Univerza v Mariboru

Fakulteta za strojništvo

Smetanova ulica 17
2000 Maribor, Slovenija

THESIS SUPERVISOR'S REPORT

I. IDENTIFICATION DATA

Thesis title:	**FE Simulations for Assessment of Material Response to Quasi-Static Loading**
Author's name:	**Bohumil hora**
Type of thesis :	bachelor
Faculty/Institute:	Faculty of Transportation Sciences (FTS)
Department:	Department of Mechanics and Materials
Thesis reviewer:	asist. prof. dr. Nejc Novak
Reviewer's department:	Faculty of Mechanical Engineering, University of Maribor, Slovenia

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	**challenging**
How demanding was the assigned project?	
The project deals with the advanced computational simulations, which were used in a proficient and detailed manner for the bachelor thesis level.	

Fulfilment of assignment	**fulfilled**
How well does the thesis fulfil the assigned task? Have the primary goals been achieved? Which assigned tasks have been incompletely covered, and which parts of the thesis are overextended? Justify your answer.	
The primary goals of the thesis were successfully fulfilled. All the planned activities regarding the FE simulations were carried out.	

Activity and independence when creating final thesis	**B - very good.**
Assess whether the student had a positive approach, whether the time limits were met, whether the conception was regularly consulted and whether the student was well prepared for the consultations. Assess the student's ability to work independently.	
The is very independent and come to the consultations well prepared. The time limits were not always met as it was agreed, so this should something that the student need to take care in the future.	

Technical level	**A - excellent.**
Is the thesis technically sound? How well did the student employ expertise in his/her field of study? Does the student explain clearly what he/she has done?	
The technical level of the thesis is excellent, so not only many different FE and programing tool were used, but all the scripts are also attached to the thesis and well explained. This will offer the possibility to use this tools also for further studies.	

Formal level and language level, scope of thesis	**A - excellent.**
Are formalisms and notations used properly? Is the thesis organized in a logical way? Is the thesis sufficiently extensive? Is the thesis well-presented? Is the language clear and understandable? Is the English satisfactory?	
Formal and language level is excellent from the very first received draft of the thesis.	

Univerza v Mariboru

Fakulteta za strojništvo

Smetanova ulica 17
2000 Maribor, Slovenija

Selection of sources, citation correctness	**B - very good.**
Does the thesis make adequate reference to earlier work on the topic? Was the selection of sources adequate? Is the student's original work clearly distinguished from earlier work in the field? Do the bibliographic citations meet the standards?	
All the most important reference about FE modelling and additive manufacturing are taken into account, while there is a lack of the introduction and description of the field of the auxetic cellular metamaterials. The work show some novelty in that field, but has to be in future also supported with the experiments.	

III. OVERALL EVALUATION, QUESTIONS FOR THE PRESENTATION AND DEFENSE OF THE THESIS, SUGGESTED GRADE

The thesis deals with the parametric analysis of deformation and mechanical behavior of modern metamaterials. The FE modelling was done in 2 different software, with two different approaches, and all the models were generated using the developed scripts. This leads to the excellent output of the thesis, which can be used for further research and possible validations with the experiments.
The questions are:

- *Why the tetrahedral mesh provides better results than hexahedral mesh (Figure 4.12)?*
- *The stresses are used for the criterion in mesh convergence study. Why?*
- *What was the reason to move from Ansys APDL to LS-Dyna?*
- *Why so high values of friction coefficient (μ_{static} = 0.78) were used?*
- *What will be the influence on the mechanical and deformation response if the structure will not have sharp edges, but the will have some radius?*

The grade that I award for the thesis is **A - excellent.**

Date: **17.12.2021**

Signature:

K618 – DEPARTMENT OF MECHANICS AND MATERIALS
NA FLORENCI 25, 110 00 PRAHA 1

FAKULTA DOPRAVNÍ ČVUT V PRAZE

BACHELOR THESIS SUPERVISOR'S REPORT

Thesis title	**FE Simulations for Assessment of Material Response to Quasi-Static Loading**
Author's name	**Bohumil Hora**
Thesis supervisors	**Ing. Petr Koudelka, Ph.D.**
	Ing. Jan Šleichrt

Evaluation criteria and their classification:

Assignment	Challenging
Fulfilment of assignment	A (Excellent)
Activity and independence when creating final thesis	B (Very good)
Technical level	A (Excellent)
Selection of sources, citation correctness	B (Very good)
Formal level and language level, scope of thesis	A (Excellent)

Additional comments of the supervisors:

The thesis deals with parametric simulations of a uni-axial compression experiment using finite element method (FEM) to assess the influence of solver type (i.e., formulation of the problem using FEM) on the effective deformation response of a homogeneous object and an auxetic structure. The assignment of the thesis was challenging in both the theoretical background of the topic and the level of technical skills needed to fulfil the goals. We appreciate the independence of the applicant during the work on the thesis and its overall level including the formal viewpoint. The results obtained by the applicant can be used in further research activities underway at the Department of mechanics and materials. We recommend the bachelor thesis for defence.

The overall grade of the bachelor thesis is ..... A (Excellent)

In Prague, January 4, 2022

Signatures of supervisors