

LAMINATED BODY PROTECTOR

Student Project

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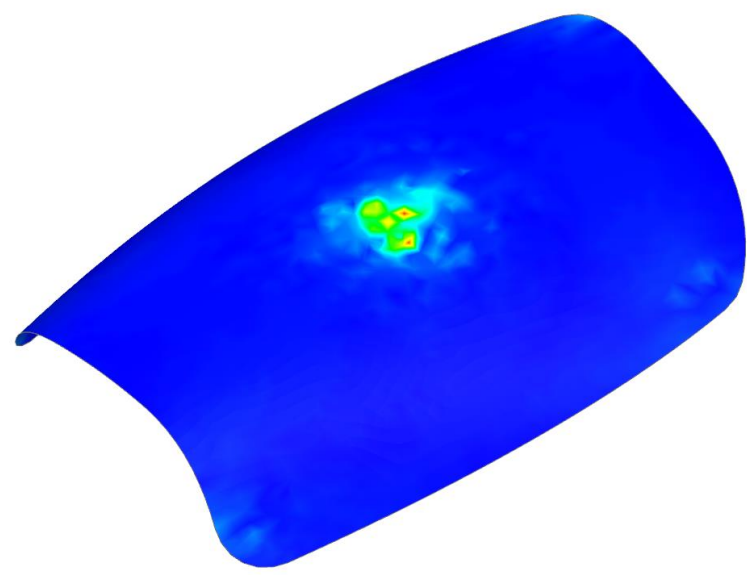
SCAN ME

Motivation

Body protection/armour equipment is often used in fields where the human body might be confronted with sudden, medium to high velocity impact loads. Further, a distinction has to be made between single point load (ballistic) and large area impact scenarios. Obviously, the former is relevant to bulletproof vests, whereas the second scenario can be encountered for example in downhill mountain biking. Due to the suitability of the inherent material properties of carbon fiber reinforced composites for this use case, a laminated body protection for large scale and medium velocity impacts was developed, designed and wet laminated within this student project.

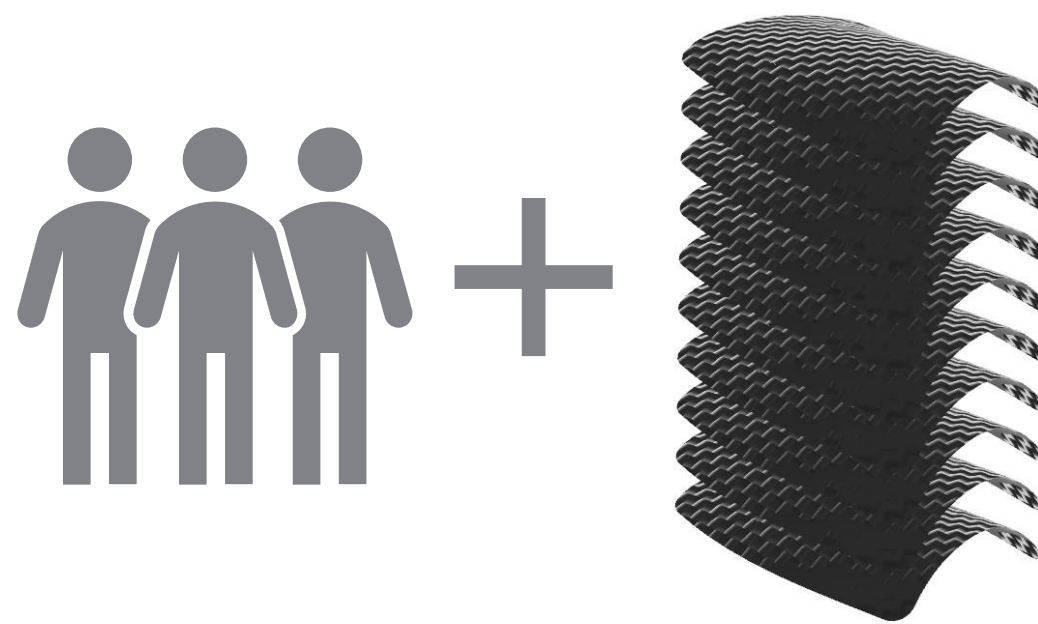
Impact Analysis

Simcenter3D



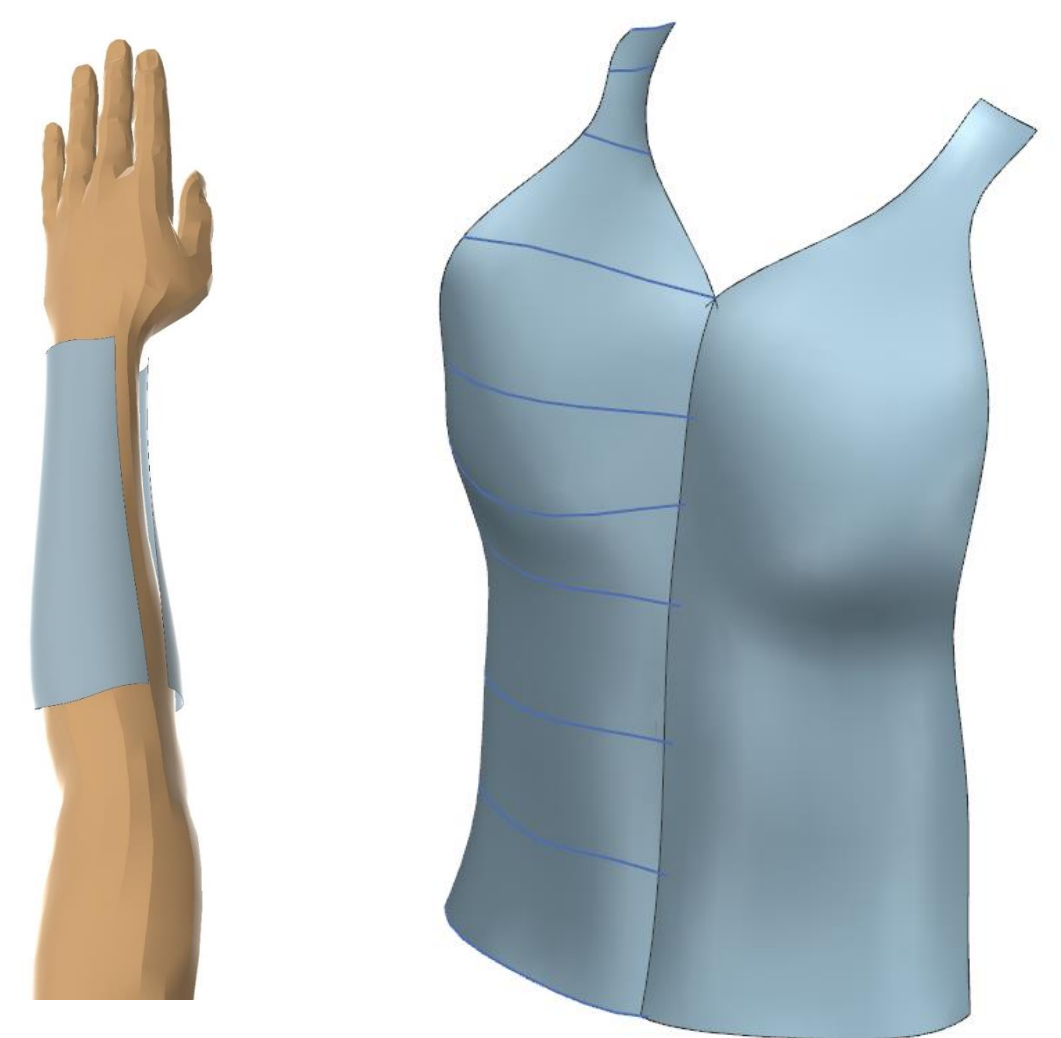
Design of Composites

User Centered & Participatory Design



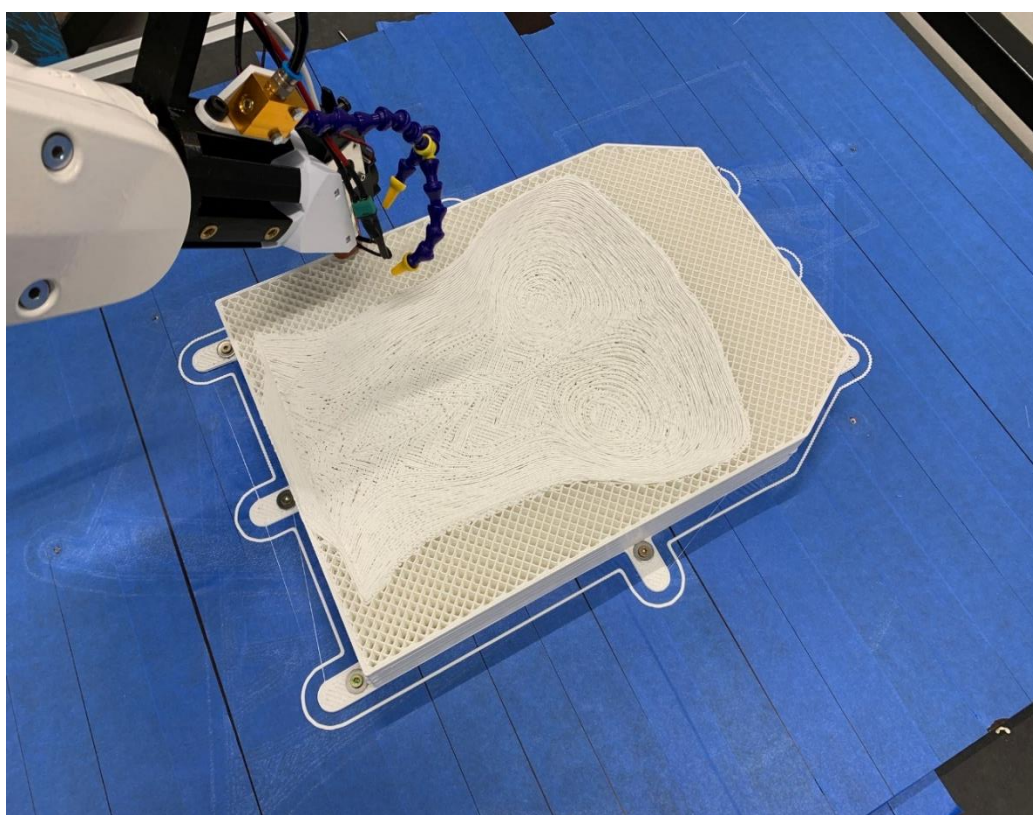
Freeform Modelling

Siemens NX



Mold Manufacturing

→ Robot aided 3D printed mold (OLAF)



Wet Laminating

→ Final fabricated component conventional cured composites



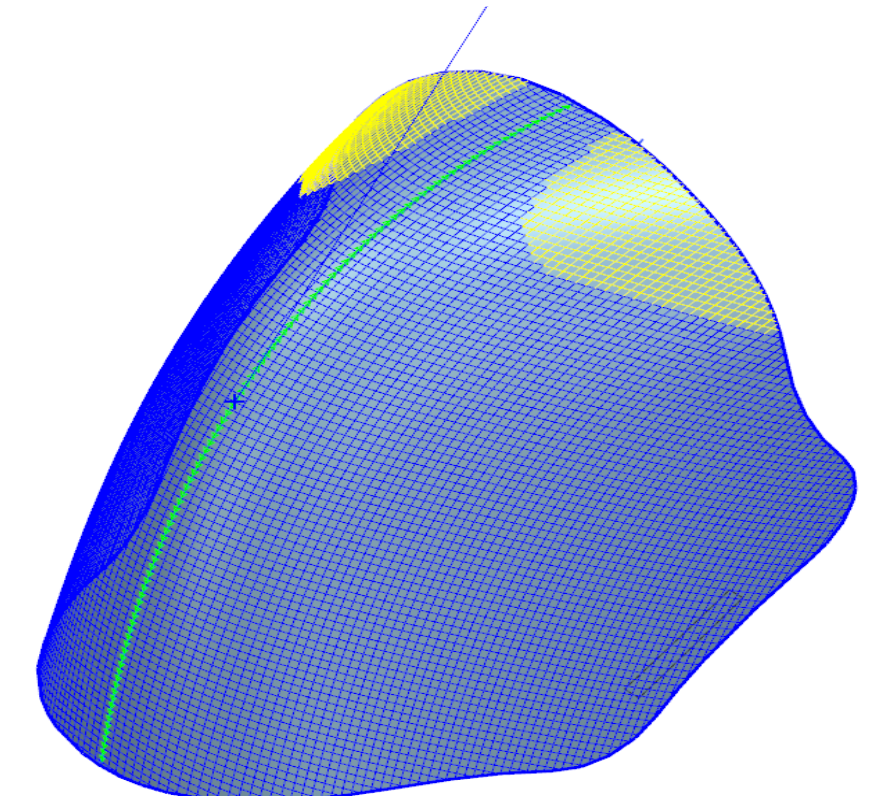
Novel thermoplastic composites



Draping Simulation

→ Carbon Fiber Reinforced Woven Composites

FiberSim



Conclusion

All steps of the digital product development were carried out by using the Siemens PLM environment (Siemens NX, FiberSim, Simcenter3D). Therefore, a fully implemented virtual prototype of the body protector suit was created. Additionally, the fast manufacturing of real world prototypes was supported by the virtual model and the used Siemens PLM software tools.

Acknowledgment: We especially want to thank Siemens AG for providing the software tools as well as the digital environment to carry out this project.