

Supervisor's opinion on PhD thesis of Muhammad Usman Javaid, MTI

Date: 20.5.2019

Thesis Title: **Knife Stabbing Response of Woven Fabrics**

Doctoral Scholar: Muhammad Usman Javaid

The thesis titled „Knife Stabbing Response of Woven Fabrics“ submitted by Muhammad Usman Javaid, MIT fulfils the objectives mentioned in this thesis. The work is comprehensive and shows his analytical ability to design the research and to evaluate the theoretical and experimental results. He has published work from his dissertation, in reputed impact factor journals and has presented at various occasions.

This work includes the analysis of isotropy of knife stabbing of single and multiple sheets fabrics. Para-Aramid woven fabric is studied in this work, whose surface friction is modified by treating it with SiO₂, TiO₂ and Ozone. Stabbing is complex phenomenon due to the involvement of many variables. Many experiments are performed to measure the response of various fabrics in five cutting directions. Multiple sheet stacks are also studied for their orientation at a specific stacking angle. Quasi-static and dynamic stab resistance is measured. Various fabrics are also characterized for their surface topology, comfort, physical, and mechanical properties.

The focus of the study is the dynamic and quasi-static stab resistance of fabrics at different cutting directions and stacking of sheets at different orientation directions. Results reveal that when mechanical properties of warp and weft are significantly different the knife stabbing direction may become significant. The coefficient of friction between yarns and orientation of angle of sheets has a direct impact on the fabrics' response. On higher friction and 45° orientation of sheets, the knife stabbing direction becomes insignificant. Furthermore, significantly higher response of quasi-static and dynamic stab resistance was observed that increased by more than 200%. It was deduced to distribute the penetration energy in various directions and clogs the knife penetration.

Formally, work is right, taken over parts of the text or images are properly cited and all sources of literature are in agreement with arranged rules. Plagiarism checking on 20.5. 2019 prove no relevant similarity to other work

This thesis is well written, and the quality of the graphs and tables is very good, and they are well presented. The overall quality of the thesis is very good, and I recommend it for defence.

Liberec, 20.5.2019

Ing. Jana Salačová, PhD.

