

I. IDENTIFICATION DATA

Thesis title:	The impact of outer surface roughness to the performance of a small rocket with D class engine.
Author's name:	Müller Santiago Ismael
Type of thesis :	bachelor
Faculty/Institute:	Faculty of Mechanical Engineering (FME)
Department:	Department of information and automation technology
Thesis reviewer:	Ing. František Lopot, Ph.D.
Reviewer's department:	Department of Designing and Machine Components

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	challenging
<i>How demanding was the assigned project?</i>	
The surface friction is still an up-to-date topic which is being solved by numerous groups around the world. The groups challenge for no friction or higher friction depending on the application. Roughness and surface friction are strongly related and the surface roughness is one of the parameters that has not been thoroughly investigated for the additive manufacturing. The student selected to demonstrate how the roughness influences the performance of 3D printed parts. This required theoretical, practical and manual skills.	

Fulfilment of assignment	fulfilled with minor objections
<i>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.</i>	
The student perform a sufficient review related to the topic, established a hypothesis, compared two different surface treatments and theoretically established the change of surface roughness to a rocket performance. Unfortunately, there was no real rocket model launched to verify the theoretical expectation.	

Activity and independence when creating final thesis	A - excellent.
<i>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.</i>	
The student worked independently and consulted the critical point of the thesis. The student even participated in the U12113 Rocket team as a leader and competed in a CRC rocket competition. The only recommendation to the student was to improve his time management skills and make the planning more realistic.	

Technical level	B - very good.
<i>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?</i>	
The student had to understand and extend his theoretical knowledge in this case on an example of surface roughness. He applied the theoretical knowledge to a real problem, performed an experiment and used the data from the experiment to a simulation. The simulation showed the influence of surface roughness to the performance of small rockets that often compete in competitions.	

Formal level and language level, scope of thesis	B - very good.
<i>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?</i>	
The chapter Introduction contains expected topics such as standards, means of measuring surface roughness and additive manufacturing. Sometimes the explanation of the standard on practical example, mentioning advantages and disadvantages would be beneficial. Also comparison of the variables that describe roughness would be beneficial. Finally, it would be appropriate to link the roughness values with the used technology. There are other minor mistakes such as the placement of table titles under the table.	

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?

Most of the sources are reviewed papers or books, however, the student should not rely on company webpages or Wikipedia in the theoretical part of the thesis.

Additional commentary and evaluation (optional)

Comment on the overall quality of the thesis, its novelty and its impact on the field, its strengths and weaknesses, the utility of the solution that is presented, the theoretical/formal level, the student's skillfulness, etc.

The rapid progress in 3D printing will soon require the necessity of standard notation, for instance, for tolerance or surface roughness. This thesis opens this problem and therefore it is very beneficial for further scientific investigation at our department. The student was able to demonstrate the ability to write the academic work independently, however, to reach the perfect result, a rocket launch experiment needed to be conducted.

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

The thesis is balancing between A and B. The topic is up-to-date, however, the time pressure for finishing the thesis is present.

General questions:

- 1) *Why is arithmetic mean deviation (R_a) one of the most used parameters? What value is usually reached while performing a conventional workshop manufacturing?*
- 2) *What is the limit resolution while using reflectance confocal microscopy for mapping the surface heights? Is this limit sufficient for standard mechanical engineering applications?*
- 3) *What were the parameters for the simulation? How would they differ from a field experiment?*

The grade that I award for the thesis is **B - very good**.

Date: **30.5.2023**

Signature:

