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Opponent Assessment Report on Dissertation Thesis

Title of Thesis: Clothing Patternmaking Method for Stretch Fabrics

Author (candidate): M.Eng. Nareerut JARIYAPUNYA

The submitted dissertation thesis, which is written in English language, is closely connected with the current topic in the terms of method design for determination of the optimum geometry of the garment pattern construction in order to obtain the pressure required capability. The given dissertation thesis consists of 106 pages, which are clearly divided into 5 logically related and content-balanced chapters, which are followed by a list of used references and a list of own publishing activities. The two objectives of the dissertation thesis are clearly and specifically defined. Perhaps, the definition of objectives should be presented in a separated chapter after the introduction. From the aspect of content topic as well as clarity, the sub-chapters should be presented and introduced maximally at the third level. There are the 116 quotations of foreign publications predominantly but the citations of candidate's publications are also included here. The dissertation is supplemented by two pages of annexes. It should be noted that the structure of the dissertation thesis was selected deliberately, carefully and accurately in relation to the defined objectives of the given work. In my opinion, the most important part of the dissertation thesis is represented by the “*Results and Discussion*” chapter, in which the measured data are evaluated at a high professional technical level due to the utilisation of ANOVA statistical processing and graphical interpretation in the form of various graphs.

Assessment of the Proposed Dissertation Thesis

- from the aspect of the dissertation thesis contribution for the scientific field

the submitted dissertation thesis represents an innovative approach to the solved issue and new knowledge for the given scientific field with a focus on garment pattern construction, because the obtained results are original, applicable in practice and they can be also applied in the pedagogical process. Perhaps, it would be a good idea to make the demonstrative videos for students from experimental procedures, but it can be a topic

for the following continuation in the research work. The dissertation can be also considered as a benefit for the other scientific fields, such as material engineering, textile materials and biomechanics, because the given work can be used in a multidisciplinary way;

- **from the aspect of the problem solving process, the usage of methods used and fulfilment of the predetermined objectives**

the methods are selected and used appropriately and they are adequate to the topic of the work. I appreciate and I assign high value to the inclusion of acquired knowledge from candidate's internships, because owing to the given internships, the instrumentation for the necessary experiments was appropriately used for creation of the dissertation work. I consider the process of problem solving by the selected methods, the results obtained from the experiments and the way of their presentation as an original. I agree with the statement in the conclusions of the given work. I can conclude that the objectives of the dissertation thesis have been fulfilled in the full extent;

- **from the aspect of the results of the dissertation work and the significance of the candidate's original contribution**

the dissertation thesis shows the complex approach of the candidate to solve the given system of problems, because the work represents the linkage between the theoretical knowledge and the experimental data with the result of practical outputs in the form of space graphs, which were created in the ORIGIN program and have shown the noticeable dependencies of important parameters, while the given important parameters can be applied for prediction of values relating to “input parameters” for a particular material. Although it was very difficult and demanding task, the candidate showed the adequate and sufficient skills for preparation of these mentioned dependencies in order to be used and generalised for further processing of results. In her work, she used image analysis which was based on NIS-Elements and MATLAB programs. The discussion of the results is done consistently, carefully, precisely and in a comprehensive way. The dissertation shows new findings and knowledge that can amend the missing information in the publications with the similar issue;

- **from the aspect of the formal overview in relation to the text editing of the dissertation thesis**

the work contains minor typing or formal errors, such as presenting units in the round brackets – the units should be given in square brackets, non-uniform style of displaying the ranges of variables, a space has to be inserted between the value and the unit as such as %, or mathematical relationships are without indicating units and the full words are used instead of the abbreviated SI symbols – e.g.: 60 s should be used instead of 60 seconds. Furthermore, for the pressure values, the kPa unit should be used instead of Pa unit in Tab. 4.6 (page 67) to make the results more clear without any values of thousands.

On the other side, the graphical processing of the dissertation work is at really high level – perhaps, the graphs could be larger or included into the annexes because they are well and intelligible processed;

- **from the aspect of the overall level of the dissertation thesis**

the dissertation thesis has a comprehensive and intelligible concept and gives the evidence that the candidate has coped with the given difficult issue on the basis of the adequate, appropriate careful approach to the solution of the whole complex of problems. From a technical and scientific aspect, the dissertation work is processed at a high quality level. The overall level of work is not significantly influenced by the mentioned formal errors, and in my opinion, the work is effective and valuable. The dissertation thesis is the demonstration of the candidate's ability to have scientific approach in relation to the solution of the technical problem;

The evaluation of candidate's publications in relation to the topic of work

I consider the candidate's publication activity as extraordinary, because she has 19 publications, while 2 of these publications are published in journals with IF with Q2, 3 publications are in SCOPUS and she is listed as the first author in 16 publications. The titles of publications and the year of their publication indicate that the results of the dissertation work were continuously published at conferences and in journals and the candidate sufficiently informed the professional community about the continuous results.

From the above mentioned facts, I state that the submitted dissertation thesis of candidate, M.Eng. Nareerut JARIYAPUNYA, with the title “Clothing Patternmaking Method for Stretch Fabrics“, meets all the requirements given in the official documents on dissertation thesis.

I would like to ask candidate to answer the following questions briefly:

- 1) What was the reason of the difference between the results of a standard and manual experiment (page 89, Fig. 4.22 a)?
- 2) How were the values of Young's modulus of elasticity obtained?
- 3) What was the main reason for selection of 60 s as a relaxation time (e.g.: page 66 and Fig. 4.5)?
- 4) Could you define the term “neural network“? What is your opinion on application of neural networks for further research in relation to the solution of the given issue?

I evaluate the submitted dissertation thesis in a positive way
and
I propose to accept this thesis for defence
and
after successful defence,
I recommend to confer a scientific degree of Ph.D. (doctor)
to M.Eng. Nareerut JARIYAPUNYA
in 3106V015 study field – Textile Technics and Materials Engineering,
study programme P3106 – Textile Engineering

In Púchov, June 24, 2019



doc. Ing. Jan Krmela, Ph.D.

Review of doctoral thesis

Student: Nareerut Jariyapunya, M.Eng.

Supervisor: M.Sc., Blažena Musilová, Ph.D.

Title of the thesis: **Clothing Patternmaking Method for Stretch Fabrics**

Study programme: Textile Engineering

Study branch: Textile Technics and Materials Engineering, Faculty of Textile Engineering, Technical University of Liberec

This submitted doctoral thesis is devoted to study of patternmaking method for stretch fabrics, which are suitable for compression garments. Significant characteristics of compression textiles and their properties were also studied.

The composition of thesis conforms to principles and requests to the structure of scientific thesis. The topic of thesis is current and relevant in the context of up-to-date research in the area of compression garment and systems of patternmaking construction.

It is evident that the author has plunged into the subject and has gradually found and addressed the necessary attributes and contexts that are related to the patternmaking construction of the knitted products. Chapters 1-2 are theoretical background of the research.

Chapter 3 performed the knitted fabrics suitable for compression garment. In the Figure 4.1, p.61 the dependences of the force-elongation of sample S3 and S6 with biggest size of elastane yarn count show high values of force, but different values of elongation. How do you explain this phenomenon?

How do you interpret the high elongation values of your samples (e.g. up to 300% - 500%)? What does interlock knitted structure with 30% elastane look like? Elongation of the warp knitted structure - locknit (charmeuse) can be expected due to the used elastane in back guide bar and polyamide in front guide bar (long underlaps).

Explanation of the significant influence on the stress value when yarn count number of elastane is higher (p. 63, Figure 4.2 same structure – sample S3 and S6 (elastane 78 dtex) is insufficient. Those curves are not similar and values too.

When we compare the results from dynamic work recovery (p.68) not only percentage of elastane might be helping for adjustment to improve the performance of the fabric recovery but together with the relation of the ground yarn count (polyamide). Small recovery is caused with the increasing the ground yarn count and the similar value of wale and course densities of all samples.

In chapter "4.4.1 Measurement of fabric properties by novel tensile measurement device" the results (loading – elongation) which are displayed on curves in Figure 4.22, p. 89, especially in the 1st cycle were calculated? The curves are not exponential. Why?

When stretching knitted structures large shrinkage in perpendicular direction are occurred. Was that effect included in new patternmaking method?

Now, with the technical improvement of knitted machines, their possibilities and new technics of patterning of the weft/warp knitted structures with the methods of closing/linking, the modern approach will connect the knitted products and patternmaking system together to design so called "seamless" product and eliminate cutting the each product parts and joining together with the sewing process. Both technology warp/weft can produce that sort of product. In the area of weft knitted technology, modern V-bed flat knitted machines can produce the whole-garment product. In the case of circular knitted machines it is necessary the "seamless" product finished with sewing process (shoulders, sleeves), but body/torso with the welt can be designed directly to the machine.

With respect to the above mentioned comments, the author of the thesis proved her ability to perform research and to achieve scientific results.

I recommend the thesis for presentation with the aim of receiving the Degree of Ph.D.

Liberec, July 16, 2019



Irena Lenfeldová, M. Sc., Ph.D.

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