I. IDENTIFICATION DATA

Thesis title:	**Thermal-management for battery electric vehicles and benchmarks**
Author's name:	**Thibault-Pierre BOULENGER**
Type of thesis :	master
Faculty/Institute:	Faculty of Mechanical Engineering (FME)
Department:	Department of Automotive, Combustion Engine, and Railway Engineering
Thesis reviewer:	Ing. Jaroslav Kaněra
Reviewer's department:	ZF Engineering Plzeň

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	**ordinarily challenging**

How demanding was the assigned project?

According to Chapter 1.4, the aim of the thesis is to find a definition of cycles, which are relevant for evaluation of thermal management of a BEV. The work was not focused on setting up an entirely new cycle(s), but more about selecting the right routines from a wide list. Thus, I consider this target ordinarily challenging.

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 was fulfilled, but there was obviously a huge time pressure. Student explains that his task was to pick 15 optimized cycles which would be used for vehicle thermal management evaluation. At the beginning, there were 52 cycles, 22 were relevant for thermal operation. Out of these 22 cycles, only 2 were discarded. Apparently, there was not enough time to further continue the work and deeper assess the cycles.

Methodology	**partially applicable**

Comment on the correctness of the approach and/or the solution methods.

Battery behavior during certain operating events is described at the beginning of the thesis, together with a relation to thermal behavior of the battery pack. That is very relevant for such a topic.

Unfortunately, I am missing deeper explanation of the assessment of each driving cycle, which is considered for evaluation of battery thermal management. Rough description is provided in Table 3, some info can be found in the rest of the thesis, but quantifiable and clearly presented information is missing.

Certain paragraphs of the work are too general. Some amount of information about benchmarking and investigation of competitors' solutions is mentioned, but this has a very loose relation to the target of the thesis (thermal management).

Technical level	**C - good.**

Is the thesis technically sound? How well did the student employ expertise in the field of his/her field of study? Does the student explain clearly what he/she has done?

In the first part, author mentions some interesting battery management strategies. Until the end of Chapter 3, the text feels technically dense and rich. Unfortunately, some following parts sound like a reportage (namely 5.2.7.) or description of student's story (5.1., 5.2.). Although interesting, I do not think this should not be a part of a technical work.

Formal 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?	
There are some minor mistakes and typos in written text, some sentences are ending abruptly. However, I like the graphical part, there are many schemes, visualizations, and useful figures. Some figures are in English, some figures are in French. It looks like mélange from formal point of view, it would be better if the language was united.	

Selection of sources, citation correctness	D - satisfactory.
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?	
Author's work with the list of references is very vague. Some web pages are cited without the date of citation. Sources are not numbered. There must have been much more references used than just seven (7) which are mentioned in the final list. Namely all the figures, tables and other data coming from Renault (where does Figure 22 come from?).	

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

Summarize your opinion on the thesis and explain your final grading. Pose questions that should be answered during the presentation and defense of the student's work.

The thesis of Mr. BOULENGER deals with thermal management for battery electric vehicles and benchmarks. The first half of the work sounds technically rich, shows that author is able to understand technical background and can be assessed as very good. Unfortunately, there was obviously not enough time to correctly finish the work. That is why I award the thesis with a grade **D - satisfactory.**

Questions:
1) What are the main parameters of a driving cycle, which could be used for thermal management evaluation? Are the mentioned cycles (Corri-door Monanco, Mountain Climb 15km etc...) also used in product design phase, or are they exclusively dedicated to benchmarking?
2) Is there already any further development in deeper selection of final driving cycles?

Date: **31.8.2021**   Signature: