Sächsisches Textilforschungsinstitut e.V. (STFI) An-Institut der Technischen Universität Chemnitz
Annaberger Straße 240 · 09125 Chemnitz · Germany
Managing Director: Dr. Heike Illing-Günther
Phone: +49 371 5274-0 · Fax: +49 371 5274-153 · E-Mail: stfi@stfi.de

Zwanzig20 – futureTEX - optiformTEX: Development of a Flexible Production Technology for Natural Fibre Semi-Finished Products with Topological Distribution Characteristics

For the production of molded components in nonwovens, flax, hemp, kenaf or sisal fibers or their blends with thermoplastic fibers (especially polypropylene fibers) are used. The nonwovens consist either of a uniform fiber layer (airlay technology) or several uniform fiber layers laid on top of each other (stacker technology), which are solidified into contiguous mat semi-finished products using mechanical, thermal or chemical post-treatment methods. In combination with a thermoplastic or thermosetting matrix, such mats are processed primarily with the help of pressing technology into large-area cladding components in the automotive interior.

Technical solutions for load-appropriate component reinforcement and the resulting optimized use of materials are of great importance, especially for automobiles, however currently still very expensive. The use of staple fibers for the implementation of load-appropriate component reinforcement directly in the semi-finished production process through a targeted adaptation of local surface mass distribution (topologization) offers an economic alternative with enormous future potential for know-how transfer to neighboring areas of textile technologies.

The basic idea for the "optiformTEX" project within the futureTEX competence network is the development of a flexible textile technology process and associated plant components for the production of load-resistant natural fibre semi-finished products by specifically influencing the surface mass distribution in the pile before semi-finished product solidification. Finally, the "optiformTEX" project was able to develop a process for production of topologically optimized nonwovens with locally adaptable surface masses. On the basis of the developed nonwovens, production processes for fiber composite components have been optimized, which allow exploitation of considerable lightweight construction potential. Using optiformTEX semi-finished products, weight advantages between 30 - 50 % could be achieved compared to semi-finished products with constant material distribution. In addition, models for design and calculation of composite components, e.g. door side panel and guitar case, were further developed based on optiformTEX technology.

In the joint venture project optiformTEX, following partners worked successfully under project management of SachsenLeinen GmbH:

- Oskar Dilo Maschinenfabrik KG (Dilo)
- Volkswagen AG/GF Kunststoff (HT) (VW)
- Technische Universität Chemnitz, Professur Strukturleichtbau und Kunststoffverarbeitung (TUC)
- Sächsisches Textilforschungsinstitut e. V. (STFI)

As result of project work, an optiformTEX module for local reinforcement of nonwovens by means of defined fiber accumulations was developed by the company Dilo. A copy of this module has been integrated into a laboratory needle nonwovens plant at STFI and is available for customer trials and subsequent research projects.

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Contact: Dr.-Ing. Barbara Schimanz Phone: +49 371 5274-202 E-Mail: barbara.schimanz@stfi.de
Dipl.-Ing. Dirk Zschenderlein Phone: +49 371 5274-283 E-Mail: dirk.zschenderlein@stfi.de