# THESIS REVIEWER'S REPORT

## I. IDENTIFICATION DATA

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|---|---|
| **Thesis title:** | **Design of a Composite Beam Pipe for CBM Experiment** |
| **Author's name:** | **Martin SMETANA** |
| **Type of thesis :** | master |
| **Faculty/Institute:** | Faculty of Mechanical Engineering (FME) |
| **Department:** | Department of Designing and Machine Components |
| **Thesis reviewer:** | Patrick Dahm |
| **Reviewer's department:** | GSI – Helmholtzzentrum für Schwerionenforschung |

## II. EVALUATION OF INDIVIDUAL CRITERIA

**Assignment** **challenging**

*How demanding was the assigned project?*

The use conditions of the CBM-Experiment create a generally challenging environment for any construction. With the added boundary condition of possible high-vacuum application this challenge is only reinforced.

**Fulfilment of assignment** **fulfilled with minor 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 presented work provides a viable solution for low- to mid-vacuum application, for high- or ultra-high-vacuum application several points have to be improved.

**Methodology** **correct**

*Comment on the correctness of the approach and/or the solution methods.*

The methods of conception, used for the thesis are correct and suitable. Boundary conditions, chosen for the simulations are questionable but acceptable for the concept stage.

**Technical level** **B - very good.**

*Is the thesis technically sound? How well did the student employ expertise in the field of his/her field of study? Does the student explain clearly what he/she has done?*

The overall technical level of the thesis is very good. The student has conducted research with regards to the applied technologies and has also taken the insights thereof into account. The depth of the research and research regarding the boundary conditions of the use case at hand is somewhat lacking and leads to the objections regarding the satisfaction of the assignment.

**Formal and language level, scope of thesis** **B - very good.**

*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 level of the thesis is very good; the correct use of technical terms could be improved. All figures, tables and formulas are consequently labeled and the thesis is overall well structured. More extensive research, especially in regards to vacuum technology would have been beneficial.

**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?*

The selection of sources is very good and citations of sources meet the standards. In some places, the distinction between parts written by the student and those taken from sources is not as clear as I would have liked.

| **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.* |
| Overall the thesis fulfilled the requirements of the assignment, although some minor objections arise.<br>These objections could have been avoided with additional research and calculations regarding vacuum technology, leak rates and construction guidelines for high vacuum applications.<br>The presented work shows a good understanding of the subject, but a lack of thorough research. |

**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. Pose questions that should be answered during the presentation and defense of the student's work.*

Overall the thesis fulfilled the requirements of the assignment, although some minor objections arise.
These objections could have been avoided with additional research and calculations regarding vacuum technology, leak rates and construction guidelines for high vacuum applications. This also leads to the thesis being a bit on the short side. The presentation of methods and concepts is structured well and the overall readability is very good.

**Questions:**

Is there any application of slide-in-connections, such as presented in ch. 5.2.1 with pressures below $10^{-6}mbar$, that you know of?

How (qualitative) are leak rates and permeability of CF-Composites in vacuum applications?

How could possible high leak rates in your concept be improved?

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

Date: **20.8.2021** Signature: