# THESIS SUPERVISOR'S REPORT

## I. IDENTIFICATION DATA

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| **Thesis title:** | **Recovery system for small rocket** |
| **Author's name:** | **Jagam Gautam Harshwardhan** |
| **Type of thesis :** | bachelor |
| **Faculty/Institute:** | Faculty of Mechanical Engineering (FME) |
| **Department:** | Designing and Machine Components |
| **Thesis reviewer:** | Mgr. Ing. Daniel Hadraba Ph.D. |
| **Reviewer's department:** | Designing and Machine Components |

## II. EVALUATION OF INDIVIDUAL CRITERIA

**Assignment** **ordinarily challenging**

*How demanding was the assigned project?*

The recovery systems of rockets are historically well studied and documented. There are several common options that engineers usually select from depending on the requirements and rocket parameters. On the other hand, the design of functional recovery system for a rocket offers a great opportunity for proving the engineering skills adequate for the engineering bachelor level.

**Fulfilment of assignment** **fulfilled with major objections**

*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 student reviewed the technical solutions for recovery system in very general and more popular manner with little technical information. The student was supposed to work more on the recovery system, provide technical drawings, calculations and simulation then, for instance, focusing on avionics or coding. It is also unclear how much work was done by the student and/or other rocket club team members as there are similar figures or code snaps in other thesis.

**Activity and independence when creating final thesis** **D - satisfactory.**

*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 whole thesis was accessed by the student independently and with no help or consulting from the supervisor. There were no consultation or revision processes and the supervisor was informed about the thesis finalization few days before printing and submitting the thesis. The help and organization of the work was offered several times (e-mail, establishing the shared folder, citation manager, etc.) but there was no reaction to the supervisors' suggestions. The final thesis was reviewed by the supervisor for the first time after submitting the thesis in the KOS system.

**Technical level** **F - failed.**

*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?*

There are major errors in the technical level. First, there are no technical drawings of the situation or figures describing the calculated problems. In addition the calculation of the spring, selection of the springs and required torque is not correct. The term terminal velocity is not very clear and no analysis, calculus of velocity-dependent frictional forces is not provided. The student is not systematic, using different values for the same variable, such as Earth gravitational acceleration (9.81 or 10.00 $m/s^2$) or stating values in inches and/or meters.

**Formal level and language level, scope of thesis** **E - sufficient.**

*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?*

The language is sound but the sentences are often empty or vague. The structure follows the traditional methodological standard, i.e. theoretical part, practical part, discussion, and conclusion. The student uses contractions such as I'll or doesn't or that's that should not be present in technical texts. In addition the citation is not by the Czech standard and the

citation in the equations is even more dangerous, for instance, page 20 A[28] introduces a great example for a catastrophic error. The problematic can be also the naming of the program, such as OpenRocket Simulator to be open rocket. This add confusion and danger to any project in general.

| **Selection of sources, citation correctness** **E - sufficient.** |
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| *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?* |
| The student relies on internet resources and uses little literature that targets the core of this problem, i.e. books about aerodynamics, drag forces, structural design and strength and materials. The student did not use the citation format that is obligatory for thesis in the Czech Republic. |

| **Additional commentary and evaluation (optional)** |
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| *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 thesis lacks deeper engineering insight and contains some incorrect and dangerous interpretations and approaches. |

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

*Summarize your opinion on the thesis and explain your final grading.*

The thesis reminds a first draft and would deserve more reviewing and corrections. If the student succeeds in correcting the major errors, then the final grade D or E is adequate.

*General questions:*

1) *You define terminal velocity as a time elapsed for the rocket traveling certain distance (page 36). Explain the term terminal velocity and describe it on a velocity-time graph.*
2) *Why do you consider only the weight of the parachute for calculating the deployment force and not press fit between the rockets multiple stages? Explain and demonstrate correct approach.*
3) *The design relies on two springs in parallel. Where is this reflected in the design?*
4) *Why did you select springs with a ten times higher stiffness than calculated stiffness?*
5) *Explain and sketch the situation with forces and torque that provides an insight into your calculation of the required motor torque.*

The grade that I award for the thesis is **E - sufficient.**

Date: **21.8.2024** Signature: