THESIS REVIEWER'S REPORT

I. IDENTIFICATION DATA

Thesis title:	**Parametrization and automatic generation of 3D CAD model**
Author's name:	**Perié Alexandre Adrien**
Type of thesis :	master
Faculty/Institute:	Faculty of Mechanical Engineering (FME)
Department:	Department of Technical Engineering
Thesis reviewer:	Mgr. Ing. Daniel Hadraba Ph.D.
Reviewer's department:	Designing and Machine Components

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment	**extraordinarily challenging**

How demanding was the assigned project?

Every company faces some level of requirements for continuity and engineering evolution. This need obviously requires fast and editable access to the historical know-how of the company including engineering drawings. However, the lack of manpower and requirement for speed complicates the transfer between analog to digital or digital to digital formats. Digitalization or successful conversion of 2D drawings to the 3D CAD models is very current. The assignment is clearly stated and challenging, however, the page 8 and 9, the Figures 2 and 3, especially, have a little context for the reader. The assumption of the reader is that the major part of the thesis deals with 2D technical drawing conversion to 3D CAD model.

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 screenshot of the bike frame 3D CAD model was shown, however, the comparison and analysis of the input data and the final model is missing. Even more, the input data are barely or not at all introduced. The reader hardly knows if an Excel sheet with parameters or a 2D technical drawing was the input. Therefore, it is very difficult to conclude whether the introduced method is viable and with what level of reliability.

Methodology	**partially applicable**

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

The structure does not follow the traditional methodological standard, i.e. theoretical part with a review, practical part with methods and results, discussion, and conclusion. Fairly, the thesis misses theoretical part almost totally and the practical part is confusing and not well structured. It is very difficult to understand what the input/independent variable and output/dependent variable are in the thesis.

Technical level	**E - sufficient.**

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?

The thesis provides little or no engineering or natural sciences related explanations. The author uses very general language with no technical justifications or explanations. For instance, the statements such as "made some assumption" without stating the assumptions in the text or "the parts fit correctly" without respecting the engineering terminology of fits can be misleading or leaves gaps for wrong interpretation. The writer just uses tools such as OpenCV – findCountours() but does not state the original papers (Suzuki S. 1985) neither explain the principle on which the function work nor review the alternatives. The parametrization also have some blank spaces as the figure does not match the notification in the equations. It is very difficult to state whether the student was targeting the parametrization and conversion of certain values to 3D and/or the conversion of 2D technical drawing to 3D CAD model.

Formal 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 is sound but the sentences are often empty or vague. The python scrips are poorly commented while mixing French and English language. The length of the thesis, about 25 pages, it hardly sufficient for master thesis of this topic.

Selection of sources, citation correctness	**F - failed.**
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 author provided almost no bibliography. There are basically two sources that can be considered reviewed academic or technical sources. Wikipedia, company webs and manuals or GitHub needs to be treated with special care and should be used as supporting material together with credible sources such as IF journals or reviewed books.	

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.
The topic of the thesis is challenging and innovative as there is still a need for transfer of analog 2D drawings to 3D digital environment. Unfortunately, the result is a bit chaotic and not well presented. It is almost impossible to judge what knowledge the writer acquired during the study program. It would be very beneficial to dedicate the first half of the thesis to the theoretical part and then clearly explain the workflow of the automatic 3D model generation.

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 does not provide much engineering details. The topic is very current, however, there is no theoretical part and standard engineering structure is missing, i.e. the work is very difficult to reproduce.

Content related questions:

Page 15. The author has stated that "the parts fit correctly". Do you consider engineering fits when you create 3D CAD model? Where and why do we have engineering fits in 2D drawings in an assembly?

Page 22. The author has stated some level of Artificial Intelligence usage. What framework and model was the author using?

Page 26. The author has stated that he "made some assumptions". Could you explain what the assumptions were?

General questions:

1) The author provides the assembly in 3D, for instance the bend in the chain stays, but you only talk about sketches and drawings in 2D. How is the planar information used to create 3D spatial model?
2) How does the algorithm decide whether to use line, circle or spline? Is there any metric? If so explain. If not, how can this problem be solved?
3) Explain how the frame mechanism in Figure 7 does not collapse?

The grade that I award for the thesis is **E - sufficient.**

Date: **30.1.2024**   Signature: