

Review of Doctoral Thesis

1. PhD candidate
Houssam Mahmoud / mahmoud@fme.vutbr.cz
2. Name of PhD programme
Design and Process Engineering
3. Title of PhD thesis
Diagnosis of Pneumatic Cylinders Using Acoustic Emission Methods
4. Principal supervisor
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5. Co-supervisor
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7. Overview of the scope of PhD thesis¹
Excellent
The dissertation is of a theoretical and mainly experimental nature and consists of 74 pages. The main part of the work, including literature and own author publications, are on 66 pages. The remaining pages are "List of symbols and abbreviations", "List of figures and tables", as well as an Appendix with "The code of the MATLAB program". Summing up this point of the review, I find that the adopted layout and the way of organizing the content is logical and clear. The editorial page of the work does not raise any serious reservations, and the selection of the literature items is correct and sufficient. The reviewed doctoral dissertation contains all relevant and necessary elements.
8. Significance of the topic and clarity of problem statement
Very good
The subject of the dissertation undertaken by the doctoral student and the goals formulated in it are actual and important from a scientific and practical point of view. The main goal is to investigate the possibilities of implementing AE system for pneumatic cylinder leakages detection. The reviewed doctoral dissertation is in line of the current research trends (monitoring and in-service testing) in the field of AE. For the positive

¹ Overview of the scope of PhD thesis is a short description of objectives of PhD thesis's research and summary of main findings and scientific achievements.

feature of the dissertation should recognize the goal set by the author to be solved, mainly on the experimental, as well theoretical way.

9. Knowledge of existing literature

Very good

The selection of the literature is correct and sufficient. Author made good and correct review, as well analysis and evaluation of ref. literature in field of AE. Positive is, that author made review of works and researches done (presented in literature) in aspect of his job and used this knowledge in own work.

10. Choice of methods and technical soundness

Excellent

The author chose a number of methodologies and types of experiments. He carried out first of all measurements and experiments on samples (pneumatic cylinders), which from a technical point of view were in good technical condition (operational - no failures). Then he logically planned experiments with the simulation of various failures that could occur in the case of pneumatic cylinders. From a technical point of view, the work was done reliably and correctly, as well as it took in to account many aspects of failures and experiment configurations.

11. Quality, originality and significance of the results

Excellent

The author found the possibility and direction of action, aimed at solving the problem presented in the work in an innovative and original way. The proposed in work solutions and methodologies are interesting both in the scientific and practical aspect. I evaluate the quality of this work highly.

12. Quality of attached papers

Very good

Attached publications of author of the dissertation are connected mainly with subject of the dissertation. There are presented it different stages of work in wider range. This is showing that author conducted research successively, analysing obtained results next used it and modifying subsequent experiments.

13. Overall assessment, strengths and weaknesses (based upon the above evaluation categories 8–12)

Very good

The reviewed doctoral thesis of Ing. Houssam Mahmoud solves the original scientific task regarding the diagnostics of pneumatic cylinders using AE methods. I state that the goal set in this doctoral thesis has been achieved. The author proved that he knew the current state of art in the area covered by the subject of work, he showed up planning skills, programming and conducting scientific experiments.

14. Questions and comments

Main doubts, questions and remarks are presented here. In work are not used actual terminology which is defined in standard EN 1330-9:2017-09. There is not anything about standard PN-EN ISO 18081:2016-08,

that described AE leak testing. Why? In work are used many times shorthand, that are sometimes caused unclear sentence and its mean. I recommend to explain some used terms if are using first time in the text of work. In the definition of AE phenomena in chapter 1 in 10 row is used modified text which is correct for work but not general AE field. For example in next sentence "The main factors of the propagation velocity of the elastic stress wave are the wave type, the wave frequency, and the properties of the material" is used shorthand and the sentence is not clear. Chapter 2.1 row 2: I guessed that "envelope" is in mean "shell". Next in 10 row "The received signal is highly amplified and transmitted to the monitor where the number of events, the event rate and changes in the event rate are observed.", again shorthand. As mentioned on the beginning I suggested used one time full measurement chain, where described the way since AE wave, through sensor, changed for AE signal, next is amplify in preamp. etc.. In chapter 2.1.2 editorial faults in row 10. In chapter 2.1.3 in row 3, what is mean "inlet pressure" -> difference of pressures or ref. to atmospheric pressure? In row 4 is used term "continuous" but need explanation (eg. EN 1330-9), next sentence inform that two parameters are used to describe leakage. What parameters? In chapter 2.2 editorial in row 1. In chapter 3 since row 8, where is Reynolds number described. I suggest include information that it is depends on fluid and literature giving different ranges. In literature number 9 and 19 are the same. I suggest included in literature EN 1330-9.

15. Conclusion

PhD thesis is an independent scientific work that presents a novel solution to a significant problem in the research area and demonstrates the candidate's ability to conduct independent research.

YES

16. Date and signature

Date:

Please note

- A. Evaluate categories 7 to 13 using the following scale: unacceptable, acceptable, satisfactory, good, very good, excellent. The qualification of 'excellent' should only be given for a PhD Thesis in the top 3% of the research in your field of expertise.
- B. E-mail the completed form to: Klara.Javorceкова@vut.cz