ČVUT

ČESKÉ VYSOKÉ
UČENÍ TECHNICKÉ
V PRAZE

SUPERVISOR'S OPINION OF
FINAL THESIS

I. IDENTIFICATION DATA

Thesis name:	**Numerical Analysis of Climatic Conditions Influence on the Current State of the St. Ann Church**
Author's name:	**Brenda Natalie Podio**
Type of thesis :	master
Faculty/Institute:	Faculty of Civil Engineering (FCE)
Department:	Department of Mechanics
Thesis supervisor:	Tomáš Krejčí
Supervisor's department:	Department of Mechanics

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	**challenging**
Evaluation of thesis difficulty of assignment.	
The difficulty of thesis assignment is evaluated as challenging.	

Satisfaction of assignment	**fulfilled**
Assess that handed thesis meets assignment. Present points of assignment that fell short or were extended. Try to assess importance, impact or cause of each shortcoming.	
All points of the assignment were fulfilled.	

Activity and independence when creating final thesis	**A - excellent.**
Assess that student had positive approach, time limits were met, conception was regularly consulted and was well prepared for consultations. Assess student's ability to work independently.	
I appreciate Natalie's diligence and a serious interest in the solution of the problem.	

Technical level	**A - excellent.**
Assess level of thesis specialty, use of knowledge gained by study and by expert literature, use of sources and data gained by experience.	
The numerical analysis of St. Ann's Church required the further study of topics such as heat transfer, damage modeling and FEM. Moreover, it was necessary to learn the professional graphical pre and postprocessor GiD and the computational software Atena within a short time.	

Formal and language level, scope of thesis	**A - excellent.**
Assess correctness of usage of formal notation. Assess typographical and language arrangement of thesis.	
The thesis is very well structured and written in excellent English. There are nearly no mistakes and mistype writing in the text. Graphs and figures are well-arranged, and they illustrate the results very well.	

Selection of sources, citation correctness	**A - excellent.**
Present your opinion to student's activity when obtaining and using study materials for thesis creation. Characterize selection of sources. Assess that student used all relevant sources. Verify that all used elements are correctly distinguished from own results and thoughts. Assess that citation ethics has not been breached and that all bibliographic citations are complete and in accordance with citation convention and standards.	
The work is based on previous studies which, together with other references, are cited correctly.	

Additional commentary and evaluation
Present your opinion to achieved primary goals of thesis, e.g. level of theoretical results, level and functionality of technical or software conception, publication performance, experimental dexterity etc.
The numerical simulation can be regarded as a useful tool for future interventions and repairs of St. Ann's Church.

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III. OVERALL EVALUATION, QUESTIONS FOR DEFENSE, CLASSIFICATION SUGGESTION

Summarize thesis aspects that swayed your final evaluation.

The master's thesis presented by Brenda Natalie Podio deals with a computer simulation of the behavior of St. Ann Church in Vižňov influenced by climatic loading. The author pays special attention to the mechanical response of the church to the thermal loading during an annual temperature cycle. A finite element model was created for simulation of heat transfer using in situ measurements and climatic data. The main part of the study consists of non-linear analyses of 3D model of the church loaded by temperature changes. The heat transfer simulations were performed with an open source code SIFEL which allow to input climatic data. Then the results, temperature increments, were transferred into the commercial software Atena as one of the loadings in subsequent mechanical analysis.

Results of computations are illustrated by many figures, where the crack pattern shows areas of possible damage and crack evolution. Some of these locations are in correspondence with in situ observation. Other in situ observed damage areas have different causes, e.g., non-uniform subsoil settlement, chemical degradation, etc.

The numerical analysis required the further study of topics such as heat transfer, damage modeling and FEM. Moreover, it was necessary to learn the professional graphical pre and postprocessor GiD and the computational software Atena within a short time.

The thesis is very well structured and written in excellent English. There are nearly no mistakes and mistype writings in the text. Previous studies and other references are cited correctly. Graphs and figures are well-arranged, and they illustrate results very well. Concerning the recommended length of the thesis, many pictures were moved into annexes.

Results of the analysis are analyzed correctly in detail, and conclusions are also well defined. I appreciate the combination of the open source software SIFEL and the professional software Atena to one-way coupled analysis. The numerical simulation can be regarded as a useful tool for future interventions and repairs of St. Ann's Church.

I appreciate Natalie's diligence and a serious interest in the solution of the problem. The master's thesis presented is fully acceptable, and I recommend it for defense.

I evaluate handed thesis with classification grade **A - excellent.**

Date: **18.7.2019**   Signature: