THESIS SUPERVISOR'S REPORT

I. IDENTIFICATION DATA

Thesis title:	**MODELLING, SIMULATION AND VALIDATION OF ENGINE MODELS FOR IMPLEMENTATION OF MODEL PREDICTIVE CONTROL ON SI ENGINE AIRPATH**
Author's name:	**Arulkumaran Mathivanan**
Type of thesis :	master
Faculty/Institute:	Faculty of Mechanical Engineering (FME)
Department:	Automotive, Internal Combustion Engine and Railway Engineering
Thesis reviewer:	Prof. Ing. Jan Macek, DrSc.
Reviewer's department:	Automotive, Internal Combustion Engine and Railway Engineering.

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment **challenging**

How demanding was the assigned project?

The combination of control engineering requirements with ICE simulation calls for simplification of the model. There are several commercial codes doing it but the author used in-house approach of Toyota Europe performing it. The combination of 1D commercial code GT Suite and mean value model calibrated by it has been finally tuned by experiments done in parallel to those simulation tasks.

Fulfilment of assignment **fulfilled with minor 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 task has been fulfilled with almost satisfactory accuracy except for several minor issues. The further work is needed for amending partial models of turbomachinery.

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

Arul worked according to the framework instructions. Time-to-time he waited for the results of experiments, which causes some out-of-schedule delays. He was able to fulfill the final deadline despite it.

Technical level **C - good.**

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 method of model based predictive control is not described in details in the thesis. The transformation of the full 1D model to simplified fast mean value model is done at good level. Some tuning coefficients, based on theory of turbomachinery modelling, would improve the accuracy of the model, if used.

Formal level and language level, scope of thesis **D - satisfactory.**

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 language of the thesis is satisfactory but there were many spelling and graphical errors and misprints in it (use of spaces, use of capital letters, etc.).

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?

The sources have been selected in a reasonable amount and with relevant contents. The references have not been cited correctly, which was partially improved in the last version of thesis.

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 topics of the thesis was demanding, especially considering the combination of two simulation levels and experiments. The elaboration provided satisfactory accuracy of predictive model control. Due to the elaboration with some minor issues in calibration and due to highly challenging, practically applicable topics with measurable impact, t**he grade that I award for the thesis is** C - good.

Date: **30.1.2020** Signature: