

I. IDENTIFICATION DATA

Thesis title:	Development of a method to predict bolt loosening
Author's name:	Thibault DUGAST
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	challenging
<i>How demanding was the assigned project?</i>	
The assignment specifies investigation of bolt loosening factors, development of method which accurately predicts the likelihood of bolt loosening (based on Thomala's method) and validate proposed approach with a simulation, everything applied to complex assembly.	
Because of these complex requirements, I consider the assignment to be challenging.	

Fulfilment of assignment	fulfilled
<i>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.</i>	
I don't have any objections against fulfilment of the assignment. All the specific questions are answered.	

Methodology	correct
<i>Comment on the correctness of the approach and/or the solution methods.</i>	
I evaluate approach of the author as correct. Content is logically ordered; solution methods seem to be correctly selected. Thesis was done in cooperation with SEGULA Technologies where the 5-month internship took place. That's why some of the numerical results cannot be presented, but author made appropriate comments where necessary.	

Technical level	A - excellent.
<i>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?</i>	
Thesis is technically correct. Beginning with a deep literature survey, describing loosening of a bolt in general, then explaining analytical and numerical methods and previous work on the topic. Next chapters are focused on the main part of the work - development of a custom method.	

Formal and language level, scope of thesis	B - very good.
<i>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?</i>	
Thesis is extensive and well organized. Figures are properly selected; important equations are numbered. I haven't seen almost any typos. All the figures are clear and used in appropriate way.	
In chapter 1.1, tasks which were planned and performed are presented in a form of Gantt diagram. This is a good way how to depict the workload on a time scale.	
As I am not a native speaker, I cannot thoroughly assess level of English. Unfortunately, some explanations are a bit too tangled for a technical work like this. Sometimes, I was not able to find out from where some of the calculated values come (mostly frictions coefficients, sometimes applied forces).	

Selection of sources, citation correctness**B - very good.**

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?

There are enough sources cited in the thesis. Website sources, which can easily disappear from the world wide web, should be cited with respective dates of access.

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.

Thesis of Mr. Dugast is focused on development of a method to predict bolt loosening. Author presents a deep literature research, analyzing previous work on this topic. Numerical approach is then used and CAD model from Abaqus is converted to OptiStruct SW from HyperMesh. Both models are compared and then, final optimization of the wheel rim is proposed to reach higher stiffness of the rim, which is very important for minimization of the loosening of the bolt assembly.

My impression when reading the thesis is, that a lot of work must have been done to achieve such results. Therefore, I award this thesis with a grade **A - excellent**.

Questions:

- 1) Chapter 2.4.2. (Figure 18) explains, that bolt spacing plays an influential role. Did you consider geometry change (in chapter 5.1.3) to adjust the distances between holes in the investigated rim?

Date: **24.8.2023**

Signature:



Jaroslav Kaněra