MASTER THESIS PEER REVIEW

I. PERSONAL AND STUDY DETAILS

Student's name:	**Wolters Daan**	Personal ID number:	**499485**
Faculty:	**Faculty of Biomedical Engineering**		
Study program:	**Biomedical and Clinical Engineering**		

II. EVALUATION OF THE MASTER THESIS

Masters's thesis title in English:

Development of Melt Electro written fibrous materials for ligament/bone tissue regeneration

	Evaluation criteria	N. of points
1.	Fulfillment of the aim of the thesis and suitability of the structure of the thesis with respect to the topic (compliance with the assignment). (0 – 30)* Each assignment, or rather any part or sentence from the assignment has to be dealt with, 20 points can only be given for a fully fulfilled assignment. Reduce the number of points with respect to the part of the assignment that is not adequately dealt with. Stating the aim in the introduction is compulsory and if the student fails to state the aim, he/she loses 10 points. The total of 30 points can be granted only to a flawless and precisely prepared thesis.	18
2.	Theoretical level and application of accessible sources. (0 – 30)* The role of the reader is very important here. It is as follows: if most of the text is adopted, then the student gets only 5 points. If everything is written by the student, in his/her own words, he/she may get maximum 15 points. Additional maximum 15 points can be added for appropriate and complete processing of accessible sources, i.e. state of the art is described in an independent chapter (5 points), important and relevant sources are commented on including the description of the selection process (selection strategy 5 points). All sources are adequately cited. The composition of the cited sources is also judged, i.e. whether they reflect the state of the art and are related to the topic, general sources such as mathematical formulas etc. are not included in full-bodied citations. The ratio of these sources can be calculated i.e. useful / not useful sources and the ration has to have impact on the evaluation (5 points).	30
3.	Scope of experimental work (SW, HW) and applied knowledge, quality of the methodology and conclusions of the thesis. (0 – 30)* If the thesis is a combination of theoretical deductions (4 points – can be replaced by a paper in English), modelling and simulation (4 points), SW implementation (4 points) and technical realization (4 points – can be replaced by a patent or utility model) and 4 points for functionality of both SW and HW - then the student can get up to 20 points. If the thesis has the correct structure including the discussion (5 points – at least 2 A4 pages) and conclusions (5 points – at least one A4 page) then another 10 points can be added. It means 30 points for a complex and flawless thesis which includes some outcomes in projects, papers, patents or utility models.	23
4.	Formal requisites and layout of the thesis (writing mastery, structuring, graphs, tables, citations in the text, list of references etc.). (0 – 10)* Currently, students have materials explaining how to prepare a professional text on PC, they have all knowledge and skills; therefore it is not necessary to make allowances for the quality of PC processing. The list of contents of the thesis should have decimal system. Consider references between the individual parts including numbering of equations, pictures, tables and graphs (1 point), quality of pictures (1 point), number of spelling mistakes (1 point for just a few), whether it contains important features with respect to the type of the thesis (2 points). Only standard terminology should be used especially in the English language (ability to express oneself with the use of professional language - 2 points), if graphs are according to the rules (see tolerance and influence of statistical processing – 1 point), if there are relevant captions for graphs and tables and everything is readable (1 point), observance of citation rules ISO690 and ISO690-2 (1 point).	8
5.	**Total points**	79

* Verbal evaluation should be part of the Comments

III. PROPOSED QUESTIONS FOR THE DEFENSE (OPTIONAL)

1. The thesis mentioned that Young's modulus of 343MPa was used for the FEM model of PCL, although when measuring the mechanical properties of the scaffold, values of around 2MPa were measured, what is the reason for this and how it affect the validity of the model?

2. In this thesis you are working with a scaled up FEM model of the scaffold, what effect will the inhomogeneity of the material (created during printing) have on the mechanics of the scaffold, compared to the FEM model?

3. Figure 27 shows that a relatively sparse element mesh was used for the FEM, why did you not use a denser mesh, especially in the filament crossing region? Can you comment on what type of elements and why you chose in your work?

IV. THE OVERALL ASSESSMENT OF THE LEVEL OF THE MASTER THESIS

Grade**:	A (excellent)	B (very good)	C (good)	D (satisfactory)	E (sufficient)	F (failed)
Number of points:	100 - 90	89 - 80	79 - 70	69 - 60	59 - 50	< 50
	❑	❑	X	❑	❑	❑

** in case of F (failed) please explain in detail

I give the above grade to the master thesis and I recommend/~~do not recommend~~ it for the defence.

V. COMMENTS

The thesis deals with the development and testing of a new Melt Electro written PCL fibrous scaffold, which is designed for connective-bone tissues. The work is clear and standardly structured. The student has progressively reviewed the current state of the art in a fairly detailed manner, based on which he has compiled the aims of the thesis, the MEW printing methodology, the FEM simulation methodology, and the methodology for testing of the mechanical properties of the printed scaffolds. Unfortunately, the student also describes the methods in the results chapter, which should no longer be devoted to the development of the methods, but purely to the presentation of the results, but I consider this to be a minor fault that does not much reduce the quality of the thesis as such. Subsequently, a rather discussion of the individual results is made in the thesis. Graphically, the work is more or less fine, with only a small number of poorly resolved figures, such as Fig. 30 on page 51. Another criticism is related to the graphic design of the List of tables and figures, which is not clear.
The thesis is properly cited with sufficient sources. Professionally, the thesis is in order. Of great interest is the treatment of the FEM model in magnification so as to reduce the effect of sample size on the use of the FEM. However, the question is how much error this magnification introduces due to the homogeneity of the material. In the thesis under review, unfortunately, I still lack details on the FEM model, especially what types of elements were used, in what number and why.
The objectives of the thesis in the assignment were met, except for "biologically evaluate produced scaffolds to improve the performance of the scaffold". This point of the assignment was almost not solved in the thesis.
However, the thesis as such is relatively successful. Therefore, I recommend the thesis for defence.

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