

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 Rai Vehicles
Thesis reviewer:	Ing. Radim Zahradnicek
Reviewer's department:	DEVINN

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	challenging
<i>Evaluation of thesis difficulty of assignment.</i>	
Author choose to design new cooling system for hydrogen fuel cell, task including: getting to know fuel cell system, designing new cooler and choosing right pump and fans for required parameters. Radiator size should be design or evaluated with different load profiles, scope of work was quite complex.	

Satisfaction of assignment	fulfilled with minor objections
<i>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.</i>	
Overall thesis meets assignment with minor objections. Author has correctly designed new cooler with given specification, offering two possible designs, he selected fitting fans and pump already existing on the market, so the cooling system can work as a whole. For the objections, although he has made sensitivity analysis, it would be more practical, if he would evaluate both designs in specific load profile and boundary conditions.	

Method of conception	correct
<i>Assess that student has chosen correct approach or solution methods.</i>	
Student has chosen correct solution method, results seems to be plausible, although it would be appropriate to compare the results with results from some fluid dynamics simulation.	

Technical level	B - very good.
<i>Assess level of thesis specialty, use of knowledge gained by study and by expert literature, use of sources and data gained by experience.</i>	
Author has chosen complex design of the cooling system, calculations seems to be correct and their level appropriate for the Master degree student.	

Formal and language level, scope of thesis	B - very good.
<i>Assess correctness of usage of formal notation. Assess typographical and language arrangement of thesis.</i>	
Thesis was written in English, which is not first language of the Author. Although there were some mistakes, overall language level was quite good. Symbols and abbreviations could be little more explained in the text, it would make the thesis easier to read. Some axis descriptions were missing.	

Selection of sources, citation correctness	B - very good.
<i>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.</i>	
Student used enough sources. He used citations, assessing whether all of his ideas and taken over information was properly distinguished is not in power of the opponent.	

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.

Autor has chosen to cooperate with company outside of the university, this has made his work more difficult, if not on the technical side, than at least on the communication and bureaucratic side between three parties (company, university, author). Primary goals were achieved although some more calculations and simulations would have to be made in order to build a prototype.

III. OVERALL EVALUATION, QUESTIONS FOR DEFENSE, CLASSIFICATION SUGGESTION

Summarize thesis aspects that swayed your final evaluation. Please present apt questions which student should answer during defense.

- 1. How do you suggest to regulate the cooling system to keep constant outlet cooling water temperature with different inlet/ambient temperature?*
- 2. From your results, is it possible to estimate cooling fan speed in certain conditions (ambient temperature, constant FC power, coolant outlet temperature), if so, describe how would you do it, if not, what information is missing and how would you obtain it?*

I evaluate handed thesis with classification grade **B - very good**.

Date: **14.8.2020**

Signature:

