohem silnější, než jednotlivých těch okruzích.

Myslíte si, že vás na to mohla, nebo může nějak připravit škola? Nebo že jste se to spíš naučil v praxi, potom tenhle přístup?

Myslím si, že je to hodně o lidech, kteří to učí. Myslím si, že škola by to měla učit. Myslím si, že jsem se to víc naučil praxí. Já už u školy při škole jsem pracoval v nějakým ateliéru. A měl jsem štěstí na dobrý ateliéry, přihlásil jsem se do dobrých ateliérů. U Ivana Kroupy jsem strávil nejvíc času a tam nás posouvali opravdu hodně dál, a to mi přijde, že mi hodně formovalo.

Ten můj způsob architektonického myšlení jo, že nešlo o ty konkrétní věci, ale o to, jak k nim přistupovat, co je důležitý, co není. A tohle pak vlastně vás osvobodí v tom, že ať dostanete jakýkoliv zadání, tak si to umíte nějak dát dohromady a definovat ten koncept, který vás pak vede dál. To mi přijde důležitý.

Myslím si, že právě toho hodně o těch lidech a myslím si, že by to na té škole mohlo být mnohem víc. Nevím, jak to tam je teď, ale ta praxe je jako úplně zásadní. Myslím si, že by se mělo víc chodit na stavby, víc jako pracovat v terénu.

A mám pocit, že to nemusí být zas takový problém, jako to zařídit jo, z hlediska té fakulty nebo toho vzdělávacího systému, protože leckdy si pamatuju, že jsme se něco učili. Já jsem si to pamatoval teoreticky a pak jsem to jako poznával na té stavbě, že to jako je ono. Jo, ale znal jsem to jenom z čar a chybí tam úplně ta provázanost.

Jo to prostě opravdu vidět, jak se to dělá, protože když nevíte, jak se to dělá, tak sice můžete teoreticky vědět, jak to má být, ale nechápete, že na té stavbě některý věci opravdu nejdou udělat rukama. A když to víte, tak se vám to i líp s těmi lidmi, co to realizují na té stavbě, vede. Když oni pochopí, že vlastně vám jde teda o to udělat nějakej koncept, ale že nejste úplně jako odtržená od reality a že víte, že to má nějaké svoje náležitosti a že něco se dělá fakt blbě, něco prostě je lepší a tak dále tak. Zdá se mi, že často se povede jako že i ty lidi to chtějí udělat tak co nejlíp. Jo, že nemají pocit, že teda dostaneme něco befelem, že to takhle jako musí bejt.

Na jednu stranu ty technický parametry musíte hlídat tak, aby to fungovalo jako celek, ale na druhou stranu ta praxe nebo jako kontakt s realitou je to, co mi na škole chybělo teda úplně nejvíc, že tam jsme jeli vlastně všechno úplně teoreticky.

Vlastně ve všech předmětech. Jako statika jako fajn, ale místo toho, abychom získávali tenhle přehled, který architekt potřebuje, když navrhuje, tak jsme počítali třeba průhyb nějakého sloupu, nějakého průřezu, čemuž jsem jako moc nerozuměl. Naučil jsem se ty vzorce, uměl jsem to spočítat, ale abych jako řekl z oleje, když půjdu dělat takovouhle budovu o tom rozpětí, kde potřebuju zavětrovat stěny a jak velký bude hlavní nosník, tak to možná odhadnu teď už, proto, že jsme něčím prošli, ale rozhodně jsem toho nebyl schopen po škole. Hodně teoreticky byly i ty předměty, TZI, technické zařízení a infrastruktura. Kde jsme jako spoustu věcí se jako učili, ale na škole jsem nikdy neviděl, jak to vypadá ve skutečnosti.

Samozřejmě se vám to pak špatně představuje, když to kreslíte nebo studujete. Takže si myslím, že jo, že určitě by škola v tom měla hrát velkou roli. Měla by posílit praxe a samozřejmě ideálně mít tam kvalitní pedagogy.

Co si myslíte, že by vám usnadnilo navrhování budov s kvalitním vnitřním prostředím z hlediska ať už legislativy spolupráce se specialisty, nástrojů?

Určitě vidím velký rezervy ve státní správě a v tom povolovacím procesu, kde, jak jsem říkal, když to jde, tak je to fajn, ale ne vždycky tam ta vůle je z druhé strany. Kdyby byla možnost mít nějaký, když řeknu konzultační aparát, když děláte takovýhle věci, tak si myslím, že to by bylo fajn.

Samozřejmě to máte zodpovědnost jako architekt, můžete si někoho najmout, ale stejně to pak jde do toho povolovacího procesu. a kdyby to bylo připravené jako co nejlíp z obou stran, tak si myslím, že by to jako rozhodně spoustu věcí zjednodušilo. Když si vzpomenu jako na to nekonečný mailování a jako obcházení těch úřadů a vyjadřovaček, tak prostě to zdržovat zbytečným výsledku si myslím. tak to je jedna věc.

Česká komora architektů teď docela dobře začala fungovat, nabízí spoustu možností, jak se dovzdělat. Nevím, jak je to přímo v téhle oblasti, ale nějaká kvalitní nabídka seminářů. Teď jsem třeba absolvoval seminář online, když se nedalo nikam chodit, na vegetační a zelený střechy, souvrství a bylo to jako super. Dozvěděl jsem se tam spoustu věcí, mluvili tam fajn lidi.

V té stránce softwarové, jestli nějaká pomoc třeba na to počítání světla rychlá, asi na to jsou nějaké programy, jo, ale kdyby třeba nějaký program, ve kterém teda jako modelujeme tu budovu, už uměl dávat nástřely toho, jak to bude fungovat. Co se týče osvětlení, akustiky, podle zvolených materiálů. Takový kompilát všech těch programů, jako jednotlivých specialistů. To, o čem jsem mluvil, že byste měla nějakou zpětnou vazbu, jakoby takový zdravý nadhled nad všemi těmi oblastmi.

Protože dopřesnit to jde pak trochu vždycky, ale když se seknete úplně v tom konceptu, tak pak špatně nahrazuje a dohání.

Skvělý jo, jestli vás napadá ještě něco, co byste chtěl dodat?

Vy jste to říkala na začátku, že se soustředíte na to vnitřní prostředí a ty kvantifikovatelné veličiny a… což jako je jako jasně, tomu rozumím, je to správně, ale pořád si myslím, že by bylo fajn, aby všichni měli na mysli, kdo, kdo vytváří nějaký prostory vnitřní. Že to jako není nějaká vytržené a část vnitřní nebo vnější část nebo, a hlavně třeba jako usazení stavby do místa mi přijde strašně jako důležitý a možná i klíčový. Třeba když někde se rozhodnete bydlet, tak pomalu důležitější, než ten dům je kde to je, že jo to místo takový? Tak tomu věnovat opravdu péči a aby ta věc pak vypadala jako samozřejmě že tam patří, i když je moderní třeba jo, aby měla takový ty kořeny, který mi roste jako do toho místa.

A aby tam prostě všechny ty věci správně fungovaly venku, vevnitř, světlo, pocit a kromě těch veličin jako kvantifikovatelných, kterých jsme se bavili, tak pořád si myslím, že spousta veličin, který jako ještě se nedají změřit, ale který jsou strašně důležitý, který spoluutváří ten pocit. Jo tady samozřejmě každému se líbí něco jiného, každý se cítí nějak jinak. Ta subjektivita je taky jako jasná věc.

Ale i to třeba tak sama víte, když vejdete do prostoru, já nevím třeba vinného sklípku nebo kostela, tak je tam úplně jiná teplota a jenom to vlastně vám řekne to tělo, že jste úplně někde jinde, že jo, je to nějaký jiný druh prostoru.

A není to jenom o tom, že si vytopíte prostě na jednadvacet, protože když máte povrchovou teplotu nižší, tak se cítíte jinak, než když jako jste vy dřevěný obložení a stejná teplota vzduchu.

Tyhle všechny jako kvantifikovatelné věci stejně dohromady dělají nějaký pocit a ta jednota toho, jak ten dům bude vypadat zvenku zevnitř a jak se v něm člověk cítí, si myslím, že je hrozně důležitá. A že je to taková ta nadstavba nad tím, co se dá spočítat. Kterou by ten architekt mohl nebo měl možná tomu svému dílu jako přinášet.

English translation of interview with Jan Kalivoda:

What does the term indoor environment mean to you, what do you imagine it to mean?
Everything that is associated with a person's stay inside a building, that is, the quality of the space as a whole. Spatial, light and acoustic, the perception of all the senses.
I think that's been kind of forgotten lately, that you don't just perceive with your eyes, but also haptically and maybe feel the temperature of the materials that are used inside. The acoustics play a terrible role in how you perceive the space, what the reverberation time is, so that's afterwards if it's a lecture room for example. But overall it co-creates the impression you get. So all the senses perceive what shapes the architecture or the outer envelope.
In the study that I'm doing, I'm focusing primarily on the quantifiable, building-physical parameters of the indoor environment. That means actually lighting, mainly daylighting, acoustics both building and spatial, thermal comfort and indoor air quality. Their relationship to other aspects of architectural design and what the architect can do to make the building perform well in terms of the indoor environment.
This is related, some of the things I'm talking about are quantifiable, that's how you can measure or ensure some reasonable quality of that environment. Part of it is about a feeling, but what you said, it all touches on that.
We work a lot with light, daylight or artificial light. How it hits the space and how it changes the interior environment. What time of day it is, from morning to night and actually throughout the year. So that it has different moods and there are moments that only appear a few times a year. And for example, in single-family houses or in residential buildings, it's nice that then people discover something new every day, or something surprises them.
The principle of the world being around the sun, the planet revolving and so on, will be reflected in the interior.
Thank you, and now I would like to focus specifically on the project of the primary school in Lysolaje. The first question is, were there any specific requirements for the quality of the indoor environment in the project brief, or what were the requirements you based on? Was it just the mandatory legislative ones, or was there anything else?
The specification was basically just the limits given by the standard, we did not have any special requirements from the investor. But since we have some experience with the indoor environment, with the ergonomics of human movement or seating and workplace. And school is a place where you actually spend a lot of time, it should be ergonomic and it should work well in that you can therefore concentrate on what you have to do there. And all the things that you said acoustics, lighting, fresh air are related to that.
So we tried to put more emphasis on it than we needed to. There is, for example, a physics chemistry classroom that has acoustics calculated to the parameters of a lecture hall, which is not entirely common, but it is a large space and we wanted the teachers to be able to speak well there so that they would not get tired in 10 minutes and could lecture for the entire hour. And if there's going to be an experiment and there's going to be noise and more kids talking, so that they can understand each other, so we tried to take it a little bit further and we actually addressed the acoustics in the other spaces as well.
We tried to work with daylight where we could, so we let the overhead north light in so that the vents could stay open even when the sun was shining. A lot of the addition is like an attic space, so we tried to do it in a way that there was always some possibility of having some openings and access to daylight, diffuse, diffuse, and yet not overheat the space because those south windows have to be shaded in the summer.
That's another thing, thermal comfort, that we've been dealing with a lot. There was already one extension at that school in the past, and in some places there were some technical details that weren't quite right and the classrooms were overheating. And I have to say that while we've gotten feedback, those spaces of ours, even though there's no cooling designed in, work well in the summer.
At what stage of the design process did you address or consider those particular aspects of the internal environment.
As you go into more and more detail in the design, there is a concept at the beginning. There's already a little bit of thinking about the light and the openings, which we always try to do, that's crucial. That's why you're actually working with the facade and also modeling the mass to maybe reach that light in some places that you wouldn't otherwise reach. As I was talking about the north light, we also adapted the layout a little bit to that.
So that's what we try to think about from the first moment. Before that, there are those fundamental things like we don't want to build in the garden because the garden should be left to the children, so we're going to fix what has been done there completely unhappily, like in the last few years, where there are some failures and we're trying to densify and use that space. That's the basic theme and connection to the old building.
Well, especially for those classrooms, it really takes a couple of hours for the lighting, and we tried to do it in such a way that it had to be minimally illuminated with artificial lighting.
Those other things then go in those other steps.
Like acoustics, where we know we're going to need an area where we're going to use some acoustic material, but it can be treated in different ways, so it's then created along with the interior space.
Which areas to use, acoustic calculations are done, that then gets more precise. For example, if it didn't work out somewhere, we supplemented it with acoustic material boards, at the level of the height where the person is talking, that's where it has the biggest effect. Plus the amount of material, overall, spread out in that space. So it's evolving.
The same goes for the lighting, where the basic concept is given and then the combination with artificial lighting is calculated. To make it work, we adjusted a little bit the size of the windows and so on. So I would say that from that basic then this refinement goes on and on.
We've tried to think a little bit about ventilation and ideally all things to work naturally because I personally advocate that if it can be done naturally and there's less technology and it works, it's fine. Because there's obviously a lot less things that can go wrong. The technology may be perfect, but somebody may misuse it, it may have some malfunction and so on.
Intelligent systems you still think have some reserves, that the smartness is sometimes too smart, so to speak.
The natural ventilation we tried to do there is that we have electrically openable windows at the top of the ridge, but only thanks to that there is a natural air flow and the classrooms can be ventilated. So that's what's needed in terms of ventilation.
Well then on and on it goes into further like detail already then when you count really like the number of lux on the board and so on. Well that's a big detail then.
At what stage did you start working with specialists and professionals? Is there anything from the calculations and the simulations that you are doing yourself? In general, what tools do you use?
We're already trying within the study, we have a circle of people who we think can think a little bit like with perspective, which is terribly important. Because if you jump right into the counting at the beginning, it's like it doesn't necessarily lead to a result, or like it doesn't move you along, that you get kind of stuck. So it's nice to have someone who understands it, the acoustics, the lighting but is able to tell you in a way that works, so it could be like this or like this and you pick a way. You respect the requirement that there has to be roughly that

amount of that absorptive material or that the light has to have some distance parameter.
But in that first round, which is basically the most important round in my opinion, you have to do it with a little bit of perspective.
And that's really what we do in the studios, like consulting with lighting specialists. It's either directly the lighting contractors provide us with that support, or we have an independent lab when we need to provide some like measurements.
As well as the acoustics, we have an excellent acoustician who has experience with a lot of large spaces, he has that ear as such that actually comes into that space and says, this needs a little bit more to add to the ceiling and he doesn't have any calculation, but he has a lot of experience and he can tell, so we take advantage of that.
There is also a flight path, and a protected indoor environment of classrooms, so we had to calculate the acoustics so that the noise would not affect the indoor environment. So even the windows and the envelope had to go through that calculation. This is the first round and then, of course, as the project proceeds, the project for the building permit is made, some calculations are made there and in the detailed documentation everything is specified, including dimensions, type of material. Of course, the material is compared, like what effect it has, its resistance, so that some variants, combinations of these materials are chosen so that it fulfils what it is supposed to.
And then the output is a precisely specified design that the implementation company should follow. Which is terribly important, by the way, because in public procurement, where the contractor with the cheapest price wins, the project specification is crucial to getting it right. There we had a conflict in some areas, and we had something to fall back on, and the investor stood behind us, and we were in unity with the technical supervisor, and we managed to get it done the way it was intended. Well, once there's some ambiguity, then it's really very difficult.
And then the last thing you asked, do we do the calculations ourselves? We actually do our own at the beginning, which may sound unusual, but we do our own physical models. And they tell us a lot, at least in terms of working with light. And if you take that model, it's big enough, and you make those holes in it, you actually get an idea of how the daylight is, you set it up on the cardinal directions and you can observe it like, what it's doing. So I think that's like the first feedback is nice, that it's like actually simple. Again, it's without any technology, it's actually an imprint of that world, it's scaled down, it works the same way.
Then we make a 3D model in Sketch Up and when we turn on like generating like shadows and stuff, we simulate where the sun falls, at what time. Whether or not the spaces are going to overheat, for example with sports halls we've used that a lot. How much, when and what needs to be shaded, but also here actually in the school. We knew if anyone was going to be glared at.
Then we use software for construction technology, but that's more like dew points in construction. But it also tells you something about the temperatures of the structures, like indoors.
And the acoustics, we let the acoustics be calculated there, we do it by feel after the consultation and then we refine it.

Did you have to deal with the impact of the new extension on the original building, in terms of the environment, shading and so on?

Sure, we had to. Fortunately, the orientation was appropriate. When we were thinking about the concept, that's one of the first things you have to say, yeah there's luckily the hallways face that side so we didn't have to pay as much attention to what would be going on and the classrooms face the garden on the other side. It was clear from the beginning that we weren't hurting any of the space that's important in the old part. We had to plan how to build when there would be normal school traffic next door and it wasn't exactly easy. In some places, especially where we were connecting into existing corridor areas, walls were coming through. This also relates to dustiness. When you're building like on that site where it's for the traffic of the children, security and so on, it's definitely more complicated. For example, it defines for you where you can use construction equipment from and we had to use a different crane than would have been the cheapest because it had to feed panels in from a different side.

What compromises did you have to make in this project? Whether it be between the architectural concept and some technical solution, or whatever, just to meet the requirements of the indoor environment?

I don't see it as a compromise. I think that's one of the most important things, that the internal environment has a quality and it seems to me that it's shaping each other from the outside in and that it actually gives expression to the object.
We're not the type of studio that has an idea, a vision, and then tries to implement it in the interior space. But on the contrary, we try to listen carefully to all the clues that come up during the development. And that shapes the design. So I don't think there was actually any compromise. And that where it looked like there might be, we were able to manage technically.
We were building one part above the gym where there is no support, so we had to develop a system of steel frames that sit up against the perimeter walls, which were placed one next to the other. They brought the whole structure up, so it was a non-standard construction, let's say, but it's some technical solution in cooperation with the structural engineers. Which actually completely freed up the layout and allowed us to work as freely as we could, with that interior space and the lighting with the openings and so on.
There's always a way if there's a constraint, and otherwise I definitely think it's one thing inside and out. And it looks the way it's supposed to look because there's something in it that's supposed to be there.

Is there anything that has changed during the course of the project to accommodate, for example, requirements, authorities, either in the studio or in the later stages?

We struggled a lot with parking capacity there. The Lysolaje school actually has a lot of foreign students who are registered there and only go there for testing, which the Czech system cannot distinguish. In the end, we only added recreation rooms and special classrooms so as not to increase the tribal capacity. Otherwise, just small things, like the hygiene wanted to document ventilation somewhere, so we counted it. The engines were changed, for example, or, but that's technical stuff. But as far as the architecture is concerned, the concept seems to have been established correctly and nobody had any problem with it.
We are already trying to pre-consult within the project. We are working with specialists within the study, we are trying to go around the study as the important authorities concerned. Then you avoid that at the end you learn something that can be quite fundamental, and it's complicated and expensive to redo.
Where there is a will, it serves to the benefit of both parties, because we can incorporate what needs to be there into the project. And the other side is familiar with the project and knows that it has been worked on as a project and can actually put it together. And if you sometimes find that that will is not there, that just that consultation doesn't take place and then it's dealt with as some kind of opinion letter, and that seems like a shame.

Well, now when you look at the finished building, is there anything that maybe turned out a little differently than you expected or than you planned or did it turn out the way you designed it?

I think that the parts that are newly built actually correspond quite closely to the design, as we looked at the visualizations

and the photos of the realizations, so there are minimal changes.
But on any construction site, even if it's a renovation, something can always catch up with you. What happened here, for example, was that when the top part was uncovered, the contractors didn't cover the roof very well before the structure came in, so the gymnasium underneath got flooded. The ceilings were soaked through, the parquet floors were under water, so it was all being put away and we were got to design the gym. We came up with acoustic tiles, lighting, an acoustic ceiling and wood paneling on the walls. The insurance company paid it as a claim, so maybe we could have achieved something that wasn't originally planned or was too expensive.
And I think the gym is the sore heel of a lot of schools where the acoustics are not addressed in any way. And, of course, when you have like 30 kids dribbling a basketball in there, it's a big deal and it carries through the building. So we even designed independent structures, the floor versus the ceiling of the gym, so that even mechanically, like by the vibration, they don't bring that rumble in there.
This was something we hadn't counted on, but something we actually took advantage of as the work progressed.
Otherwise, I think the materials are still there. We tried to use materials that were admitted, simple, true. And I think it works great in combination with the fact that then there's a layer of like life, there's children, there's lots of colourful things, toys, pictures, we have this stainless-steel mesh stretched instead of a railing between the staircase and they hang pictures on it, that way the simplicity or the austerity of the steel is softened by the contrast. Together it works beautifully and it seems to me that it just gives it as a space, that's maybe another thing as we were talking about the indoor environment, that we tried not to prescribe as the plot what was going to happen there. Let them inhabit it with their own life, the kids, the teachers, their own activities, so we tried to be subtle, but use like materials that really last.
There are floors of honed concrete, which basically looks like terrazzo, used to be used, lasts 100 years, even in those tenements unchanged. And it's an awfully nice material with its texture. And you can use it in a chemistry classroom as well as in a social hall. And then we put some solid carpeting on top of it so the kids can be on the floor.
And the staircase is concrete because concrete will last too. And it doesn't seem to me that it gave you any kind of cold feeling in the result. We added things like in the locker rooms, instead of a bench, we put in a log of a tree, just a big wooden log that weighed a ton. And it was carried there by the poor guys in their hands because no crane could go there. The kids use it, sit on it, climb on it.
Just because it's a school doesn't mean you have to make it completely infantile, those classes and paint them with bright colors.
Can you think of anything else to add to this project, either the interior environment or the story of the house.
I would like to highlight the cooperation with the city district. He was there at the gate as from all sides. Even with all the problems that there were then on that construction, the mayor always stood behind the project, so in the end the quality of the workmanship was good even from the construction company.
We also worked on the interior design, we didn't just finish with the building. There are oak desks in the classrooms. Yeah, so oak is more expensive than particleboard, oak board, if you damage it, you sand it down and it can last 50 years just fine. Those cheap desks last three years and then they get thrown away. So even from a restoration, recycling and ecological point of view, it makes sense to me to use the more expensive material that will last natural when and where you can.
And we got some pretty good feedback from the principal, the teachers and the kids.

Also, if I may ask in general, what do you think you need to know and know as an architect to be able to design a building with a good indoor environment?
It's actually quite a lot. Except that there is a need for some, at least basic technical erudition in those particular areas. It's not necessary for the architect to know how to calculate, but to have a little bit of an idea, to just try to learn from the specialists.
When you design a structure, you also know roughly how big the beam will be, so that you are not surprised by a beam three times bigger, which will ruin the whole concept.
So it's good to think a little bit about how it will be lit, what the acoustics will be like, to have a little bit of an idea. And be interested in what's going on in those particular areas as well, what the possibilities are, what's new.
And to have a little bit of an overview of these things, because the architect actually connects the specialization, when the building is more complex and you can't completely satisfy everything, you have to have a clear idea of what the priority is. And to go for that and to make some compromises between those different aspects, to try to sort of lead it in that direction, because if you just say at the beginning for some reasons, for some analysis, for some feeling, what is important, then it should really be adapted to that. You can't just accommodate everybody.
Sometimes the specialist has a narrow view of his part, he does it perfectly, he has mastered his field, he understands it, but he can't see two doors like the one next door and the architect must have it in his head.
That's why I think he should understand a little bit of everything, but only in concept. When I get some information from a specialist, I try to read it quickly and I think to myself, that's just not possible. That's twice as much as we expected and then we figure out why.
And because of that, you can like piece it together and sometimes it's like a long time. Yeah there's a lot of stuff in there of course. You're dealing with the traffic, you're dealing with what it's just going to look like, what the materials are going to be, the layout, and a lot of times the puzzle is just stuck somewhere. Sometimes it's quick, sometimes it's later. And then there's that moment when you know it's sat right down. And you say yeah, now this is it, and then what often happens is that the things that didn't go together start to help each other, that something changes and suddenly it's supported. This with this. Oh, this would work and then it kind of clicks back together nicely.
That it doesn't actually put obstacles in each other's way, but that together the synergy is much stronger than the individual circuits.
Do you think that school could or can prepare you for this? Or is it more that you learned it in practice then this approach?
I think it's a lot about the people who teach it. I think the school should teach it. I think I've learned more by doing it. I've worked in a studio of some sort while I was in school. And I was lucky to get into good studios, I applied to good studios. I spent most of my time at Ivan Kroupa's, and they really pushed us a lot further there, and I think that shaped me a lot.
My way of architectural thinking was that it wasn't about those particular things, but about how to approach them, what was important, what wasn't. And then that actually frees you up in the fact that whatever assignment you get, you can somehow put it together and define that concept that then leads you on. That's what's important to me.
I think just a lot about those people and I think there could be a lot more to that school.
I don't know how it is there now, but the practice is like totally essential. I think it should be more like going to construction sites, more like working in the field.
And I feel like it may not be as much of a problem as making it work, yeah, in terms of that faculty or that educational system, because I often remember that we were learning something. I

remembered it theoretically and then I was like getting to know it on the building, that's like it. Yeah, but I only knew it from the lines, and there's a complete lack of that coherence.
Yeah it's just really seeing how it's done, because if you don't know how to do it, you might know how it's supposed to be in theory, but you don't understand that there's some things you can't really do with your hands on that construction. And when you know that, it makes things better with the people who are doing it on the site. When they understand that you're actually about doing a concept, but that you're not completely like disconnected from reality and that you know that it has some of its own essentials and that some things are really bad, some things are just better and so on and so forth.
It seems to me that often it's like even those people want to make it as good as possible. Yeah, that they don't feel like we're gonna get something perfect, that this is how it has to be. On the one hand, you have to keep an eye on the technical parameters so that it works as a whole, but on the other hand, the practice or contact with reality is what I missed the most at school, because we actually went there in theory.
Actually, in all subjects. Like statics was fine, but instead of getting this overview that an architect needs when he designs, we were calculating, for example, the deflection of a column, of a section, which I didn't really understand. I learned the formulas, I could calculate it, but just to like say out of the oil, if I go to do a building like this about the span where I need to wind the walls and how big the main beam is going to be, I might estimate it now, because we went through something, but I definitely wasn't able to do that after school. A lot of the theoretical stuff was also those subjects, TZI, technical equipment and infrastructure. Where we like a lot of things were like taught, but I never got to see what it looks like in reality at school.
Of course, it makes it hard to imagine when you draw it or study it. So I think, yeah, definitely school should play a big part in it. It should enhance the practice and of course ideally have quality teachers there.

What do you think would make it easier for you to design buildings with a good indoor environment in terms of either legislation, collaboration with specialists, tools?

I definitely see big reserves in the state administration and in the permitting process, where, as I said, if it works, it's fine, but the will is not always there from the other side.
If there was an opportunity to have some, shall I say, consultative apparatus when you do things like this, I think that would be nice.
Obviously you have that responsibility as an architect, you can hire somebody, but it still goes into the permitting process. and if it was prepared as best as possible from both sides, I think it would definitely simplify a lot of things.
When I think back to like the endless emailing and like bypassing those offices and the voicemails, just delaying it with unnecessary results I think. so that's one thing.
The Czech Chamber of Architects has now started to function quite well, it offers a lot of opportunities for further education. I don't know how it is directly in this area, but there are some good quality seminars on offer. For example, I just took a seminar like online when there was nowhere to go, on vegetated and green roofs, co-generation, and it was like cool. I learned a lot of stuff there, nice people were talking.
On the software side, if there's any help for like counting the light fast, I guess there are some programs for that, yeah, but if maybe some program that we're like modeling the building in could already give you an outline of how it's going to work. In terms of lighting, acoustics, depending on the materials chosen. It's like a compendium of all these programs as individual specialists. What I was talking about is that you would have some feedback, like a healthy overview of all those areas. Because it's always possible to refine it a little bit, but if you cut yourself completely in the concept, then it makes up for it and catches up.

Great yeah, if you can think of anything else you'd like to add?

Well, you were saying that at the beginning, that you're focusing on that indoor environment and those quantifiable variables and... which is like sure, I understand that, that's right, but I still think it would be nice for everybody to keep in mind who, who's like creating some internal spaces.
That it's like not some sort of ripped off and part of the inside or outside or, and especially like the settling of the building into the place seems to me terribly like important and maybe even key, yeah that's why like when you decide to live somewhere, slowly more important than the house is where it is, right the place like that?
So to really take care of it and then to make the thing look like it belongs there, even if it's modern maybe, yeah, to have those roots that grow like into that place.
And just to get all those things working properly out there, inside, light, feeling, and in addition to those quantifiable variables that we've been talking about, I still think there's a lot of variables that like can't be measured yet, but that are terribly important, that co-create that feeling. Yeah here of course everybody likes something different, everybody feels different somehow. The subjectivity is also like an obvious thing.
But you know that yourself, when you go into a space, I don't know, like a wine cellar or a church, it's a completely different temperature and it just tells your body that you're somewhere else, right, it's a different kind of space.
And it's not just about just heating up to twenty-one, because when you have a surface temperature lower, it feels different than when like you're wood paneled and the same air temperature.
All of these quantifiable things together make a feeling anyway, and the unity of how the house will look from the outside and how it feels inside is very important, I think. Well, that it's that superstructure over and above what you can count. Which maybe the architect could or should be bringing to their work.

New Pavilion of Elementary School Líbeznice

Interviewee: Adam Halíř

Interviewer: Kristýna Schulzová

Date and time: 1. 4. 2022 9:15

Online, MS Teams

Original interview with Adam Halíř in Czech:

Co si představíte pod pojmem vnitřní prostředí budov?

Vnitřní prostředí budov no tak si představím lidi, je to o tom, aby prostě člověk, který užívá to prostředí, byl v komfortu. A teď nemluvím jenom o technice, ale i o tom, že vnitřní prostředí je všechno, od interiéru po chemii, která nám leze ze stavebních materiálů po to, jakým způsobem se v tom baráku cítím, co mi voní a co mi smrdí.

Ten projekt se zabývá architektonickým navrhováním z hlediska vnitřního prostředí budov s tím, že mimo jiné se zaměřuji na ty kvantifikovatelné stavebně fyzikální parametry. To znamená z hlediska denního osvětlení a proslunění, z hlediska akustiky, ať už stavební nebo prostorový, z hlediska tepelné pohody a z hlediska kvality vzduchu. Jo, ale samozřejmě ty otázky, nebo ten projekt směřují primárně na … souvislost architektonického návrhu a rozhodnutí architekta s tím, jak potom to výsledné prostředí budovy vypadá, to znamená o čem architekti musí přemýšlet, na co si musí dávat pozor, nebo co si jako architekti myslíte.

Takže když se zaměříme na ten projekt tý školy v Líbeznicích. Tak, z jakých jste vycházeli v tom návrhu požadavků, nebo byli nějaký byli specifikovaný třeba nějaký požadavky na kvalitu vnitřního prostředí? I já nevím nad rámec legislativy a podobně.

Já možná musím dopředu říct, že ten projekt byl jako v tomhle atypický. My jsme vyhráli nějakou soutěž, nebyla to soutěž podle pravidel komory architektů, ale město si vyzvalo několik týmů, který za nějakou úplatu zpracovali návrhy. A my jsme tady v tom výběr zvítězili, ale nebylo to zadání pro základní školu, ale pro mateřskou školu a mělo to vzniknout jako pavilon mateřské školy v rámci areálu základní školy. My jsme to navrhli, vyhráli jsme, pak to nějakou dobu leželo.

Tohle je klíčové proto, že ve chvíli, kdy se začneme bavit o tom, že to je základní škola, a to prostředí jsme my v podstatě dodatečně přizpůsobovali, je to de facto rekonstrukce nebo konverze projektu, který se nepostavil, na projekt s jiným účelem.

Vzhledem k tomu, že na to bylo vydané, teď nevím jestli územní souhlas nebo územní rozhodnutí a šlo tam o nějaký týdny měsíce podání té žádosti získání dotace, bylo to komplikované tak, aby ta obec stihla ten termín splnění jak zprovoznění školy, tak získání dotace, e, tak se v podstatě šlo cestou, že ten stávající dům, který byl navržený jako mateřská škola, jsme my přeprojektovali.

A to je druhá rovina toho příběhu, když jsme to odevzdali, tak já jsem potom, když nám oznámili, že jsme uspěli a mělo by se to začít stavět, tak jsem panu starostovi představil naši úvahu ve smyslu, že ten dům tak jak je vymyšlený, by měl do budoucna umět konvertovat do jiné funkce. A to ať už třeba nějaký dům se společenskými službami nebo třeba nějaký ubytování pro lidi s potřebou nějakých speciálních potřeb.

Vzhledem k tomu, že to bylo na městském pozemku a ten dům v podstatě vznikal jako akutní potřeba naplnit potřeby jako umístění dětí do mateřské školky, tak z toho jsme my vyšli a říkali jsme si že tedy skutečně udržitelná architektura by měla být ta, která se dokáže v čase nějakým způsobem potom uplatňovat v jiné funkci než v té původní, který byla navržená.

Což jsem netušil, když jsme tohle prezentovali, že to nastane hned za rok a půl, nebo dva. Kdy nám řeknou tak prima, je to sice pěkná školka, ale my jsme situaci, kdy teď už ty děti povyrostly a už nám přerostly z toho školkového věku do toho školního věku a my to potřebujeme předělat na školu.

Takže jsme řekli dobře, zkusíme se na to podívat a jsme přišli s tím, že bychom asi byli schopni to předělat. Samozřejmě to doznalo poměrně velkých změn, nicméně venkovní perimetr toho domu zůstal stejný. Výška římsy zůstala stejná, čímž v podstatě bylo naplněno územní rozhodnutí a my jsme ten dům přetvořili vevnitř.

A tím vzniklo to, že je tam řada rozhodnutí, který na který možná narazíme, ale jenom to přepnu, že třeba to osvětlení, třeba způsob organizace vnitřního prostoru byl v podstatě reakcí na to, že jsme trhali trn z paty investorovi v těžké situaci.

V jaké fázi toho návrhu jste začali řešit kvalitu vnitřním prostředí? Klidně to můžeme vzít po těch jednotlivých podoblastech.

My se snažíme to řešit hned ve studii, protože se domníváme, že to je klíčová součást a že se to ovlivňuje navzájem s tou architekturou. Už ve verzi mateřská školka jsme počítali s tím, že to bude větrané nuceně. Byla tam plánovaná aula nebo shromažďovací prostory. Ale protože tam byl požadavek na poměrně rychlou konstrukci a realizaci, tak tam jsme uvažovali o tom, že to bude kompletně prefabrikovaná nebo montovaná konstrukce.

Při přeprojektování na tu základní školu byl trojnásobný nárůst počtu dětí do stávajícího objemu, který jsme měli definovaný. Ve spolupráci s Ondřejem Hlaváčkem z TechOrgu jsme dospěli k tomu, že při zatížení vnitřními tepelnými zisky není montovaná konstrukce vhodná, takže jsme šli do konstrukce masivní, kterou jsme vybavili tou aktivací betonového jádra a z toho vyšla změna zásadní změna konstrukce. Původně to bylo navržené ve dřevě, se základní nosnou konstrukcí montovanou železobetonovými prefabrikovanými rámy, přešli jsme na kompletní monolit a tu požadovanou aulu a shromažďovací prostory jsme tím překlenuli.

Takže byla to velmi těsná spolupráce všech, jak statiků, chlazení a obecně haustechnika vnitřního prostředí a nás jako architektů, kteří naplňovali ty prostorové požadavky.

V podstatě rovnou navazuje na moji další otázku, která se právě týká spolupráce s profesemi AS dalšími specialisty v průběhu architektonické studie, jestli jste konzultoval třeba i já nevím světelnou techniku akustiku podobně.

Při přepracování studie z mateřské školky, kde požadavek na denní osvětlení není tak striktní, na školu základní jsme museli ověřit, že naplníme požadavky na denní osvětlení, které jsou u učeben poměrně tvrdé. To byla myslím úplně první věc, kterou jsme řešili předtím, než jsme starostovi dali informaci, že ano, dokážeme to předělat. Lenka Prokopová přepočítala osvětlení a museli jsme vědět, že to zvládneme a splníme ty požadavky. Protože osvětlovat třídu ze stropu řekněme si otevřeně není úplně nejjednodušší způsob, jak toho docílit

Děkuju, a když se potom zeptám na třeba akustiku?

Tam to bylo podobné, protože zase tvar tříd v tom kruhovém půdorysu je poměrně specifický, takže jsme zase prostě potřebovali zjistit s akustiky, jakým způsobem jsme schopni, ještě navíc s ohledem na to, že budeme chladit a topit stropem, naplnit požadavky dozvuků, prostorové akustiky. Tedy

předpokládám, se ptáte na prostorovou, ne stavební. Tak tam prostě to bylo poměrně klíčový.

Jak ve třídách, tak třeba na chodbách. Ta chodba, to foyer, je kruhová, z jedné strany jsou vyskládané v těch nikách vzduchotechnické jednotky, ty jsou zakrývané akustickými obklady a oproti tomu stojí celoprosklená stěna. Tyhle prostory bez akustiky nemohly vůbec fungovat, takže to byl taky moment, kde to šlo ruku v ruce se vším, s veškerou technikou, a i designem těch vnitřních prostor.

Tím jste mi částečně odpověděl i na ten další dotaz, jestli jste ať už ve studii nebo třeba někdy později dělali nějaké kompromisy mezi architektonickým konceptem a technologickou stránkou věci, abyste naplnili požadavky a jaké konkrétně?

Tak on ten barák je svým způsobem celý taková kompromisní hříčka, ale teď pokud se bavíme o tom, co k tomu vede, že člověk udělá kompromis, tak tady k tomu vedl od začátku celkový vývoj toho postupu, zadání. A ještě jste měla na začátku dotaz, jestli bylo v našem zadání to, abychom dbali na vnitřní prostředí, abychom to zohlednili, tak musím říct, že to v podstatě v zadání definováno nebylo tam byl tam bylo definováno to, kolik tam potřebují dát dětí a že chtějí aulu. Teď mluvím o tom druhotném zadání pro základní školu.

A my jsme teda k tomu přistoupili metodou, co jsme schopni nabídnout a zároveň jak to udělat, abychom do toho půdorysu vůbec to množství dětí a to vnitřní zatížení, když to řeknu ve wattech, mohli dostat a z toho nám vyšel nějaký výsledek. Je taková rovnice o více neznámých, různými substitucemi a poučkami a vzorečky jsme se dostali do nějakého výsledku.

Já mám vždycky pocit, že pokud ten kompromis člověk dělá tak, že ho přetrpí, tak to asi není dobře. A pro mě je to výzva, pokud technicky je něco nutného, tak je to výzva že ta architektura na to má zareagovat a pokud to umí, tak ten návrh je celkově dobrý a pokud to neumí a je to nějaké trpěné zlo, tak to je špatně.

Ještě se zeptám, ať už u tohohle projektu, nebo obecně ve vaší praxi, jestli třeba ve fázi studie spíš jdete cestou konzultace se specialisty, právě na tyhle technické věci, nebo jestli třeba používáte i vy nějaké, ať už softwarové nástroje, nebo něco takového, abyste si spočítali například světlo?

Nástroje nepoužíváme. A většinou prostě je to o společný diskuzi a protože ten člověk, kterýž ať už je to požárník, osvětlovač, akustik, nebo tak má tu empirii pod kůží tolik, že my stejně bychom přes nějaký software nebyli schopni tu věc odhalit a najít ty mezní podmínky, kde se člověk může pohybovat.

Já mám radši komunikaci napřímo a ta interakce s lidmi, se kterými máme zkušenost, spolupracujeme, tak je v tomhle si myslím i po stránce spoluautorství toho díla, že ty lidi, který se na tom podílí, tak potom daleko líp tu věc přijmou za svou a tvoříme to společně. Není to jenom otázka jednoho geniálního střapatého člověka s velkou tlustou tužkou, ale je to nějaká dlouhodobá diskuze, která to posouvá do výsledků.

Museli jste třeba právě u tohohle projektu, potom v pozdějších fázích dělat nějaký změny na konceptu, abyste vyhověli požadavkům legislativy, úřadů a podobně?

To si moc neuvědomuju. Což je taky věc, kterou se snažíme v průběhu té cesty k výsledku eliminovat, protože ve chvíli, kdy to člověk podcení na začátku, tak ho to doběhne na konci. Myslím, že pokud se tohle děje, tak je to trochu zanedbání té role koordinátora a člověka, který tu věc má dovést do úspěchu, do výsledku, který funguje. občas se stane, že třeba člověk opomene nějakou věc, nebo se z ní třeba nesetkal a pak se pak se pak to vyplave někde, ale tady naštěstí to dopadlo docela bez nějakých těchto důsledků, komplikací.

A potom u té dokončené stavby. Něco, co vás překvapilo nebo co třeba dopadlo jinak, než jste plánovali v projektu?

Zajímavý moment tady v téhle věci je, že kolegové, Ondřej Hlaváček to doporučil skupině i z fakulty elektrotechnické, A mají to nějak zařazený v nějakém výzkumném projektu která dlouhodobě sleduje to topení a chlazení stropem. Jakým způsobem se vyvíjí optimalizace toho sledování jak ta deska funguje vůči vnitřnímu prostředí. To byl pro mě bylo konečně nějaký popsání té situace, protože ty topení, chlazení, stropy jsme užívali na více barákách. A vždycky někdo říká, no my si to budeme sledovat, ale nikdy z toho nebyl úplně žádný výsledek. Takže tady oni to dlouhodobě sledují a myslím si, že to k tomu budou nějaký průběžný výsledky.

Překvapilo nás, nebo překvapilo … my to už víme delší dobu, nebo se s tím člověk pere, že ve chvíli, kdy ten barák má nějakou poměrně sofistikovanou techniku v sobě, není možné, aby to řízení dělal školník, který nemá vzdělání pro to používání takových technologií, což je velký problém u všech baráků, který mají nějaké sofistikovanější vybavení. Ne že to je prostě kotel a topení, ale když jakmile je do toho větrání a třeba nějaký způsob údržby vnitřního klimatu přes MaR, tak ten personál většinou není vyškolený.

Speciálně prostě po ty základní školy je to téma, který si myslím je nutný sledovat a ve chvíli, kdy se teď se vypsalo spousta soutěží a všude mají napsáno, chceme udržitelný topení, větrání, všechno. Ale druhý je ten bod B, že je potřeba říct, ano, budeme na to mít tady v podstatě vysokoškolsky vzdělaného člověka, který tohle je schopný jak řídit a dávat do kupy tak, aby to vnitřní prostředí odpovídalo tomu, jak je ten dům vybaven.

Super děkuju a jestli ještě můžu takový obecnější dotaz, co si myslíte, že architekt potřebujete znát a vědět a umět, abyste byl schopen navrhnout budovu s dobrým vnitřním prostředím?

Všechno (smích). Když si to člověk poskládá dohromady, je to hodně komplexní obor. Já myslím, že to člověk nebude vědět do smrti, co všechno potřebuje znát. V nějakou chvíli máte pocit, že to je správně udělaný, ale pak přijde situace, která nemusí třeba mít vliv na to, jak to vypadá, ale jak to ve finále funguje. Viz třeba tady ten lidský element, nebo časový element. A to jsou věci, které jsou možná ne úplně měřitelné, ale je potřeba zohledňovat. Trošku jsem utekl z té otázky, ale je to tak, člověk o tom přemýšlí pořád, neumím to vyjmenovat, je toho dost.

Co z toho si myslíte, že jste se naučil ve škole nebo co z toho si myslíte, že je vůbec možné se naučit ve škole? Co vás naučila praxe?

Já jsem ze školy odešel už dávno, takže nechci být neuctivý a mám hrozně krátkou paměť na to, co jsem uměl ve škole a co jsem se naučil za pochodu. Nemám už moc přehled. Jakým způsobem probíhá výuka na fakultě v těchhle technických oborech. Ale pamatuju si za nás, že to nebylo moc slavný, že jsme procházeli tou výukou prostřednictvím nějakých seminárek, jejichž účel a způsob zpracování bylo velmi účelový prostě aby člověk dostal ten zápočet, ale nebylo to o tom, že by člověk něco zjistil. A možná je to důležitý téma, to, co teď tady spolu probíráme, předpokládám, že je toho nějaký materiál pro vzdělávání ostatních, takže tohle je tohle je téma, který by určitě, bylo fajn, aby ty architekti poznali.

Nemyslím si, že jsou schopni to nastudovat a znát, ale minimálně je důležitý, aby věděli, že to existuje, a že ty věci jsou opravdu klíčový pro to, co potom vzniká v realitě, protože mnohdy se setkávám s tím, že třeba i praktikující architekti v architektonických soutěžích nebo tak nebo odevzdají návrh, který je úplně nerealistický z pohledu toho, co ten dům bude následně potřebovat. A to se teda netýká jenom techniky a stavebně fyzikálních věcí, ale třeba i stavařiny jako takové.

Co si myslíte, že by vám jako architektovi usnadnilo navrhování kvalitního vnitřního prostředí budov. Ať už

z hlediska právě třeba nějakých nástrojů nebo z hlediska legislativního prostředí, nebo cokoliv, co vás napadne?

Nevím, jestli umím odpovědět na ty nástroje, protože byť k technologiím IT nebo těm softwarovým věcem mám pozitivní vztah, ale čím jsem starší, tak mám pocit, že nemám morálku a nebo chuť učit se tyhle věci, protože stejně vím, že to nejsem schopen obsáhnout a nastudovat si problematiku jakéhokoli oboru do takové hloubky, abych byl schopný to odhadovat.

Samozřejmě člověk časem nabyde nějaký schopnosti, empirie, ať už je to osvětlení, akustika, tak tuší, ale ve chvíli, kdy přijde nějaký složitější problém, tak stejně musím ty profesanty přizvat a bavíme se o tom nad tím společně. To znamená, že v tuhle chvíli možná dostupnost a poučenost těch techniků z druhé strany, ale myslím si, že se to vyvíjí pozitivním směrem. Anebo je to tak, že prostě možná žiju v bublině, že si vybíráme lidi, který s námi chtějí komunikovat a chtějí dělat věci, které dospějí do nějakého dobrého cíle. Je to o tom najít ty partnery a komunikovat v tom týmu. To je asi úplně to nejdůležitější pro mě.

Co pro vás právě znamená třeba dobrá komunikace mezi architekty a specialisty. Co vám jí usnadňuje? Zlepšuje?

Pokud jsou k dispozici, nejsou zahlcení, jinými zakázkami, to asi nejdůležitější.

A potom je to asi lidský faktor. Všechny ty disciplíny by měly mít přesah. To znamená, jak my do techniky, tak ti technici do té architektury. To znamená, že není možné školit techniky ve smyslu tady máš svoji linii a tu si hleď a musíš dosáhnout maxima, ideálu na 100%, ale tak jako my činíme rozhodnutí a zohledňujeme řadu věcí, které jsou třeba někdy i protichůdné, tak i ti technici by měli umět tohle vnímat. Jo a, ale to je o tom, jak si člověk vybírá ten tým, jak jsi ho sestavuje. No, takže pokud budou na obou stranách lidi kteří budou dostatečně flexibilní v uvažování a budou chápat, že neexistuje strategie pro moji profesi win-win a všichni ostatní mě nezajímají, tak si myslím, že to směr, kterým by to mohlo fungovat.

English translation of interview with Adam Halíř:

What do you think of by the term „indoor environment of buildings“?

I think of people, it's about making sure that the person using the environment is comfortable. And now I'm not just talking about technology, the indoor environment is everything from the interior to the chemistry that comes out of the building materials to the way I feel in that building, what smells good and what smells bad.

The project deals with architectural design in terms of the indoor environment of buildings, focusing among other things on those quantifiable building physics parameters. This means in terms of daylighting and sunlight, in terms of acoustics, whether structural or spatial, in terms of thermal comfort and in terms of air quality. These questions are primarily directed at the connection between the architectural design and the architect's decisions and what the final building environment then looks like, that is, what architects have to think about, what they have to look out for.
So if we focus on the school project in Líbeznice. What were the requirements that you based the design on, or were any requirements specified for the quality of the indoor environment? Beyond legislation and so on?

I may have to say up front that the project was atypical. We won a competition, it wasn't a competition under the rules of the chamber of architects, but the city invited several teams to come in and do designs for a fee. And we won the competition here, but it wasn't a commission for an elementary school, it was for a kindergarten and it was to be built as a kindergarten pavilion within the elementary school campus. We designed it, we won, then it sat for a while.

This is key because the moment we start talking about the fact that this is an elementary school, and we basically retrofitted the environment, it's a de facto renovation or conversion of a project that wasn't built into a project with a different purpose.

Since there was a spatial planning decision and it was a matter of some weeks of submitting the application to get the subsidy, it was complicated so that the municipality could meet the deadline of getting the school up and running and getting the subsidy, so we basically went the route of redesigning the existing house that was designed as a kindergarten.

And that's the other level of the story, when we turned it in, then when we were notified that we had been successful and it should start to be built, I presented our reasoning to the mayor in the sense that the house as conceived should be able to convert to another function in the future. And that might be some sort of community services house or maybe some sort of accommodation for people with some special needs.

Since it was on city property and the house was basically built as an acute need to fulfill the needs of a kindergarten, we came from that and said that truly sustainable architecture should be that which can be applied over time in some way in a different function than the original one that was designed.

Which I had no idea when we presented this that it would happen in a year and a half or two. When they're going to tell us so fine, it's a nice kindergarten, but we're a situation where now the kids have grown up and they've gone from the kindergarten age to the elementary school age and we need to convert it to a school.

So we said okay, let's try to look at it and we came up with the idea that we might be able to redo it. Of course, it's had quite a lot of changes, but the exterior perimeter of the house has

stayed the same. The height of the cornice stayed the same, which basically fulfilled the spatial planning decision and we remodeled the house on the inside.

And this has led to the fact that there are a number of decisions that we may come across, but I'll just preface this by saying that the lighting, for example, the way the interior space was organized was basically a reaction to the fact that we were tearing a thorn out of the investor's side in a difficult situation.

At what stage of the design process did you start to address the quality of the indoor environment? We can take it one sub-area at a time.

We are trying to address that right away in the study, because we think that's a key component and it interacts with the architecture. In the kindergarten version, we were already planning for mechanical ventilation. There were already requirements for an auditorium, a gathering space. But because there was a requirement for a fairly quick construction and implementation, so there we were thinking of it being a completely prefabricated structure.

When we redesigned for elementary school, there was a threefold increase in the number of children to the existing volume that we had defined. In collaboration with Ondřej Hlaváček from TechOrg, we came to the conclusion that a prefabricated structure was not suitable with the internal heat gain loads, so we went for a massive structure, which we fitted with that activation of the concrete core, and from that came a fundamental change in the design.

It was originally designed in wood, with a basic support structure of prefabricated reinforced concrete frames; we switched to a complete monolith and bridged the required auditorium and gathering space.

So it was a very close collaboration between everybody, the structural engineers, the cooling and general technology of the indoor environment specialists and us as architects who fulfilled those spatial requirements.

It basically follows on from my next question, which is about cooperation with the professions and with other specialists during the architectural study, whether you also consulted lighting technology, acoustics and so on.

When the study was redesigned from a kindergarten, where the daylighting requirement is not as strict, to an elementary school, we had to verify that we would meet the daylighting requirements, which are quite harsh for classrooms. I think that was the very first thing we addressed before we gave the Mayor the information that yes, we can redo it. Lenka Prokopová recalculated the lighting and we needed to know that we could do it and meet those requirements. Because daylighting a classroom from the ceiling, let's face it, is not the easiest way to do that.

Thank you, and then if I ask about acoustics?

It was similar there, because the shape of the classrooms in the circular floor plan is quite specific, so we needed to find out again with the acousticians how we are able, especially considering that we will be cooling and heating through the ceiling, to meet the requirements of reverberation, spatial acoustics. I mean, I assume you're asking about spatial, not structural. So that was just quite key there.
Both in the classrooms and in the corridors. The corridor, the foyer, is circular, on one side there are air conditioning units stacked in these niches, which are covered with acoustic cladding, and there's a full glass wall opposite. These spaces couldn't function at all without proper acoustics, so that was also a moment where it went hand in hand with everything, all the technology, and the design of those interior spaces.

This partly answered my other question, whether you made any compromises between the architectural concept and the technological side of things, either in the study or later, in order to meet the requirements, and what were they?

In a way, the whole building is a kind of compromise, but now if we are talking about what leads to a compromise, then the overall development of the process, the assignment, led to it from the beginning. And you also had a question at the beginning about whether our assignment included to taking the indoor environment into account, and I have to say that that was basically not defined in the brief. They defined how many children they needed to put in there and that they wanted an auditorium. Now I'm talking about the secondary assignment for the elementary school.

And so we approached it by the method of what we were able to offer and also how to do it so that we could get the number of children, and the internal load, to put it in watts, into that floor plan at all. It's kind of a multiple unknown equation, and through various substitutions and guidelines and formulas we've gotten to some result.

I always feel that if you compromise in such a way that you suffer through it, it's probably not a good thing. And for me it's a challenge, if something is technically necessary, it's a challenge that the architecture has to respond to and if it can do that, then the design is good overall and if it can't do that and it's some kind of a tolerated evil, then it's bad.

I would like to ask you, either in this project or in your practice in general, whether in the study phase you rather go the way of consulting with specialists, on these technical things, or whether you also use some, whether software tools or something like that to calculate, for example, light.

We don't use tools. And most of the time it's just a collaborative discussion, and because the person, whether they're a fire safety specialist, a lighting technician, an acoustician, whatever, has so much empiricism under their skin that we wouldn't be able to predict the thing anyway through some software and find those boundary conditions where we can operate.

I prefer to communicate directly, and the interaction with people that we have experience with, we collaborate with, so I think in that sense, even in terms of co-authorship of the work, that the people who are involved in it, then it's much better for them to take ownership of the thing and create it together. It's not just a matter of one brilliant shaggy-haired person with a big fat pencil, but it's some kind of long-term discussion that moves it into results.

With this particular project, did you have to make any changes to the concept in the later stages to meet the requirements of legislation, authorities and so on?

I don't really realize that. Which is also the thing that we try to eliminate during the journey to the result, because the moment you underestimate it at the beginning, it catches up with you at the end. I think if that's happening, it's a little bit of a neglect of the role of the coordinator and the person who's supposed to lead the thing to success, to a result that works. Sometimes it happens that maybe a person neglects a thing or maybe they didn't meet it and then it washes up somewhere, but here fortunately it worked out quite without any of these consequences, complications.

And then with the completed building. Something that surprised you, or maybe turned out differently than you planned in the project?

An interesting moment here is that my colleague Ondřej Hlaváček recommended it to a group from the Faculty of

Electrical Engineering, and they have it included in some research project that has been monitoring the heating and cooling of the ceiling for a long time. How is the optimization of monitoring, how that ceiling slab works in relation to the indoor environment. That to me was finally some description of that situation because we've used those heating, cooling, ceilings on multiple buildings. And always somebody would say, well we're going to monitor that, but there was never quite any result from that. So here they've been tracking it for a long time and I think there's going to be some interim results to that.

We were surprised, or surprised ... we've known this for a long time, or one struggles with it, that the moment the house has some fairly sophisticated technology in it, it's impossible to have a janitor who's not trained to use that kind of technology doing the maintenance, which is a big problem with all houses that have some of the more sophisticated equipment. Not that it's just a boiler and a heater, but once ventilation is involved and maybe some sort of indoor climate maintenance through measurement and control, that staff is usually not trained.

Especially just after those elementary schools, it's a topic that I think is necessary to pursue and at the moment a lot of competitions have come out now and they have written all over the place, we want sustainable heating, ventilation, everything. But the second point is that we need to say, yes, we're going to have a college educated person here basically who is capable of both managing this and putting this together so that the indoor environment matches the way the house is equipped.

What do you think an architect needs to know and be able to do to be able to design a building with a good indoor environment?

Everything (laughs). When you put it all together, it's a very complex field. I don't think you'll know for the rest of your life what you need to know. At some point you feel like it's done right, but then a situation comes along that may not necessarily affect how it looks, but how it works in the end. See for example the human element here, or the time element. And these are things that are maybe not entirely measurable, but need to be considered. I've gotten away from the question a little bit, but it's true, you think about it all the time, I can't list it, there's a lot.

What of this do you think you learned in school or what of this do you think is even possible to learn in school? What has practice taught you?

I left school a long time ago, so I don't mean to be disrespectful, and I have a terribly short memory of what I knew in school and what I learned on the fly. I don't have much of a grasp of how teaching is done in the faculty in these technical fields anymore. But what I remember for us was that it wasn't very glorious, that we went through that teaching through some seminars, the purpose and the way it was handled was very much for the purpose of just getting that credit, but it wasn't about learning anything. And maybe that's an important topic, what we're discussing together now, I suppose there's some material for educating others, so this is a topic that would definitely, it would be nice for those architects to know.

I don't think they're able to study it and know it, but at the very least, it's important that they know that it exists and that those things are really key to what then emerges in reality, because a lot of times I see even practicing architects in architectural competitions or whatever or submit a design that's completely unrealistic in terms of what the house is going to need afterwards. And so it's not just about technology and building physics stuff, but maybe also about construction in general.

What do you think would make it easier for you as an architect to design a quality indoor environment. Whether in terms of just maybe some tools, or in terms of the legislative environment, or whatever you can think of?

I don't know if I can answer the tools, because even though I have a positive attitude towards IT technology or those software things, the older I get, I feel like I don't have the morals or the desire to learn those things, because I know I'm not able to encompass it anyway and study the issues of any field in such depth that I'm able to make an educated guess.

Of course, one acquires some skills, some empiricism over time, whether it's lighting, acoustics, you get a hunch, but the moment a more complex problem comes up, I still have to bring in these professors and we talk about it together. That means that at the moment maybe the availability and the instructiveness of those technicians from the other side, but I think it's moving in a positive direction. Or maybe it's just that maybe we're living in a bubble, that we're picking people who want to interact with us and want to do things that will come to some good conclusion. It's about finding those partners and communicating within that team. That's probably absolutely the most important thing for me.

What does good communication between architects and specialists mean to you? What makes it easier for you, improves it?

If they are available, they are not overwhelmed by other workloads, that's probably the most important thing.

And then it's probably the human factor. All those disciplines should have overlap. That is, both we into the engineering and the engineers into the architecture. That means that you cannot train engineers in the sense of here's your line and you have to achieve the maximum, the ideal 100%, but just as we make decisions and consider a number of things, which may sometimes be contradictory, so should the engineers be able to perceive this. Yeah, and, but it's about how you pick the team, how you put it together. Well, so as long as there are people on both sides who are flexible enough in their thinking and understand that there is no win-win strategy for my profession and I don't care about everybody else, I think that's a direction that could work.

Elementary School Amos Psáry

Interviewee: Ondřej Píhrt

Interviewer: Kristýna Schulzová

Datum a čas: 14. 4. 2022 13:00

Online, MS Teams

Co pro vás znamená pojem vnitřní prostředí budov?

Především to pro mě znamená uživatelské pocity, naším úkolem beru, že je udělat ty pocity příjemné. To je vnitřní prostředí budov. Samozřejmě se nabízí ten výklad tohoto pojmu v takovém tom TZB módu, jako vlhkost teplota rosný bod, ale to samozřejmě k tomu jako přijde taky, přispívá to k té celkové pohodě, nicméně to asi není to hlavní.

Takže vnitřní prostředí je to, jak se tam lidi cítí, aby se tam cítili tak jak mají a co nejlíp, aby to vnitřní prostředí odpovídalo účelu té budovy.

Já se v tomhle výzkumu zabývám architektonickým navrhováním z hlediska vnitřního prostředí. To znamená, jaká je vlastně role architekta v návrhu vnitřního prostředí? Co pro to může udělat, nebo jaká část je jeho zodpovědnost. Zaměřuji se mimo jiné na ty kvantifikovatelné stavebně fyzikální parametry, to znamená osvětlení, hlavně denní, akustiku, tepelnou pohodu a kvalitu vnitřního vzduchu. Ale v zásadě to řeším spíš jako v souvislostech s těmi ostatními aspekty toho architektonického návrhu.

Byly už v zadání projektu základní školy v Psárech nějaké specifické požadavky na kvalitu vnitřního prostředí, respektive z jakých jste vycházeli požadavků? Jen z legislativních a normových?

Tenhle projekt je docela speciální, z několika důvodů.

Jednak nic takového nebylo nikdy stanoveno zadavatelem, takže jako v rámci zadání byly požadavky jenom rovné normativním požadavkům na školní budovy, ale žádný specifický zadání nebylo.

Potom ještě my jsme podávali žádost o stavební povolení na začátku roku 2016 a to zrovna vstoupila v platnost ta vyhláška o budovách se téměř nulovou spotřebou energií. A my, protože jsme tu žádost podávali v lednu, tak jsme vlastně ještě podle ní nemuseli jako postupovat. A to znamená že my jsme tu budovu napřed vlastně řešili s technikou tak jak (smích) tak jak by se to mělo. To znamená s tou, co my sami jsme vyhodnotili jako za nutnou. A tu, která bude přispívat k tomu dobrému vnitřnímu prostředí. Ještě nás k tomu netlačily žádné legislativní požadavky.

Z povahy té budovy a z povahy těch prostorů bylo jasné, že někde nějaká vzduchotechnika bude, ale víceméně to bylo postavené třeba na přirozeném větrání. A potom, zrovna v té době jednak vstoupila v platnost vyhláška, a potom státní fond životního prostředí se chystal vypsat nový kolo dotační výzvy na veřejné budovy v pasivním standardu. Ono už do té doby probíhala ta první výzva, to první kolo, do kterého se ale nikdo nepřihlásil, protože se toho všichni strašně báli. Takže oni to druhé kolo už připravovali pečlivě.

Přizvali si k tomu firmu PORSENNA (dotační poradentví), a s nimi i objeli nějaké příklady dobré praxe v zahraničí, hlavně Rakousko, Německo, Švýcarsko. Právě veřejné budovy i školy, aby zjistili, jako v jakém rozsahu, co vlastně to znamená a co jako lze očekávat a co je vlastně nutné, protože si to nikdo neuměl představit, tady nic takového jako nebylo.

A tahle naše škola byla v přípravě a byl to relativně medializovaný projekt tím, jak to byla vítězný návrh z architektonické soutěže na školu, taková soutěž tady 20 let nebyla. Pan starosta jakožto zástupce zřizovatele byl velmi aktivní, i politicky, a hrozně se o to zajímalo a prostě se stalo, že si nás ten státní fond životního prostředí vyhlédl, že by to možná šlo z toho našeho projektu udělat takový pilotní. Oni se i chystali podstatně navýšit ty prostředky, třeba třikrát.

My jsme vzali ten dům tak, jak byl to vlastně byla hotová dokumentace pro stavební povolení, tím pádem to už bylo prakticky hotový. A právě PORSENNA, pan inženýr Čejka na to udělal takovou expertízu a vlastně z toho vyšlo, že tomu domu stačí jenom strašně málo, aby se do toho pasivního standardu dostal.

A ukázalo se, že mu vlastně stačí i o dost míň, než aby se třeba jenom tupě vyplnily všechny požadavky vyplývající z té nové vyhlášky do toho průkazu. Protože právě na základě těch exkurzí do toho výpočtu průkazů uměli zahrnout reálný provoz budovy. Ne, že to vycházelo tak, že mělo splnit jenom tím, že tu budou narvete vším, co jako bylo na trhu a bylo to akorát složitý a drahý, a stejně vycházela šílená spotřeba.

Takže my jsme ten projekt ještě upravovali, a dělali jsme z toho pasivní budovu a vlastně jediná zásadní úprava byla, že jsme třeba o 4cm jsme zvýšili tepelnou izolaci budovy, že tam nebylo 20cm vaty, ale 24.

Samozřejmě se definovali nějaký parametry výplní, aby to odpovídalo tomu pasivnímu standardu, ale vlastně největší technologický zásah byl, že se doplnilo nucené větrání všech prostor, což byla jedna z podmínek té pasivity.

My jsme tam už předtím měli nucené větrání tříd, takové přivětrávání, takže jsme to vlastně akorát posílili. A jestli jsme ten dům zdražili, nebo zvýšili jsme mu technologickou náročnost třeba o 5% a získali jsme 50 milionů korun dotace.

Mě se ten přístup jako strašně líbil, protože samozřejmě každý rád dělá úsporné budovy, ale někdy už je to prostě moc, někdy jsou ty úspory a ta pasivita za cenu právě nějakýho uživatelského komfortu nebo velký technické složitosti nebo nějakých ústupků z toho vnitřního prostředí, z toho postaveného vnitřního prostředí, to znamená prostoru, velikosti, orientace oken, prostě všech těchhle věcí moc velké. To potom jako architekt se člověk vždycky ptá, děláme ještě vnitřní prostředí, nebo už děláme jenom vnitřní prostředí pro vnitřní prostředí? Tady mi právě přišlo, že to dopadlo nakonec úplně bez kompromisů.

A poprvé jsem si říkal, že to jako má nějaký smysl. Takže největší výdobytek té budovy ohledně vnitřního prostředí je, že ho má totálně kontrolovaný, že je postavená v pasivním standardu a přitom to v tom baráku vůbec není vidět, nebo není to vidět na první pohled.

Já bych se vrátila možná ještě trošku dřív v příběhu toho návrhu. V které fázi toho návrhu jste řešili jednotlivé aspekty vnitřního prostředí, třeba ty stavebně fyzikální, kdy jste řešili denní osvětlení, jak jste do toho promítali akustiku a podobně?

Od začátku, denní osvětlení jsme už promítali do soutěžního návrhu. Vždycky jsme to vnímali tak, že každá budova, a ještě o to víc škola, musí být prostě dobře osvětlená přirozeně.

Samozřejmě bylo jasné, že na školu jsou přímo určené parametry, které přímo ovlivňují dispozici, hloubku učeben a tak. Takže parametr osvětlení jsme brali v úvahu hned od začátku.

Samozřejmě, že jsme se i zamýšleli nad orientací učeben z hlediska přehřívání a tak, ale to jsou všechno parametry, které je dobré mít na zřeteli, ale ono vždycky nelze všechno na 100% splnit. Vždycky vyvažujete nějaký místní danosti, celkové

provozní vazby toho baráku. Umístění na pozemku se řídí mnoha věcmi a třeba orientace učeben je třeba jenom jedna z nich.

A nějaký jsou řešit technicky jednodušeji, nějaký jsou řešit technicky hůř. Takže třeba ta orientace učeben je určitě důležitá, ale když nevyjdou všechny učebny na sever, což se vám těžko podaří vždycky, nebo ani ne všechny na sever a na jih, tak prostě někde ten západ východ použít musíte, ale dá se to řešit nějakým vnějším stíněním, které zase není tak technologicky složité.

Takže osvětlení jsme řešili od začátku. A potom jsme řešili taky, a to souvisí s tím denním osvětlením, nějakou možnost přirozeného větrání. Přišlo nám, že je důležité tu možnost mít, i když nám asi bylo jasné, že se tam budeme pohybovat i s nějakou vzduchotechnikou.

Ale to souvisí s těmi okny, takže jsme se soustředili na to, aby okna měla i otvíravé části. A tam, kde to nutné není, protože jsme chtěli ta okna veliká, jsme je dělali plná.

Takže osvětlení jsme řešili, a i třeba tu orientaci, ale jiné parametry v návrhu jsme neřešili. To jsme potom řešili samozřejmě v návaznosti na hygienické požadavky, výměny vzduchu, ve stavebním povolení.

Plus jsme samozřejmě řešili větrání, výměny vzduchu.

Napřed to měli udělané jenom na přirozené větrání, ale pak jsme i v průběhu toho návrhu různě pátrali, jak to funguje? A není to úplně optimální, protože vy nedokážete zajistit tu správnou disciplínu, většinou toho vyučujícího, aby větral tak jak se má. Často se stane, že ten vzduch ve třídách se neobměňuje, a pak se celý vymění naráz. Proto jsme už i před tou pasivitou tam měli zakomponované nucené větrání. Uvažovali jsem taková ta čidla CO2, která se rozsvítí, když to klesne pod nějakou míru, aby se šlo otevřít okno, i takové příklady jsou. A nakonec jsme prostě šli tím automatickým větráním. Ukázalo se to jako dobrý krok, že to pak šlo snadno překlopit na tu pasivitu.

Jaký byly další parametry, které formovaly hmotu té budovy a umístění na pozemku?

Jednak samotná morfologie toho pozemku, to byl takový mírný svah. Potom to byla samozřejmě byla orientace k obci a k přístupovým komunikacím. No a potom to byly provozní vazby té školy, kdy my jsme chtěli, aby ta škola měla nějaké centrum, nějaké svoje srdce, které budou všichni mít rádi a všichni budou používat a budou se tam přirozeně potkávat a až potom se rozptýlí do těch jednotlivých klastrů. My tam máme ty třídy uspořádány takových shluků, kterým se říká klastry.

Tohle všechno dohromady vytesalo ten dům.

Je to takový soubor parametrů, které člověk sleduje. Ale každým pozemku to může být jiné. I když některé principy jsou obecné, třeba s tím centrálním prostorem té školy, to rádi používáme doteď. A pak se prostě řídíme místními podmínkami.

Spolupracovali jste už ve studii s nějakými profesanty, s nějakými specialisty, ať už na vnitřní prostředí, nebo s někým dalším?

Při tom návrhu ani tak ne, při tom soutěžním návrhu jsme čerpali hlavně ze zahraničních realizací.

Jak se potom na to navázal celý projekt, který začínal dopracováním soutěžního návrhu do podoby návrhu stavby, už jsme měli projekčního partnera, který měl pod sebou všechny profese. Ale spíš jsme to řešili tak, aby ten dům fungoval, než že bychom řekli, hele, tady potřebujeme sledovat hladinu CO2 a vlhkost, to se do toho přidalo až trošku později, taky postupně, jak jsme se do té problematiky toho vnitřního prostředí, specificky škol, dostávali. Tohle byla naše první škola.

Museli jste tam řešit nějakým způsobem zdroje hluku, ať už z okolí nebo z nějakých vzduchotechnických jednotek a podobně?

To jsme museli řešit a spíš než zdroje hluku, který by ovlivňovaly to naše vnitřní prostředí jsme museli řešit naše vlastní zdroje hluku v podobě těch tepelných čerpadel a hlavně vzduchotechnických jednotek, které máme na střeše, abychom my sami nebyli zdroj hluku pro okolí.

Působení té vlastní budovy na okolí a na zbytek obce?

Na to jsou samozřejmě hygienické požadavky, takže to se řešilo standardně. Veškerá vzduchotechnická zařízení včetně tepelných čerpadel jsou na střeše objektu a jsou kolem nich protihlukové zábrany, které jsme tam museli samozřejmě zakomponovat, aby nenarušovaly vzhled budovy, ale to považuju za standardní věci z legislativy.

Ale jinak kolem té budovy nebyl žádný významný zdroj hluku, kvůli kterému jsme museli dělat nějaké nadstandardní parametry výplní nebo fasády. Ještě i díky tomu, že už ty parametry, který si vyžádal ten pasivní standard, hlavně teda tepelně technický, posunuly standard těch výplní na velmi vysokou úroveň, která zároveň funguje docela dobře jako na akustický útlum.

A dělali jste tam nějaké kompromisy mezi architektonickou koncepcí a technickými požadavky, když jste říkal, že to do sebe docela pěkně zapadlo?

Nevím o žádných podstatných, kdy bychom vyloženě řešili, že se musíme vzdát nějaké části architektury, která pro nás byla podstatná ve prospěch nějakého technologického zařízení, které by mělo být ještě pod podstatnější. Řešili jsme tam spoustu detailů, které třeba byli vyvolané rozvody, hlavně vzduchotechnikou.

Ale to jsme považovali za standardní součást práce architekta, abychom to prostředí drželi příjemné, aniž bychom toho uživatele jako vystavovali nějakým rušivým estetickým vlivům.

Součástí kvalitního vnitřního prostředí je pro nás i ukázněnost a estetická čistota. Takže na to jsme samozřejmě dali hodně, stálo to občas docela dost úsilí, ale jako podařilo se to a myslím si, že se to může podařit jako vždycky, akorát, že se to nedá udělat bez té práce, která se vloží do té přípravy.

A potom ani sebelepší příprava nenahradí vaší osobní účast při realizaci. A je potřeba pořád vědět, co z toho má nakonec vzniknout. Nositel vize toho vnitřního prostředí a celého toho baráku asi nemůže být nikdo jiný, než ten architekt, který k té stavbě má nějaký vztah, řekl bych i citový.

Takže probíhalo spoustu bojů i při realizaci. Takováhle velká budova občanské výstavby se většinou dělá v Čechách, dělala, snad už je to jako minulost, s trošku sníženou pozorností k detailům. I dodavatelé, kteří se o takovouhle stavbu ucházejí, ty nabídkové ceny dělají s tím, že tam po nich nebude nikdo šlapat, že támhle bude někde kastlíček v rohu a tam děláme falešnej překládek a tady sice měl být dřevěný trámový strop, ale když tam bude sádrokarton, tak se taky nikdo nezblázní.

A když tam v tom projektu od začátku do konce není ten architekt nebo ten někdo, kdo má tu vizi a zároveň i do toho technicky vidí a ví, co má v tom projektu, tak se to nikdy nemůže podařit dotáhnout ke spokojenosti všech. Ta čistota vnitřního prostředí, ta optická, ta estetická je taky podstatná součást toho vnitřního prostředí. Jak jsem říkal na začátku, naprosto primární je působení tvar, velikost toho prostoru a to, že tam je i příjemné prostředí hlediska fyzikálního, by mělo být samozřejmé.

A byly tam nějaké změny z hlediska požadavků úřadů, ať už hygieny nebo stavebního úřadu?

Myslím že ne, ale my jsme to konzultovali průběžně, nebylo to tak, že bychom si něco naivně vymysleli a naprojektovali to to dali to na hygienu, aby nám to odsouhlasili. Vzniklo to ve spolupráci, a tím pádem nás nepřekvapily žádné dodatečně vznesené požadavky.

A v průběhu konzultací s hygienou, byly tam nějaké požadavky, které vstupovaly do architektonické podoby?

Řešili jsme tam denní osvětlení tříd, které měly hlubší dispozici. Třídy 1. stupně kromě té základní plochy třídy, která je něco kolem 64 m čtverečních, mají k sobě ještě hrací koutek, takovou dodatečnou plochu. V té budově je to řešeno dvěma způsoby. Jeden je, že to navazuje, že si dvě třídy mezi sebou dělí ještě jednu třídu, nebo větší část jedné třídy. Tam to bylo v pohodě, ten hrací kousek byl na fasádě a měl svoje velké okno.

Ale potom v 2. patře je o tenhle prostor ta třída zvětšená směrem do hloubky dispozice. Takže ta třída má najednou skoro 80m čtverečních, Vlastně na ten samý modul, osmimetrový, který tam byl jako šířky, to znamená fasády. A najednou jsme tam měli prostě prostor, který nebyl denně osvětlitelný okny na fasádě. Takže jsme tam přidávali nějaké světlovody, tohle byl hlavní zásah.

A i v těch normálních třídách, protože to denní osvětlení vycházelo do nějaké hloubky asi 6 m dispozice a my jsme tam měli přes 7 m. S hygienou jsme se domluvili, jaká část třídy je brána jako třída a ten zbytek byl nábytek a jeho obslužný prostor. Tak tohle nám umožnilo udělat větší třídu, aniž bychom ji roztahovali do délky, protože to je nevýhodné z hlediska variability té třídy. Ono se nakonec ukázalo, že ty třídy 1. stupně, které mají ten hrací koutek začleněný po té dlouhý straně a mají o to zvětšený ten půdorys, mají vlastně s ohledem na požadavky moderní výuky optimální velikost, těch 80 m^2.

Zatímco parametry denního osvětlení vás nutí dělat dlouhé úzký třídy, kde umíte udělat fakt jenom to frontální vyučování s tabulí vpředu. Tohle tedy musíte vždycky splnit, tabule centrálně, osvětlení zleva, a přes to nejede vlak, takže tohle tam pořád ještě té hygieně musíte všechno nakreslit, dokázat, že to funguje nebo se domluvit, jak to udělat, aby to fungovalo. A pro ně to bylo přijatelné.

Je to takové bruslení mezi hygienickými předpisy, které jsou v mnoha ohledech zbytečně přísné a mnoha ohledech by při slepém následování i dokázaly zabránit nějakému lepšímu řešení té školy s ohledem na trendy ve způsobu vyučování. Tohle nám bylo jasné od začátku, protože by nás to nutilo dělat tu dispozici jinak. Když to dostane na stůl nějaký projektant, který tu vizi nemá, dostane za úkol udělat školu, tak to prostě udělá tak, aby s tím neměl nikdo nikdy žádný problém, ale jenom podle norem a legislativy. Ale to, jak se tam bude učit, je buďto všem jasné, a těm zbylým je to jedno.

My jsme od začátku cítili, že ta naše škola je trochu jiná, než jsou všechny ostatní, co jsme kdy viděli. Takže jsme vycítili, že s hygienou bude potřeba to konzultovat a získat je na naši stranu, nadchnout je pro tu samou myšlenku, aby se snažili s námi hledat způsob, jak to vyhoví, než aby nám jenom říkali, že to nevyhoví. A jak to máme udělat. Ty průběžné konzultace byly důležité.

Je něco, co u finální stavby dopadlo jinak, než jste čekali nebo než jste navrhli?

Když se mě na to někdo ptá, tak to já považuju za jeden z největších úspěchů, že od soutěžního návrhu k té zrealizované budově je strašně blízko. I jako reklama na architektonické soutěže, když je kvalitní porota a dokáže vybrat kvalitní návrh. Všichni architekti ví, jak se soutěží, často se problém neukáže zrovna nebo se na vizualizaci něčím zakryje. Není vždycky všechno vyřešený, ale od toho je ta porota, aby odhalila třeba i potenciální problémy, a aby hlavně řekla, jestli jdou opravit bez ztráty konceptu budovy nebo ne. To by měl být hlavní úkol té poroty, aby tohle tomu zadavateli řekla.

Takže to, že ten náš barák vypadá vlastně od soutěže až po realizaci prakticky stejně, a tak jak měl, považuju za docela dobrou věc. Až mě při celé té mnohaletý anabázi dodneška udivuje, že se to takhle hezky podařilo.

Naopak se tam ještě přidaly věci. Suterén by původně v rámci úspor udělaný jako takové shell and core, aby se nemusel vybavovat. A potom to celkový nadšení z té budovy a že to bude fungovat jinak a v rámci té komunity to nebude jenom na výuku dětí dopoledne, ale budou tam i kroužky a budou tam sportovní akce, a bude to to komunitní centrum, vedlo k tomu, že tak tomu všichni tak uvěřili, a věřili tomu po celou tu realizaci, že se nakonec našly peníze, aby se tam přidaly další funkce do té školy. Ještě jeden taneční sál, nebo třeba studio na virtuální realitu nebo studio školního rozhlasu. To tam všechno ještě přibylo do těch prostor, který tam byly původně jako rezervní.

Takže to bylo hrozně hezké pozorovat, jak to všichni chtěli, aby to dopadlo tak, jak to bylo vymyšlený. Včetně nakonec té stavební firmy, která v tom jako asi moc neviděla, protože jí moc nevycházeli ty vícepráce, co si tam vymýšleli.

Napadá vás k tomu projektu školy v Psárech ještě něco? Ať už z hlediska vnitřního prostředí, nebo…?

Oni bohužel tu školu od otevřeli zrovna do covidu, takže ona vlastně on jim provozu fungovala jenom 4 nebo 5 měsíců. A ještě jak to byl první rok tak třeba 7., 8. a 9. třídy vůbec tam ještě neměli děti. Takže ta budova v plném vytížení funguje až letos.

Takže já jsem zvědavý, jak se všechny ty teoretické předpoklady naplní… a to se týká vlastně jenom toho vnitřního prostředí. Jestli to bude topit, jestli to bude chladit, jakou to bude mít energetickou náročnost nakonec, protože takovýto pasivní dům vyžaduje třeba dva roky sledování provozu a ladění těch různých systémů, musí se s tím pracovat, není to plug-and-play.

Jsem hrozně zvědavý na nějakou zpětnou vazbu, zatím máme jenom zpětnou vazbu z pohledu jako žáků a učitelského sboru. To vypadá, že funguje. A že tu školu mají všichni rádi a že to opravdu funguje jako komunitní centrum a že se opravdu používá celý den. Takže kromě vyučování nějakou mimoškolní zájmovou činnost, že se pronajímají tělocvičny, hřiště, to je jasný, to funguje vždycky a ve školách to vždycky fungovalo.

A tu školu mají lidi tam rádi a opravdu se stala centrem života a podnítila vznik nějaký neziskové organizace, která se zabývá čistě organizováním kroužků v té budově.

Jediné co jsem jako zaslechl nějaký stížnosti, že ji učitelé občas jako stěžují. Oni totiž v těch klastrech, ten je vždycky dvě až tři třídy, a k tomu jsou kabinety a sociální vybavení. To znamená, že učitelé jsou po té škole rozesetí a mají ty svoje sídla po celý škole a jim se nelíbí, že nemají moc šancí se potkávat, učitelé mezi sebou, že vlastně nemají žádný důvod jako chodit do těch společných prostor, který tam mají.

Ale to je spíš koncepčním nastavením, takže to spíš beru jako námět k zamyšlení. Protože, a to je taky důležité, když se dělá škola, tak na děti se většinou myslí, ale už málokdo myslí na ty učitele. Ti se vždycky strčí někam do kouta a udělá se jim sborovna, jsou s tím všichni hodně rychle hotoví. Ale z tohohle mě třeba vyplývá, že i na ty učitele je potřeba myslet víc, udělat jim třeba nějaký učitelský klub. A když se člověk podívá na příklady, ve Skandinávii je naprosto běžné že tam na to jsou požadavky.

No ale výstupy, jak ten barák funguje jako z hlediska vnitřního prostředí, jak tam všechny ty systémy fungují ještě úplné relevantní nemám, ale myslím si, že teď by někdy měly být. Co

vím je, že se trošku přecenily topné faktory tepelných čerpadel. Výrobcem dané do výpočtu.

A tím, jak je to pasivní barák a ty systémy prostě neměly třicetiprocentní rezervu, jako se běžně dělá v rodinných domech a ve všech topných soustavách, které neslouží tomu bodovému hodnocení, tak se najednou ukazuje, že ta čerpadla prostě dělají v 5 stupních nad nulou to, co mají dělat až při -5. Tam je bivalentní zdroj tepla, tepelná čerpadla a plynový kotel, třeba 100 kilowatt v čerpadlech a 50 kilowatt v plynu. Takže ono se to dorovná, ale ta čerpadla prostě nefungují podle předpokladů daných výrobcem. To je špatně, to někdo lže v technických listech.

Co si myslíte, že jako architekt potřebujete vědět nebo umět, abyste navrhli budovu s dobrým vnitřním prostředím?

Musíte vědět, že to vnitřní prostředí se musí řešit, a že jsou na to i nějaké legislativní požadavky, a že to není jen tak, musíte mít nějaký povědomí, že je potřeba se tím vůbec zabývat. To bych řekl je základní věc. Potom si to můžete samozřejmě teoreticky nastudovat.

Ale to vám jako architektovi ještě moc nedá, dokud si to nezažijete, dokud s tím nemáte tu reálnou zkušenost, ta je naprosto nenahraditelná.

Teoretická znalost bez té zkušenosti vás může spíš jako architekta utlumit, že vám podrazí nohy, když jste zodpovědnej. Když zodpovědnej nejste, tak se na to vykašlete. A když jste zodpovědnej, projdete si tou realizací, tak stejně vás to trošku drží potom při zemi, když víte, na co všechno musíte dávat bacha.

Občas třeba vypadáte po škole trošku jako kazišuk, že říkáte jenom co nejde, tak na to je taky potřeba si dávat pozor i před investorem.

Ale je potřeba tomu hlavně uvěřit. To se dá jenom na základě nějaké dobré praxe. To je myslím ten moment, kdy nám prostě pan inženýr Čejka z PORSENNY vysvětlil, co to vlastně znamená, že to není jenom papírová válka, že to může i fungovat jako ve skutečnosti. Vlastně nás dostal k sobě jako na jednu loď a dodělali jsme to najednou s ním, nebo on s námi. Tohle je zásadní, nějaké širší pochopení, a to se nedá naučit ve škole. Buďto v tom rostete, což už možná jako dnešní mladý lidi už budou mít teďka jako čím dál víc. Ale my jsme v tom nevyrostli. Spoustu jsme o tom slyšeli, ale až reálná zkušenost s takovýmhle barákem člověku dá trošku vzhled, co to všechno opravdu znamená. Z obou stran, vy musíte umět jako architekt posoudit, kdo už vám toho cpe moc, a kde naopak třeba málo.

Protože to jako architekt děláte jako pořád, vy máte nějakou svojí vizi, ale jste jenom nějaká špička velkého týmu specialistů a vy tak nějak musíte mít přehled o tom, co zhruba každý dělá a hlavně, kde jsou možnosti těch jednotlivých profesí, abyste to uměl posoudit tak jako hrubě. Nemáte šanci to všechno jako umět za něj, ale máte zodpovědnost za výběr těch specialistů.

Takže ta zkušenost. Napřed tomu věřit, že to k něčemu je. Potom si tím projít a potom je nějaká naděje, že to budete umět aplikovat do architektury, která pořád bude architekturou.

Co považujete za podstatný na spolupráci s profesanty a se specialisty? Aby to fungovalo.

Vzájemný respekt, k těch svým funkcím v projektu, není to tak, že já jsem architekt a vymyslel jsem to hezký a všichni ostatní mi to jdou zkazit. Ale to je bohužel docela častý přístup.

Musíte věřit tomu, že každý ten specialista, je k něčemu, že to bez něho nejde. Což architekt často i věří, nebo ví. Ale často ti specialisti si třeba nemyslí, že ten architekt k něčemu je.

S takovýma pak nemůžete pracovat, protože takoví lidi potom nechápou, co po nich chcete a považují vás za nevzdělaného blbečka, který chce dělat jako sochy a ne domy. Prostě vzájemný respekt k tomu, co každý tom procesu navrhování má dělat a umí. A důvěra.

Je něco, co by vám navrhování vlastně dobrého vnitřního prostředí v budovách usnadnilo, ať už z hlediska legislativní situace nebo nějakých nástrojů, softwarových a podobně.

Záměry jsou dobrý, problematika je složitá. A je strašně moc jako specialistů z razítka, kteří se tváří, že tomu rozumí a umí to.

No usnadnilo by to, kdyby se nepohybovali mezi specialisty takoví, kteří naplňují jako jenom de jure požadavky vyhlášek a průkazu, ale vlastně vůbec jim je jedno co z toho ve skutečnosti vyleze.

Konkrétní věc, která by mi to ulehčilo neznám, ale ulehčí to každému architektovi spolupráce s kompetentními lidmi, který se dokážou podívat na smysl zákona, a ne jenom na jeho znění.

Používáte ve své praxi nějaký softwarový nástroje pro ověření parametrů vnitřního prostředí, ještě než přijdou specialisti?

Zatím nepoužíváme, ale zavádíme BIM, od čehož si slibujeme spoustu benefitů, které do teď bez toho BIMu možné nebyly a tohle se samozřejmě mezi ně počítá. Když máte reálné konstrukce na reálném místě, tak jsou softwary a nadstavby, které to potom umí ověřit, ve fázi studie. Tak takhle ano, ale v praxi zatím ještě ne.

Napadá vás ještě něco k architektonickému navrhování vnitřního prostředí budov?

Asi to, co jsem říkal na začátku, nenechat se strhnout tou legislativou, barák pořád musí být barák a jako architekt musíte udělat to vnitřní prostředí, to postavené.

Technologie je tam jako pomocník, ale můžete samozřejmě udělat koncept takový, který tu technologii vystaví, nebo to na tom postaví, ale tak to jsou spíš takové speciality.

Stejně tak, jako když něco navrhujete, tak to musí být hezký, krásný. Tak stejně tak tam musí být kvalitní vnitřní prostředí i fyzikálně. Úplně stejně. To to by mělo být stejně samozřejmý, jako že to, co děláte je hezký.

A jako neodsouvat to na druhou kolej, trošku o tom něco vědět a vždycky myslet na nějaký prostorový nároky, vědět, že to všechno nelze jenom bez technologie a vědět, jaká ta technologie má jaký prostorový nárok, aby vám to pak nezkazilo ten barák. To se snadno stane.

English translation of interview with Ondřej Píhrt:

What does the term indoor environment mean to you?

First of all, for me it's about user feelings, our job I take it is to make those feelings pleasant. That's the internal environment of the buildings. Of course, there is the interpretation of that term in that HVAC mode, like humidity, dew point temperature, but of course that comes into it as well, it contributes to the overall well-being, but that's probably not the main thing.

So the indoor environment is how people feel about being there, making them feel the way they should feel and making the indoor environment fit the purpose of the building as well as possible.

In this research, I'm looking at architectural design from the point of view of the indoor environment. That is, what is the role of the architect in the design of the indoor environment? What can he do for it, or what part is his responsibility. I focus, among other things, on those quantifiable building physical parameters, that is, lighting, especially daylighting, acoustics, thermal comfort and indoor air quality. But basically I deal with it more as in the context of those other aspects of that architectural design.

Were there any specific requirements for the quality of the indoor environment in the project specification for the primary school in Psary, or what were your requirements based on? Only from the legislative and standard requirements?

This project is quite special for several reasons.

For one thing, nothing like that was ever specified by the client, so as part of the brief the requirements were just equal to the normative requirements for school buildings, but there was no specific brief.

Then we applied for a building permit at the beginning of 2016, and the decree on nearly zero- energy buildings had just come into force. And because we submitted the application in January, we didn't actually have to follow it yet. And that means that we actually dealt with the building first with the technology as (laughter) as it should be. That is, with what we ourselves assessed as necessary. And one that will be conducive to a good indoor environment. We haven't been pushed to do that by any legislative requirements yet.

It was clear from the nature of the building and the nature of the spaces that there would be some air conditioning somewhere, but it was more or less based on natural ventilation. And then, at that time, the decree came into force, and then the state environmental fund was going to launch a new round of subsidy calls for public buildings in the passive standard. By that time, the first call, the first round, was already under way, but nobody had applied because everybody was so scared. So they were already preparing the second round carefully.

They invited the company PORSENNA (subsidy consultancy) to do this, and with them they went around some examples of good practice abroad, mainly Austria, Germany, Switzerland. Just public buildings and schools, to find out, like to what extent, what it actually means and what can be expected and what is actually necessary, because nobody could imagine it, there was nothing like that here.

And this school of ours was in the pipeline and it was a relatively publicized project in that it was the winning design from an architectural competition for the school, there hadn't been a competition like that for 20 years. The mayor, as the representative of the founder, was very active, even politically, and was terribly interested in it and it just so happened that the state environmental fund looked us up, that maybe we could make this into a kind of pilot project. They were even going to increase the funds substantially, maybe three times.

We took the house as it was, it was actually a finished documentation for the building permit, so it was practically finished. And it was PORSENNA, Mr. Čejka, the engineer, who did an expertise on it, and it actually came out that the house only needs very little to get to the passive standard.

And it turned out that he actually needed a lot less than that to just fill in all the requirements of the new decree in the licence. Because it was on the basis of those excursions that they were able to include the actual operation of the building in the calculation of the certificates. It wasn't that it came out that it was just going to meet it by just cramming everything in there that was like on the market and it was just complicated and expensive and still came out with crazy consumption.

So we modified the project, and we made it a passive building, and actually the only major modification was that we increased the thermal insulation of the building by 4cm, so that there was not 20cm of wool, but 24cm.

Of course, some parameters of the fillings were defined to match the passive standard, but actually the biggest technological intervention was the addition of forced ventilation of all the spaces, which was one of the conditions of passivity.

We already had forced ventilation of the classrooms before, a kind of airing, so we actually just strengthened it. And if we made the house more expensive, or if we increased its technological performance by 5% and got 50 million crowns of subsidy.

I really liked that approach, because of course everybody likes to make efficient buildings, but sometimes it's just too much, sometimes the savings and the passivity at the cost of just some user comfort or great technical complexity or some concessions from the internal environment, from the built internal environment, that is, space, size, orientation of windows, just all these things are too big. Then as an architect one always asks, are we still doing the indoor environment or are we just doing the indoor environment for the indoor environment? This is where it seemed to me that in the end it turned out completely without compromise.

And for the first time, I thought, this makes some kind of sense. So the biggest achievement of the building in terms of the indoor environment is that it's totally controlled, it's built to a passive standard and yet you can't see it in the building at all, or you can't see it at first glance.

I would go back maybe a little earlier in the story of the proposal. At what stage of the design did you address particular aspects of the internal environment, such as the physical aspects of the building, when did you address daylighting, how did you incorporate acoustics, etc.?

From the beginning, we have already projected daylighting into the competition design. We've always felt that every building, and even more so a school, simply has to be well lit naturally.

Of course, it was clear that there are parameters that directly affect the layout of the school, the depth of the classrooms and so on. So the lighting parameter was taken into account right from the beginning.

Of course, we also thought about the orientation of the classrooms in terms of overheating and so on, but these are all parameters that are good to keep in mind, but it is not always possible to meet everything 100%. You're always balancing some local conditions, the overall operational constraints of the

building. The location on the property is governed by a lot of things, and maybe the orientation of the classrooms is just one of them.

And some are solved technically easier, some are solved technically harder. So, for example, the orientation of the classrooms is certainly important, but if you don't have all the classrooms facing north, which is hard to do all the time, or not even all facing north and south, then you have to use the west east somewhere, but you can solve it with some external shading, which is not so technologically complicated.

So we've been dealing with lighting from the beginning. And then we also addressed, and this is related to the daylighting, some possibility of natural ventilation. We thought it was important to have that possibility, even though it was probably clear to us that we were going to be moving some air in there.

But that's related to the windows, so we focused on making sure the windows had opening parts. And where it's not necessary, because we wanted the windows big, we made them full.

So we have addressed the lighting, and even the orientation, but we have not addressed other parameters in the design. We then dealt with that, of course, in relation to the hygiene requirements, air changes, in the building permit.

Plus, of course, we dealt with ventilation, air changes.

At first they had done it just for natural ventilation, but then during the design process we did some research, how does it work? And it's not quite optimal, because you can't get the right discipline, usually the teacher, to ventilate the way it's supposed to. Often what happens is that the air in the classrooms doesn't get replaced, and then it gets replaced all at once. That's why even before passivity, we had mechanical ventilation built in. We were thinking of these CO2 sensors that light up when it drops below a certain level so that you can open a window, there are examples of that. And in the end we just went with the automatic ventilation. It turned out to be a good move, that it was then easy to flip over to the passivity thing.

What were the other parameters that shaped the mass of the building and the location on the property?

First of all, the morphology of the land itself, it was such a gentle slope. Then, of course, there was the orientation to the village and the access roads. And then it was the operational ties of the school, where we wanted the school to have some kind of a center, some kind of a heart of its own that everybody would like and everybody would use and they would naturally meet there and then disperse into those individual clusters. We have those classes there arranged in these clusters.

All of these things combined sculpt the house.

It's a set of parameters that one looks at. But each plot it can be different. Even though some of the principles are general, like with the central space of that school, we like to use that to this day. And then we just follow the local conditions.

Have you worked with any specialists in the study, either in the indoor environment or with anyone else?

Not so much for the design, for the competition design we drew mainly from foreign realizations.

Then as the whole project built on that, which started with refining the competition design into a building design, we already had a design partner who had all the professions under him. But it was more about making the house work, rather than saying, look, we need to monitor the CO2 levels and humidity here, that came in a little bit later, also gradually, as we got into the issues of the indoor environment, specifically the schools. This was our first school.

Did you have to deal in any way with noise sources there, either from the surroundings or from any air handling units and the like?

We had to deal with that and rather than noise sources that would affect our indoor environment, we had to deal with our own noise sources in the form of those heat pumps and especially the air handling units that we have on the roof so that we ourselves would not be a source of noise for the surroundings. The effect of the building itself on the neighborhood and the rest of the community?

There are of course hygiene requirements for this, so it was dealt with as standard. All the air handling equipment, including the heat pumps, are on the roof of the building and there are noise barriers around them, which we had to incorporate, of course, so that they don't interfere with the appearance of the building, but I think that's standard legislation.

But otherwise, there was no significant source of noise around the building that required us to make any above-standard parameters for the fillings or the facade. Even more so, because the parameters that the passive standard, especially the thermal technical ones, demanded, have already pushed the standard of those fillings to a very high level, which also works quite well as acoustic attenuation.

And did you make any compromises between the architectural concept and the technical requirements, since you said that it fit together quite nicely?

I don't know of any substantive ones where we've had to give up some part of the architecture that was substantive to us in favor of some technological device that should be even more sub- substantive. We dealt with a lot of details in there that, for example, were caused by the ductwork, especially the HVAC.

But we considered it a standard part of an architect's job to keep the environment pleasant without exposing the user to any distracting aesthetic influences.

For us, discipline and aesthetic cleanliness are part of a quality indoor environment. So we obviously put a lot of effort into that, it took quite a bit of effort at times, but it was a success and I think it can be done like it always is, it's just that it can't be done without the work that goes into the preparation.

And then even the best preparation is no substitute for your personal participation in the implementation. And you still need to know what you're going to get out of it. The carrier of the vision of the interior environment and the whole building probably can't be anyone other than the architect, who has some kind of relationship to the building, I would say even an emotional one.

So there was a lot of struggle in the implementation as well. A large civic building like this is usually done in the Czech Republic, it was done, perhaps it's like a thing of the past, with a little less attention to detail. Even the contractors who bid for a building like this do their bidding with the assumption that no one will step on them, that there's going to be a little box in the corner somewhere, and we're doing a false lintel there, and there was supposed to be a wood beam ceiling, but if there's plasterboard, no one's going to go crazy either.

And if you don't have that architect or someone who has the vision and also has the technical vision and knows what's in the project from start to finish, you can never get it done to everyone's satisfaction. The cleanliness of the internal environment, the visual, the aesthetic is also an essential part of that internal environment. As I said at the beginning, the absolutely primary effect is the shape, the size of that space,

and the fact that there is also a pleasant environment from a physical point of view should go without saying.

And have there been any changes in terms of the requirements of the authorities, either the health authority or the building authority?

I don't think so, but we consulted continuously, it wasn't like we naively made something up and designed it and gave it to hygiene to get it approved. It was a collaborative effort, so we weren't surprised by any of the additional requirements that were raised.

And in the course of the consultation with hygiene, were there any requirements that went into the architectural form?

There we dealt with the daylighting of the classrooms, which had a deeper layout. The Grade 1 classrooms, in addition to that basic classroom area, which is something like 64 square metres, have a play area, an additional area. It's designed in two ways in that building. One is that it builds on each other, that two classes share another classroom, or a larger part of one classroom. It was fine there, the play area was on the facade and it had its own big window.

But then on the 2nd floor, the classroom is enlarged by this space towards the depth of the layout. So that classroom is suddenly almost 80 square meters, actually on the same module, eight meters wide, that was there as the width, that is, the facade. And suddenly we just had a space that was not daylit by the windows on the facade. So we added some light tubes, that was the main intervention.

And even in the normal classrooms, because the daylight went to a depth of about 6 m and we had over 7 m. We agreed with the hygiene department what part of the classroom was taken as a classroom and the rest was furniture and its service area. So this allowed us to make a bigger classroom without stretching it out in length because that is disadvantageous in terms of the variability of that classroom. It turned out that those first grade classrooms, which have the play area integrated on the long side and have the floor plan enlarged by that, are actually the optimum size with regard to the requirements of modern teaching, the 80 m2 .

While the parameters of daylighting force you to do long narrow classrooms where you can really only do frontal teaching with a whiteboard in front. So you always have to meet that, the blackboard centrally, the lighting from the left, and there's no train going through it, so you still have to draw all that out to the hygiene department, prove that it works, or work out how to make it work. And it was acceptable to them.

It is a kind of skating between hygiene regulations, which in many ways are unnecessarily strict and in many ways, if followed blindly, could prevent some better solution for the school with regard to trends in the way of teaching. This was clear to us from the beginning because it would have forced us to do the layout differently. When some designer who doesn't have that vision gets it on the table, gets the task of doing the school, they're just going to do it in a way that nobody ever has a problem with it, but just following the standards and the legislation. But the way it's going to be taught there is either clear to everybody else, and the rest of them don't care.

We felt from the beginning that our school was a bit different from all the others we had ever seen. So we sensed that we would need to consult with the hygiene department and get them on our side, get them excited about the same idea, and get them to try to find a way to accommodate it with us rather than just telling us that it's not going to accommodate it. And how we should do it. Those ongoing consultations were important.

Is there anything about the final construction that turned out differently than you expected or designed?

When someone asks me about this, I consider it one of the greatest achievements that it is so close from the competition proposal to the completed building. Even as an advertisement for architectural competitions, if there is a good jury and they can choose a good design. All architects know how to compete, often the problem doesn't show up right or is covered up by something in the visualization. Not everything is always solved, but that's what the jury is there for, to reveal potential problems and to say whether they can be fixed without losing the concept of the building or not.

That should be the jury's main task, to tell the client that.

So the fact that our house looks practically the same from the competition to the realisation, and the way it was supposed to, I consider to be quite a good thing. I'm still amazed that it turned out so nicely after all these years.

On the other hand, things have been added. The basement would have originally been done as a kind of shell and core to save money, so it wouldn't have to be fitted out. And then the general excitement about the building and that it was going to work differently and within that community it wasn't just going to be for teaching kids in the morning, but there were going to be clubs and there were going to be sporting events and it was going to be that community center, led to everybody believing so much in it and believing in it throughout the implementation that eventually there was money to add more features to that school. One more ballroom, or maybe a virtual reality studio or a school radio studio. All of that was added to the space that was originally there as a reserve.

So it was awfully nice to see how everyone wanted it to turn out the way it was made up. Including, at the end, the construction company, who probably didn't see much in it because they weren't very good at the extra work they were making up.

Can you think of anything else about the school project in Psary? Either in terms of the indoor environment or...?

They unfortunately just opened the school to covid, so she actually only operated for 4 or 5 months. And even when it was the first year, like 7th, 8th and 9th grades didn't even have kids there yet. So the building is only fully operational this year.

So I'm curious to see how all these theoretical assumptions come to fruition... and that's really just the internal environment. Whether it's going to heat, whether it's going to cool, what's the energy performance going to be at the end of the day, because a passive house like this requires like two years of monitoring the operation and tuning the different systems, it's got to be worked with, it's not plug-and-play.

I'm very curious to get some feedback, so far we've only had feedback from the perspective of us as students and the teaching staff. That seems to be working. And that everyone loves the school and that it really works as a community center and that it's really being used all day. So apart from teaching some extra-curricular activities, that they rent out the gyms, the playgrounds, that's clear, that always works and it's always worked in schools.

And the people there love the school and it has really become a center of life and has sparked the creation of a non-profit organization that is purely dedicated to organizing clubs in that building.

The only thing I've like heard some complaints about is that teachers sometimes like complain about her. Because in those clusters, there's always two or three classes, and there are classrooms and social facilities. So that means that the teachers are scattered all over that school and they have these residences all over the school and they don't like that they don't

get much chance to meet each other, the teachers don't really have any reason to like go to those common areas that they have there.

But that's more of a conceptual setting, so I'm taking it as food for thought. Because, and this is also important, when you do a school, most people think about the kids, but very few people think about the teachers. They always get shoved into a corner somewhere and they get a choir room, they're all done with it very quickly. But this makes me think that maybe we need to think more about the teachers too, maybe make them a teachers' club. And if you look at examples, in Scandinavia it's quite common that there are requirements for that.

But I don't have the outputs of how the building works in terms of the internal environment, how all the systems work there, but I think they should be there at some point. What I do know is that they've overestimated the heating factors of heat pumps a little bit. The manufacturer put them into the calculation.

And by the way it's a passive house and those systems just didn't have a 30 percent margin like they normally do in single-family homes and all heating systems that don't serve that point rating, all of a sudden it turns out that those pumps just do at 5 degrees above zero what they're supposed to do at

-5. There is a bivalent heat source, heat pumps and a gas boiler, maybe 100 kilowatts in the pumps and 50 kilowatts in the gas. So it'll even out, but the pumps just don't work as the manufacturer intended. That's wrong, that's somebody lying in the spec sheets.

As an architect, what do you think you need to know or be able to do to design a building with a good indoor environment?

You have to know that the internal environment has to be addressed, and that there are some legislative requirements for that, and that it's not just that, you have to have some awareness that it needs to be addressed at all. I would say that's a fundamental thing. Then, of course, you can study it in theory.

But that doesn't give you much as an architect until you've had that real-world experience, which is absolutely irreplaceable.

Theoretical knowledge without that experience can make you more likely to be stifled as an architect, to trip over your own feet when you're in charge. If you're not responsible, you're out of it. And when you're responsible, you go through the realization, it still keeps you grounded a little bit afterwards, knowing what you have to watch out for.

Sometimes you may look a bit like a goat after school, that you only say what you can't, so you also need to be careful of that in front of an investor.

But you have to believe it. You can only do that on the basis of some good practice. I think that's the moment when Mr. Čejka, the engineer from PORSENNA, explained to us what it actually means, that it's not just a paper war, that it can work like in reality. He actually got us on the same boat and we finished it at the same time with him, or he with us. This is crucial, some broader understanding, and you can't teach that in school. Either you grow in it, which maybe as young people nowadays they're going to have as more and more. But we didn't grow up in it. We've heard a lot about it, but it's only the real experience of a house like this that gives you a little bit of a glimpse of what it all really means. From both sides, you have to be able to judge as an architect who is already cramming too much in, and where you need too little.

Because you do it as an architect all the time, you have a vision, but you're just the top of a big team of specialists and you kind of have to have an overview of what everybody does and especially where the possibilities of those individual professions are, so you can judge it in a rough way. You don't have a chance to like know it all for him, but you have the responsibility of selecting those specialists.

So the experience. Believing it's good for something first. Then you go through it, and then there's some hope that you'll be able to apply it to architecture, which will still be architecture.

What do you consider essential about working with professionals and specialists? Making it work.

Mutual respect, for the functions in the project, it's not like I'm the architect and I came up with a nice idea and everyone else is going to ruin it for me. But that's a pretty common attitude, unfortunately.

You have to believe that every one of those specialists is useful, that you can't do without them. Which the architect often believes or knows. But often the specialists don't think that the architect is useful.

Then you can't work with such people, because they don't understand what you want them to do and they consider you an uneducated moron who wants to work like statues and not houses. Just mutual respect for what everyone in the design process is supposed to do and can do. And trust.

Is there anything that would make designing actually a good indoor environment in buildings easier, either in terms of the legislative situation or some tools, software and so on.

The intentions are good, the issues are complex. And there are an awful lot of rubber stamp specialists who pretend to understand it and know how to do it.

Well, it would make it easier if there weren't such specialists who fulfill the de jure requirements of the ordinances and the certificate, but don't really care what comes out of it.

I don't know the specific thing that would make it easier, but it will make it easier for any architect to work with competent people who can look at the meaning of the law and not just the wording.

Do you use any software tools in your practice to verify indoor environmental parameters before the specialists arrive?

We are not using BIM yet, but we are introducing BIM, which promises a lot of benefits that were not possible without BIM until now, and this is of course counted among them. When you have real structures on a real site, the software and the superstructures that can then verify that are in the study phase. So in that way, yes, but not yet in practice.

Can you think of anything else to add to the architectural design of the indoor environment?

I guess what I said at the beginning, don't let the legislation get you down, a house still has to be a house and as an architect you have to do the internal environment, the built environment.

The technology is there as a helper, but of course you can make a concept that exposes the technology or builds on it, but those are more like specialties.

Just like when you design something, it has to be pretty, beautiful. Just like there has to be a good indoor environment physically. Just the same. That should be as self-evident as that what you're doing is beautiful.

And like not to put it on the back burner, to know a little bit about it and always think about some space requirements, to know that you can't just do it all without technology and to know what the technology has what space requirements so that it doesn't ruin your house. That can easily happen.

Office Building THE BLOX

Interviewee: Jan Holna

Interviewer: Kristýna Schulzová

Date and time: 22. 3. 2022 16:00

Online, MS Teams

Original interview with Jan Holna in Czech:

Chtěla bych se zeptat na nějaký věci k projektu BLOXu. A to konkrétně na vnitřní prostředí. V té budově to znamená z hlediska světla, hlavně denního světla. A akustiky, to znamená hlavně asi ochraňuje proti hluku, kvality vzduchu a tepelný kvality. Směřuje k tomu, co vy architekti z těchhle věcí v těch projektech řešíte, nebo na co si musíte dávat pozor? A co jste konkrétně řešili u tohohle projektu?

Začal bych asi takovou zajímavou zkušeností, kterou mám zhruba týden dozadu, kdy mi zavolal klient, investor, jestli bychom šli do projektu bytů, klasický developerský projekt, že my máme zkušenosti a máme za sebou nějaký projekty bytových domů pro developery. A ptal se mě, jestli taky máme zkušenosti s projekty s nulovou uhlíkovou stopou, s environmentálně uvědomělými projekty. A já jsem vlastně zjistil, že to, co je v administračkách samozřejmostí, v bytových domech vůbec samozřejmostí není. Že zatímco bytový baráky si hrajou poměrně dost na nějakou nulovou stopu a tyhle věci, ale je to vlastně tak, že to nikdo nechce. Kromě nějakého s odpuštěním blbého energetického štítku se po tom vlastně nikdo nepídí. Kór dneska, kdy se prodá vlastně úplně všechno z těch bytů, nikdo z developerů se nepídí po tom, aby ty domy byly přírodě friendly.

Z jednoduchého důvodu, že vyhrává poměr cena/výkon, ty domy se prodávají, nepronajímají se, ten developer je dál nedrží, takže mu je vlastně jedno svým způsobem, co prodá. O to víc se paradoxně řeší ty bytové domy, které mají právě tu nulovou uhlíkovou stopu a uvádějí se v různých časopisech a tak dále. Ale je jich hrozně málo.

Kam se chci dostat, že vlastně, zatímco u těch bytových domů si toho každý všímá, respektive je to velký téma, jak ten barák udělat s nulovou stopou, ale ve skutečnosti se to nedělá jo, protože to nikdo nezaplatí, tak v administrativách je to přesně naopak.

Tady se nikdo neptá, jestli administračka má zátěž a tak dále. Proč? Protože ve skutečnosti ty administračky mají světové hodnocení, které je nakonec posouvá do poměrně dost ekologických staveb.

Takže vlastně všechny ty administračky, ať už jsou nebo nejsou stavěný s nějakou snahou mít, jsou vlastně podvědomě nebo podprahově nucený být relativně dost ekologický baráky.

Když se zpátky vrátím k té vaší k té vaší základní otázce, jak se do BLOXu a ono by se to dalo bagatelizovat, jak se do všech administraček a do všech našich administraček propisuje nějaká ekologie, životní prostředí a jak se to propisuje do různých fasád, konstrukcí počínaje a technologií konče, tak bych řekl jednu jedinou věc, že asi tak 10, možná i víc let dozadu se všechny ty administračky se najednou začaly stavět pod dohledem principů, které zohledňují životní prostředí, zohledňují stavbu, zohledňují provoz, zohledňují konstrukce a ty systémy jsou dostatečně známý.

Jsou to systémy LEED nebo BREAM anebo snad existuje ještě nějaký český certifikát. Vedle těch LEEDů a BREAMů, které jsou nejdůležitější a nejznámější, existují i jiné certifikace. Ale tyhle jsou takové nejznámější a každá ta administračka, kterou dneska stavíme, je začleněná nebo zaklasifikovaná do tohohle systému, a ať už je to LEED nebo BREAM. Ten systém nebo ta certifikace donutí všechny zúčastněné strany počínaje námi a konče u investora a developera, aby udělal barák, který je relativně bez emisní a málo náročný na energie jo.

Na druhou stranu je fakt, že většina těchto systémů nebo certifikací, každý by si myslel, že dostat tu nejvyšší certifikaci znamená tam mít nahoře nějaké větrný elektrárny a získávat vodu z ranní rosy, a být soběstační a tak dále. A ono to tak není, protože ve skutečnosti, co se týče stavby, mám pocit, a ty systémy certifikací tomu nasvědčují a věřím tomu, že to je správně, že daleko víc než implantování nějakých relativně náročných rádoby ekologických technologií tu ekologii splníte spíš tím, že to sklo, které tam vezete přes půl Evropy, nepovezete přes půl Evropy, ale povezete ho maximálně z druhého města.

A kupodivu jak ten LEED, tak ten BREAM vlastně na tohle pamatuje. A zjišťujeme, že aby ten dům byl ekonomický a zároveň byl ekologický a zároveň měl co nejmenší stopu, že to vůbec není v tom tam dávat nějaké honosné technologie, které, jak říkám, vaří vodu ze vzduchu, ale je to o tom, že stačí, když uděláte vlastně poctivý dům z materiálů, které jsou pokud možno z blízké provenience.

A uděláte správný poměr mezi prosklenými stěnami a plnými stěnami a tak dále. Samozřejmě třešnička na dortu je, že to můžete trošku vylepšit tím, že tam dáte víc budek na střechu pro tetřevy nebo pro rorýse nebo něco podobného. A to už jsou takový, že spíš na pousmání.

Přišli jsme na to, že aby ty administračky vyhovovaly těm certifikacím, potažmo, aby vyhovovaly nějakému správnému pohledu na ekologii, tak spíš než tam dávat nějaké šíleně sofistikované technologie, stačí dodržet normy, kór český, který jsou papežštější než papež a je důležitý z mého pohledu se řídit relativně jednoduchými logickými výroky, úsudky při návrhu i při stavbě. A dostanete poctivý barák z poctivých materiálů, z jednoduchých materiálů, z logických materiálů, z logických konstrukcí. Což pomůže ekologii daleko líp, než kdybyste na tenhle barák postavila jednu, co já vím, větrnou elektrárnu.

Když se dostanu zpátky, BLOX je jeden z prvních baráků, ne-li první v Čechách administrativní, který má nejvyšší certifikaci od BREEMu. Proč od BREEMu? Protože se svého času, co já si pamatuju, rozhodovalo mezi BREEMem a LEEDem a tou českou certifikací.

LEED je americký, BREEM je anglický.

Takže nějak líp ten BREAM fungoval v tomhle našem evropském prostředí než ten LEED, možná to bylo i z toho důvodu, že tu nejvyšší specifikaci LEED už v té době měl jiný barák, taky náš, Main Point Karlín, pardon, tak se investor rozhodnul pro BREEM, protože ta česká certifikace ještě tady nebyla a vlastně ani dosud není moc známá.

Ta nejvyšší certifikace BREEM sama o sobě říká, že ten dům musí být energeticky málo náročný, ale přiznám se, vlastně jsem moc nezažil, že by se tam kvůli BREEMu tam dělaa třeba nějaká speciální, okna nebo speciální konstrukce. Vlastně nikdy jsem nezažil situaci, kdyby se řeklo „hele, okno musí mít podle vyhlášky takový a takový parametry, ale podle toho BREAMu je musí mít daleko vyšší“.

Myslím si, že ty certifikace, jak ten LEED, tak ten BREEM, jsou nastavený tak, že jak jsem říkal na začátku, když vezmete okno, které funguje na českou vyhlášku nebo českou normu, tak se do toho BREEMu nebo LEEDu dostanete. Takže není tam úplně nic, tak světoborného.

Víte co, třeba když uděláte prosklenou fasádu směrem na Evropskou, a máte tam prosklené plochy, které jsou od úrovně podlahy do úrovně podhledu, musí mít nějakou bezpečnostní specifikaci, kdy vlastně to sklo je tak těžké a má tak takové bezpečnostní vlastnosti, že to okamžitě generuje zároveň i vlastnosti protihlukových zábran a tak dále. Není to věda, je řada věcí, které mají svojí logiku a svojí souvztažnost.

Zase odskočím, v dnešní době, když děláme byty, většina z těch bytů, aby neplesnivěla a nehnila...

Já vždycky říkám, že český stavební průmysl, na rozdíl od doktorů, právníků, učitelů, různých iniciativ a tak dále, neumí mluvit a prosazovat svoje záměry na vládě a prosazovat si je neumí dokonce ani čeští developeři. Podezřívám jenom jedinou frakci, která to umí. A to jsou dodavatelé různých materiálů, speciálně třeba polystyrenu nebo něčeho podobného.

Jinak si totiž nedokážu představit to, že dokázali prosadit tak složitý, a tak velký normy zateplení, že ty baráky jsou tak strašně zateplený, a tak strašně utemovaný, že vám plesniví.

A každý normální člověk by řekl, fajn, tak když plesniví, tak toho polystyrenu ubereme. Anebo tu přirozenou infiltraci povolíme mít větší. To by nešlo, protože by zřejmě neprodávali tolik polystyrenu a tolik těsnění, takže vymysleli geniální tah. Že do každého bytu, který je na jakoukoliv světovou stranu, kdekoliv, jakkoliv, musíte, protože jinak by to hnilo tím, jak to máte všechno zavřený, udělat nucené větrání, průvětníky a tak dále.

Což jsou zase prachy navíc ale je to super, že jo, takže my v rámci ekologie a tohle je tohle je přesně ono, v rámci pitomý ekologie my vymyslíme takovouhle kravinu. Jo a nám to teda pomáhá, jo, protože když si vezmete, tak vlastně ty průvětrníky musí být dneska už všude, na každých bytech.

Kdekoli, takže když potom postavíme barák, který je v ulici, kde jezdí tramvaj, tak ještě před 15 lety jsme si rvali vlasy na hlavě, protože ta strana, která byla směrem k tramvaji, musela být bůhvíjak zaakustičněná a dneska to tak není. Dneska tam stačí postavit normální barák s dobře přeteplenou fasádou, s dobře utemovanými skly, protože tam bude mít větší, no a to nám stačí a ta fasáda, protože tak tak huňatá, tlustá nepustí ani trošku toho chladu zevnitř.

Zároveň samozřejmě splňuje poměrně dost výrazně akustický požadavky a tím pádem, je normální fasáda, prakticky dávaná kamkoliv, schopná zatlumit hluk tramvaje. Takže zpátky na stromy.

Hele ten barák je naprosto normální, stačí jenom dodržovat naše normy, které jsou fakt hodně přísné. A pak tam musíte dávat tím pádem skla, která by třeba v jiných částech Evropy byla považována za strašně ekologická a strašně protektivní vůči hluku anebo protektivní vůči teplotám a tak dále. Tady stačí jenom dodržet české normy.

Já ještě se vrátím k těm certifikačním schématům. Právě k tomu LEEDu a BREAMu. V posledních letech se tam dostaly požadavky na věci, které ovlivňují zdraví obyvatel. Právě denní osvětlení, kvalita vzduchu a podobně, respektive některé tam byly vždycky, ale vím, že v těch pozdějších verzích třeba denního osvětlení, tam právě přibývá.

Zaznamenal jste, že se to nějak mění tímhle směrem, ty požadavky?

Naprosto narovinu, my uděláme dům, navrhneme ho a pak ho necháme naším specialistou osvětlovačem projít, jestli je adekvátně osvětlený, kdysi nebo v Praze už ne, ale někde jinde, jestli adekvátně osluněný, co se týká bytů.

Administračky mají ještě výhodu v tom, že se dá použít sdružené osvětlení, samozřejmě není to úplně všespásné. Ale tam se kalkuluje s tím, že vedle přirozeného osvětlení můžete mít i umělé osvětlení a mixovat to a všechny tyhle věci se samozřejmě řeší se specialistou.

A jestliže on mi jednoho krásného dne řekne, že v únoru jsme to dělali takhle, ale v březnu už platí jiná norma, tak mu řeknu, tak to udělej na jinou normu.

Samozřejmě že máme obecně, to se netýká jenom BLOXu, postupem času čím dál tím větší nároky na osvětlení, ale na druhou stranu je fakt, že konkrétně v Praze jsou Pražské stavební předpisy, ze kterých byla vyhozena nutnost osluňovat byty, což si myslím, že úplná kravina. Nutnost osvětlit oslunit byt je přežitek. Někdy se ze začátku minulého století, kdy města vypadala úplně jinak.

A došlo to tak daleko, že se z těch měst díky těm obrovským vzdálenostem stala města, která jsou naprosto umělohmotná, bez sociálních vazeb a tak dále. Takže těmi PSP (Pražské stavební předpisy) se to snad aspoň trošku vrátilo zpátky.

Ale jestli mluvíme o administračkách, tam je to opravdu tak, že se to dá specialistovi, který to napočte a mixuje se přirozený s umělohmotným osvětlením. A že bychom cítili nějaký větší tlak, razantní nebo nějaký skokový tlak, to ne.

Ale každý ten barák, každá administračka, každý bytový dům se posuzuje. Vždycky, když děláme hotely, tak si říkáme super, tady nemusíme nic dělat, protože hotely vlastně nejsou s trvalým pobytem, takže tam nemusíme zjišťovat míru osvětlení uvnitř hotelových pokojů a je nám krásně při tom projektu.

Tím jste mi nahrál na další dotaz ohledně profesionálů a specialistů, v které fázi toho projektu je přizýváte, nebo konkrétně u tohohle a samozřejmě i obecně specialisty na světlo, na akustiku, na kvalitu vzduchu, vzduchotechniku?

Světlaři jdou okamžitě, dokonce u bytových domů není výjimkou, když objem bytového baráku nastavíme podle světelného modelu. Takže tam dokonce určují hmotu domu, hmotu studie, dalo by se říct, že jdou úplně první.

Co se týče dalších specialistů, ti nastupují někdy už i ve studii a tak dále. Ale není to kvůli environmentalistice, spíš kvůli tomu, že třeba potřebujeme prověřit, jaký systém, co já vím, vytápění tam bude, v návaznosti na to, jak velké šachty tam budou.

Nebo kolik budeme potřebovat místa v technologických support místnostech toho baráku, takže se specialisty vlastně mluvíme hned od začátku. Není to tak, že studii uděláme bez specialistů, URko (územní rozhodnutí) možná sem tam někoho a tak dále. Se specialisty úzce spolupracujeme hned od začátku.

Jaké u BLOXu nebo u nějaké jiné administračky museli dělat kompromisy, abyste splnili požadavky úřadů? Se zřetelem na ty na ty požadavky akustické, světelné. Napadá vás něco konkrétního?

Jeden velký kompromis vám hned ukážu. Když se kouknete tady na tyhle desky nahoře a oni ve skutečnosti měly být i tady v téhle té části… (ukázal fotografii realizovaného domu s protihlukovými zábranami na střeše).

Kupodivu se moc nepamatuju na environmentální kompromisy v interiéru. Samozřejmě, já neberu jako moc velký kompromis, když řešíme různý velikosti oken a tak dále, abychom se s tím světlem dostali tam, kam máme v interiéru, to není kompromis. To je běžná praxe. Ani si myslím, že to asi není kompromis, spíš najití nějakého řešení

Velké kompromisy tam jsou hned dva, ale týkají se vnějšího prostředí. Někdo si vymyslel, že tady v tomhle v tom parku od té Evropské bude strašně moc hluku.

Češi jo … zas odbočím, zaplaťpánbůh my Češi nemáme moře. Protože kdybychom to moře měli, tak bychom ho stejně měli úplně, jak to říct slušně, k ničemu, protože my bychom měli moře, pak bychom měli takový to to molo, kam přijíždějí

vždycky ty lodě a na tom molu bychom museli mít zábradlí, protože nějakému českému blbcovi by vadilo, , že z toho mola můžu spadnout, takže bychom ve skutečnosti přes to zábradlí z těch lodí nevyndali ven ty různé náklady, takže zaplať pámbu, protože my všude musíme mít zábradlí. Všude. My musíme mít upozornění, že můžu spadnout, nebo že se můžu praštit do hlavy, nebo že nemůžu vařit kočku v mikrovlnce a tak dále.

Tak si představte, že tady je městský park, okolo toho je Evropská třída. Tenhle park odjakživa byl otevřený. Žijete v městském prostředí, je celkem logický, že tady bude asi hluk, když je tady Evropská třída. Troufnu si říct, že asi není potřeba z mého pohledu tady někoho chránit, ale jo, je.

Protože se najednou zjistilo, že v tomhle prostředí bude ohromný hluk. Takže tyhle desky, které tady vidíte, jsou to hlukový zábrany, aby se přes ten barák nedostával hluk sem do toho prostoru.

A zároveň celá tahle ta fasáda, která je tak ďubkovaná, která je perforovaná, má vzadu pohltivý materiál, aby se od ní neodrážel hluk z té Evropské.

A nevím už, jak je možný, že se to podařilo, ale ty samé zabrány, které vidíte tady, měly být i tady (ukazuje travnatý předprostor na východní straně domu u chodníku). Aby do toho parku nešel hluk. Že tam nebude vidět a že to bude hnusný, to už nikoho nezajímalo. Ale naštěstí to nebylo nakonec nutný to tam udělat, takže z toho zbyly akorát tyhle hlukové zábrany, které nikdo nechápe proč. Ale nějaký český hygienik, který zrovna tou dobou nebyl zavalený covidem, si kousal nehty.

Já se omlouvám za tyhle impertinentní poznámky, ale mě to fakt sere, jo, s odpuštěním, a pak tady (východní fasáda) je tahle ta deska, která teda, když do ní řvete, tak se nic neozývá zpátky.

Tohle jsou třeba takové kompromisy? Já to zase na druhou stranu nevnímám jako kompromis. To je běžná praxe českého architekta, kdy je tu řada věcí, se kterými se my architekti se musíme popasovat a kompromis bych řekl, že je naše standardní bojové pole.

Ono je to taky vidět, že když sem přijdou nějací architekti ze zahraničí, zvučná jména, tak většinou si vylámou zuby, protože nejsou schopni v těch kompromisech pracovat. A já si vždycky říkám, že kdyby čeští architekti mohli působit někde v zahraničí, ve Francii, Španělsku, v Dánsku, v Holandsku, ale i v Polsku nebo možná i na Slovensku, že budou neskutečně dobrý.

Já jsem teď shodou okolností v Dánsku na univerzitě, a když jsem se jim pokoušela vysvětlit, jak fungují požadavky na proslunění, moc nechápali.

Jasně, protože většina Čechů věří, že za to může Evropská unie. Co mám já informace a co jsem kdy viděl, Evropská unie většinou doporučí, že bychom si měli nějakou normu stanovit a udělat a tady přijdou ty byrokratický blbové a aktivisti a začnou do toho šít natolik, že z jedničky se udělá desítka a z desítky stovka a tak dále a tak dále.

Svého času jsme jediní v Evropě měli normu na tepelný odpor oken a tak dál a zatímco všude na světě se to řešilo okno jako celek, takže se vzal průměr a tím pádem jsem neřešila ta problematická místa, nebo se řeklo dobře, tady ten rám je problematický, ale ve skutečnosti jako celek to vyhoví, u nás se ta norma vztahovala na nejproblematičtější místa. Proto vlastně v celé Evropě běžely strukturální fasády a u nás strukturálka nemohla být udělaná, protože tepelně neprošla právě v té mezeře, musel tam být rám a musel být přiznaný ten rám, ten profil.

Ještě u toho BLOXu, udělaly se potom třeba v dalších fázích projektu nějaké změny oproti studii, podmíněné nějakými požadavky, nebo klidně i z jiného důvodu?

BLOX má pohnutou historii v tomhle ohledu. Ale mimochodem to není otázka jenom BLOXu, to je otázka všech projektů, který tady jsou. My teď momentálně stavíme v Dobřichovicích bytový dům, kde od té doby, co jsme si plácli s investorem, po dobu, než se začal stavět, uplynulo rok a půl. To je strašně krátká doba na české poměry. Většina staveb vzniká v horizontu od té doby, co se začne projektovat do doby, než se kopne, v horizontu 8 až 10 let. Za tu dobu se změní spousta věcí.

Mám spoustu komických historek.

Jak jsme navrhli fasádu, která svého času byla nejlepší, a když se konečně zrealizovala, tak bylo na světě dalších asi 221 fasád, protože to, co bylo moderní v roce 2000, už opravdu v roce 2020 moderní nebylo. Mám historky, jak se začínaly projektovat baráky s danou funkcí, která tehdy byla prosazovaná a než se ten projekt dokončil, ne postavil barák, ale než se ten projekt dokončil, vládní garnitura, městská garnitura a vůbec normová garnitura se změnila tak, že nakonec ta funkce nešla prosadit, protože to, co tehdy na začátku šlo, bylo prosazované, se stalo na konci vlastně vůbec neprosaditelným. A to, co bylo na začátku neprosaditelný, se naopak totálně protežovalo.

Mám spoustu historek, jak se mění normy a jejich účinnost rychleji, tak tam zpátky tam zpátky, než vůbec jste schopná projednat jednu etapu projektu, takže vy třeba projektujete na něco a za 3 měsíce máte jinou normu, za další 3 měsíce, další a další a další, ale přitom to schvalování trvá rok a půl. Takže vy jdete s něčím, co víte, že za rok a půl možná ani nebude platit.

Takže nechci úplně říkat, že BLOX je v tomhle výjimka, nebo nechtěl bych, aby když budu vyprávět tu historii toho BLOXu, abyste si myslela, že to je něco, co je výjimečný, je to zcela standardní postup.

Na BLOX jsme vyhráli soutěž tehdy s Metrostavem tuším a udělali jsme vlastně soutěž, pak jsme udělali architektonickou studii a pak jsme udělali územní rozhodnutí, které nabylo právní moci. A v momentě, kdy nabylo právní moci, to Metrostav prodal tomu developerovi, který to nakonec postavil a ten developer nejenom že zjistil, že se mu ten první koncept nelíbí, takže jsme to překopali, byť jsme to dělali my, tak se změnil projekční tým. A kolega Hejda, který vedl tu skupinu vlastně předtím, tehdy se to jmenovalo Metrostav, Evropská nebo Evropská 11 nebo něco podobného, tak tenhle tým se vlastně změnil.

Začal jsem to dělat já s mými kolegy okolo mě, změnil se název. Změnil se klient a změnilo se i tvarosloví toho domu, protože klientovi se ten původní návrh nelíbil a navíc to územní rozhodnutí vyšlo ven s tolika podmínkami, že se musel změnit tvar. Ne, že by se změnil úplně, stále to bylo to Lko.

Ale najednou tam byly požadavky, že někde se musí s tím mnohem víc ustoupit, někde zase míň ustoupit. Někde se může udělat víc podlaží, někde míň podlaží. A jak tam vidíte vlastně takového toho hada na fasádě, tak je to všechno o tom, že ta hmota tak nějak proplouvá, kličkuje mezi těmi jednotlivými požadavky a územními limity, které tam jsou, a odstupovými limity, který tam jsou.Spíš než abychom se podřizovali nějakým environmentálním věcem, tak jsme se spíš podřizovali iniciativám. Anebo jsme se podřizovali vlastně různým odstupovým vzdálenostem, které tak různě ze všech možných stran plynuly a byly více či méně podstatné a opodstatněné.

Je něco, co vás u toho dokončeného domu překvapilo, co dopadlo nějak jinak, než jste doufali nebo plánovali?

Kdybyste se zeptala, jestli jsem s tím domem spokojený, tak vám odpovím, že správný architekt nikdy není se svým domem spokojený a mám tam spoustu věcí, který bych udělal jinak, dneska už. Nebo ne spoustu věcí, to kecám, ale třeba bych dneska už to dělal jinak.

Ale ono je to tím, že dneska už je zase jiná doba. Dneska už je to 10 let, takže to takhle nemůžu brát. Musím to brát pohledem, jak jsem to viděl předtím a tehdy, když jsme to udělali, jsme s tím byli spokojený. Vlastně hodně. Neměl bych to říkat, ale byli.

Ale vy jste se vlastně zeptala, jestli jsou tam věci, který nás nějakým způsobem překvapily. A já se při této příležitosti vždycky říkám, že mě hrozně mrzí, že dneska už je taková ta doba, kdy vlastně ten barák vidíme, dneska už i ve 3D realitě s těma brýlema na očích, který jsme si pořídili a procházíme se, asi 2 roky dozadu.

Já jsem v tom oboru už vlastně pětadvacet let a tyhle věci už trvají 20 let, nebo tak nějak. Ale pamatuji si ještě ze studií, kdy jsme tahali čáry, kde to nebylo tak, že všichni měli počítač. Když jsem přišel do práce v roce 96 nebo 95 a dostal jsem svůj vlastní počítač, tak to bylo je pro mě úplně „ty jo". Tehdy to bylo tak, že jsme dostávali počítače jenom ti, kteří na tom uměli.

Já jsem přišel ze školy a zajímal jsem se o počítače, takže jsem uměl na počítači. Dneska je to úsměvný, dneska už to umí každý. Ale ještě jsem na té škole zažil takovou tu věc, kdy vlastně malujete v ruce, děláte tu perspektivu v ruce, ale ve skutečnosti na ní není vidět úplně ta fotografická realita. Dneska vlastně už u té studie téměř uděláte vizualizaci tak, že ten barák potom, když ho vidíte v realizaci, tak vlastně nevíte, v čem se liší od té vizualizace.

A to si myslím, že má ten efekt, že ten barák vás nepřekvapí v ničem, protože bohužel ty materiály a ty různé konsekvence vidíte už poměrně časně. A na druhou stranu je to právě ta škoda. Že se člověk těší, že ho to třeba překvapí. A ono ho to nepřekvapí.

Ještě nekončíme, že ne? Ne, tak abychom nekončili tak pesimisticky.

Já si ještě k tomu dovolím dotaz, že vy vlastně mluvíte o tom, že jak ten dům bude vypadat si pomocí těch digitálních nástrojů dokážete dost dobře představit? A co nějaké jiný aspekty? Právě třeba zvuk nebo nějaký dojem z toho prostoru?

Nevím, tak jsem nad tím asi nepřemýšlel. Rovná se asi zřejmě to není tak důležitý.

Jako asi jo, sem tam něco člověka překvapí, protože když si stoupne a vidí to v reálu, tak ho to překvapí, že ta vizualizace mu nedá ten vjem velikosti té stavby. Že to furt vidí ve velmi realistických materiálech, ve velmi realistickém prostředí, ale dívá se na A3 formát, zatímco před sebou potom vidí 1 ku 1 ten barák. Ale to už se taky smývá, protože v momentě, kdy si dáte virtuální realitu a dáte si na oči ty brejle, tak to vidíte před sebou 1 ku 1 a je vám špatně, když skočíte z 5. patra dolů na chodník, protože to vidíte tak, jak to v budoucnu uvidíte.

Takový ty vůně a to, jak to zapadá do toho prostředí a jaký to má sociální aspekty, a hluk nebo respektive zvuky anebo jak to vypadá v zimě, jak to vypadá v létě by vás asi překvapilo v momentě, kdy byste vlastně nebyla u zrodu toho baráku. Ale ten zrod toho baráku, ta stavba probíhá 1 a půl roku, ať už je ten barák velký nebo malý a vy si na to máte čas asi zřejmě zvyknout, tak proto to asi nevnímám. Ono to opravdu není tak, že přijdete k hotovému baráku a teprve ho vidíte. A ještě to má ten efekt, že když dům se rodí, tak se rodí ke konci už tak relativně po malých krůčkách, velmi pomalu. Takže vy si na to zvykáte a není to tak, že přijdete do baráku a řeknete si, hm.

Tyhle efekty jsou spíš naopak, když ten barák necháte tak jako plout. A přijdete do něj, nebo přijdete k němu třeba po 10 nebo po 20 letech.

Zkoumat, jak degraduje, což vůbec nemyslím špatně, kde funguje, kde jsou vychozené chodníčky a kde zase naopak byste řekli, že to funguje blbě a ono to funguje dobře a nebo jste překvapený, že to pořád funguje dobře.

To je co nejlepší, co se může stát, ne?

No, ale stejně jste se tam překvapený. Ale máte pravdu, paradoxně asi vás spíš překvapí, když do toho projektu vstoupíte za nějakou dobu a vidíte, jak je používaný. Spíš než ten nový barák, u kterého jste.

Možná ještě je to moje ve skutečnosti blbá dobrá zkušenost, protože já jsem v DAMu vlastně od začátku, jsem byl jenom rok v PaKu, což byl Pata a Kordovští, a pak jsem pak jsem byl zlanařený a unesený do DAMu, kde působím už od roku 96.

A vlastně kdybych třeba šel někam jinam a třeba bych si čuchnul k nějakému projektu a pak bych přišel za rok za dva, protože bych dělal někde jinde, a pozvali by mě kolegové, abych si prohlídl nějakou stavbu, u který jsem byl u zrodu, ale pak jsem tam dlouho nebyl a pak jsem tam přišel, až byla realizovaná tak asi jo, ale tuhle zkušenost já vám nedokážu zprostředkovat čistě z důvodů mých individuálních zkušeností, a to z toho důvodu, že vlastně u každé stavby jsem měl možnost být na začátku a dokončit ji až do konce.

Co si myslíte, že architekt potřebujete vědět, nebo co by měl architekt znát ze stavební fyziky a věcí, které se k tomuhle vztahují? Samozřejmě chápu, že na to máte specialisty, ale i třeba na to, abyste s nimi byli schopný efektivně komunikovat?

Já si myslím, že to je hodně individuální, protože existují lidi, i mezi náma, nás je 5 společníků a myslím si, že každý z těch kluků by vám řekl trošku něco jiného.

Já se domnívám, že mentální kapacita jednotlivce je relativně dost omezená. A že současný svět funguje na principu rozdělení jednotlivých kompetencí, funkcí a tak dále, protože fungování v dnešní společnosti je tak komplikovaný a složitý, že vlastně to nemůže obsáhnout jeden člověk. Že je strašně hezká taková ta představa toho úplně antického architekta, který uměl na jednu stranu, otesat kámen a na druhou stranu předpovědět zatmění slunce nebo měsíce.

Ale dneska už to tak nefunguje a ono úplně stačí na to, abyste chtěla kreslit, tak musíte na profesionální úrovni znát 5, 6 docela složitě ovládajících se programů, a to vám ten mozek zavaří natolik, že vlastně do toho brát další a další a další aspekty toho baráku dost dobře není možný.

Já si dokonce myslím, že znát tyhle věci hodně podrobně může být pro obecně pro tu profesi vlastně škodlivý. To jsou takový moje kecy, který čistě může vyvrátit kdokoliv jiný, ale už několikrát se mi potvrdilo i třeba u jiných lidí, že když vlastně dělají pořádně svojí práci, tak vlastně do těch ostatních oborů, čím vzdálenější ten obor je, tím do něj v dobrém slova smyslu přestávají vidět, protože opravdu už nejsou schopný pojmout ten další obor.

A že v momentě, kdy se ho snaží pojmout, vlastně zas na druhou stranu kašlou na tu svojí hlavní činnost, a to je blbě. A to je jeden aspekt, že si sám vlastně škodím, že se ochuzuju o možnost dělat pořádně tu svojí práci.

A druhá věc je, že samozřejmě, když se začnu zajímat o tyhle věci, tak si začnu vlastně dělat svoje přímé představy o věcech, které neznám úplně, a to může být zase devastující proto, protože nepřijmete nějaké další myšlenky od člověka, který tomu ale opravdu rozumí.

Mimochodem na tohle jsou specialisti Češi, vědět všechno a s chutí se montovat do věcí, kterým opravdu hovno rozumím. To je celý český náš národ, v momentě máme plnou republiku chirurgů, plnou republiku stavebních inženýrů, raketových inženýrů a tak dále.

Já osobně si myslím, že se švec má držet svého vlastního kopyta, a tudíž myslím si, že je dost prostoru v architektuře, kterému by se člověk měl věnovat a musí věnovat a musí se věnovat

opravdu odpovědně. Tak pak zjišťujete, že architekt, který je schopen obsáhnout technologii různých sofistikovaných, co já vím, tepelných čerpadel a všech těchto věcí anebo nějakou environmentalistiku, anebo si hlídá nějaké technologické věci, tak pak najednou mu uteče, že má, co já vím, blbou barvu na blbém místě.

No nebo mu utečou koncepční konceptuální proporční detaily v baráku. Znám spoustu svých kolegů, kteří jsou úžasní ve stavařině, ve statice, v technologiích, kteří se vyznají různém plánování a tak dále. A pak jim utíkají věci, kdy si člověk říká, člověk, kdyby míň uvažoval o tom, jaký materiál tam dá, ale spíš by uvažoval o tom, jak ho ze své architektonický části použije, bylo by to lepší.

Mimochodem, to je vlastně důvod, i když já jsem to nechtěl, ale proč učím na ARCHIPu architekture detail. Což je vlastně věc, kdy učím ty lidi se dívat na architektonické detaily z hlediska architektury, a nikoliv z hlediska konstrukcí. Ve skutečnosti mě nezajímá, jestli dokážu ten hřebík zabouchnout do betonu nebo ne. Ale jestli ten hřebík bude, nebo nebude vidět. V tomhle předmětu tedy.

Samozřejmě nebudu mlátit měkký hřebík do betonu, ale myslím si, že pro mě jako architekta je fakt důležité, jestli ten hřebík bude vidět. A jestli se dá použít, nebo nedá použít k fixaci, to ať mi řekne stavař specialista.

Multifunkční hele to je myslím, že v někdy na přelomu minulého a předminulého století nějaký člověk si nechal patentovat nůžky, které uměly asi 999 věcí a jednou z jejich velmi špatných vlastností bylo, že neuměly stříhat. Tohohle bych se jako architekt nechtěl dožít.

English translation of interview with Jan Holna:

I'd like to ask you some questions about the BLOX project. Specifically on the indoor environment of the building, that is, in terms of light, especially daylight, acoustics, that is, mainly, I guess, noise protection, air quality and thermal quality. Is it directed towards what do you architects address in those projects or what do you have to look out for in those things? And what specifically did you address on this project?

I would start with an interesting experience that I had about a week ago when I got a call from a client, an investor, asking if we would be interested in a residential project, a classic development project, that we have experience and we have done some residential projects for developers. And he asked me if we also had experience with zero carbon footprint projects, environmentally conscious projects. And I actually found out that what is commonplace in office buildings is not commonplace at all in apartment buildings. That while apartment buildings play quite a bit on some zero footprint and those things, but it's actually that nobody wants it. Apart from some, pardon, stupid energy label, nobody's actually asking for it. Especially nowadays, when basically all of the apartments are sold, none of the developers are looking for the houses to be environmentally friendly.
For the simple reason that the price/performance ratio wins, the houses are sold, they are not rented out, the developer doesn't keep them, so he doesn't really care in a way what he sells. Paradoxically, the apartment buildings that have just that zero carbon footprint and are featured in various magazines and so on, are even more talked about. But there are so few of them.
Where I want to get to is that actually, whereas with the apartment buildings, everybody notices, or it's a big topic, how to make the building zero footprint, but you don't actually do it because nobody will pay for it, in the office buildings it's exactly the opposite.
Here nobody asks if the office building has a footprint and so on. Why? Because in fact those office buildings have world-class ratings that end up turning them into quite green buildings.

So actually all of these office buildings, whether or not they are built with any attempt to be green, are actually subconsciously or subliminally forced to be relatively pretty green buildings.

Going back to your basic question, how does ecology, the environment, get imprinted into BLOX, and it could be trivialized, how does it get imprinted into all of our office buildings and all of our office buildings, and how does it get imprinted into the various facades, the construction, and the technology, I would say one single thing, and that is that about 10 years ago, maybe even more, all these office buildings suddenly started to be built under the supervision of principles that take into account the environment, that take into account the building, that take into account the operation, that take into account the construction, and those systems are well known.

They are LEED or BREAM or maybe there is a Czech certificate. In addition to LEED and BREAM, which are the most important and best known, there are other certifications. But these are the most well-known ones and every single building that we are building today is incorporated or classified into this system, whether it is LEED or BREAM. That system or that certification will force all the stakeholders, starting with us and ending with the investor and the developer, to make a building that is relatively emission-free and low-energy.

On the other hand, the fact is that most of these systems or certifications, everybody would think that getting the highest

certification means having some wind turbines up there and getting water from the morning dew and being self-sufficient and so on. And it's not, because in fact, in terms of construction, I feel, and the certification systems suggest that, and I believe that's right, that far more than implanting some relatively demanding wannabe green technology, you're going to meet that green credential by not shipping the glass that you're shipping over half of Europe over there, but shipping it from the next town at most.
And strangely enough, both LEED and BREAM actually keep that in mind. And what we're finding is that in order to make the house economical and at the same time to make it green and at the same time to make it have the smallest footprint, it's not about putting in some flashy technology that, as I say, boils water out of the air, it's about just actually making an honest house out of materials that are preferably from nearby provenance.
And you get the ratio right between glass walls and solid walls and so on. Of course, the icing on the cake is that you can improve it a little bit by putting more boxes on the roof for grouse or for swifts or something like that. Now, they're already the kind of thing that's rather amusing.
We've found that in order for those office buildings to comply with those certifications, hence to comply with some proper view of ecology, rather than putting in some crazy sophisticated technology, you just have to comply with standards, like the Czech ones, which are more papal than the Pope and it's important from my point of view to follow relatively simple logical statements, judgments in design and in construction. And you will get an honest house made of honest materials, simple materials, logical materials, logical construction. Which will help the ecology far better than if you put one, I don't know, wind power plant on this house.

When I get back, BLOX is one of the first buildings, if not the first in the Czech Republic, that has the highest certification from BREEM. Why BREEM? Because at one time, as far back as I can remember, the decision was between BREEM and LEED and that Czech certification.

LEED is American, BREEM is English.

So somehow the BREEM worked better in this European environment than the LEED, maybe it was also because the highest LEED specification was already in another building at that time, also ours, Main Point Karlín, so the investor decided for BREEM, because the Czech certification was not yet here and is not really known yet.

The highest BREEM certification itself says that the building must be low-energy, but I must admit, I haven't really seen much of any special, windows or special construction being done there because of BREEM. In fact, I've never seen a situation where they've said, 'look, the window has to have such and such parameters according to the building regulation, but according to this BREAM it has to have much higher parameters'.

I think that those certifications, both the LEED and the BREEM, are set up so that, as I said at the beginning, if you take a window that works to the Czech ordinance or the Czech standard, you get into that BREEM or LEED. So there's nothing quite that world-class.

You know what, for example, if you make a glass façade towards Evropská street, and you have glass areas that are from floor level to ceiling level, they have to have some kind of safety specification, where actually the glass is so heavy and has such safety properties that it immediately generates at the same time noise barrier properties and so on. It is not rocket science, there are a number of things that have their own logic and their own correlation.

I'll digress again, nowadays when we do apartments, most of those apartments, so that they don't mold and rot...

I always say that the Czech construction industry, unlike doctors, lawyers, teachers, various initiatives and so on, can't speak up and assert their interests in government, and even Czech developers can't assert their interests. I suspect there is only one faction that can. And that is the suppliers of various materials, especially polystyrene or something similar.

Otherwise, I cannot imagine that they have managed to enforce such complex, and such high standards of insulation, that these buildings are so extensively insulated, and so heavily sealed, that they get moldy.

And any sane person would say, well, if it's going to get moldy, let's reduce the amount of polystyrene. Or we allow the natural infiltration to be higher. That wouldn't work because they probably wouldn't sell as much polystyrene and as much caulking, so they came up with a brilliant move. That you have to put forced ventilation, air vents and so on, into every flat that faces any direction in the world, anywhere, because otherwise it would rot by the way you have it all closed up.

Which again is extra money but it's great isn't it, so we in the framework of ecology and this is it, in the framework of stupid ecology we're going to come up with this rubbish. And it helps us, because if you think about it, you actually have to have these air vents everywhere, on every flat nowadays.

Anywhere, so then when we build a building that's on a street where the tram goes, 15 years ago we were still tearing our hair out because the side that faced the tram had to be God knows how acoustically insulated, and today it's not. Nowadays, you just put a normal building there with a well-insulated facade, with well-sealed glass, and the facade, because it's so fluffy and thick, doesn't let even a little bit of the cold in.

At the same time, of course, it meets quite a lot of acoustic requirements and therefore, a normal façade, practically put anywhere, is able to muffle the tram noise. So back to the trees.

Look, the building is perfectly normal, you just have to comply with our standards, which are very strict. And then you have to put in glass that would be considered in other parts of Europe, for example, incredibly environmentally friendly and incredibly noise-protective or temperature-protective and so on. Here, you just have to comply with Czech standards.

Let me come back to the certification schemes. LEED and BREAM. In recent years, there have been requirements for things that affect the health of the occupants. Daylighting, air quality, etc., or some of them have always been there, but I know that in the later versions, for example, daylighting, there's more of it.

Have you seen any change in that direction, those requirements?

Quite frankly, we make a house, we design it and then we have our lighting specialist go through it to see if it's adequately daylighted, it used to be, or not in Prague anymore, but somewhere else, if it's adequately sunlit as far as apartments are concerned.

Office buildings have the added advantage of being able to use combined lighting, of course it is not completely universal. But there you calculate that in addition to natural lighting you can also have artificial lighting and mix it and all these things are of course solved with a specialist.

And if he says to me one fine day, we did it this way in February, but in March it's a different standard, I'll say, well, do it to a different standard.

Of course, we have generally, and this is not just for BLOX, we have more and more demands on lighting as time goes on, but on the other hand, the fact is that in Prague specifically there are Prague building regulations which have thrown out the necessity to light up flats, which I think is complete bullshit. The necessity to provide sunlight to an apartment is a relic. Sometimes from the beginning of the last century when cities looked very different.

And it's gotten to the point where these cities, because of these huge distances, have become cities that are completely artificial, without social ties and so on. So with the PSP (Prague Building Regulations), maybe it's come back a little bit.

But if we're talking about office buildings, that's really where you give it to a specialist who calculates it and mixes natural with artificial lighting. And that we would feel any greater demands or any exponential or any jump increase, no.

But every one of those buildings, every one of those office buildings, every one of those apartment buildings is being assessed. Every time we do hotels, we're like great, we don't have to do anything here because hotels are not actually permanent residences, so we don't have to figure out the level of lighting inside the hotel rooms there and we're fine with the project.

This leads me to another question about professionals and specialists, at what stage of the project are you bringing them in, or specifically for this one, and of course specialists in light, acoustics, air quality, and HVAC in general?

The lighting engineers go immediately, for apartment buildings it is even not an exception if we configure the volume of the apartment building according to the light model. So there they even determine the mass of the house, the mass of the study, you could say they go first.

As for the other specialists, they come in sometimes already in the study and so on. But it's not because of environmentalism, it's more because we need to check, for example, what kind of heating system is going to be there, in relation to how big the shafts are going to be.

Or how much space we'll need in the technological support rooms of the building, so we're actually talking to specialists right from the start. It's not like we're going to do the study without specialists, the planning permission might need someone here and there, and so on. We work closely with the specialists right from the beginning.

What compromises did you have to make at BLOX or any other office building to meet the authorities' requirements? With regard to those acoustic, lighting requirements. Can you think of anything in particular?

I'll show you one big compromise right now. If you look at these boards up here and they were actually supposed to be in this part of the... (he showed a photo of the completed house with noise barriers on the roof).
Oddly enough, I don't remember much environmental compromise on the interior. Of course, I don't take it as a very big compromise when we're dealing with different window sizes and so on to get the light where we need it to be in the interior, that's not a compromise. That's a common practice. I don't even think it's probably a compromise, it's more about finding a solution
There are two big compromises there, but they are related to the exterior environment. Somebody figured there's going to be an awful lot of noise in this park from the Evropská street.

Czechs, right ... I'll digress again, thank God we Czechs don't have the sea. Because if we had the sea, we would have it anyway, how to say it politely, for nothing, because we would have the sea, then we would have this pier where the boats always come and we would have to have a railing on that pier, because some Czech idiot would be worried that I might fall off that pier, so we wouldn't actually be able to get the various loads out of the boats through the railings, so thank goodness, because we have to have railings everywhere. Everywhere. We have to have warnings that I can fall, or I can hit my head, or I can't cook the cat in the microwave, and so on.
So imagine there's a city park, there's a Evropská street around it. This park has always been open. You live in an urban environment, it's quite logical that there's probably going to be noise when there's Evropská street. I dare say there's probably no need to protect anyone here from my point of view, but yeah, there is.
Because it's suddenly been established that there's going to be a huge amount of noise in this environment. So these panels that you see here, they're noise barriers to keep the noise from coming through the building into the area.
And at the same time, this whole facade, which is so dimpled, which is perforated, has an absorbent material in the back so that the noise from Evropská doesn't bounce off of it.

And I don't know anymore how it was done, but the same barriers that you see here should have been here (showing the grassy foreground on the east side of the house by the sidewalk). To keep the noise out of the park. That it wouldn't be visible and that it would be ugly, nobody cared anymore. But fortunately it wasn't necessary to do it there in the end, so all that's left is these noise barriers that nobody understands why. But some Czech hygienist, who wasn't overwhelmed with covid at the time, was biting his nails.

I'm sorry for these impertinent remarks, but it really pisses me off, yeah, with forgiveness, and then there's this slab here (east facade) that, well, when you shout into it, it doesn't echo back.

Are these, like, compromises? I, on the other hand, don't see it as a compromise. This is a common practice of the Czech architect, where there are a number of things that we architects have to grapple with, and compromise I would say is our standard battlefield.

It's also evident that when some architects from abroad come here, big names, they usually break their teeth because they are not able to work in those compromises. And I always think that if Czech architects could work abroad, in France, Spain, Denmark, Holland, but also in Poland or maybe even in Slovakia, they would be incredibly good.

I happen to be at university in Denmark right now, and when I tried to explain to them how the sunlight requirements work, they didn't really get it.

Right, because most Czechs believe that the European Union is to blame. As far as I have information and as far as I have ever seen, the European Union usually recommends that we should set a standard and here come these bureaucratic morons and activists and they start messing with it so much that one becomes ten and ten becomes a hundred and so on and so forth.

At one time we were the only ones in Europe that had a standard for thermal resistance of windows and so on and whereas everywhere else in the world it dealt with the window as a whole, so you took the average and that way you didn't deal with the problem areas, or you said well, this frame here is problematic but actually as a whole it will comply, here the standard applied to the most problematic areas. That's actually why all over Europe they were doing structural façades and, in our country, the structural façade couldn't be done because it didn't that particular gap didn’t comply, the frame had to be

there and the frame had to be uncovered, the profile had to be uncovered.

As far as BLOX is concerned, were there any changes made in other phases of the project compared to the study, due to some requirements, or for other reasons?

BLOX has a tumultuous history in that respect. But by the way, this is not just a question of BLOX, this is a question of all the projects that are here. We are currently building an apartment building in Dobřichovice, where a year and a half has passed from the time we shook hands with the investor to the time when construction started. That's an awfully short time by Czech standards. Most of the buildings are built in a timeframe of 8 to 10 years, from the time we start designing to the time we dig. A lot of things change in that time.

I have a lot of comic stories.

How we designed a facade that was the best facade at the time, and when it finally came to fruition, there were about 221 more facades because what was modern in 2000 was really not modern in 2020. I have stories of how we started designing buildings with a particular feature that was being pushed at the time and by the time the project was finished, not the building was built, but by the time the project was finished, the government establishment, the city establishment, and the norm in general had changed in such a way that in the end the feature couldn't be pushed because what was promoted at the beginning became actually not promoted at all at the end. And what was impossible to implement at the beginning became totally promoted.

I've got a lot of stories of how standards change and their effectiveness changes faster back and forth than you're even able to get through one phase of a project, so you're designing for something, for example, and 3 months later you've got another standard, and another 3 months later, and another and another, and yet it takes a year and a half to get it approved. So you're going with something that you know in a year and a half it might not even be valid.

So I don't want to completely say that BLOX is an exception to this, or I wouldn't want when I tell you the history of BLOX to make you think that this is something that is exceptional, it's a completely standard procedure.

We won a competition for BLOX at that time with Metrostav I think and we actually did the competition, then we did the architectural study and then we did the planning permission which became effective. And the moment it became legal, Metrostav sold it to the developer who eventually built it, and the developer found out that he didn't like the first concept, so we redid it, even though we still did it, the design team changed. And my colleague Hejda, who was the head of the group actually before, it was called Metrostav then, European or European 11 or something like that, so that team actually changed.

I started to do it with my colleagues around me, the name changed, the client changed and the morphology of the house changed because the client didn't like the original design and also the planning permission came out with so many conditions that the shape had to change. Not that it changed completely, it was still the L shape.

But all of a sudden there were demands that somewhere you have to concede a lot more, somewhere you have to concede less. Somewhere you can do more floors, somewhere less floors. And as you actually see that snake on the facade there, it's all about that mass kind of floating, zigzagging between those individual requirements and the zoning limits that are there and the distance limits that are there, so rather than being subject to some environmental things, we were more subject to initiatives. Or we've been subjecting ourselves to actually different distance limits that have come so differently from all different directions and were more or less substantial and justified.

Is there anything that surprised you about the finished house that turned out differently than you had hoped or planned?
If you ask me if I'm happy with the house, I'll tell you that a proper architect is never happy with his house and there are a lot of things I would have done differently today. Or not a lot of things, but maybe I would do it differently today.
But it's because today is a different time. It's been 10 years now, so I can't take it that way. I have to take it in the perspective of how I saw it before and back then when we did it, we were happy with it. A lot, actually. I shouldn't say that, but we were.
But you actually asked if there were things that surprised us in some way. And I always take this opportunity to say that I'm terribly sorry that it's kind of that time now where we actually see the house, nowadays, even in 3D reality with those glasses on our eyes that we got and we're walking around, about 2 years ago.
I've actually been in the business for 25 years and these things have been going on for 20 years or so. But I remember back in my college days when we were drawing lines, where it wasn't like everybody had a computer. When I came to work in '96 or '95 and I got my own computer, I was like, "Oh yeah". Back then it was that only those of us who knew how to use it were given computers.
I came out of school and I was interested in computers, so I knew how to use a computer. It's funny now, everybody can do it nowadays. But I still had that thing at that school where you're actually drawing by hand, you're doing the perspective by hand, but you're not really seeing quite the photographic reality of it. Nowadays, actually, with the study, you almost make a visualization so that the building, when you see it in the realization, you don't really know how it differs from the visualization.

And I think that has the effect that the building doesn't surprise you in any way, because unfortunately you see the materials and the different consequences quite early on. And on the other hand, that's the pity. That you look forward to being surprised. And it doesn't surprise him.

We're not finished yet, are we? No, let's not end on such a pessimistic note.

Let me ask you another question about that, you're actually talking about the fact that you can imagine pretty well what the house will look like using these digital tools? What about some of the other aspects? Just the sound, for example, or some kind of impression of the space?

I don't know, I guess I didn't think about it. It's probably not that important.

Like I guess it is, every now and then something surprises you because when you stand and see it in real life, it surprises you that the visualization doesn't give you that sense of the size of the building. That he's still seeing it in very realistic materials, in a very realistic environment, but he's looking at an A3 format, whereas then he sees 1 to 1 of the building in front of him. But that's getting washed away too, because the moment you put on virtual reality and you put those goggles on your eyes, you see it 1 to 1 in front of you and you feel bad when you jump down from the 5th floor to the pavement because that's how you're going to see it in the future.

So the smells and how it fits into that environment and the social aspects of it and the noise or the sounds or what it looks like in the winter, what it looks like in the summer would probably surprise you at the point where you wouldn't actually

be at the birth of that building. But the birth of the house, the construction of the house takes 1 and a half years, whether the house is big or small, and you have time to get used to it, I guess, so that's why I don't see it. It's not really that you come to the finished house and you just see it. And it also has the effect that when a house is born, it's born towards the end in relatively small steps, very slowly. So you get used to it, and it's not like you go to the house and say, hm.

These effects are more like the opposite of letting the house just sort of float. And you come to it, or you come to it after 10 or 20 years.

To examine how it degrades, which I don't mean in a bad way at all, where it works, where there are well-trodden paths and where, on the contrary, you would say it works badly and it works well or you're surprised that it still works well.

That's the best that can happen, right?

Well, but you're still surprised there. But you're right, paradoxically, you're probably more surprised when you go into the project after a while and see it being used. Rather than the new house you're at.

Maybe still my actually stupid good experience, because I've actually been in DAM since the beginning, I was only in PaK for a year, which was Pata and the Kordovskýs, and then I was lured and kidnapped into DAM, where I've been since '96.

And actually, if I would go somewhere else and maybe get a sniff of a project and then I would come back in a year or two because I would be working somewhere else, and I would be invited by colleagues to see a building that I was at the birth of, but then I wouldn't be there for a long time and then I would come back, when it was finished, I guess, but I can't convey that experience to you purely because of my individual experience, and the reason is that I've actually had the opportunity to be at the beginning of every building and finish it.

What do you think an architect needs to know, or what should an architect know about building physics and things related to that? Of course, I understand that you have specialists for that, but also maybe to be able to communicate effectively with them?

I think it's very individual because there are people, even between us, we're 5 partners and I think each of those guys would tell you a little bit different.

I think the mental capacity of an individual is relatively quite limited. And that the contemporary world operates on the principle of the division of individual competencies, functions and so on, because the functioning in today's society is so complicated and complex that it can't really be encompassed by one person. It is very nice to think of the ancient architect who could, on the one hand, cut a stone and, on the other hand, predict a solar or lunar eclipse.

But today it doesn't work like that anymore, and it's quite enough to want to draw, you have to know 5, 6 quite complicated programs at a professional level, and it messes up your brain so much that actually taking more and more and more aspects of the house into it is pretty much impossible.

I even think that knowing this stuff in great detail can actually be detrimental to the profession in general. That's kind of my rant, which purely can be refuted by anybody else, but I've had it confirmed several times with other people, for example, that when they actually do their job properly, they actually stop seeing into those other fields the further away that field is, in a good way, because they really can't take in that other field anymore.

And that by the time they try to embrace it, they're actually on the other hand, they're not doing their core business, and that's stupid. And that's one aspect that I'm actually hurting myself, that I'm depriving myself of the opportunity to do my job properly.

And the other thing is that, of course, when I start to get interested in these things, I actually start to make my own direct ideas about things that I don't know completely, and that can be devastating again because you don't take some more ideas from a person who actually understands it though.

By the way, this is what Czechs are specialists in, knowing everything and readily assembling into things I really don't understand shit about. That's our whole Czech nation, at the moment we have a full republic of surgeons, a full republic of civil engineers, rocket engineers and so on.

I personally think that a shoemaker should stick to his own hoof, and therefore I think that there is enough space in architecture that one should and must devote oneself to, and must devote oneself to in a really responsible way. So then you find that an architect who is able to embrace the technology of various sophisticated, what do I know, heat pumps and all these things, or some environmentalism, or keeping an eye on some technological things, then all of a sudden he gets away with having, what do I know, a wrong colour in the wrong place.

Well, or he misses the conceptual proportional details in the house. I know a lot of my colleagues who are amazing at structural engineering, statics, technology, who are great at all kinds of planning and so on. And then they run out of things where you think, man, if they would think less about what material they put in, but rather think about how they're going to use it from their architectural part, it would be better.

Anyway, that's actually the reason, although I didn't want to do it, but why I teach architectural detailing at ARCHIP. Which is actually the thing where I teach these people to look at architectural detail in terms of architecture and not in terms of structures. I don't really care if I can slam the nail into the concrete or not. But whether or not the nail will be visible. In this subject, then.

Obviously I'm not going to pound a soft nail into concrete, but I think it's really important to me as an architect whether the nail will be visible. And whether or not it can be used for fixing, I'll let a specialist builder tell me.

Multifunctional hey that's I think sometime around the turn of the last century some guy patented a pair of scissors that could do about 999 things and one of their very bad features was that they couldn't cut. I wouldn't want to live to see that as an architect.

Office Building Konplan (interview with the architect)

Interviewee: Jiří Zábran (architect)

Interviewer: Kristýna Schulzová

Datum a čas: 25. 2. 2022 12:00

Online, MS Teams

Original interview with Jiří Zábran in Czech (part related to Konplan):

KONPLAN na Borských polích. Taková kovová budova. Z hlediska stavební fyziky jako něco neskutečného. Jo, tam jsou vlastně ty lamely, který s tím něj ten interiér a jsou natočený tak., že od 8 hodin do půl 4 stíní. Protože pak mají jít lidi domů, oni ty manažeři německý, je tam trápí večer. Já jsem říkal ne, večer tam svítí sluníčko, půjdete domů, tak ty jsou na natočený proti slunci a je to je to je to. Myslím si, že to je i nízkoenergetický. Celý je to nějak počítaný, akustika se tam hodně řešila.

Já jsem ten Konplan dělal pro Němce z Neutramberku u Řezna a tam je mateřská obrovská firma. Oni si postavili novou administrativní budovu. Ta je hrozná, ta je prostě blbá no, a když viděli, co se tady postavila jejich dceřiná společnost? Tak jako z toho byl špatný a vyhlásili soutěž na novou budovu a pak to teda jako zkolabovalo tím covidem.

Tam ta stavební fyzika sehrála zásadní roli v tom designu té budovy.

Tam to dělal inženýr Kott, já jsem z ní byl úplně hotovej, my jsme byli jako oheň a voda. On byl prostě přes ty normy, přes to nejel vlak prostě a já jsem byl úplně free.

Němci šli právě docela za mnou, ale on o té stavební fyzice zase na druhou stranu ví všechno, on učil a pak šel rovnou do praxe. Takže my jsme ten strašně jako nepohodli, ale ve výsledku ta budova prostě funguje a já zpětně musím říct, že on odvedl skvělou práci. Nicméně když by to bylo podle normy, tak to je. Jako blbý no, takže tam jako bojoval ale sedlo si to. Tak tam by zase bylo spoustu informací z jeho strany zajímavej. No to by to by určitě.

Takže on měl tendenci mi povídal do architektury a já jsem zase měl tendenci mu povídat do toho, do té vzduchotechniky, kterou zvolil podle mě nešťastně v podhledech. Já jsem je pak nechtěl tam jako v tom pohledu celý jako probíhá jak vzduch a celý to nějak funguje, jsou tam mimochodem chlazené stropy, což je docela taky taková technologie, netradiční nebo ne běžná.

A jako je to docela zajímavě vyřešený dům podle mě. Jako že i on tam použil spoustu jako z hlediska té stavební fyziky, jako hlavně na to chlazení, Tak to má vymyšlený pěkně, i když já jsem byl proti, protože to bylo na úkor třeba toho, že tam musely být podhledy, jo.

Takže nemohli být přiznaný ty technologie?

Nemohly být přiznány. No ale ta budova prostě funguje, jako ve finále je to fakt pěkný. Já si myslím, že i na webu je pár fotek z toho.

Ten architekt by měl být víc cvičený na ten příběh. A jako je to že jsem to založil na ty pracovní době a na tom na tom sluníčku, a na těch vlastně svislých lamelách. To stínění, když by bylo vodorovně, tak je to úplně jinak.

A najednou to prostě ta budova jako dostala krásnej šmrnc, ona se tak krásně jako chová, když jako odjíždíme autem, ale on je poblíž kruháči, tak ona se pořád mění. Tím, že se ty lamely uzavírají, otvírají a v tom je to prostě skvělý.

Šperk jo až bych řekl. No tak s tím mám určitě radost, no.

A teď je to stínění, to probíhalo prostě my jsme vyrobili tu lamelu. Já jsem jí nechal vyrobit kamaráda zámečníka a vzal jsem jí těm Němcům na ukázku, protože to nikdy neviděli. To je vlastně z toho tahokovu, jestli vybíral, jak moc to teda bude vrhat ten stín, aby to nedělal, že ty takový ty mezery sluneční?

No pak dokonce musel přijet jeřáb a na pozemku to vyvěsil do výšky a ty Němci se přijeli podívat z Německa. Jestli to takhle bude dobrý, nebo jako spoustu příběhů k tomu jo.

English translation of interview with Jiří Zábran (part related to Konplan):

KONPLAN in the Borská Pole. It's a metal building. In terms of building physics, like something unreal. Yeah, there's actually these lamellas that shade the interior, and they're angled so that from 8:00 to half past 4:00 they shade.
Because then they've got people at home, they've got these German managers, they're keeping them at work till the evening in the evening. I think it's low energy as well. It's all calculated somehow, the acoustics have been addressed a lot.
I did the Konplan for the Germans at Neutraubling near Regensburg, and the parent company there is huge. They built a new office building. It's terrible, it's just stupid, and when they saw what their subsidiary had built here? So like it was bad and they put out a competition for a new building and then it like collapsed with that covid.
That's where the building physics played a major role in the design of that building, right?
Kott was the engineer there, and I was completely blown away by it, we were like fire and water. He was just over the standards, the train didn't go through it, and I was completely free.
The Germans were quite behind me, but on the other hand he knew all about the building physics, he used to teach and then he went straight into practice. So we had a terrible disagreement, but in the end the building just works and I have to say in retrospect that he did a great job. However, if it was up to standard, it would have sucked, so I kind of struggled there but it clicked. So there would have been a lot of interesting information on his part again. Well, it would be, I'm sure.
If we could get in touch with him as he was teaching, he'd probably be happy to tell you something.
I'm sure it's good, because he's there. I, when I wasn't at the review day, he was like, let's do it this way because this looks nice. Well that was totally wrong, I just basically told them that when he tells you something and gives you a choice of 2 options and he's going to vote for 1 pick the other one because that was totally wrong. So he had a tendency to interfere with my architecture and I in turn had a tendency to interfere with his HVAC, which I think he chose unfortunately in the suspended ceilings. I didn't want them. There's like in that ceiling the whole like air is going through and the whole thing works somehow, there are cooled ceilings by the way, which is quite such a technology, unconventional or not common.
And like it's a pretty interestingly designed house in my opinion. Like he used a lot of interesting solutions in terms of the building physics, like especially for the cooling, so he's got it worked out nicely, although I was against it because it was at the expense of, like, having to have false ceilings.

So the technology couldn't have been exposed?
They couldn't have been exposed. Well, the building just works, like, the final is really nice. I think there's a couple of pictures of it on the website.
And just exactly like the design of the facade like in terms of the shading and what you just said that it should match the hours of operation, how does it work, the light?
The architect should be more trained on that story. And like the fact that I based it on the working hours and the sunlight and the actually vertical lamellas. The shading, if it was horizontal, it's completely different.
And all of a sudden it just like gave the building a beautiful, it's just like, it's acting so beautiful when we're like driving around it, but it's near the roundabout, so it's always changing. The way that the lamellas are closing, opening up, and that's just great.

There are photos on the website at different times of the day and there are some photos where the sun is setting and it looks absolutely fantastic, the facade.
It's a jewel, yeah, I'd say. Well, I'm certainly happy about that.
And now the shading, it was just we made the lamella. I had a locksmith friend make it and I took it to the Germans to show them because they'd never seen it. It's actually made out of stretch metal, so we were picking out how much it was going to cast that shadow so that it didn't make, you know, those kind of sun gaps?
Well then he even had to have a crane come and hang it up high on the property and these Germans came from Germany to look at it. If that's how good it's going to be or like a lot of stories to it yeah.
And that was also like maybe worth mentioning. Well, I guess that's one to look at too.

Office Building Konplan (interview with chief project engineer)

Interviewee: Jiří Kott
Interviewer: Kristýna Schulzová
Datum a čas: 6. 5. 2022 11:00
Online, MS Teams

Original interview with Jiří Kott in Czech:

Co pro Vás znamená vnitřní prostředí budov?

Budova musí být použitelná, musí tedy mít příjemné prostředí. Záleží, o jakou budovu jde, jestli o školu, jsou specifické požadavky, specifikované normami. České normy jsou velmi podrobné, slouží jako návod pro projektanty, aby se v budovách dalo žít.

Vnitřní prostředí má řadu složek, osvětlení, hluk, teplota, znečišťující látky.

Stavebnictví je vždy otázka času a peněz. Záleží, jak vysoký standard chtějí z hlediska užívání.

Byly v zadání projektu administrativní budovy firmy Konplan nějaké specifické požadavky na vnitřní prostředí? Nebo se vycházelo z norem?

Je rozdíl, jestli to investor staví pro sebe, nebo jako developer, který projekt následně prodá či pronajme, nebo státní správa.

Pro sebe – ví co chce, kolik na to má peněz, investuje do kvalitnějšího provedení, aby mu vydrželo.

Developer má přístup „levně postavit, draze pronajmout nebo prodat“ , tlak na minimalizaci nákladů a komfortu.

Státní správa jede striktně podle norem.

Konplan je česká pobočka německé firmy Krones, v Plzni předtím sídlili v prostorách pronajatých, Avalon openspace, rozrůstali se, hledali kam se přesídlit, že si postaví svoji budovu, kde budou fungovat, koupili si areál na Borských polích, kde už byly navržené 6+3 budovy od developera, našim zadáním upravit areál aby jim vyhovoval.

Valbek byl generální projektant, dělala se zastavovací studie, kterou dělaly 2 architektonické týmy, architekt Zábran a jeho tým a druhý architekt Kouřim, starší a mladší.

Investor chtěl i administrativu i zkušební halu drobnější, na základě zastavovací studie se investor rozhodl pro Zábrana, který tam byl jako subdodavatel

Krones je Německý investor, různé věci po světě (svoje budovy i třeba pivovary a stáčírny nápojů kompletní nápojové linky, klient třeba Pilsner Urquell, Kofola etc.)

V Plzeňské pobočce jsou zaměstnanci strojaři, inženýři, elekroinženýři, IT, servisáci, zprovozňují po světě, projektanti, budova pro kolegy projektanty, aby byla hezká,

Němci si najali konzultační kancelář z Mnichova, pomáhali investorovi řídit projekt (čas, finance), na začátku pomáhali definovat jaká má budova být, připomínkovali, Němci mají v Neutraublingu (vedle Řezna mateřský areál, velká administrativní budova ne úplně stará, ukazovali, co se jim líbí a nelíbí, co by měli rozvinout a čeho se vyvarovat, co by si představovali, našeptávali do projektu.

Přání investora na IEQ: řečeno způsob vytápění a chlazení: přání aby přívod vzduchu do interiéru přes stropní vyústky Inducool výdechové jednotky, přivádí se vzduch pomocí vzduchotechniky, hliníková deska s měděnou trubičkou, vychlazená voda, vzduch přes vychlazenou desku, musí se hlídat teplota rosného bodu aby nekapalo na lidi.

Vzduch pomalu přiváděn, pravidla na umístění v podhledu, aby se to hezky rozfukovalo do stran, a vířilo vzduch v místnosti, ne jako fancoil, pomalu víří vzduch v místnosti, přívětivá teplota

Další přání Němců aby byla budova vytápěna podlahovým vytápěním a chlazením

2 věci: stropní přívod vzduchu včetně chlazení, komfort léto i zima.

Přání investora bylo aby byli spokojení zaměstnanci a mohli ovlivnit teplotu a komfort – malá desková otopná tělesa u fasády. MaR zjistí že, je tam tepleji a upraví výkon podlahového vytápění, v daném okruhu sníží nebo zastaví průtok – MaR pozná, že se topí,

Ve fasádě – hodně prosklená, aby byli schopni pracovat na počítačích bez oslnění sluncem.

Architekt Zábran vymyslel kovové řešení lamel na fasádě, což je zajímavé řešení – funguje z hlediska tepelných zisků ze slunka do interiéru, snížení oslunění.

Lamely nepokrývají vše, tahokov dělá do interiéru kosočtverce, z hlediska komfortu od začátku v projektu měli v interiéru rolety za velkými prosklenými tabulemi, člověk si individuálně stáhne, zajistí si že jim sluníčko nesvítí do monitoru.

Rolety nejsou koncipované na ovlivnění tepelně technického komfortu, ten zajišťují 3skla v prosklené fasádě, vnější lamely

Dodavatel oken firma Saint Gobain skladba 3-skel s povrchovými úpravami které eliminují prostupy tepla ven a dovnitř, ale je skrz tabule vidět.

Radiátor i pod okna.

Stavení kuriozitka: investor nechtěl zdvojené podlahy – protože špatná zkušenost.

Zároveň na pracoviště různě rozmístěné přivedené elektro kabely skrz podlahu v půdoryse

Prosklená fasáda od průvlaku k podlaze

Nebyl parapet u podlahy pro parapetní lištu kanál na zásuvky a datové zásuvky a kabely

Integrované kabelové žlaby pro slaboproud a silnoproud, podlahové vytápění, přívody k radiátorům

Aby se to vešlo do podlahy – nad ŽB stropní deskou 21 cm tlustá skladba musel vymyslet, stavební firma musela provést, 1 vrstva kabelových kanálů, položit vytápění k radiátorům,

Po obvodu ozeleněné truhlíky vymyslel Zábran a realizovaly se, tak z každého truhlíku podlahou vede odvodnění, kanalizační trubka ve spádu, do středního traktu k šachtám a jádrům, každý truhlík odvodněn, 1. vrstva instalací,

Zalili pěnobetonem, dostali rovinu, na tu rovinu tepelná izolace a kročejová izolace – přenos kročejového hluku mezi podlažími, na to kabelové kanály přístupné shora, propojky mezi kabelovým kanálem shora přístupným a tím zalitým v pěnobetonu, naskládat desky plastové, polystyrenové, pro osazení hadů podlahového topení. To celé zalito cemlitem, potom podlaháři lepili koberec, řada kroků, velké množství technických profesí a nochnologií

MaR taky čidla v podlaze, snímají teplotu podlahové desky, pro vytápění/chlazení, povrch podlahy nesmí být teplejší než něco aby bylo lidem příjemné (zima/léto)

Elektrikář umístí čidla do podahy, při dalším zalití Cembitem se nesmí nic zničit, ale musí zatéct všuse kam má.

Skladba podlahy, složitá projekčně, koordinace řady profesí

Trubky vytápění, smyčka se nesměla křížit – trubky by byly moc vysoko a přesahovaly by vrstvu kde mají být zalité.

Špatná zkušenost se zdvojenou podlahou – co viděl dlouho v provozu, výrazně se prokreslovaly čtverce do podlahových krytin, představa že tam kdykoli vlezu a zapojím či přepojím co potřebuju moc neplatí, akustika není žádný hit, investor požadoval variabilitu vnitřních prostor, od začátku definovaných variabilitě členění kanceláří:

Modul 7,5 metru sloup, každých 2,5 metru pruhy nadělili na různě velké kanceláře, projekt v určité fázi/začínala realizace:

Německý investor oslovil architekty z Německa – průzkum vnitřní organizace Konplan firmy, průzkum oddělení a vztahy s dalšími odděleními, kolik jich je a kdo co potřebuje, rozmístili oddělení po podlažích budovy a rozmístili 2 3 oddělní na patře, půdorys budovy (zasedačka, openspace, uzavřené a uzamykatelné kanceláře (když do IT přivezou nové počítače, nemůžou být jen tak v openspace, majetkově ručí), personální oddělní nemůže být openspace, zamykací kanceláře,

Němci udělali rozvrh půdorysů, požadavek na openspace po podlažích.

Jak je to dnes rozdělené, i když je budova 40 m dlouhá, openspace je předělen místnostmi a truhlíky a klidovými zónami u truhlíků – tento openspace mě nepobuřuje. Nejsem zastánce openspace. Je to jako když sedíte na nádraží v hale – bzučí, nepříjemné. Tady se podařilo budovu načlenit, takže i když je prostor propojen středovou chodbou, jsou tam velké, ale ne nepříjemně velké prostory

Snažil jsem se, a ne vždy našel u architekta pochopení, aby byla budova správně z hlediska akustiky

Nápady že prostor bude železobetonovým bunkrem jsem rozporoval. Aby se lidé ve velkoprostorové kanceláři cítili příjemně, musí tam být přiměřený klid. Když si dva kolegové v rohu kanceláře povídají, nemusí je slyšet celé patro.

Výsledné řešení akustiky:

V celé ploše podlaží je položený koberec (1 část poltivého spektra), typ koberce s lepšími akustickými vlastnostmi.

S vnější prosklenou stěnou nic akusticky neuděláte.

Architekt si přál pohledové železobetony kolem jádra.

Na vyřešení akustiky tedy zbývá podhled. Snažili jsme se, aby měl dobrý akustický útlum (lokální i celkově) Výrobky firmy Ecophon, kazety ze skelného vlákna, velmi dobrou alfa w a další parametry.

Samozřejmě byl tlak na cenu (ze strany investora), ale podařilo se odolat na základě zkušenosti firmy Konplan z předchozí budovy (pronájmu kde sídlili) kde byla špatná akustika.

Dokázali přesvědčit investora pro dražší řešení protože je to jeho budova. V prostoru je klid

I u fasády z hlediska trojskel (u 4 pruhové silnice frekventované kde hluk) i u fasády se snažili o dobrý akustický útlum z exteriéru.

Investor stavěl pro sebe a měl vyzkoušeno z openspace v nájmu že nebyla ideální kvalita prostředí a zaměstnává lidi kterých není moc na trhu , takže chtěl aby budova byla příjemná a zajímavá aby lidi byli schopni pracovat .

Ne zcela obvyklé řešení u výtahů – šachta v šachtě (norma na výtahy říká že pokud šachta přiléhá k chráněnému prostoru má být řešena jako šachta v šachtě) openspace přiléhá aby nebyl slyšet hluk z výtahu

Vnější ŽB šachta vystlaná Sylomerem (pružným materiálem (mají různé škály tuhostí, potřebná tuhost se napočítá)

Mezi stěny kročejový polystyren, aby při betonáži vnitřní šachty nezatékalo: svařovaná folie chrání polystyren aby držel musí se desky lepit (ne mechanicky, ta kotva by přenášela hluk)

Přináší to hezký detaily: vnější šachta vnitřní šachta pohledové betony a překrýt dilatací, aby to mělo štábní kulturu, k podlaze ke stropu

Aby budova technicky fungovala: investor vyžadoval kvalitu vnitřního prostředí, bylo nutné skloubit technické požadavky s představami architektů

Architekti obecně vysazeni proti kazetovým podhledů. Pravda že dnes jsou všude, existují v řadě provedení od spousty výrobců, něco šunt, něco výrobky se štábní kulturou

Z mého (Kott) pohledu kazetové podhledy mají opodstatnění; velmi dobře fungují, to že jsou všude 60*60 ve viditelném rastu a divně bílé barvě je věci architektů a investorů

Firmy nabízí i jinak barevné kazety, jiné rastry, ale akustické vlastnosti se poznají

Snažili se z hlediska komfortu, protože je to administrativní budova, aby mohli pracovat i invalidi (dané vyhláškou ale ne všichni na to slyší) na každém podlaží WC pro invalidy.

Je tam 80 lidí na podlaží, nikdo neřekne jestli muži nebo ženy, investor to neví, když není těžká výroba tak neví pohlaví na které dimenzovat záchody

Dámské hygienická kabina od 50 žen výš (architekti netuší že takový předpis je ale podařilo e integrovat)

Snažil se aby byla přívětivá

Vypořádali se s truhlíky, které jsou architektovým nápadem, pro budovu velmi zajímavý, investora zaujalo, inženýři technicky si s tím dokázali poradit. Truhlík je dlouhý 7 m široký 2 metry, vyložení 60 cm před fasádu, stavaři se snažili aby budova byla uživatelná. Řídící systém na závlahu, přivedená voda, v zimě mrzne tak se musí na zimu vypustit a profouknout tlakovým vzduchem

Statická výzva, z hlediska tepelně izolačního výzva, každý truhlík přívod vody, připojení na kanalizaci kdyby měsíc pršelo nebo třeba praskl přívod vody, aby tam by kytky nezašly.

Když architekt přišel s kovovými lamelami před fasádou, stavaři navrhli a investorovi zdůvodnili potřebu lávek 60 cm široké mezi lamely a lidé tam mohou vstoupit (za dodržení bezpečnostních předpisů, uvázaní na sedák) a jsou schopni umýt sklo zvenčí

Když vidíte budovy že architekt navrhl velké prosklené plochy (v bytech šlágr dnešní doby) velké okno 2 metry vysoké, 3 m dlouhé, členěné, ale z té velké plochy jen malé otvíravé křídlo 60 cm přivětrání

2*2 m okenní tabule nepřístupné k umytí, když 10 pater, nebo 3 patra u frekventované silnice, zvenčí se to nikdo neumyje

Mrakodrapy v Londýně mají jeřáb na střeše na mytí oken

Když se v ČR zeptáte developera (okno pevně zasklené levnější) developer řekne že si uživatel objedná plošina (centrum prahy nebo i periferie), dokážete si představit jak si SVJ objedná plošinu 2x do roka?

Je tam spousta instalací které nejsou vidět

Systém MaR: podlahové vytápění podlahové chlazení, stropní chlazení, radiátory, hlídaná okna jestli otevřené a zavřené

Zimní, letní režim, přechodové režimy, řada úskalí, navrhnout budovu

Správce budovy který s tím umí zacházet. Nejde navrhnou inteligentní budovu, protože vyžaduje inteligentní obsluhu.

Pouze bohatý investor může dlouhodobě platit někoho, kdo se mu o to stará.

TZB dožije a musí se vyměnit, revize lidi si neuvědomují, kdy tepelná čerpadla podle obsahu chladiva revidovat: uniká neuniká, dnes už ne freony, jiné prý ekologické

„U jednoduché chemie se již škodlivost prokázala, u složité ještě ne tak ji smíme používat“

Když nemáte reviezi: pokuta od státní inspekce ŽP že to nesledujete. Koupí čerpadla náklady nekončí!

Co považujete za podstatné na spolupráci inženýra a architekta?

Po zastavovací studii si investor vybral jeden a byl návrh budovy – v tom návrhu budovy architekti navrhli vzhled kovových lamel, navržená základ dispozice (schodiště, záchody, střední trakt, zbytek volný pro openspace)

Řada věcí s architekty v rámci stavebního povolení, kdy se dopřesňovala koncepce objektu: zvukově pohltivá podlaha a strop, v případě jídelny arch chtěl přiznanou ŽB desku s instalacemi, zavěšené solo akustické prvky

Architekt si přál solo prvky do jídelny tak je tam navrhli, ale v rámci SP a prováděčky neposkytl představu o rozmístění prvku, inženýři to v projektu dali do pravidelných řad

Při realizaci si arch vymyslel že chce nepravidelné rozmístění, rozhodil to v prostoru, ale nerespektoval rozmístění vzt vyústek, do prováděčky to ale nespecifikoval

Z některých věcí byl pak architekt na stavbě překvapen

Nelíblo se mu navržené zábradlí, nedodal ale výkresy, jak si ho představuje

Pozice architekta v ČR vs. V Německu:

Architekt je zdroj nápadů

Pozice architekta v ČR zdroj nápadů, vití, nezajímá ho, jak se to technicky udělá.

Chodí a vykřikují že neplatí žádná norma, ale v těch je základní ergonomie užívání, v rámci fakulty by se ti měli naučit.

Požadavky norem se rozmělňují, aby si developeři mohli dělat, co je napadne: ve staré normě na schodiště požadavek na tepelnou vodivost zábradelního madla, před pár lety 4 roky změna požadavek na tepelnou jímavost madla vypuštěn

Normy přestávají být použitelné a návodné

V Čechách architekti chrlí nápady, mají vizi a hrají si na umělce, někteří mají kvalitu a výtvarno a nápad (což Zábran má), ale druhá věc je, že nemají představu, jak to technicky realizovat.

Německý architekti mají nápady, jak to má vypadat, ale spíš pozice hlavního inženýra projektu – jsou schopni odřídit a odkoordinovat, v Čechách jsem se s takovým úplně nesetkal, nemusí rozumět VZT do mrtě, ale ví že trubka povede, jak bude zhruba velká a tak.

Domluvit se s projektantem jestli anemostat čtverec nebo kruh, kolik jich tam cca bude.

Co by podle vás měl architekt umět, aby byl schopen navrhnout budovu s kvalitním vnitřním prostředím?

Jsem absolvent oboru pozemní stavby a konstrukce na Fsv, dost se kamarádil s lidmi z oboru Pozemní stavitelství a architektura-chodil na volitelné předměty (pro ně tedy povinné) , oni museli absolvovat a kamarády z FA oboru.

Na čistě FA škola vychovává umělce a ne techniky.

Umělecké vlohy lid mají nebo ne, je potřeba v rámci přijímaček rozvíjí výtvarno výrazně, míra technického vzdělávání jde stranou

Za vhodný kompromis mezi ing a akad arch považuje obor na Fsv (mají technické i umělecké)

FA se snaží přiblížit k akademické, což je ale špatně, architekt je technik který má výtvarný cit (ne každý ho má)

Nehrát si na akademii ale věnovat se praktickým znalostem

Kott jako hlavní inženýr neumí spočítat VZT, ale ví že tam ty kabel jsou a že je rozvaděč a že potřebuje prostředí a manipulační prostory etc. To by měli mít, že budova musí mít nosné sloupy, beton ocel umí hodně ale není všespásný

O ceně stavebního díla se rozhoduje ve studii, je dané nejen jak bude vypadat a jak bude velká a kolik bude stát

Na Konplanu předsazené kovové lamely nejsou levné, ale cena za vzhled budovy

Dnešní architektura hledá, jak se dostat ke zdobnosti, nejsou v módě štuky na fasádě, prdelatí andělíčci v interiéru…takže současná architektura má rozházená okna po fasádách, různých velikostí a tvarů (čtverce, obdélníky), najít zdobnost

Budova Konplan zdobná je, to je věc architektury, někde rastr vystřídaný, někde ne, truhlíky nejsou nad sebou, ale jako stavaři se s tím vypořádali

Ani mu to nepřesouvali z pole do pole, nehýbali s truhlíky, i když by to pro ně z technického hlediska bylo jednodušší.

Architektura neví, jak se ke zdobnosti dobrat, cena hraje velkou roli.

Řešili jste dopad budovy směrem ven?

Borská pole kde končí průmyslová část, městem určené spíš k veřejné a bytové funkci

Z hlediska města územně plánovací požadavky, z hlediska úřadů hygiena přísná: hluk z budovy na sousední bytové domy projekt Unicity doložit že chlazení a VZT na střeše dodrží hlukové parametry u

Strojně chlazená, v létě 2 chladící jednotky na střeše vnější vyvozují hluk, počítalo se zdroje hluku na budově, odvětrání záchodů, hladina hluku vůči sousednímu objektu

Před den ok protože Folmavská ulice hlučná a vše se schová

V noci v chodu může být jen 1 chladicí jednotka (v létě když je v noci výhodné nasávat studený vzduch) Hluk vůči sousedům, v noci se smí spínat 1 jednotka administrativní řešení

Hluk z parkoviště k bytovce

Skutečnost je že dělá jednotka malý hluk – když jsem tam stál na té ploše, vyzkoušel jsem si, že když běžela na plný výkon tak tam stál a povídali si se správcem budovy jak jim to funguje

Hluk chladicích jednotek nás vůbec neomezoval, když jsme si spolu povídali, Srovnatelné s pračkou.

Bytostně nesnáším, když je budova, která vypadá dobře a na střeše krabice na chlazení která kompletně zabije všechno, takže udělal v 6 patře vnitřní dvorek kde schované vnější chladicí jednotky, na siluetě budovy se neobjevují, když s kouká na budovu tak vrstva lamel, lávka 60 cm kolem celé budovy, stěna neprůhledná za ní chladicí jednotky, v ní vynechaný pruh 1 m u podlahy na nasávání vzduchu zvenku ale stěna i jako tlumič hluku směrem nahoru, jednotky dělají kravál nahoru ale ne do stran.

Na pěkným baráku krabice pro antény či vzt

Technika z hlediska hluku jde za 10 let dost dopředu, otázka co za 10 let až se vykloktají ložiska

Větší hluk z dlouhodobého hlediska ze související dopravní zátěže obsluha budov než z vlastní budovy, to by muselo být těžce výrobní.

Co považujete za podstatné na spolupráci inženýra a architekta?

Vzájemný respekt k druhé profesi! Každý umí něco, když budova má dobře dopadnout, pouze dobře fungující budova je žádoucí z hlediska investora i společnosti a přetrvá, nejsme tak bohatí aby každý 3 roky vybourat interiér protože se zašpinil a nejde to opravit.

Že se olepí dveře pyramidkama do nahrávacích studií jsou mimo

Když statik řekne že něco nejde, on na to dává razítko, architekt si to sám nespočte.

Pokud se podívám do arch časopisů tak řada řešení v rozporu s normami, dispozice jsou špatně…

Ve všech časopisech stavby krásně nafocené když jsou nové po dokončení, po 5, 10 letech zjistíte že stavba je v hrozném stavu, trhliny, mokrá, rozpadá se, vzlínající voda, zatéká, opadává

Tak se před 10 lety bavil s člověkem který se dlouhodobě podílí

V rámci stavebnictví vždy 1 prototyp (RD za 5 milionů, velká stavba za miliardu) ten 1 prototyp se požaduje, aby fungovaly 50 let, stavíme za krátký čas

Když se bavíš se strojařem, vyvíjí součástku za 2 roky, my za 2 roky projekt i se to postaví

Potom se divte že máte 2 A4 reklamací (a to je ještě dost dobrý).

Pokud chtějí detailní 3D model na vše v budově ale staví se jen jedna, účelné u auta kde série

Náklady a podrobnější projekt – časově náročné a musí to někdo zaplatit, u BIM digitální model technických instalací, ale to že se nekříží trubky ještě není BIM, kompletní informační model

1 věc je 2d model a druhá je BIM model – někdo musí zaplatit a majitel budovy musí být schopen s ním pracovat a musí mu to k něčemu být

Kolem r. 2000 se soubory neoteřou, programy nejsou

Když životnost 50 let – za 5 let model nikdo neotevře

Jsme schopni udělat, ale je na to společnost dost bohatá, k čemu to bude sloužit

Na úřadech ji počítač neutáhne ani velký pdf tak na to nejsou prostředky

Původ ve strojírenství sw používané ve stavebnictví, ale oni podle něj vyrobí miliony součástek, takže se to zaplatí, když firmy sw rozprodají strojařům tak ho vnucují stavařům, že ho též potřebují

3D modelování že se předejde na stavbě kolizím, trubky se srovnají v podhledu, dnes zkouší Google brýle a rukavice a skládá součástky

V budoucnosti na stavbu na Google brýlích pod holým železobetonovým stropem uvidí trubky

Inteligentní budovy potřebují inteligentní lidi aby je spravovali

Ještě ke spolupráci se Zábranem na Konplanu:

Architekt v interiéru řešil aby to dobře vypadalo, kvalitu vnitřního prostředí výrazně ovlivnilo přání investora a on jako HIP řešil technické provedení

Nápady že stropní podhledy budou z Heraklitu zavrhl, Heraklit nemá akustický útlum, to není použitelné, olepíme interiér pyramidami z nahrávacích studií, včetně dveří

Architekti musí přemýšlet co navrhují (jinak výstavní pavilon na veletrh umělecké dílo na 10 dní, max. rok po převezení) nebo budova na 50 let tak nejsme tak bohatí, abychom mohli každých 10 let vše vybourat, materiály které vydrží a budou se udržovat. Restaurace po 10 20 letech se modernizují, mít to roztříděné co si můžu dovolit z hlediska materiálů a životnosti řešení

((dočasná stavba nižší požadavky z hlediska statiky) co to je jak dlouho to má sloužit

Já sedím v kanceláři postavené před 6 lety a funguje a bude muset fungovat dalších 15 20 let

Paneláky za chvíli 50 let ano nové koupelny jádra a leg ro budov pořád stojí , schodiště zábradlí zárubně do rytů elektroinstalace

V vědomím toho že musí chvíli vydržet TZB aby vydrželo, i aby se dalo obnovit (ne zalité v základech, přístupné)

Když něco měním já tak nenaruším byt souseda developerské projekty není uživatelsky příjemné, levně postavit draze prodat

Pokud si laik myslí že stavební úřad dbá na správnost řešení tak je naivní, úřady hlídají papíry ale nemají znalosti a čas na technickou správnost

Zrušení malých stavebních úřadů a větší centralizace je podle něj krok správným směrem

English translation of interview with Jiří Kott:

What does the indoor environment mean to you?
A building must be usable, so it must have a pleasant environment. Depending on what kind of building it is, if it's a school, there are specific requirements, specified by standards. The Czech standards are very detailed, they serve as a guide for designers to make buildings liveable.
The indoor environment has many components, lighting, noise, temperature, pollutants.
Building is always a question of time and money. It depends on how high a standard they want in terms of use.
Were there any specific requirements for the indoor environment in the brief for the Konplan office building? Or was it based on standards?
It makes a difference whether the investor is building it for himself, or as a developer who will then sell or lease the project, or the state administration.
For himself - he knows what he wants, how much money he has for it, he invests in a better quality design to make it last.
Developer has a "build cheap, rent or sell expensive" approach → pressure to minimize costs and comfort.
State government strictly following standards.
Konplan is the Czech branch of the German company Krones, in Plzeň they were previously based in rented premises, Avalon openspace, they were growing, looking for a place to relocate, they were going to build their own building where they would operate, they bought a site in Borské polí where 6+3 buildings were already designed by the developer, our task was to adapt the site to suit them.
Valbek was the general planner, the building study was done by two architectural teams, the architect Zábran and his team and the other architect Kouřim, older and younger.

The investor wanted both the administration and the test hall to be smaller, based on the building study the investor decided to go with Zábran who was there as a subcontractor

Krones is a German investor, various things around the world (his buildings and for example breweries and bottling plants complete beverage lines, client for example Pilsner Urquell, Kofola etc.)

In the Pilsen branch there are employees of mechanical engineers, electrical engineers, IT, service engineers, commissioning around the world, designers, building for fellow designers to make it nice,

The Germans hired a consulting firm from Munich, helped the investor manage the project (time, finances), helped define what the building should be like at the beginning, commented, the Germans have a parent campus in Neutraubling (next to Regensburg, a large office building not quite old, showed what they liked and didn't like, what they should develop and what they should avoid, what they would like to see, whispered into the project.

The investor's wishes for the quality of the indoor environment specified the method of heating and cooling, the wish to supply air to the interior through the ceiling outlets of the Inducool exhaust unit, air is supplied through the air handling unit, aluminum plate with copper tubing, chilled water, air through the chilled plate, the dew point temperature must be monitored to avoid dripping on people.

Air slowly brought in, rules on placement in the ceiling, so it blows nicely to the sides, and swirls the air in the room, not like a fancoil, slowly swirls the air in the room, friendly temperature
Another wish of the Germans is that the building be heated by underfloor heating and cooling
2 things: ceiling air intake including cooling,
Comfort summer and winter.
Investor's wish for happy employees and to be able to influence the temperature and comfort - small plate heaters at the facade. Measurement and control detects that it is warmer there and adjusts the output of the underfloor heating. In a given circuit, it will reduce or stop the flow - the M&R will know that it is heating up,
In the façade - lots of glazing to be able to work on computers without the glare of the sun
Architect Zabran came up with a metal lamella solution on the façade, which is an interesting solution - works in terms of heat gains from the sun to the interior, reducing glare,
Lamellae do not cover everything, stretch metal makes diamond-shaped shadows in the interior, in terms of comfort from the beginning in the project they had roller blinds behind large glass panes in the interior, one can individually draw down, ensure that the sun does not shine into their monitor
The roller shutters are not designed to affect the thermal comfort, this is provided by the 3 panes of glass in the glazed facade, the outer slats
Window supplier Saint Gobain composes 3-panes with surface treatments that eliminate heat transfer out and in, but you can see through the panes
Radiator also under windows
Building curiosity: the investor did not want double floors - because of a bad experience
At the same time, differently spaced electrical cables fed through the floor in the floor plan
Glazed facade from the clerestory to the floor
There was no windowsill at the floor for the windowsill rail to channel the power and data sockets and cables
Integrated cable trays for low and high current, underfloor heating, radiator feeds
To make it fit in the floor - above a 21cm thick reinforced concrete slab the engineer had to devise, the construction company had to make, one layer of cable ducts, lay heating to radiators,
Perimeter green boxes were designed by architect Zábran and implemented, so from each box through the floor there is drainage, drainage pipe in the gradient, to the middle wing to the shafts and cores, each box drained, 1st layer of installations,

They poured in foam concrete, got a flat surface, thermal insulation and noise insulation on the flat surface - transfer of noise between floors, cable ducts accessible from above, interconnections between the cable duct accessible from above and the one encased in foam concrete, stack plastic, polystyrene plates for the installation of floor heating tubes. All this was covered with cement, then the floorers glued the carpet, a series of steps, a large number of technical professions.
MaR also sensors in the floor, sensing the temperature of the floor slab, for heating/cooling, the floor surface must not be warmer than something to make people comfortable (cold/summer)
The electrician will place the sensors in the soffit, the next time Cembit is poured, nothing must be destroyed, but it must flow everywhere.
Floor composition, complex design, coordination of many professions
Heating pipes, the loop must not cross - the pipes would be too high and would overhang the layer where they are to be poured.
Bad experience with double flooring - having seen it in use for a long time, squares in floor coverings were significantly cut into the flooring, the idea that I can get in there at any time and plug or rewire what I need doesn't really apply, acoustics are no hit, investor wanted variability of interior spaces, defined from the beginning by the variability of office zoning:
Module 7.5 meter column, every 2.5 meter strips divided into different sized offices, project at some stage/beginning implementation:
A German investor approached architects from Germany - they researched the internal organization of Konplan, researched the departments and the relationships with other departments, how many departments there are and who needs what, they placed the departments on the floors of the building and placed 2 or 3 departments per floor, building floor plan (boardroom, openspace, closed and locked offices (when they bring new computers into IT they can't just be in openspace, property liability), HR can't be openspace, lockable offices

The Germans made a floor plan layout, a requirement for openspace on a floor-by-floor basis,
How divided up today, even though the building is 40m long, the openspace is divided by rooms and boxes and rest areas by

the boxes - this openspace doesn't bother him (Kott), he's not a proponent of openspaces, like when you sit in a train station lobby - buzzing, uncomfortable, managed to load that even though the space is connected by a central corridor, there are large but not uncomfortably large spaces
Tried, and didn't always find the architect sympathetic, to get it right in terms of acoustics
I disputed the idea that the space would be a reinforced concrete bunker. In order for people to feel comfortable in a large office, there needs to be reasonable quiet. If two colleagues are talking in the corner of the office, the whole floor doesn't need to hear them.

The resulting acoustic solution:
The entire floor area laid carpet (one part of the radiant spectrum, a type of carpet with better acoustic properties.
You can't do anything acoustically with an exterior glass wall.
The architect wanted exposed reinforced concrete around the core.
That leaves the ceiling to solve the acoustics. They tried to make it have good acoustic attenuation (local and overall) Ecophon products, fibreglass cassettes, very good alpha w and other parameters.
Of course there was pressure on the price (from the investor), but they managed to resist based on Konplan's experience from a previous building (rental where they were located) where the acoustics were bad.
They were able to convince the investor for a more expensive solution because it was his building. The space is quiet.
Even for the façade in terms of triple glazing (on a 4 lane busy road where the noise) and the façade they tried to have good acoustic attenuation from the exterior.
The investor was building for himself and had experienced from the openspace in the lease that the quality of the environment was not ideal and employs people who are not many in the market , so he wanted the building to be pleasant and interesting so that people were able to work .

Not quite the usual solution for elevators - a shaft in a shaft (the standard for elevators says that if the shaft is adjacent to the protected space it should be designed as a shaft in a shaft) openspace adjacent to avoid noise from the elevator
External reinforced concrete shaft lined with Sylomer (flexible material (they have different stiffness ranges, the required stiffness is calculated)
Styrofoam between the walls to prevent leakage when the inner shaft is being concreted: welded foil protects the Styrofoam to keep it in place, the boards must be glued (not mechanically, the anchor would transmit noise)
It brings nice details: outer shaft to inner shaft view concrete and overlap the expansion joints to give it a staff culture, floor to ceiling
To make the building work technically: the investor required the quality of the internal environment, it was necessary to reconcile the technical requirements with the architects' ideas
Architects generally planted against coffered ceilings. It is true that today they are everywhere, they exist in many designs from many manufacturers, some junk, some products with a staff culture
From my (Kott's) point of view, cassette ceilings have a justification; they work very well, the fact that they are everywhere 60*60 in visible growth and strange white colour is a matter for architects and investors
Companies offer different coloured cassettes, different grids, but the acoustic properties are recognizable

They have tried from the point of view of comfort, because it is an office building, to allow disabled people to work (given by decree but not everyone listens to it) on each floor toilets for disabled people.
There are 80 people per floor, no one will say if men or women, the investor doesn't know, if it's not heavy production they don't know which gender to size the toilets for
Women's hygiene cubicle from 50 women upwards (the architects have no idea that there is such a regulation but managed to integrate it)
We tried to make it welcoming.
They dealt with the planters, which are the architect's idea, very interesting for the building, the investor was interested, the engineers technically managed to deal with it. The trunk is 7 metres long by 2 metres wide, lining 60 cm in front of the facade, the builders tried to make the building usable. Control system for irrigation, water is brought in, in winter it freezes so it has to be drained and blown out with pressurized air
Structural challenge, in terms of thermal insulation challenge, every box water supply, connection to the sewer if it rained for a month or maybe the water supply burst so that the plants wouldn't die.

When the architect came up with the metal lamellas in front of the façade, the builders proposed and justified to the investor the need for a 60 cm wide walkway between the lamellas and people can enter (subject to safety regulations, tied to a harness) and are able to wash the glass from the outside
When you see buildings that the architect has designed large areas of glass (in apartments the big hit these days) a large window 2 meters high, 3 meters long, articulated, but of that large area only a small opening sash 60 cm windward
2*2 m window panes inaccessible to wash when 10 floors, or 3 floors by a busy road, nobody washes it from the outside
London skyscrapers have a crane on the roof to wash windows
If you ask a developer in the Czech Republic (fixed glazed window cheaper) the developer will say the user orders a platform (centre of Prague or even periphery, can you imagine how an HOA orders a platform 2 times a year).
There are a lot of installations that are not visible
MaR system: underfloor heating underfloor cooling, ceiling cooling, radiators, monitored windows if open and closed
Winter mode, summer mode, transition modes, many pitfalls, design the building
Building manager who knows how to handle it
Can't design an intelligent building because it requires intelligent operation
Only a wealthy investor can pay someone to take care of it in the long term
HVAC will reach the end of its life and must be replaced, revisions people don't realize when to revise heat pumps by refrigerant content: leaks not freons nowadays, others supposedly green
"Simple chemistry has been proven harmful, complex chemistry not yet so we are allowed to use it"
If you don't have a revision: fine from the state environmental inspectorate for not monitoring. The costs don't end with the purchase of a pump

What do you think is essential for the collaboration between architect and engineer to lead to a good outcome?
After the development study, the investor chose one and there was a building design - in that building design the architects suggested the look of the metal lamellas, the proposed basic layout (stairs, toilets, central tract, the rest free for open space)
A number of things with the architects as part of the building permit process to refine the building concept: sound absorbing floor and ceiling, in the case of the dining room the architect wanted an exposed reinforced concrete slab with installations, suspended solo acoustic elements
The architect wanted solo elements in the dining room so they designed them there, but within the building permit and implementation he did not provide an idea of the placement of the element, the engineers put it in regular rows in the project
During the implementation, the architect came up with the idea that he wanted an irregular layout, he arranged it in the space, but he did not respect the layout of the outlets, but he did not specify it in the implementation plan
The architect was surprised by some things on the site.
He didn't like the proposed railings, but he didn't provide drawings of how he envisaged them

<u>The position of an architect in the Czech Republic vs. Germany:</u>

Architect is a source of ideas
The position of the architect in the Czech Republic is a source of

ideas, visions, he is not interested in how to do it technically
They go around exclaiming that there are no standards, but there is basic ergonomics of use in those standards, they should learn within the faculty
Standards requirements are diluted so developers can do whatever they want: old staircase standard had requirement for thermal conductivity of handrail, a few years ago 4 years change requirement for thermal conductivity of handrail omitted
The standards are no longer applicable and instructive.
In the Czech Republic architects are spouting ideas, they have a vision and play at being artists, some have quality and art and idea (which Zábran has), but the other thing is that they have no idea how to implement it technically
German architects have ideas how it should look like, but rather the position of the chief engineer of the project - they are able to order and de-coordinate, in the Czech Republic he has not met with such a person, he may not understand HVAC to the bone but he knows that the pipe will lead, how large it will be approximately and so on
Discuss with the designer if the anemostat is square or circle, how many will be there.

What do you think an architect should know to be able to design a building with a quality indoor environment?

He is a graduate in civil engineering and construction at Fsv, he was quite friendly with people from Civil Engineering and Architecture- he took electives(so compulsory for them) , they had to graduate and friends from FA field
A purely FA school produces artists, not engineers.
Artistic aptitude people have or not, they need to develop art significantly in admissions, the degree of technical education goes aside
Considers a course in the faculty of civil engineering as a good compromise between engineer and academic architect (they have both technical and artistic)
FA is trying to get closer to academic, but that is wrong, architect is a technician who has artistic flair (not everyone has it).
Don't play at academy but pursue practical knowledge
Kott as a chief engineer can't calculate HVAC but he knows that the cables are there and that there is a switchboard and that it needs an environment and handling areas etc. It should have that the building must have load bearing columns, concrete steel can do a lot but is not all encompassing
The cost of the building is decided in the study, it is determined not only how it will look and how big it will be and how much it will cost
On Konplan, the front metal lamellas are not cheap, but the price for the look of the building
Today's architecture is looking to get to decorativeness, it's not fashionable to have stucco on the façade, ass cherubs in the interior...so contemporary architecture has windows scattered across the façades, different sizes and shapes (squares, rectangles), to find decorativeness
The Konplan building is decorative, it's a matter of architecture, somewhere the grid is alternated, somewhere not, the planters are not on top of each other, but as engineers they dealt with it
They didn't even move it from field to field, they didn't move the planters, even though it would have been easier for them technically.
Architecture doesn't know how to get at ornamentation, the price.

What do you consider essential in the collaboration between an engineer and an architect?
Mutual respect for the other profession! Everybody knows something when a building has to turn out well, only a well-functioning building is desirable from the point of view of the investor and the company and will last, we are not so rich to demolish the interior every 3 years because it got dirty and it can't be fixed
That they're taping the doors to the recording studios with pyramids is out of line.

When a structural engineer says something's wrong, he puts his stamp on it, the architect can't calculate it himself.
If I look in architectural magazines, many of the solutions are not in accordance with the standards, the layout is wrong...

In the construction industry, always 1 prototype (5 million house, 1 billion big building) that 1 prototype is required to work for 50 years, we build in a short time.
When you talk to a mechanical engineer, he develops a part in 2 years, we build it in 2 years
Then are surprised that you have 2 A4 warranty claims (and that's still pretty good).
If they want a detailed 3D model for everything in the building but only build one, expedient for a car where a series
Cost and more detailed project - time consuming and someone has to pay for it, with BIM a digital model of the technical installations but not crossing pipes is not BIM yet, a complete information model
One thing is a 3D model and another is a BIM model - someone has to pay for it and the building owner has to be able to work with it and it has to be useful to them
Around 2000, files don't get wiped, programs don't
If the lifetime is 50 years - in 5 years nobody will open the model. We're able to do it, but the company is rich enough to do it, what's the point. In the government offices, the computer can't even handle a large pdf, so there are no funds for it.
Originally in mechanical engineering software used in construction, but they make millions of parts by it, so it gets paid for, when companies sell off the software to the machinists they force it on the builders they also need it
3D modelling that collisions are avoided on site, pipes are aligned in the ceiling, nowadays they try Google glasses and gloves and assemble parts
In the future on construction on google glasses under a bare reinforced concrete ceiling they will see the pipes
Smart buildings need smart people to manage them

About the cooperation with Zábran on Konplan:
The architect designed the interior to look good, the quality of the interior environment was greatly influenced by the wishes of the investor and I, as the chief engineer of the project, dealt with the technical design.
I rejected the idea of Heraklite ceilings, Heraklite does not have acoustic attenuation, it is not applicable, we will cover the interior with pyramids from recording studios, including the doors.
Architects have to think about what they are designing (otherwise an exhibition pavilion for a trade fair a work of art for 10 days, max a year after moving) or a building for 50 years so we are not so rich to demolish everything every 10 years, materials that will last and be easily maintained, restaurant space after 10, 20 years needs to be upgraded, have it sorted what I can afford in terms of materials and durability of the solution (temporary building lower requirements in terms of structure), what it is, how long it has to last.
I'm sitting in an office 6 years ago and it works and will have to work for another 15 20 years
Prefabs in a while 50 years yes new bathrooms cores and leg ro buildings still standing , stair railings door frames to engravings wiring
Knowing that plumbing has to last a while to last, even to be rebuildable (not buried in foundation, accessible)
When I change something I don't disturb the neighbor's apartment development projects are not user friendly, cheap to build expensive to sell
If the layman thinks that the building authority cares about the correctness of the design, he is naive, the authorities watch the papers but do not have the knowledge and time for technical correctness
Abolition of small building authorities and more centralization is a step in the right direction.

Prague 7 Townhall

Interviewee: Vojtěch Sosna

Interviewer: Kristýna Schulzová

Date and time: 6.4.2022 18:00

Online, MS Teams

Original interview with Vojtěch Sosna in Czech:

Co pro tebe znamená pojem vnitřní prostředí budov, nebo co si pod tím pojmem představíš?

Takhle abstraktní otázka jo? Pokud to řekneš takhle, má to vždycky pro mě hrozně silný podtext, nebo spíš skoro nadtext té stavební fyziky.

Pokud je to vnitřní, když to zní takhle vnitřní prostředí bude, vlastně je to úplně dearchitektonizovaný, to slovo. Já to pro mě hromada různých výpočtů a studií.

Já v tom projektu řeším architektonické navrhování z hlediska kvality vnitřního prostředí budov s tím, že se to zaměřuje na ty kvantifikovatelné stavebně fyzikální parametry čili denní osvětlení, akustika, tepelná pohoda a kvalita vzduchu.

Byly už v zadání nějaké specifické požadavky na kvalitu vnitřního prostředí, nebo, respektive z jakých požadavků jste vycházeli? Jestli z legislativních nebo i z nějakých jiných?

V samotné soutěži nebylo ohledně tohohle zadaný vůbec nic. Protože to bylo dost obecné.

V okamžiku, kdy jsme to vyhráli, konzultovali jsme s investorem možnosti, který tam pro stroje v tom domě byli, protože šlo o rekonstrukci, on třeba představu o tom že by mohly být všechny prostory klidně větrané nuceně.

Ale to nebylo možné, v podstatě jsme minimalizovali technologie na samou hranu možného, po diskuzi se zástupci investora a s projektovým manažerem.

V tom domě bylo dost limitní to, že tam jsou konstrukční výšky jenom 3,3 metru v těch obecných patrech. Což znamenalo, že abychom vůbec splnili legislativní minimum na světlou výšku místnosti, dostávali jsme na podhled prostor necelých 30cm necelých. Což byl asi největší limit toho domu.

V které fázi návrhů jste začali v podstatě cokoliv vnitřního prostředí řešit? Jsme předali jo.

Ve studii, jako hned po soutěži.

Přemýšleli jste o něčem z toho, ať už světlo, akustika, tepelná pohoda už v té soutěži?

V soutěži vůbec ne, když jsme odevzdávali soutěžní návrh, tam se k tomu se v podstatě nemáš moc šanci dostat.

A není to podstatný, protože ty věci se mnohdy dají doplňovat později. Co má asi jako třeba vliv na to z formálního hlediska je třeba velikost oken, že jo, tak to je třeba zásadní, ale co se týká potom vnitřního prostředí, třeba ohledně čerstvosti vzduchu nebo rekuperace, tak to jsou všechno věci, které se do toho baráku dají potom doplnit.

Nebo nevím, mě to tak připadá jo, že něco je pro mě směrodatný velikost oken to má samozřejmě jako dost zásadní vliv na ty veličiny, které jsou třeba měřitelné, což je osvětlení těch místností.

Ale k jako k ničemu jinému se nedostaneš soutěže to fakt zkrátka není možný, jo?

Ale hned po soutěži, když jsme dodělávali studii, jsme to řešili s investorem a se zástupci investora, což byli najatí lidi, kteří vedli ten projekt na pozici technického manažera nebo produkčního manažera, což byl dost zkušený člověk.

V té studii už jste to konzultovali s nějakými profesanty?

Po soutěži ano, to jsme hned měli tým a konzultovali jsme to. Řešili jsme všechny technologie baráku. To odevzdání studie mělo podrobnost v podstatě stavebního povolení, i to tak bylo strukturované, takže to mělo poměrně dost vymyšlené technologie už v koncepci.

Když jsem odevzdávali tu studii, měli jsme tři energetické koncepce a dávali jsme z nich investorovi vybrat. Jedna z těch energetických koncepcí byla tepelná čerpadla, energetičtí specialisté navrhovali zemní vrty, což vůbec nebylo možný stihnout projednat. Musely by být hrozně hluboký a je tam vysoko spodní voda, tak to bylo na vodoprávní řízení, tak to nebylo možné.

Investor si vybral to, co bylo nejjednodušší: přímo v ulici je teplovod, v tom původním domě byla výměníková stanice, bylo to normálně napojené. Takže se dál topí teplárnou, když se stavělo, přijeli si z pražské teplárenské tu výměníkovou stanici rozebrat. Po stavbě ji tam zase vrátili, ale menší, protože ten dům byl zateplený, tak už nepotřeboval takový výkon.

Používali jste nějaký softwarový nástroj na ověření něčeho, ať už ze světla, nebo z něčeho jiného, ještě před konzultací se specialisty?

Nepoužívali, to bylo na nich. Už ve studii se počítalo osvětlení kanceláří, protože třeba v tom výpočtu, to víš určitě daleko líp než já jo, tak tam hraje roli, jak hluboko je umístěný zasklení a ten dům má postavenou tu architektonickou formu na tom, že to zasklení je utopený hodně hluboko, aby působil hodně mocně, těžce.

A i když teda si myslím, že to je úplná pitomost, jak ty stěny jsou tlusté má strašný vliv na ten výpočet, takže v tom domě se musí neustále svítit. Respektive aby to bylo zkolaudovatelné vůbec hygienou, je tam navržené sdružené osvětlení.

V celých kancelářích?

Jo, úplně v celém baráku. Ale vůbec to není potřeba, ty lidi si tam nesvítí.

Je to ale jako nějaká parametrická věc z toho výpočtu, že to takhle je, když je to sklo utopené v nějaké hloubce, počítá se tam přistínění těch hlubokých ostění. Tím pádem všechna světla jsou navržena na to, že tam svítí celodenně. Ale nepoužívá se to.

Řešilo se něco z hlediska vlivu toho baráku směrem ven, ať už stínění, akustika něco takového?

Řešila se akustika. Stínění ne, protože ten dům byl v podstatě rekonstrukce stávajícího objemu, který se neměnil jo, nebo jenom velice málo v té střešní krajině úplně nahoře kde to opravdu vliv na nic nemá. Takže se to neřešilo, protože to byla rekonstrukce fasádního pláště a změna dispozice. Já bych to jako úplně zjednodušil.

Ale řešila se akustika, protože na střeše jsou umístěny chillery, protože některý místnosti mají chlazení. Ve stavebním povolení byla podmínka, že před kolaudací musí dojít k měření zatížení hlukem toho okolí. Takže tam je v posledním patře taková nástavba, která se používá jako svatební síň a na to navazuje taková ohrádka z tahokovu. A ta je z vnitřní strany pokrytá akustickými které pohlcují případný hluk z těch chillerů, těch

jednotek. A to je tak stejně tak ve dvoře. probíhalo tam měření, no.

Co jste v tom projektu, v té studii museli dělat za kompromisy třeba nějaký architektonický, abyste splnili požadavky úřadů a požadavky na vnitřní prostředí?

Asi vlastně nic, protože jsme se dohodli na tom, že kanceláře nebudou větraný nuceně. Dohodli jsme se na tom, že budou v tom objektu použity topně chladící registry zavěšené pod stropem. Které jsou vlastně zakryté, je tam použit perforovaný podhled, taková hliníková skládací mřížka, ktera zakrývá všechny ty věci, který nad tím jsou.

Jsou tam velice placatá tělesa, která umějí to, že ten dům přichlazují v létě a ten chlad na tebe padá ze shora, což je příjemný, protože člověku není zima od nohou.

Zvažovalo se použití podlahovky, ale to by nebylo použitelný v reverzním chodu v létě, protože by byla zima lidem od nohou. Dohodli jsme se tedy, že tam použijeme tohle, ale není tam deklarovaná teplota, umíme to přichladit, ale neumíme říct o kolik. Ale je to tam zavedené, protože když už to topí, docela rozumnou úvahou jsme dospěli k tomu že když by to umělo chladit, proč to nepoužít.

Úřad tam měl jenom požadavky vycházející z hygienických norem, že musí být nuceně větrané ty prostory, které nemají okna. Což jsou v zásadě jenom zasedačky. Vlastně i zasedačka v 8. patře, která okna má, všechny zasedačky v tom baráku mají nucené vnitřní větrání a je tam i nějaké přichlazován deklarovaný.

Úřad nám to ohledně vnitřního prostředí nějak nekomplikoval, nebyl tam z jeho strany nějaký nesplnitelný požadavek, nebo něco, co by narušilo tu architektonickou koncepci, vždycky to šlo bez problémů splnit.

Jak se tam řešila interiérová akustika nebo prostorová akustika?

Měli jsme na to profesanty, kteří byli přizvaní už při dodělávání té studie. Tam jsme to řešili, ale velice zhruba. Potom se to řešilo ve velkém detailu v prováděčce a vlastně všechny prostory jsou spočítaný, u celého baráku. Teda kromě toalet.

Pod těmi podhledy jsou použité pohltivé desky, kterými jsme vlastně léčili dvě mouchy jednou ranou. V tom domě, jak je to stávající stav, jsou na stropní desky použity prefabrikované Spirolly, které neměly dostatečnou požární odolnost na nové využití toho objektu. My jsme potřebovali stejně zvyšovat tu požární odolnost, takže jsme použili desky, který to zvýšily a zároveň fungují jako akustické.

Čili ty panely jsou vlastně obalený úplně všude a díky tomu vychází jako docela dobře nebo hodně dobře akustika v těch kancelářích, který jsou všechny vlastně jako zatlumený v tom podhledu. Ty společné chodby taky. A potom samostatný úplně místnosti, který se samostatně počítaly, tak byly všechny ty zasedačky a hlavně ten spodní zasedací sál, tomu se věnovala jako zvýšená pozornost a potom teda té vstupní hale, protože je to docela veliký prostor, který je pokrytý samýma tvrdýma povrchama. Tak jsme měli strach, aby tam nebyla blbá akustika, takže tam je to taky zatlumení, to počítaný tak i samostatně.

A když se zpětně podíváš na ten hotový dům, dopadlo to tak, jak jste čekali, nebo plánovali, nebo je něco, co vás na ten dokončeném baráku překvapilo?

Vlastně nás nic asi nepřekvapilo. Jen jsme to měli vymyšlené trošku jinak provozně, protože jsme chtěli, aby úředníci seděli vždycky v kanceláři, který budou mít modulově 6 * 6 metrů. To se moc nestalo. Ten dům je rozdělen na 6 * 3 moduly, že vždycky do půlky okna dojíždí ještě příčka.

Což je ale řešení, které si vyžádal úřad. To je vlastně řekl bych takový kompromis, protože my jsme to takhle moc nechtěli a úřad na tom trval.

Je to trochu na úkor akustického komfortu, všechny ty příčky těch půl modulech jsou postaveny až na čisté podlahy, takže se tam přináší kročejový hluk mezi těmi dvěma kancelářemi. Ale je to udělaný kvůli tomu, aby ten úřad byl v budoucnu variabilní, aby se ty příčky daly odstranit, až ti úředníci jednoho dne přijdou všichni na to, že je lepší mít pro ty 4 lidi ten jeden veliký kancl, protože to je výrazně větší prostorový komfort. Některé kanceláře to tak mají už od začátku, třeba 30% z toho domu je vyřešeno že jsou to fakt ty 6 * 6, ale tohle to mě štve na tom domu asi nejvíc.

Napadá tě tady k tomu projektu ještě něco, co souvisí buď to s vnitřním prostředím a nebo i jako s příběhem toho domu, nebo s uživatelským komfortem jako takovým.

Samozřejmě je to extrémní v tom, že ten dům vůbec není moc velký, na to že je tam 200 úředníků, to sis určitě mohla přečíst na mnoha fórech, že je ta radnice malá. To je pravda, je to malý barák. A s tímhle se nic moc nedá nadělat návrhově, protože naší úlohou bylo v podstatě namačkat 200 lidí do stávajícího objemu, což jsme se nějak pokusili udělat. Docela dobrý je, že oni jsou natolik disciplinovaní, nebo je to možná jako daný befelem od radních, to nevím, že ten dům v těch společných prostorech je pořád jako když se dokončil, oni tam jako nic moc nepřidali.

Protože radní Zelenka, který byl vyčleněný pro stavbu té radnice, je grafik, má docela vztah k estetice, takže chápe, že to zanášení domů dost ničí celkový dojem z těch vnitřních prostor,které klíčové, když ten dům je takhle malý.

Ale co se děje v těch kancelářích, už je samozřejmě věc jiná. To nikdo moc neovlivní, a i když jsme se to snažili navrhnout tak, aby to pro ně bylo účelné, lidi to používají jinak, než to jsme si to mysleli, to asi k tomu patří. Z mého pohledu je to teda hrozně zadělaný věcma. Takže ty kanceláře zevnitř vypadají hrozně, ale to asi je spíš kulturou, duševní hygienu těch lidí a jejich kulturou, to moc neovlivním.

My jsme jim dali k dispozici nějakou možnost, jak to zařídit ideálně. Byli jsme si vědomi, že je to malé. Když jsme dokreslili, měli jsme od toho domu klíče a mohli jsme tam jít. Byl vystěhovaný, ale ne úplně, byly tam skříně a stoly a my jsme si to stavěli, rozložení nábytku v těch jednotlivých kanálech, abychom dospěli k ideálnímu řešení v těch prostorových možnostech, které máme, což byl modul 6 * 3 osově pro 2 lidi. To je typická věc, který se v tom domě opakuje do zblbnutí.

Ale ty lidi si to třeba jako stejně nakonec dají jinak, to architekt neovlivní, jedině že by ty stoly přišrouboval.

Ale já to chápu, ta míra svobody, kterou v tom baráku mají, je opravdu hrozně malá.

Je tam třeba autonomní stínění, když svítí sluníčko tak moc, že se ten dům neumí dochladit, sjedou žaluzie. A ty lidi si se můžou vytáhnout, aby měli pocit, že to můžou ovlivnit. V každé kanceláři je ovladač, kterým si můžeš zvýšit intenzitu světla, nebo si můžeš zatáhnout nebo vytáhnout ty žaluzie, ale to můžeš jenom na chvilku. Ten okamžik svobody je krátký, protože ten dům za chvilku zase převezme zodpovědnost a sjede těmi žaluziemi a tu teplotu ti zase změní.

Ale je to tak nutné, že to je vlastně takový generál, malinko, ten barák.

Co si myslíš, že architekt potřebuje vědět a znát, aby byl schopný navrhnout budovu s dobrým vnitřním prostředí?

To bych taky rád věděl, ale asi nevím.

My tohle začínáme řešit až v poslední době, že nad tím přemýšlíme víc do hloubky. A přemýšlíme o tom, na jakou stranu jsou ty domy vystaveny slunečnímu zářením, kde jsou velký plochy. Z čeho je to dělaný? Jestli to, jestli ty materiály má nějakou tepelnou akumulaci, nebo nemají. K tomu jsme dospěli časem, teĎ nad tím vždycky přemýšlíme a snažíme se to dělat tak, aby to fungovalo v tom návrhu.

Myslím, že architekt by měl vědět kde je vždycky západ, kde je východ, když něco navrhuje a jak velký jsou ty prosklené plochy, které na tyhle ty strany otáčí. A měl by jako přemýšlet nad tím, jakou to má tepelnou akumulaci a taky, že jsou nehorázné prostředky na to, abych něco dokázal chladit.

Architekt by měl vždycky zvažovat, že potom ty finanční prostředky, který budou vícenáklady oproti tomu řešení, které by třeba nepotřebovalo vzduchotechniku, je vždycky rozumný použít, protože v délce života toho objektu je to nakonec zanedbatelný, ten rozdíl ve stavební části.

To je vidět nakonec na fakultě (budova FA ČVUT).

A je těchhle znalostí něco, co si myslíš, že tě může a měla by naučit škola?

Tohle všechno mi měla říct, si myslím. Tenhle základní obrys bych teda fakt měl nějak pochytit ze školy, to by mi přišlo dobrý.

Máš pocit, žes to pochytil?

Ne, vůbec (smích).

Nebo třeba vaši studenti?

Snažíme se jim to říkat, ale těch témat na škole je tolik, že člověk není schopen pobrat všechno. Bylo by asi fajn, kdyby na to byl jednoduchý manuál, takové desatero přikázání, které by si ty studenti pamatovali.

Třeba se učíš, že betonová deska na rozpětí 8 m má mít 30 cm. Stejně tak by člověk měl vědět, že když udělám barák který bude na východ nebo na západ a bude tam mít velký okna, bude asi zřejmě nějaký problém s přehříváním.

Přišlo by mi to dobrý, kdyby se to dalo nějak hodně zjednodušit, aby to bylo fakt pár bodů.

Co si myslíš, že by navrhování vnitřního prostředí usnadnilo, z hlediska nástrojů, třeba i softwarových nebo z hlediska spolupráce se specialisty? Nebo i z hlediska legislativy.

Spolupráce se specialisty, bylo by fajn, kdybych měl k sobě nějakého člověka, nebo bychom měli tady s klukama, dokáže jako vymýšlet vnitřní prostředí koncepčně, už od té úvodní fáze, nepotřebuje to všechno počítat. Řekne nám pár věcí, když mu ten barák ukážeme, řekne nám prostě „tady v tomhle místě bude problém“, někoho takového zatím nemáme. Vím o jednom – Jan Žemlička.

Takových lidí kdyby bylo víc, bylo by hrozně fajn s nimi procházet koncepty studií. Kdyby se ti lidi na to uměli podívat v okamžiku, kdy to architekt nějak základně prostorově vymyslí, a oni mu řeknou: „Hele, tady je to blbý, tohle nebude fungovat…“, to by mi opravdu usnadnilo práci. Ale nevím, že by jich bylo moc.

Potom legislativně si myslím, že by bylo fajn, kdyby neplatily takový jako nesmysly jako NzEB 2022.

Na to jsou navázané ještě dotace, protože to je v podstatě nesplnitelné. My doděláme nějaký projekt a připadám si jako Alenka v říši divů, protože abychom splnili parametry té nZEB, musí být na tom domě solární elektrárna. Protože ty parametry jsou tak strašně přísný, že to bez toho nesplníš. Kladu si otázku, jestli to má smysl, dělat solární elektrárnu zrovna v tom místě, jestli se to někdy vrátí, jestli je to opravdu taková úspora, když myslím na životní prostředí.

Protože výroba těch panelů taky něco stojí, a uhlíková stopa je obrovská.

To ale na začátku nemůžeš vědět, protože nevíš, kolik bude těch slunečních dní. Akorát to musíš splnit, protože to je dotace z veřejných prostředků. Tím ale úplně enormně stoupnou náklady, v okamžiku kdy chceš postavit tu solární elektrárnu.

Z veřejných prostředků ty peníze dostaneš díky tomu, že ji tam máš. Jestli je tohle počínání správného hospodáře, to nevím. Myslím si, že není, že se rozhýří hrozně moc prostředků, protože zrovna je tady nějaký takovýto program..

Ale jinak nic proti tepelným izolacím a tak, proti tomu nebojuju. Ale to myslím, že v legislativně se občas objevují pěkný pitomosti.

Napadá ještě k architektonickému navrhování z hlediska vnitřního prostředí?

No jako že by se neměla podceňovat akustika vnitřních prostor, že to je dost zásadní pro vnímání toho prostoru, tím návštěvníkem. Že to dokáže dost zkazit pocit z toho baráku, když je tam blbá akustika.

No a myslíš si, že už to je třeba ve spolupráci s nějakejma specialista jste schopný navrhnout a předvídat akustickou kvalitu těch prostor?

Nejsme, jedině když je ten prostor hodně jednoduchý. Třeba když jsme dělali modřanskou halu, taky jsme si nechávali počítat ty základní prostory, což byla třeba ta hlavní hala a tam nám normálně řekli, že to spočítat nedokážou, že to nejde. Že tam je riziko vzniku třepotavé ozvěny a že se uvidí, až se to postaví.

Tak jsme to postavili tak, jak to bylo navržený. Říkali jsme, kde můžou být pohltivé materiály a kde naopak být nemůžou. A není tam třepetavá ozvěna, ale vlastně to nešlo spočítat. Oni nám řekli „je to přetlumený, to jo, ale je tam riziko vzniku třepotavý ozvěny“.

Připadá mi, že ta akustika docela výrazně vstupte dál do výsledné podoby interiéru.

Jako do výsledný podoby jak to vypadá nebo jak je to vnímané?

Oboje, jak vypadají a i jak to je vnímaný.

A to se nedá zachránit ani větší strojovnou. To je prostě, když je to blbý, tak se to musí přeorat.

English translation of interview with Vojtěch Sosna:

What does the term indoor environment mean to you, or what do you imagine it to mean?
Such an abstract question, huh? If you put it that way, it always has a very strong subtext, or almost a supertext of building physics for me.
If it's indoor, if it sounds like that the indoor environment will be, actually it's completely dearchitectonized, that word. To me it's a bunch of different calculations and studies.

In this project I am dealing with architectural design in terms of the quality of the indoor environment of buildings, focusing on the quantifiable building physical parameters, i.e. daylighting, acoustics, thermal comfort and air quality.

Were there any specific requirements for indoor environmental quality already in the brief, or what requirements did you base them on? Were they based on legislative requirements or on some other requirements?

There was nothing in the competition brief about this at all. Because it was pretty general.
At the moment we won it, we consulted with the investor about the possibilities that were there for the building systems, because it was a reconstruction, he had the idea that all the rooms could be mechanically ventilated.
But that was not possible, we basically minimized the technology to the very edge of what was possible, after discussion with the investor's representatives and the project manager.

In that house, it was quite limiting that there are only 3.3 metres of construction height on the general floors. Which meant that in order to meet the legislative minimum for room clear height at all, we were getting less than 30cm of ceiling space. Which was probably the biggest limit of the house.

At what stage of the designs did you start to address basically anything of the indoor environment?

In the study, like right after the competition.

Did you think about any of that, whether it be light, acoustics, thermal comfort in that competition already?

Not in the competition at all, when we submitted the competition proposal, you don't really get much chance to get to that.
And it's not essential, because those things can often be added later. What affects it from a formal point of view is, for example, the size of the windows, so maybe that's essential, but then as far as the indoor environment is concerned, for example, in terms of fresh air or heat recovery, those are all things that can be added to the house later.
Or, I don't know, it seems to me that something is the size of the windows that is of course quite a major influence on those variables that are measurable, which is the lighting of those rooms.
But you can't get to anything else, it's simply not possible in the competition.

But right after the competition, when we were finishing the study, we discussed it with the investor and with the investor's representatives, who were the people hired to run the project as technical manager or production manager, who were pretty experienced people.

Have you consulted any specialists in the study?

After the competition, yes, we had a team and we consulted right away. We dealt with all the technology of the house. The submission of the study had the detail of basically a building permit, it was structured that way as well, so it had quite a lot of technology already thought out in concept.
When we submitted the study, we had three energy concepts and we gave the investor three concepts to choose from. One of those energy concepts was heat pumps, the energy specialists were proposing ground boreholes, which was impossible to negotiate at all. They would have had to be terribly deep and there is a high underground water level, so it was on the hydrological permit, so it was not possible.
The investor chose what was simplest: there is a district heating pipeline right in the street, there was a heat exchanger station in the original house, it was normally connected. So it continues to be heated by the heating plant; when the construction was underway, the Prague heating company came to dismantle the heat exchange station. After the construction they put it back in, but smaller, because the house was insulated, so it didn't need that much energy.

Have you used any software tool to verify something, from light or otherwise, before consulting with specialists?
We haven't, that was up to them. They already calculated the lighting of the offices in the study because, for example, in that calculation, you know it much better than I do, so there is a role for how deep the glazing is placed and the house has built that architectural form on the fact that the glazing is sunk very deep to make it look very powerful, heavy.
And although I think that's completely nonsense, how thick the walls are has a terrible effect on the calculation, so you have to have light in the house all the time. I mean, in order to be sanitation-approved at all, there's a combination lighting system designed in.

In all the offices?

Yeah, all over the house. But there's no need for that, those people don't turn on the lights.

But it's like a parametric thing from the calculation that it's like that, if the glass is sunk at some depth, it's the addition of those deep walls that counts. So all the lights are designed to be on all day. But it's not used.

Has anything been addressed in terms of the impact of the building to the outside, either shading, acoustics something like that?
Acoustics were addressed. Shading no, because the house was basically a renovation of an existing volume that didn't change yeah, or very little in that roofscape at the very top where it really doesn't affect anything. So it wasn't addressed because it was a façade reconstruction and a change in layout.
But the acoustics were addressed because there are chillers on the roof, because some rooms have cooling. There was a condition in the building permit that the noise load of the surroundings must be measured before the building was approved. So there's an extension on the top floor that's used as a wedding hall, and there's a stretch metal fence enclosure on top of that. And it's covered on the inside with acoustic material to absorb any noise from the chillers, the units.

What architectural compromises did you have to make in that project, in that study, for example, to meet the requirements of the authorities and the requirements of the indoor environment?

Probably nothing, actually, because we've agreed that the offices won't be mechanically ventilated. We agreed to use heating and cooling registers suspended from the ceiling in the building. Which are actually covered, there's a perforated ceiling used, a sort of aluminum folding grid that covers all the stuff that's above that.

There's very flat fixtures that are able to make the house cooler in the summer and that coolness falls on you from above, which is nice because you don't get cold from your feet.
We considered using a floor unit, but that wouldn't be usable in reverse in the summer because it would be cold from people's feet. So we agreed to use that, but there's no temperature declared, we can get it cooler, but we can't say how much cooler. But it's put in there because if it's heating, by quite reasonable reasoning we concluded that if it could cool, why not use it.
The authority just had requirements there based on health standards that those rooms that don't have windows must be mechanically ventilated. Which is basically just meeting rooms. Actually, even the meeting room on the 8th floor, which has windows, all the meeting rooms in that building have mechanical indoor ventilation, and there is some cooling declared.
The authority didn't complicate things for us in terms of the indoor environment, there wasn't some impossible requirement on their part or something that would interfere with the architectural concept, it was always easy to meet.

How were interior acoustics or spatial acoustics addressed there?

We had specialists who were brought in when the study was completed. We dealt with it there, but very roughly. Then it was dealt with in great detail in the detailed design, and actually all the spaces are calculated, for the whole building. Except for the toilets.
Under the ceilings, we used absorbent boards, which actually treated two birds with one stone. In that house, as it's existing building, they used prefabricated Spirolls for the ceiling slabs, which didn't have enough fire resistance for the new use of that building. We needed to increase that fire resistance anyway, so we used boards that increased that and also act as acoustical. So those panels are actually wrapped all over and because of that, it comes out as pretty good or pretty good acoustics in those offices, which are all muffled in that ceiling. The common corridors, too. And then the separate rooms that were counted separately were all those meeting rooms and especially the downstairs meeting room, that was given extra attention and then the lobby because it's quite a large space that's covered in all hard surfaces. So we were worried that the acoustics would be bad, so there's a soundproofing there as well, that's calculated separately.

And when you look back at the finished house, did it turn out the way you expected or planned, or is there anything that surprised you about the finished house?

Actually, I don't think anything surprised us. We just thought of it a bit differently operationally, because we wanted the employees to always sit in the office, which will be modularly 6 * 6 meters. That didn't really happen. The house is divided into 6 * 3 modules, that there's always a partition running into the middle of the window.
Which is a solution that was requested by the department, though. That's actually a compromise, I guess, because we didn't really want it that way and the department insisted on it. It's a bit of a detriment to acoustic comfort, all those partitions of those half modules are built up to the clean floor, so there's impact noise between the two offices. But it's done to make that office variable in the future, so that those partitions can be removed when those officials one day all figure out that it's better to have that one big office for 4 people, because that's significantly more space comfort. Some offices have had it that way from the start, like 30% of the house is sorted out that it's really those 6*6, but that's probably what annoys me the most about the house.

Can you think of anything else about the project here that relates to either the indoor environment or also like the story of the house or the user comfort as such?

Of course, it's extreme in that the house is not very big at all, for 200 officials, you could read on many forums that the town hall is small. That's right, it's a small building. And there's not much we can do about that design-wise, because our job was basically to cram 200 people into the existing volume, which we sort of tried to do. It's pretty cool that they're so disciplined, or maybe it's like a given befeel from the council, I don't know, that the house in those common areas is still like when it was finished, they didn't add much there like.
Because Councilman Zelenka, who was assigned to that town hall project, he's a graphic designer, he's very much in touch with aesthetics, so he understands that the cluttering of the houses pretty much ruins the overall impression of those interior spaces, which are key when the house is this small.
But what's going on in those offices is, of course, another matter. Nobody has much control over that, and even though we tried to design it to be practical for them, people use it differently than we thought they would, I guess that's part of it. From my point of view, it's just so cluttered with stuff. The offices look terrible from the inside, but I think that's more to do with the culture, the mental hygiene of the people and their culture, I can't really control that.

We have given them some way to make it ideal. We were aware that it was small. When we finished drafting, we had the keys to the house and we could go in. It had been moved out, but not completely, there were cupboards and desks and we built it, the furniture layout in those individual offices to arrive at the ideal solution in the space we had, which was a 6*3 axis module for 2 people. That's a typical thing that's repeated to the point of oblivion in that house.
But those people might end up doing it differently anyway, the architect can't control that, except to screw the tables in.
But I understand, the amount of freedom they have in that house is really very small.
There's autonomous shading, if the sun shines so much that the house can't cool down, the blinds come down. And those people can draw the blinds up so they feel like they can control it. There's a control in every office that you can turn up the light, or you can close or pull those blinds, but you can only do that for a little while. That moment of freedom is short-lived, because in a moment the house will take charge again and pull down those blinds and change the temperature again.
But it's so necessary that it's actually kind of a General, a little bit, the house.

What do you think an architect needs to know in order to be able to design a building with a good indoor environment?
I'd like to know that too, but I don't think I know.
We're only starting to address this recently by thinking about it more in depth. And we're thinking about which side of the buildings are exposed to the sun, where the large areas are. What's it made of? Whether or not those materials have any heat accumulation. We've come to that over time, now we're always thinking about it and trying to make it work in that design.

I think an architect should know where west is always, where east is always when they're designing something, and how big the glass surfaces are that face those sides. And he should, like, think about what the thermal accumulation is, and also that it takes an outrageous amount of resources to be able to cool something.
An architect should always consider that then those funds, which will be more costly than a solution that maybe doesn't need air conditioning, is always a reasonable thing to use because in the life span of that building it's ultimately negligible,

the difference in the building part.
You can see that ultimately in the faculty (the FA building of CTU).

And is this knowledge something you think school can and should teach you?

They should have told me all this, I think. So I really should get this basic overview from school somehow, I think that would be good.

Do you feel like you got it?

No, not at all (laughs).

Or maybe your students?

We try to tell them, but there are so many topics at school that you can't take in everything. It would probably be nice if there was a simple manual, ten commandments that the students could remember.
Maybe you're taught that a concrete slab for an 8 m span should be 30 cm thick. Likewise, you should know that if I make a house that faces east or west and has big windows, there's probably going to be some overheating problem.
I would find it good if one could simplify it a lot, so that it is really a few points.

What do you think would make designing the indoor environment easier, in terms of tools, maybe even software, or in terms of collaboration with specialists? Or even in terms of legislation?

Collaboration with specialists, it would be nice if I had a person with me, or we had here with the guys, who can like think of the indoor environment conceptually, from that initial phase, he doesn't need to calculate it all. He'll tell us a few things, if we show him the house, he'll just say "there's going to be a problem in this place", we don't have someone like that yet. I know of one - Jan Zemlicka.
If there were more people like that, it would be really nice to go through the concept studies with them. If these people could look at it at the moment when the architect has some basic spatial idea and they say, "Hey, this is wrong, this won't work...", it would really make my job easier. But I don't know that there would be too many of them.

Then legislatively I think it would be nice if nonsense like NzEB 2022 didn't apply.
There are still subsidies attached to that because it's basically unachievable. We finish a project and I feel like Alice in Wonderland because to meet the parameters of that nZEB, there has to be a solar power plant on that house. Because the parameters are so stringent that you can't do it without it. I'm wondering if it makes sense to do a solar power plant in that particular location, if it's ever going to pay for itself, if it's really that much of a saving when I think about the environment. Because it costs something to make those panels, and the carbon footprint is huge.
But you can't know that at the beginning, because you don't know how many days of sunshine there will be. You just have to meet it because it's a public subsidy. But that's going to drive up the cost absolutely enormously the moment you want to build that solar power plant.

You get the money from public funds because you have it there. Whether that's being a good economist, I don't know. I don't think it is, that an awful lot of money is being squandered because there's a program like this.

But otherwise, nothing against thermal insulation and all that, I'm not fighting it. But I think there's some pretty stupid stuff in legislation sometimes.

Any other thoughts on architectural design in terms of the indoor environment?

Well, like that one should not underestimate the acoustics of indoor spaces, that it is quite crucial for the perception of that space, by the visitor. That it can pretty much ruin the feeling of the building if the acoustics are bad.

Well, do you think it's already, maybe in collaboration with some specialists you're able to design and predict the acoustic quality of those spaces?
We're not, unless the space is very simple. For example, when we did the Modřany hall, we also had the basic spaces calculated, which was for example the main hall, and they told us that they couldn't calculate it, that it was impossible. That there was a risk of a flutter echo and that they would see when it was built.
So we built it the way it was designed. We said where the absorbent materials could be and where they couldn't be. And there's not a flutter echo, but you couldn't actually calculate it. They told us "it's over-attenuated, yes, but there's a risk of flutter echo".
It seems to me that the acoustics enter quite significantly further into the final interior design.

As in the final form of what it looks like or how it's perceived?

Both how they look and how it is perceived.

And you can't save that with a bigger machinery. It's just, if it's wrong, it has to be redone.

Appendix 2 – candidate's publications

Directly related to the thesis

Schulzová, K.; Bošová, D.

BIM Tools For Analysing The Indoor Environmental Quality in Architectural Design

(conference paper) In: 13th Architecture in Perspective 2021 (2021) pr. 270-277

Schulzová, K.; Bošová, D.

Contemporary Residential Architectural Design in Terms of Indoor Environmental Quality

(conference paper) In: 20th International Multidisciplinary Scientific GeoConference SGEM 2020. (2020) p. 515-522.

Schulzová, K.; Bošová, D.

Residential architecture in terms of the indoor environment

(conference paper) In: 12th Architecture in Perspective 2020 (2020) p. 255-260

Schulzová, K.; Bošová, D.

The Quality of Daylight in Various Types of Residential Buildings **(included in full length in the appendix)**

(conference paper) In: Proceedings of the enviBUILD 2019 (2019) p. 159-164.

Schulzová, K.; Bošová, D.

The Development of Indoor Environmental Quality Definition from Vitruvius to the Present

(conference paper) In: 11th Architecture in Perspective 2019. Ostrava: VŠB-TUO, (2019) p. 38-42

Schulzová, K.; Bošová, D.

Building physics requirements and architecture students

(conference paper) In: 18th International Multidisciplinary Scientific Geoconference SGEM 2018 - Nano, Bio, Green and Space - Technologies for a Sustainable Future. Sofia: STEF92 Technology Ltd., (2018) p. 537-544. vol. 18.

Schulzová, K.

Architektura mateřských škol z hlediska kvality vnitřního prostředí

(conference paper) In: Architecture and Sustainable Development 20. Praha: Czech Technical University in Prague, 2020. p. 14-21. ISBN 978-80-01-06770-3.

Loosely related to the thesis

Schulzová, K.; Prokopová, L.; Bošová, D.

EXPERIMENTAL SIMULATION OF DAYLIGHT FACTOR AND ITS PERCEPTION BY ARCHITECTS (conference paper) In: 19th International Multidisciplinary Scientific Geoconference SGEM 2019. Sofia: STEF92 Technology Ltd., (2019) p. 449-455. vol. 19.

Schulzová, K.; Černá, A.; Bošová, D.

The Impact of Extending the Loggia of a Precast Panel Building on Daylight and Insolation of the Apartments

(conference paper) In: 2018 VII. Lighting Conference of the Visegrad Countries (Lumen V4), (2018) p. 25-28.

Schulzová, K.

The Challenge of Extending Panel House Loggia on Neighbourhood Level

(conference paper) In: Facing Post-Socialist Urban Heritage. Faculty of Architecture, Budapest University of Technology and Economics, (2019). p. 106-109.

Schulzová, K.; Bošová, D.

THE IMPACT OF EXTENDING THE PRECAST PANEL HOUSE LOGGIA ON THE INDOOR ENVIRONMENT

In: 19th International Multidisciplinary Scientific Geoconference SGEM 2019. Sofia: STEF92 Technology Ltd., 2019. p. 565-572. vol. 19. ISSN 1314-2704. ISBN 978-619-7408-89-8.

Schulzová, K.; Černá, A.; Bošová, D.

Vliv rozšíření lodžií na denní osvětlení a proslunění bytů panelové soustavy VVÚ ETA (conference paper) In: Sborník recenzovaných příspěvků Kurz osvětlovací techniky XXXIV. Ostrava: VŠB - Technical University of Ostrava, 2018. p. 177-181. ISBN 978-80-248-4221-9.

Schulzová, K.

Případová studie udržitelné dřevostavby

(extended abstract) In: Sborník konference Moderní materiály a technologie ve stavebnictví 2018. Praha: ČVUT, Fakulta stavební, Katedra konstrukcí pozemních staveb, 2018. ISBN 978-80-01-06485-6.

Schulzová, K.

Tepelně technické vlastnosti domu s izolací ze slaměných balíků v porovnání s konvenční dřevostavbou

(conference paper) In: Dřevěné konstrukce a energeticky úsporné dřevostavby. Praha: České vysoké učení technické v Praze, Fakulta architektury, 2018. p. 31-35. ISBN 978-80-01-06468-9.

Unrelated to the thesis

Kuric, A.; **Schulzová, K.**
Historická okna a energetická náročnost: Případ architektury funkcionalismu
Zprávy památkové péče. 2022, ISSN 1210-5538. (accepted for publication)

Schulzová, K.

Regulace vlhkosti vnitřního vzduchu v kontextu hospodaření s vodou

(conference paper) In: Udržitelný životní cyklus vody, jeho ekonomická návratnost a vliv na podobu objektu, urbanizovaného území a krajiny. Praha: Czech Technical University in Prague, 2020. ISBN 978-80-01-06732-1.

Schulzová, K.

Dřevo jako prostředek zlepšení vnitřního prostředí budov

(conference paper) In: Sborník příspěvků a prezentací studentská vědecká konference „Dřevěné konstrukce a dřevostavby se zvláštním zaměřením na občanskou výstavbu. Praha: České vysoké učení technické v Praze, Fakulta architektury, 2019. p. 93-100. ISBN 978-80-01-06647-8.

Citations and feedback on publications

Schulzová, K.; Bošová, D.

Contemporary Residential Architectural Design in Terms of Indoor Environmental Quality

Cited by:

Khalil, N., Samsudin, N. S., & Zainonabidin, A. (2022). The Sustainable Aspect of Safety in Architectural Early Design: An Introduction to Prevention through Design (PtD) Concept. International Journal of Sustainable Construction Engineering and Technology, 13(2), 34-50.

Schulzová, K.; Bošová, D.

The Quality of Daylight in Various Types of Residential Buildings

Cited by:

Dolníková, E., Katunský, D., Miňová, Z., & Dolník, B. (2021). Influence of the Adaptation of Balconies to Loggias on the Lighting Climate inside an Apartment Building under Cloudy Sky. Sustainability, 13(6), 3106.

Schulzová, K.; Černá, A.; Bošová, D.

The Impact of Extending the Loggia of a Precast Panel Building on Daylight and Insolation of the Apartments

Cited by:

Dolníková, E., Katunský, D., Miňová, Z., & Dolník, B. (2021). Influence of the Adaptation of Balconies to Loggias on the Lighting Climate inside an Apartment Building under Cloudy Sky. Sustainability, 13(6), 3106.

Schulzová, K.; Bošová, D.

THE IMPACT OF EXTENDING THE PRECAST PANEL HOUSE LOGGIA ON THE INDOOR ENVIRONMENT

Awarded speaker at the SGEM 2019 conference