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ČESKÉ VYSOKÉ UČENÍ TECHNICKÉ V PRAZE

SUPERVISOR'S OPINION OF FINAL THESIS

I. IDENTIFICATION DATA

Thesis name:	**Effects of operating conditions on the production of brake wear particles**
Author's name:	**Srinath Penumarti**
Type of thesis :	Masters
Faculty/Institute:	Faculty of Mechanical Engineering
Department:	Department of Automotive, Combustion Engine and Railway Engineering
Thesis supervisor:	Prof. Michal Vojtíšek
Supervisor's department:	Department of Automotive, Combustion Engine and Railway Engineering

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment **Challenging**

Evaluation of thesis difficulty of assignment.

The goal of the thesis was to evaluate data from friction brake tests for the effect of braking conditions (initial speed, deceleration rate, disc temperature) on the production of brake wear particles. The topic is subject of an ongoing research, with many knowledge gaps and no comprehensive textbook, and of interdisciplinary nature.

Satisfaction of assignment **Fulfilled (without objections)**

Assess that handed thesis meets assignment. Present points of assignment that fell short or were extended. Try to assess importance, impact or cause of each shortcoming.

Mr. Penumarti has fulfilled the assignment to its entirety. He has started the work early, leaving sufficient time to resolve numerous technical issues and to address several open questions.

Activity and independence when creating final thesis **A – Excellent**

Assess that student had positive approach, time limits were met, conception was regularly consulted and was well prepared for consultations. Assess student's ability to work independently.

Mr. Penumarti has shown an active interest in the topic. He has worked independently, reported progress and consulted on a regular basis. Additional guidance was given on complicated subjects such as aerosol science not covered in the engineering curriculum.

Technical level **A - Excellent**

Assess level of thesis specialty, use of knowledge gained by study and by expert literature, use of sources and data gained by experience.

The thesis addresses a highly specialized topic of brake wear particle production. A wealth of information useful to the research community has been obtained through analysis and is well presented. Mr. Penumarti gained a considerable experience while working on the thesis.

Formal and language level, scope of thesis **B – Very good**

Assess correctness of usage of formal notation. Assess typographical and language arrangement of thesis.

The scope of the thesis is appropriate. The writing is well structured, generally comprehensible, the use of English is correct, there is a minimum of typographical errors. Numerous graphs and figures are well readable.

Selection of sources, citation correctness **B – Very good**

Present your opinion to student's activity when obtaining and using study materials for thesis creation. Characterize selection of sources. Assess that student used all relevant sources. Verify that all used elements are correctly distinguished from own results and thoughts. Assess that citation ethics has not been breached and that all bibliographic citations are complete and in accordance with citation convention and standards.

The selection of a total of 41 sources is comprehensive and well balanced. The attribution of information to the sources is appropriate. The format of the citations slightly differs from the common formats, but the correct information is given and the sources can be readily identified.

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Additional commentary and evaluation *Present your opinion to achieved primary goals of thesis, e.g. level of theoretical results, level and functionality of technical or software conception, publication performance, experimental dexterity etc.*
The topic addressed here – the effect of braking conditions on the production of brake wear particles - is of current interest to the UN ECE working group on brake wear particle production and to the project consortium of H2020 project uCARe – You can also reduce emissions. Mr. Penumarti faced a difficult situation as he was not physically present during the experiments, which have taken place in October of 2019 (we have agreed on the thesis topic shortly after the experiments), and subsequent experiments have been postponed due to coronavirus related travel restrictions.

III. OVERALL EVALUATION, QUESTIONS FOR DEFENSE, CLASSIFICATION SUGGESTION

Summarize thesis aspects that swayed your final evaluation.

The thesis addresses the effect of braking conditions on the production of brake wear particles, evaluated using experimental data collected during a measurement campaign at Technical University Ostrava. Mr. Penumarti has successfully addressed a complicated interdisciplinary topic, dealing with online measurement of particle size distributions. He has required additional guidance, which was primarily on advanced topics not covered during the course of studies. The result is a high quality report useful for this as well as other research groups. The overall work is, in my opinion, for a master thesis, somewhere between very good and excellent. Personal dedication and diligence of Mr. Penumarti has swayed my opinion toward the excellent grade.

I evaluate handed thesis with classification grade **A - Excellent**

Questions:

Based on the data presented, can you recommend an "envelope" of conditions (combination of, for example, initial speed, deceleration rate, disc temperature), within which the particle production is relatively low (compared to the current PN/PM exhaust emissions limits)?

Date: **August 26, 2020** Signature: