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Vedoucí odboru biomechaniky

Ústav mechaniky, biomechaniky a mechatroniky
Fakulta strojní
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Strana 1/2



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prof. Ing. Michael Valášek, DrSc.
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Review of advisor

Disertant: Eren Pehlivan
Topic: Developing trabecular structure

The thesis focuses on the problems of additive manufacturing, that is believed to be one of the main advances in the forthcoming Industry 4.0. As the additive manufacturing using powder bed technology is relatively new, there are many open questions regarding the reliability and the overall quality of the products. This is crucial in the fields of industry, where the demands on the functional properties are high like aerospace and medical. The thesis submitted by M.Sc. Eren Pehlivan cover some of the open questions related to properties of the porous structure.

It is a very actual topic and the thesis brings several new data and contributions to the area of the study. From my point of view, the most interesting is the study of struts properties based on direction of the assembly process. As far as I know, this is the first study providing exact value of the limit in the cross-sectional area. Other results that are worth mentioning, are the mathematical model of the porous structure that shows good qualitative agreement with the performed experiments and the complex study of post-treatment effect on the mechanical properties of the porous structure.

The student was given a specific assignment of prediction of lifetime of porous structure at the beginning of the study. However, he found out, that this simple task does not have a simple answer and there is not enough information in literature to provide such



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estimation. Therefore, he started to study the whole context and suggested specific experiments that will provide new insight into mechanics of the porous structure. During his study he has made a considerable effort to study up on related research and other information of relevance to address the research questions. In our numerous discussions, he was coming with original ideas that were both well formulated and relevant.

The whole study might be separated into independent tasks that contains re-study, implementation and evaluation and these tasks corresponds to the actual experiments and subsequent publications. It should be noted, that he during his study he designed, performed and evaluated multiple experiments to provide data for these outputs. He was involved in the experiments from CAD of the samples, through AM process, post-processing, measuring and evaluating the results. Important aspect of his contribution is also its full replicability, that is not common for all biomedical studies. Student demonstrated the ability to work independently with great creativity and enthusiasm.

In summary, Eren Pehlivan is clearly one of the the best Ph.D. student I have worked within the last 10 years. During his study he opened a new filed that shall be studied further. I give him my highest recommendation for obtaining Ph.D. degree after the thesis defense.

Matej Daniel

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