I. IDENTIFICATION DATA

Thesis name:	**Comparison of selected nozzles for hybrid rocket engine**
Author's name:	**Arjun Anil**
Type of thesis:	bachelor
Faculty/Institute:	Faculty of Mechanical Engineering (FME)
Department:	Department of Aerospace Engineering
Thesis supervisor:	Mgr. Jaroslav Kousal, Ph.D.
Supervisor's department:	Department of Aerospace Engineering

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	**challenging**

Evaluation of thesis difficulty of assignment.

The topic needed to study the cross-influence between nozzles and the engine and I perceive it as somewhat challenging.

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.

All the points of the assignment have been satisfactorily met. The limits of the nozzle characterization were mostly caused by the partial unavailability of the input parameters for the nozzles and are not author's fault.

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.

The author was very active and he consulted the work regularly. He was able to cooperate also with his fellow student that is developing the engine.

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 thesis is sound considering that the author had to deal with lack of detailed information about the performance of the engine. However, the general process of the calculation of the nozzle geometry would be challenging to follow to a reader not familiar with the problem. Some more detailed comments to calculations, simulations, design and predicted performance of the nozzles seem to have been a bit "left in the drawer".

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 thesis is not very long, but it could still benefit from a more detailed sectioning inside the Practical part. Formally, figures are listed in the end of the thesis, but they are not referenced in the text.

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 main monographic source that was sufficient for the particular topic is supplemented with online sources. There are some inconsistencies in the format of references (e.g. [7]). The separation of the external sources and author's own results is clear.

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 specific designs of the nozzles were made. Prototypes of the nozzles have been manufactured and they are ready to be tested.

III. OVERALL EVALUATION, QUESTIONS FOR DEFENSE, CLASSIFICATION SUGGESTION

Summarize thesis aspects that swayed your final evaluation.

The thesis has various general and particular weaknesses. However, the author had to deal with a nontrivial topic having an incomplete set of input parameters. Considering this, he handled the problem generally well.

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

Date: **18.8.2019**   Signature: Jaroslav Kousal