OPONENT'S REVIEW

I. IDENTIFICATION DATA

Title of the thesis:	Robotics in Construction of Concrete and Masonry Structures
Candidate:	Anudari Nyamsuren
Type of thesis:	Bachelor thesis
Faculty:	Faculty of Civil Engineering
Department:	Department of Concrete and Masonry Structures
Opponent:	Ing. Josef Novák, Ph.D.
Opponent´s department:	Department of Concrete and Masonry Structures

II. EVALUATION

Topicality of the thesis theme Difficult

The objective of the thesis was to carry out the state-of-the-art review on robots in the construction engineering including the evaluation of benefits and difficulties in the implementation of robotics in construction as well as to make a summary of possible applications of robots in construction and maintenance of concrete and masonry structures with detailed description of one selected application. Although the topic is very novel, the tasks are rather simple and consequently the topicality of the thesis theme is possible to consider as difficult.

Fulfilment of the thesis Excellent

The objective of the thesis has been achieved successfully - all the tasks have been carried out. Namely, a general overview of robotics including the description of fundamental components of a robot, the robot utilization in the construction industry, particularly in the concrete and masonry industry, the detailed review of bricklaying robots and the analysis of the future development in robotics are provided.

Methods and procedures: Above average

The methods and procedures used for the elaboration of the thesis are adequate. Firstly, the general overview of robotics is provided. Namely, the brief history of robotics and a typical application of robots in various industries including benefits and difficulties are presented. Subsequently, the attention is focused on the robot utilization in the construction industry, particularly in the concrete and masonry industry. A wide range of robots and their applications in the concrete and masonry industry are described. Two types of bricklaying robots are described in detail including the cost analysis when used for the construction. Last but not least, the predictions about the future development in robotics are summarized. From my point of view, the only thing which is missing is a personal view on this topic. Reader's opinion about the implementation of robots in the concrete industry would certainly improve the thesis.

Formal layout of the thesis and the level of language used Excellent

From a technical point of view the thesis is well written and clear. The text contains only minor grammatical mistakes. Presented figures are readable and improve the quality of thesis as a whole.

Citation of references Excellent

The thesis contains a reference list and a note list according to Chicago style of citation at the end of the thesis. The reference list contains many research papers and technical publications related to the topic of the thesis. The number of references only proves that the student spent a plenty of time by gathering topic-related information and findings.

Other remarks

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As the bachelor thesis is well written I have only a few questions/comments.
- p.50 - Is it adequate to consider only cost for laying one brick when it is made the comparison of production costs of structure assembled by either a robot or a labourer. Are there any other additional costs which should be taken into account to get more precise/relevant results?
- What is the lifetime of the Hadrian X robot SAM100 robot (p.45,48)? Is it possible to use these bricklaying robots for the construction of masonry structure in upper floors? What are the limitations in terms of structure height?
- There are two identical solid concrete walls but constructed with different manufacturing technology - 3D printing technology and conventional technology (monolithic concrete poured into formwork). Is the out-of-plane flexural capacity of both walls identical (for instance when exposed to wind)? If not, why not?

II. FINAL ASSESSMENT, REVIEWER'S QUESTIONS, GRADING

The reviewer's questions and comments are summarized above.

Grade: A

Date: 12.6.2019 Opponent's signature:……..