THESIS SUPERVISOR'S REPORT

I. IDENTIFICATION DATA

Thesis title:	**Bearing Failure Prediction**
Author's name:	**Daniil Grechany**
Type of thesis :	bachelor
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Cybernetics
Thesis reviewer:	Jiří Matas
Reviewer's department:	Cybernetics

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	**ordinarily challenging**

How demanding was the assigned project?

The problem was motivated and supported by a paper mill company. Technically, the solution did not require developing novel solutions, an application of standard prediction techniques would be sufficient. However, obtaining the relevant data on the bearings of the paper machines turned out not to be easy. Due to current maintenance practices the failure rate of baring is very low, thus the available data made development of a failure prediction method nearly impossible, since they contained only very few break-down events.

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 assignment defined five goals. The first goal – literature review of ball bearing failure prediction – has no trace in the thesis, there is not a single paper cited, and there is no related literature section. Given the limited volume of training data, most machine learning methods would not be applicable; nevertheless, it is straightforward to complete the requirement by reading 3-4 related papers. Task number 2, formalization of the failure prediction task has not been dealt with in the thesis. We have discussed the formalization at length during the meetings, and it was not easy to model the current practice in the mill and to model the situation. We proposed a number of models, but under time pressure, none of this is reflected in the thesis. Task no. 3 - preparation of the data needed for failure prediction was completed. It turned out that the available data were deficient, with a very low number of bearing failures, but this was not clear before the work started. Goal number 4 was fulfilled in a very simple manner. The evaluation (goal 5) is minimal.

Activity and independence when creating final thesis	**C - good.**

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.

On the one hand, Daniil did operate independently and he was prepared for the consultations. However, in all activities he was severely behind schedule. This was discussed in our meetings, but he just could not proceed faster. The thesis was written in a haste, and I had no time to read and make recommendation for changes in the final thesis.

Technical level	**E - sufficient.**

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?

The text contains no formulae. The tables and graphs provide information about the statistics of various measurements, not results of experiments. The description in section 4.1 is insufficient to reproduce the results. There is no formal description of the algorithms implemented.

Formal level and language level, scope of thesis	**C - 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 quality of the text is uneven. Some parts are written in grammatically perfect English, but are repetitive, and without a clear flow of ideas. I suspect these part were generated by a chat-GPT-like generator (which is not necessarily a problem, but I asked for such parts to be marked, which is not the case). Some parts of the text, e.g. section 2.3.1, are very loosely connected to the thesis and could have been omitted or put into an appendix. On the other hand, the description of the work carried out by the student is very brief.

Selection of sources, citation correctness	**F - failed.**

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 thesis does not refer to any prior work on the topic. All listed sources in the References section have the "access" field, suggesting they are WWW pages. However, the URL are missing. With Google, most of the sources can be located, but not unambiguously. This section was added to the thesis within the last 24 before deadline and I would not have asked the student to fix it.

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.

Please insert your comments here.

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

The presented work has serious weakness, as is clear from the description of the failures in completing the goals specified in the assignment. The conclusion are very vague, and the experimental validation of what was proposed minimal and poorly documented. Nevertheless, in my opinion, the thesis is just above the threshold of what is acceptable. I thus **grade the thesis** E - sufficient.

Date: **1.8.2023**   Signature: