SUPERVISOR'S OPINION OF FINAL THESIS

ČVUT
ČESKÉ VYSOKÉ UČENÍ TECHNICKÉ V PRAZE

I. IDENTIFICATION DATA

Thesis name:	Cooling and Heat Exchangers for Hydrogen Fuel Cell System
Author's name:	**Ogul Can Gungor**
Type of thesis :	master
Faculty/Institute:	Faculty of Mechanical Engineering (FME)
Department:	Dept. of Automobiles, ICE and Rail Vehicles
Thesis supervisor:	Jan Macek
Supervisor's department:	Dept. of Automobiles, ICE and Rail Vehicles

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment **challenging**

Evaluation of thesis difficulty of assignment.

The thesis topics was uncommon for standard MAE curriculum at CTU. The student had to study completely new fields of knowledge.

Satisfaction of assignment **fulfilled**

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.

The student reached all assignment goals, especially he found how to reduce the current heat exchanger dimensions.

Activity and independence when creating final thesis **B - very good.**

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.

The student was able to master background knowledge required by the assignment in both FC and heat exchanger areas. He worked independently but he used regular consultations with the supervisor. He did not try to generalize the heat exchanger features but just compared to different designs of compact heat exchangers of automobile radiator type. It is not basic shortcoming because he reached the assigned goals.

Technical level **C - good.**

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

The student was able to apply the knowledge extracted from literature and open-source resources successfully. During deducing and combining generally valid equations, he did not detected the equivalence of approaches time-to-time. He used some uncommon definition of heating values in his chemical theory explanations. It has not caused any obvious mistakes in design assessment.
The description of fuel cell function contains light errors, e.g., the main feature of compressors used for cell supercharging is they have to be lubricant-free, the criticism of Roots compressor is not valid, since it is used very frequently, etc. The water cooling with phase change is not suitable at atmospheric pressure due to too high temperature, etc.

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

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

There are some inconsistences in acronyms and units in the thesis (e.g., H is described as enthalpy but used as enthalpy rate, U is not described at all, the use of fractions in units is not according to standard recommendations, etc.). The description of electrons as negative ions is uncommon.

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.
Some details of publications (including doi or ISBN/ISSN) are missing but the list of more than 30 resources demonstrates student's abilities to work with literature and other open information sources.

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.*
Please insert your commentary (voluntary evaluation).

III. OVERALL EVALUATION, QUESTIONS FOR DEFENSE, CLASSIFICATION SUGGESTION

The student fulfilled the assignment. He proved to be able to elaborate new and challenging topics. The minor mistakes in the theoretical background does not depreciate the overall value of the thesis.

Question: Why are the values of cooling power for C_r=1 different in Figs. 20 and 21 or in Figs 29 and 30, respectively? Is it caused by different water and air flows for this extreme value for fixed flows in both compared figures?

I evaluate handed thesis with classification grade **C - good.**

Date: **15.8.2020**

Signature:

Jan Mouf