

## I. IDENTIFICATION DATA

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|-------------------------------|---|
| <b>Thesis title:</b>          | <b>Lifetime of Filter Element</b>       |
| <b>Author's name:</b>         | <b>Omar Alif Abdelhakim Allam</b>       |
| <b>Type of thesis :</b>       | bachelor                                |
| <b>Faculty/Institute:</b>     | Faculty of Mechanical Engineering (FME) |
| <b>Department:</b>            | Department of Process Engineering       |
| <b>Thesis reviewer:</b>       | assoc. prof. Ing. Radek Šulc, Ph.D.     |
| <b>Reviewer's department:</b> | Department of Process Engineering       |

## II. EVALUATION OF INDIVIDUAL CRITERIA

|   |                               |
|---|-------------------------------|
| <b>Assignment</b>   | <b>ordinarily challenging</b> |
| <i>How demanding was the assigned project?</i>  |                               |
| The main objectives of this thesis are i) to analyze the measurements of filter element lifetime, and 2) to create a hypothesis explaining the measurement records. In the frame of this work the parameters affecting the filter element lifetime should be analyzed. The output will be a hypothesis explaining the results of measurement analysis. Real data of filter elements were provided for the work. |                               |

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| <b>Fulfilment of assignment</b>  | <b>fulfilled</b> |
| <i>How well does the thesis fulfill 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 thesis meets the assignment.   |                  |

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| <b>Methodology</b>   | <b>correct</b> |
| <i>Comment on the correctness of the approach and/or the solution methods.</i> |                |
| The author has chosen an appropriate approach to solve the formulated tasks.   |                |

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|---|--------------------------|
| <b>Technical level</b>  | <b>D - satisfactory.</b> |
| <i>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?</i>                            |                          |
| I expected that some properties such as medium face velocity, Reynolds number will be calculated in the practical part. The calculation of pressure losses was one of the topics during the author's study. |                          |
| I expected that this knowledge will be utilized for the estimation of the "resistance" factor of the clean filter and used filter.  |                          |

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| <b>Formal and language level, scope of thesis</b>  | <b>D - satisfactory.</b> |
| <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 thesis consists of six parts, 1. Introduction (2 pages), 2. Literature review (9 pages), 3. Parameters affecting filter service lifetime (8 pages), 4. Types of air filter media (4 pages), 5. Practical part (3 pages), and 6. Conclusions (2 pages). Further, the References list, List of Figures, and List of Appendices are incorporated. Section "Symbols" is missing. The parameters are presented without units (e.g. Eq. 1, 4, 7 ). |                          |
| Page 9 – Figure caption; mismatch of capital and small letters at the beginning of the caption.  |                          |
| Page 19 – <i>As its temperature increases, its oxygen content drops, ....</i> – the formulation is unclear.  |                          |
| Page 28 – <i>The differential pressure drop can be divided into an initial restriction when the filter is new and the final restriction at the specified pressure drop when the filter is considered to be fully utilized.</i> – The formulation is unclear.   |                          |
| Page 30 – abbreviation EAC: The meaning is not explained. The abbreviation is missing in the List of abbreviations.  |                          |
| Page 30 Figure 11– abbreviation AIF: The meaning is not explained. The abbreviation is missing in the List of abbreviations.   |                          |
| Page 32 – last paragraph: <i>After 5 mbar for all flow rates.</i> – The meaning of this sentence is unclear.   |                          |

**Selection of sources, citation correctness****D - satisfactory.**

*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 28 references are cited in this thesis. The three references were overtaken from [www.researchgate.net](http://www.researchgate.net) without citation of the original source. Some bibliographic citations do not meet the standards (Ref. 8, 16, 18, 19).

Used elements are correctly distinguished from his results and thoughts.

Page 33 – Figure 13 – reference is missing.

**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.*

Page 26 – fuel consumption of approx. 30 mpg – mpg is not SI unit; meaning is not explained.

Page 28 – initial restriction – The term used is not suitable for this case.

Page 28 – Figure 10 – the meaning of parameters  $\Delta p_0$  and  $\Delta p_{max}$  is not explained.

Page 28 – pressure drop – The relation for calculation of pressure losses is not presented.

**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.*

I would like to discuss the following topics during defense discussion:

1. Could you explain the following abbreviations: mpg, EAC, and AIF?
2. Could you show the dependence of mass difference on the operation period of the filter for data presented in Table 1?
3. Could you estimate media face velocity at the filter inlet for a minimum flow rate (42 kg/h) and maximum flow rate (850 kg/h)?
4. Could you estimate Reynolds number range at the filter inlet for a minimum flow rate (42 kg/h) and maximum flow rate (850 kg/h)?

The thesis submitted fulfills the requirements for the bachelor thesis. The goals declared were satisfied. I recommend the bachelor thesis submitted by Mr. Omar Alif Abdelhakim Allam to the defense.

The grade that I award for the thesis is **D - satisfactory**.

Date: **21.8.2020**

Signature: Šulc