AACHEN DRESDEN DENKENDORF

INTERNATIONAL **TEXTILE** CONFERENCE

Aachen
November 29-30, 2018

Turning fibers into value

- Functionalization & New Materials
- Textile Machinery & New Technologies
- Trends & New Markets in the Field of Building & Construction
- Trends & New Markets in the Field of Medical Textiles
- Transfer-Session: R&D projects in small and medium-sized enterprises

http://www.aachen-dresden-denkendorf.de/en/itc/

PRESS INFORMATION

AACHEN DRESDEN DENKENDORF
INTERNATIONAL **TEXTILE** CONFERENCE

ADD-ITC 2018: Press Information

ADD-ITC 2018: Presseinformation (deutsch)

„Turning fibers into value“ ist das Motto der Aachen – Dresden – Denkendorf International Textile Conference, die am 29. und 30. November in Aachen stattfindet. Welche neuen Funktionen erfüllen Textilien und welche neuen Einsatzbereiche entstehen? Wie tragen neue Technologien dazu bei, textile Produkte noch wertvoller zu machen, und welche Möglichkeiten eröffnet das Voranschreiten der Digitalisierung?

Die Aachen – Dresden – Denkendorf International Textile Conference ist mit um die 600 Teilnehmern eine der wichtigsten Tagungen der Europäischen Textilindustrie. Experten aus den Bereichen Textilchemie, Veredlung und Funktionalisierung sowie Textilmaschinen und Verfahren werden erwartet, darunter internationale Teilnehmer aus Europa, Ägypten, China, Hong Kong, Japan, Südkorea, Südafrika, Ghana, den USA und Kanada.

Eines von drei renommierten Textilforschungsinstituten übernimmt im jährlichen Wechsel die Organisation: Das Institut für Textilmaschinen und Textile Hochleistungswerkstofftechnik der TU Dresden (ITM), die Deutschen Institute für Textil- und Faserforschung Denkendorf (DITF) und das DWI – Leibniz-Institut für Interaktive Materialien in Aachen. Sie werden unterstützt durch weitere Instituten, die meisten von ihnen aus dem Kreis des Forschungskuratoriums Textil.

Dieses Jahr ist das DWI – Leibniz-Institut für Interaktive Materialien Gastgeber der Konferenz. „Die Aufgaben und Herausforderungen sowie die Märkte für textile Produkte sind in den letzten Jahren deutlich gewachsen“, sagt Prof. Martin Möller, Wissenschaftlicher Direktor des DWI. „Manchmal ist es sogar schwierig, den textilen Ursprung eines Produkts noch zu erkennen. Gleichzeitig erschließen sich für Textilien neue Anwendungen. Auf der Konferenz werden wir die aktuellsten Trends aus Industrie und wissenschaftlicher Forschung vorstellen. Dabei haben wir das Ziel, Unternehmen und Forschungsinstitute näher zusammenzubringen.“

Neue Materialien, die auf der Konferenz vorgestellt werden, sind zum Beispiel regenerative Systeme, neue Flammschutzmittel für Textilien oder neue Nanofaser-Komposite, die bei der Filtration wässriger Medien zum Einsatz kommen. Ein Schwerpunkt ist die Elektrofunktionalität, da derzeit zunehmend „smarte“ Textilien auf den Markt kommen, die beispielsweise mit photovoltaischen oder thermoelektrischen Elementen ausgestattet sind. Im Bereich Textilmaschinenbau ist die Einbindung digitaler Prozesse ein wichtiger Schlüssel zum Erfolg. Deshalb werden auf der Konferenz unterschiedliche Aspekte der „Industrie 4.0“ diskutiert: Von der simulationsbasierten Produktentwicklung über 3D-gewebte Verbundteile für Flugzeugtriebwerke bis hin zu einer „Mikrofabrik“ mit einem automatisierten Workflow entlang der Produktionskette.

„Textil formt unsere moderne Welt“, betont Dr. Uwe Mazura, Geschäftsführer des Gesamtverbands der deutschen Textil- und Modeindustrie e. V. in seinem Grußwort. Gleichzeitig steht die Textilindustrie vor neuen Herausforderungen: Zum Beispiel gewinnen Just-in-time-Konzepte und maßgeschneiderte Lösungen an Bedeutung, und die Digitalisierung ermöglicht neue Produktionsprozesse. Diesen Herausforderungen können sich Industrie und Wissenschaft am besten in gemeinsamen Forschungsprojekten stellen. Eine Vielzahl dieser gemeinsamen Projekte werden in der „Transfer-Session“ vorgestellt, darunter textile Heizsysteme oder auf Textilien fixierte Enzyme, die bei neuen Syntheseprozessen zum Einsatz kommen.

Diese Entwicklungen wirken sich auf alle europäischen Märkte und Länder aus. Italien, das diesjährige Partnerland der Konferenz, ist ein traditioneller Hersteller hochwertiger Textilien.

Stefano Cavestro, Präsident der AICTC, der italienischen Vereinigung für Textilchemie und -farben, stellt heraus, dass Textilien schon lange keine reinen Fashion-Produkte mehr sind. Textilien werden immer mehr zu High-Tec-Materialien mit vielseitigen Anwendungen. Sieben Refe-renten aus Italien werden umfassend darstellen, wie die italienische Textilindustrie mit diesen Herausforderungen umgeht. Darüber hinaus werden sich Sessions mit neuen Märk-ten für textile Lösungen befassen, und dabei im Speziellen die Bereiche Bau und Medizin in den Blick nehmen.
Zum ersten Mal findet im Rahmen der Konferenz ein Business-to-Business Matchmaking Event statt, das von NRW.International, dem Außenwirtschaftsportal von Nordrhein-Westfalen, orga-nisiert wird.
Ergänzt wurde das Tagungsprogramm durch eine Ausstellung von Firmen und Instituten sowie über 120 wissenschaftlichen Postern. Drei der Posterpräsentationen werden mit dem Poster-Award 2018 ausgezeichnet.

Organisation 2018:
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AACHEN DRESDEN DENKENDORF
INTERNATIONAL **TEXTILE** CONFERENCE

ADD-ITC 2018: Press information (english)

“Turning fibers into value” is the theme of the Aachen – Dresden – Denkendorf International Textile Conference, taking place in Aachen on November 29th and 30th. Which new functions do textiles provide and which new fields of applications are emerging? How can new technologies add value to textile products and which opportunities are opening up via the progress of the digital era?

With around 600 participants, the Aachen – Dresden – Denkendorf International Textile Confe-rence is one of the most important conventions for the European textile industry. It attracts experts from the areas of Textile Chemistry, Finishing & Functionalization, as well as Textile Machi-nery and Manufacturing, among them international participants from Europe, Egypt, China, Hong Kong, Japan, South Korea, South Africa, Ghana, USA and Canada.

Three renowned Textile Research Institutes are taking turns organizing the conference: The Institute of Textile Machinery and High Performance Material Technology of the TU Dresden (ITM), the German Institute for Textile and Fiber Research Denkendorf (DITF) and the DWI – Leibniz-Institute for Interactive Materials, Aachen. They are supported by further institutes, most of them members of the Forschungskuratorium Textil.

This year, the DWI – Leibniz-Institute for Interactive Materials is hosting the event. “The tasks and innovation-challenges, but also the markets for textile products have clearly expanded throughout the years”, says Prof. Martin Möller, Scientific Director of DWI. “Sometimes it becomes even more difficult to recognize the textile background, but at the same time, textiles conquer new applications. At the conference, we are presenting the latest trends from industry as well as academia with the aim to bring textile companies and research institutes even closer together.”

New developments which are presented during the conference include materials like regenerative systems, novel flame retardants for textiles or new nanofiber composites for filtration. A focus is laid on electrofunctionality, as currently more and more “smart” textile products are entering the market, which are equipped with electronic features like photovoltaic or thermoelectric elements. In the field of Textile machinery, the integration of digital processes is becoming a key factor for success. Therefore various aspects of the “Industry 4.0” are discussed during the conference: From simulations based product development or 3D woven composite parts for aircraft engines to a “microfactory” with automated workflows throughout the production chain.

“Textiles are forming our modern world”, says Dr. Uwe Mazura from the Confederation of the German Textile and Fashion Industry, in his welcome address. At the same time the textile industry is facing new challenges: Just-in-time-concepts and tailor-made solutions are becoming more and more important, and the digitalization enables new productions processes. To meet these challenges, industry and academia need to carry out joint research. A broad range of these projects will be presented in the “Transfer session”, among them textile-tethered enzymes as a new tool in organic synthesis or textile heating systems.

These developments are of similar importance in all European markets and countries. This year’s partner country Italy is a traditional producer of high quality textiles. Stefano Cavestro, President of AICTC, the Italian Association of Textile Chemistry and Colourists, points out that textiles cannot longer be seen only as fashion products. Textiles are becoming high-tech

materials with various applications. Seven Italian speakers will draw a comprehensive picture of how the Italian textile industry is facing these new developments. In addition, special sessions will deal with new markets for textile solutions in building and construction as well as in the medical field.
The conference is accompanied by an exhibition of companies and institutes as well as over 120 scientific posters. Three of the posters are awarded the Poster Price 2018.
As a novelty, a business-to-business matchmaking event will be held during the conference, organized by NRW.International, an association promoting trade in North Rhine-Westphalia.

Organization 2018:
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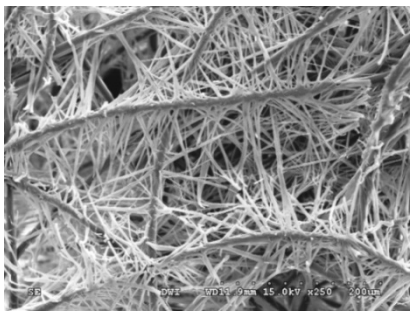
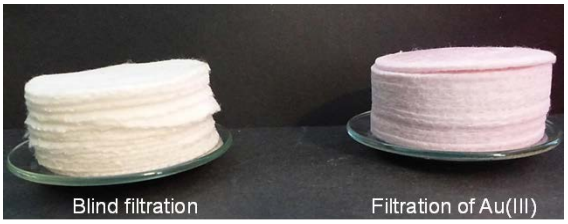
Supramolecular nanofibre composites for filtration of aqueous media

Due to increased pollution associated with industrialisation there is an increasing demand for efficient water treatment techniques. Apart from separation of suspended solid contaminants, removal of dissolved toxic substances is essential to reduce environmental impact and to protect human being from health damage. In addition, some of precious materials present in waste waters are sometimes in such a high concentration that it becomes economically feasible to recover. For example, it was found in a recent nationwide study of sewage sludge in Switzerland that depending on the area the content of precious metals (including gold and silver) can be really high.
We have developed a new textile based filter material containing functional nanofibres that are able to selectively adsorb heavy metals from aqueous media. In contrast to the established top-down processes for nanofibre formation, our cheap bottom-up approach uses self-assembly of small molecules. Thus, a 3-dimenional network of nanofibres is formed within a textile carrier simply by dipping it into a solution of specially designed molecules. The supramolecular building blocks, i.e. the self-assembling small molecules, can be further modified with functional groups to permit selective removal of environmentally hazardous heavy metals or precious metals from aqueous solutions. For instance, the filter medium equipped with supramolecular nanofibres from 1,3,5-benzenetricarboxamines bearing thioether side chains exhibits a high potential of selectively binding Au(III)-complexes allowing their nearly complete removal from aqueous solutions (99.9 % of 880 mg/L).



PET needle felt carrier bearing supramolecular nanofibers



Stacked filter medium after blind filtration and filtration of Au(III) (right: reddish discolouration indicates the presence of Au-NPs)

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Förderhinweis:
IGF-Projekt 19071 N „Funktionale Nanofaser-Komposite zur selektiven Entfernung von Metall-Ionen und Keimen aus Wasser Nanofasernetzwerk-Komposite für keimfreies Wasser“
The research project IGF-No. 19071 N of the research association Forschungskuratorium Textil e.V. Reinhardtstraße 14-16, 10117 Berlin was provided via Arbeitsgemeinschaft industrieller Forschungsvereinigungen e.V. (AiF) within the promotion program of „Industrielle Gemeinschaftsforschung und -entwicklung (IGF) of the Federal Ministry of Economics and Technology due to a resolution of the German Bundestag

Selective powder binder application during the cutting procedure to optimize the preform production process

Carbon fibre reinforced plastics are predicted to attain a yearly market growth of 13% by 2022. This will require considerable cost savings in production. For this goal to be achieved, both automatable and material-efficient manufacturing strategies are required.
This interdisciplinary research project aimed at developing a modular CNC cutting and fixing technology for optimised application of powder binder systems to achieve a higher automation level in the preform production process. This plant technology implements edge fixation to ensure the dimensional accuracy of the preform blanks and a selective structure fixation for the improved formability of complex preform geometries. The definition of suitable areas is based on the simulation results of the forming behavior for a 3D demonstrator component.
By the digital and mechanical coupling of the powder binder application unit to the cutting technology, the additional fixing step in the preform production chain is eliminated, which makes it possible to achieve considerable time savings and thus increase economic efficiency. Besides the conceptual design, the project laid the foundations for plant technology development for powder supply, selective powder application and thermal powder binder activation on the textile reinforced material as well as the potential and practicability of this technology was demonstrated.

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Funding reference
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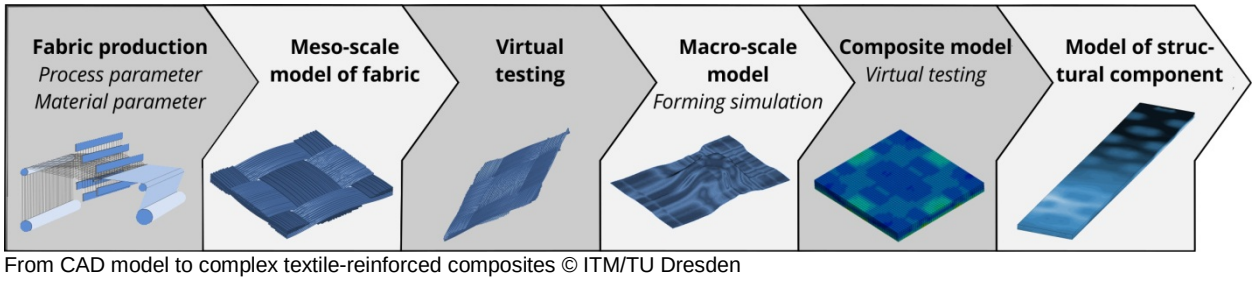
Simulation-based product development using a digitization chain

The direct production of 2D-end contour and/or 3D-end geometry preforms using weaving or multi-layer flat knitting technology for the realization of complex endless fiber-reinforced plastic composites is an essential development goal at ITM. An economic and fiber-gentle production and a broad industrial implementation require knowledge regarding production technology, an application-oriented design and development tools as an integrated digital process chain. By mean of an industry 4.0 related digital process chain, the essential interrelationships between material properties, textile structure, process parameters and composite properties can be accurately and efficiently reproduced. Multi-scale numerical models are developed to support the determination of load- and geometry-adapted textile structures. These serve to design the textile manufacturing process, the textile structure and the necessary preforming process to meet respective requirements. A digital connection between the 3D-CAD geometry and the machine control program for the textile machines is required for the best possible consideration of the component requirements. As a result, the production- and stress-compatible fiber orientation and geometry can be determined, controlled and adapted at a very early stage of component development. In addition to the development of the required machine technology and the textile binding, the focus is thus on process chain development from the CAD model to the machine control program.



From CAD model to complex textile-reinforced composites © ITM/TU Dresden

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Further information
Chokri Cherif, Thomas Gereke, Wolfgang Trümper, Gerald Hoffmann, Andreas Nocke; Simulation-based product development using a digitization chain: From CAD model to com-plex textile-reinforced composites, *Thursday 29.11.2018, Textile Machinery & New Technologies, Brüssel-Saal, 05:00 pm*

Moss Wall – A textile solution to reduce noise and particulate matter in the context of urban densification

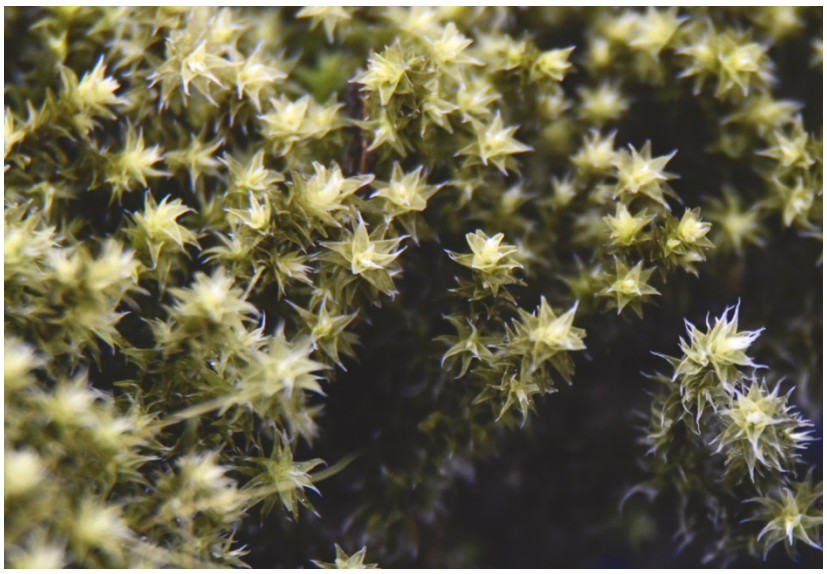
DEUTSCHE INSTITUTE FÜR TEXTIL+FASERFORSCHUNG

The DITF form the largest textile research center in Europe with more than 300 scientific and technical staff. As the world's only textile research facility and covering an area of more than 25,000 m², the DITF work right across the textile production and value chains. Since 1921, we have been across all the major fields within textiles. We are among the leading research institutions worldwide.

Problems in urban densification had to be addressed differential. Fitting solutions had to work at the right spot on the right time to overcome an individual problem. Therefore the solutions have to respect the individual circumstances and the systems must be adaptable.

The lecture shows how two typical problems of urban densification can be addressed by a Moss Wall. The textile based Moss Wall is integrated in soundproofing modules of a noise barrier. Noise as a typical problem of urban densification can be reduced with this system and due to the green living surface the sound insulation, the acceptance of those noise barriers are typically higher. But not just the emotional aspect increases the life quality. Moss also reduces particulate matter by its ability to link small particles out of the air and to metabolize them. Under the context of urban densification these modules had to be active to address the problems locally and temporally in a given surrounding.

Latest results of an ongoing project are presented by this lecture.



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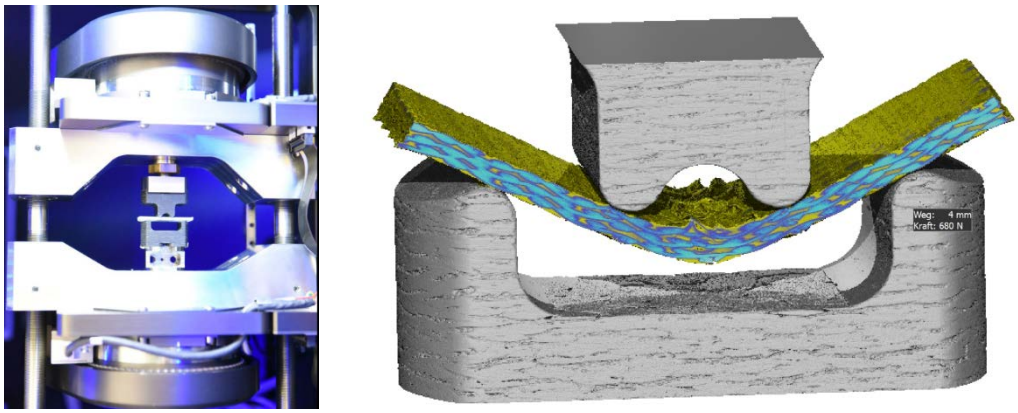
Insitu µ-CT loading test stand - a new technology to analyse textile materials and machine parts under stress conditions

DEUTSCHE INSTITUTE FÜR TEXTIL+FASERFORSCHUNG

Using high-resolution x-ray micro computer tomography (µ-CT), it is possible to look into samples with resolution of microns without influencing or destroying it. At DITF, CT-technology and knowledge is optimized for textile based samples and amazing results are achieved. Alongside analyzing the quality of samples (air inclusion, defects), it is an essential tool for the DITF department “Simulation” for developing simulation models and verifying the computational results.
Visualization and analysis of what occurs in the sample at various loads at different loading stages were impossible because of the lack of suitable and precise loading test stand for the µ-CT. This affects all kinds of samples, where failure behaviour and mechanical behaviour at loading are essential for development work. To develop such a test device for µ-CT, a ZIM project was undertaken with Kammrath & Weiss GmbH. The company is well known for micro and nano systems, e.g. specimen stages for all fields of microscopy (REM, FIB, AFM), precise accessories for scanning electron microscope and material testing devices. In the presentation, the developed prototype is presented. Outstanding properties are: symmetrical loading with long-term precision (tensile, compression, torsion and -by additional gadgets- also bending and shearing), easy change of force sensors (10N up to 10kN), no disturbing parts in the X-ray beams by construction solution, control system adapted to µ-CT-System nanotom m from GE (possible also for other systems) and easy mounting possibility in the µ-CT. A bending test on a composite specimen shows the potential of the newly developed prototype. This µ-CT loading test stand is used at DITF for research projects and will also be available in near future for the common market.



Bending test of glass-fiber reinforced plastic using the new insitu-µ-CT-loading test stand (right: showing CT-result of 4mm deflection)

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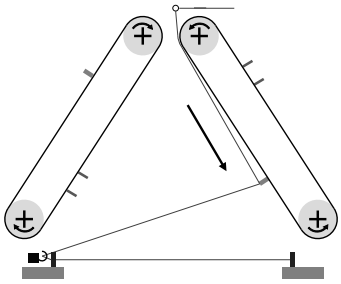
High speed weft insertion for warp-knitting machines



Challenge

The industry of technical textiles is constantly growing. Especially in the field of aerospace, civil engineering and mobility technical textiles play a significant role. Besides woven textile structures especially bi-axial or multi-axial warp-knitted fabrics are being used.

Bi-axial as well as multi-axial warp-knitted structures are manufactured on special warp-knitting machines with at least one module for weft insertion.

The production speed of these machines is significantly limited by the low working speed of the weft insertion module (1.400 1/min compared to 4.400 1/min without weft insertion). The weight and trajectory of the weft transport module are the main causes for the low production speed.

Solution

The developed technology utilizes a system of belt drives for the transport of weft yarns. This technology shall enable manufacturers to produce warp-knitted fabrics with weft insertion at speeds of up to 4400 1/min (resulting in an increase of productivity of up to 200 %).

The trajectory of the weft yarn is optimized in a way that frictional contact is reduced to a minimum. Hence even the processing of brittle and high-modulus yarns (such as carbon or glass fibres) shall be possible at high productivity.

Advantages

Striking advantages of the developed technology are the significant increase of productivity and the capability to process brittle yarns. Furthermore, the weft insertion module due to its alignment allows the reduction of length of the warp-knitting machines. Hence manufacturers can install an increased number of warp-knitting machines on the same space.

Development status

- German patent filed, PCT planned
- Proof of concept fulfilled (lab-scale)
- Scale-up to true warp-knitting currently in progress

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Development of a liquid-proof all-round seam (FlUni)

Research Institute for Textile and Clothing (FTB),
Niederrhein University of Applied Sciences, Mönchengladbach, Germany
Trans-Textil GmbH, Freilassing, Germany

Tailoring of many textile products requires sewing together different textile components. Impermeability against water and other liquids often plays an important role in technical applications. Hydrophobic coatings or the integration of a membrane can achieve impermeability of the textile area. However, this is problematic with the seam area. In this area the textile is perforated by the sewing process and additionally movement of the textile causes the movement of the sewing thread inside the stitching hole which results in widening of the stitching hole. In standard procedures, the seam is sealed by so-called “tapes” which are glued over the seam area.
Aim of the presented cooperation-project is to develop an easier seam conjunction which is impermeable against liquids over a long period of time and which supports a long-lasting and sustainable use of the textile. For this purpose, firstly a sewing thread is developed which contains an (inactive) adhesive. After sewing, this adhesive will be activated and a conjunction between thread and textile is created. Simultaneously sealing of the stitching holes will take place. Secondly a bonding-tape with an integrated moisture barrier is developed. By combining the new adhesive yarn with the bonding tape a liquid-proof and long-lasting seam with improved properties should be achieved. This seam will find application in various technical textiles including personal protective clothing.

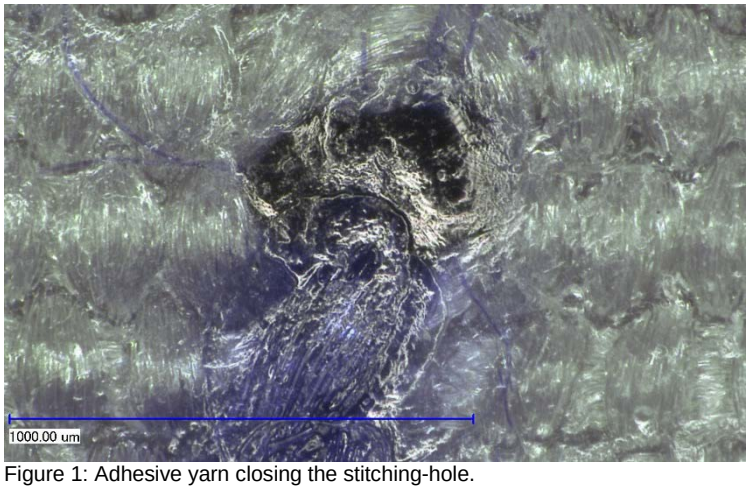

Figure 1: Adhesive yarn closing the stitching-hole.

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Financial support
The ZIM cooperation project was funded by the German Federal Ministry of Economy and Technology on the basis of a decision by the German Bundestag, „Zentrales Innovationsprogramm Mittelstand (ZIM)“ (Förderkennzeichen ZF 4102210TA7).

Realizing Moisture Sensors with Textile Materials in Different Integration Levels by Using Capacitive Measurement Principles

Every current electronic hygrometer uses capacitive moisture sensors to measure the relative humidity in the surrounding atmosphere. These sensors offer a wide measurement range and good reliability. On the other hand lots of textile applications like in the health care sector or construction textiles exist, in which the moisture content is advantageous to know.
Instead of integrating electronic capacitive sensors into textiles, the Research Institute for Textile and Clothing of the Hochschule Niederrhein presents smart textiles being the sensors themselves. Humidity sensors are realized by screen printing on textiles and also by weaving functional yarns using a capacitive and therefore robust measurement principle. Furthermore the researchers succeeded in developing a sensory yarn by utilizing special spinning techniques. The produced sensors can be applied on existing textiles by embroidery or sewing in any length and geometry. As fully functional humidity sensors these yarns constitute the highest integration level of a smart function in a textile material.

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Acknowledgement
The Cornet-project 181 EN of the research association Forschungskuratorium Textil e. V., Reinhardtstraße 12-14, 10117 Berlin is supported by the AiF within the scope of the support program of the Industrielle Gemeinschaftsforschung und -entwicklung (IGF) of the Ministry of Economics and Technology in accordance with a resolution by the German Federal Parliament.

Stress Adapted Hernia Meshes: Enhanced Anisotropy of the Base Material by Inserting a Reinforcing Embroidered Structure

Abdominal wall hernia describes the expulsion of bowels through an opening in the abdominal wall. The margin tissue of the cracked abdominal wall is unable to recover autonomously and untreated hernia can cause complications such as organic dysfunction, intoxication and necrosis of the particular area. For an effective repair the application of hernia meshes is required. A reason for relapse is seen in an inadequate adaption of the mechanical properties of the mesh to the movements and deformations of the abdominal wall. As the abdominal wall constitutes a highly anisotropic tissue [1], the adaption of the mechanical properties of the hernia mesh has to be space-resolved. Embroidery technology enables a targeted influence on the mechanical properties of the generated textile structure by a directed thread deposition. This study was conducted to detect the influence of selected textile parameters on the anisotropy of the mesh. A quadratic embroidery pattern (60 x 60 mm) with wavy seam deposition varying amplitude and wave length as well as a graded set-up were designed. Embroidery was processed by a ZSK JCZ 0209-550 (ZSK, Germany) embroidery machine on an elastic polyurethane (PU) foil Ellastolan soft 45 A 12 P (BASF Polyurethanes GmbH, Germany) with a customary polypropylene thread (Dr. Karl Wetekam & Co. KG, Germany, Tt ~ 90 dtex). Biaxial tensile testing was performed on a biaxial testing device for elastomers (Coesfeld, Germany) and the deformation was observed with the optical measurement system ARAMIS (GOM, Germany). An anisotropic coefficient was determined by the quotient of the section strain in x and y direction $\varepsilon_{s,x}$ and $\varepsilon_{s,y}$. A high impact on the isotropy of the PU foils by embroidered patterns could be approved.

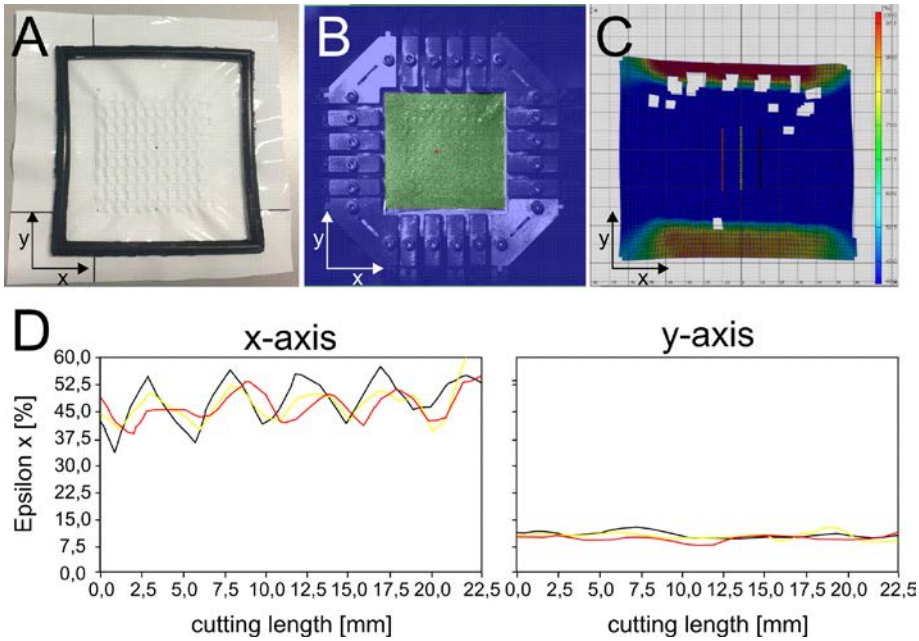

Figure 1: (A) Polyurethane sample, with embroidered reinforcement structure in the middle and framed with a caoutchouc bulge for biaxial testing and optical measurement, (B) editing the images with ARAMIS, (C) rendered depiction of the strain distribution and the three section planes along the y-axis and (D) strain of the three section planes along the cutting length of the x- and y-axis for stage 94 with maximum strain in y- and x-direction. A clear difference of the two graphs in x- and y-direction and thus an enhanced anisotropy can be determined.

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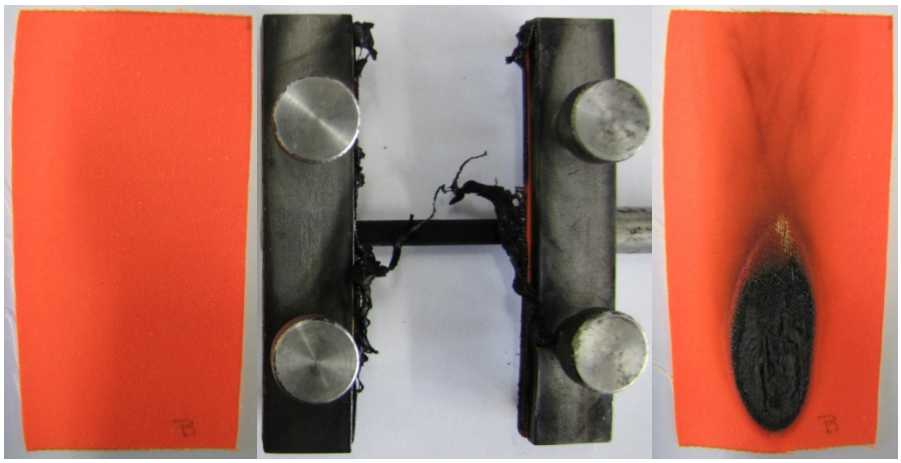
Novel halogen free

Flame retardants for textiles

Conventional bromine based flame retardant are highly effective but listed under REACH for there periztens and CMT properties. Therefore new halogene free flame retardants are requested. We established two routes for flame-retardant coatings of textiles, on the on side we used polyphosphazen and on the other side nitrogen and phosphorous silanes.
For cotton (CO), PET, PA and blends of CO/PET and CO/PA we can achieve a flame retardant effect. For both classes of flame-retardant materials we find that after the first washing cycle the add-on is stable over at least six washing cycles and the modified materials withstand various standardized flammability tests.



Cotton/PET blend fabric before and after testing the flame retardant properties

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Textile-fixed enzymes

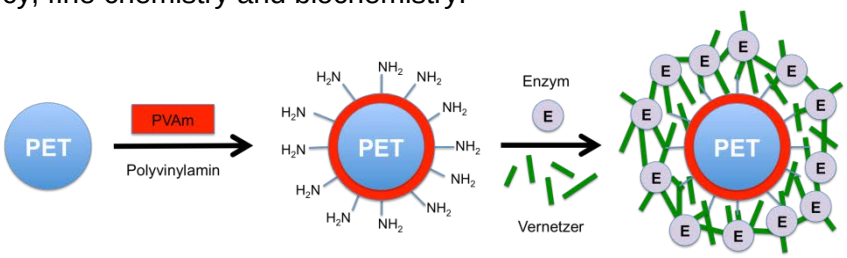
New tools in organic synthesis

The efficiency of most chemical processes is based on the use of catalysts. For many applications the catalysts are embedded in a solid matrix, which allows the recycling of the catalysts and the separation of the products. Such immobilizations offer the multiple or even permanent use. Common carrier materials are from polymeric or mineral nature. But their production and the charging with the catalysts are often complex and high-prized.

In contrast, textile carrier materials made of cotton, polyamide or polyester are considerably inexpensive. The flexible construction of fabrics enables reactor constructions of arbitrary geometry and a quick removal of the catalyst without any residues after the reaction. Moreover, their open structure guarantees an optimal substrate turnover and the active surface is easily adjustable by the fiber diameter.

In recent years, the DTNW has developed various techniques for the immobilization of different types of enzymes (biocatalysts) on textile carrier materials. The fiber-fixed enzymes exhibit high biocatalytic activity even in repeated resp. continuous use.

Now, we have successfully immobilized lipases and peroxidases, which are useful for the synthesis of chiral organic compounds. Such molecules are valuable precursors in pharmacy, fine chemistry and biochemistry.



Strategy for the permanent immobilization of various enzymes on textile carrier materials.

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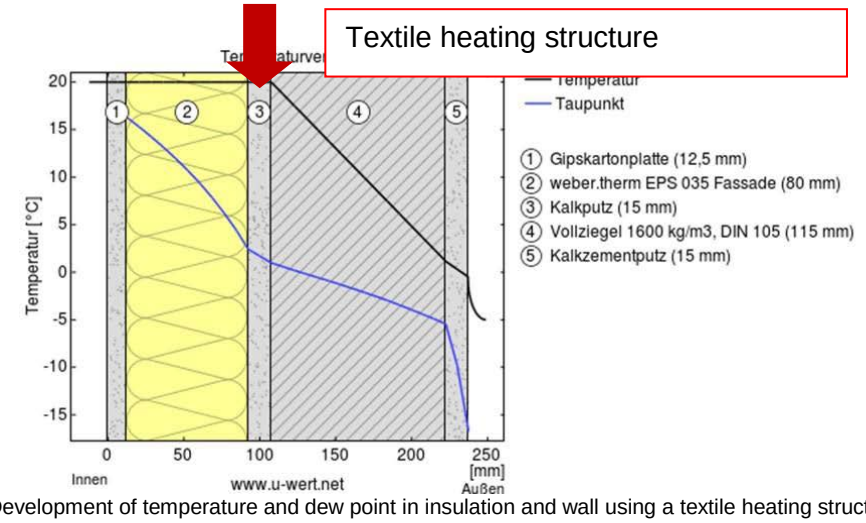
Textile Heating System for Critical Interior Insulation Situations in Buildings

Abstract

The aim of the project was the development of a textile heating system for critical interior insulation situations of buildings. Especially the dew point dislocation into the wall or into the layer between interior insulation and wall can be problems. The developed versions of textile heating structures are suitable to shift the dew point to the layer between outside wall and exterior rendering and solve these problems. Even relative wet brick walls can get drier.

Project

During restoration of listed buildings often only installation of interior insulation is possible. By reason of processing defects the dew point may shift into the layer between interior isolation and wall or into the wall. But if an additional layer between insulation and wall is heated, the dew point shifts in the direction of outer layer between wall and external rendering. The building stock is protected. For this purpose a textile heating system should be developed. Based on structurally definitions and simulations of climates novel composite constructions of wall-textile heating system -insulation was developed and tested. The open-pored woven structures with a heating capacity of 100 W/m² are able to be integrated into the rendering. Tests in a freezing and thawing chamber show the function of the heating textiles. 20 W/m² was sufficient to reach the given aim. Results of the project are available for interested companies working on the field of restoration of buildings.



Development of temperature and dew point in insulation and wall using a textile heating structure

Funding

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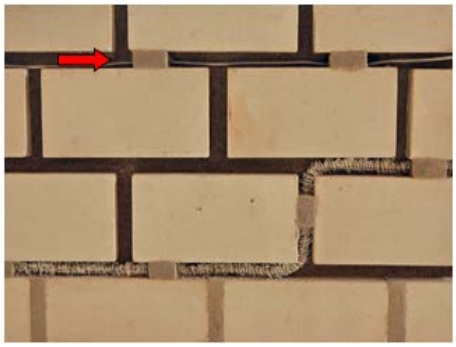
Sensor line - textile string-like structure with integrated sensor technology for monitoring of buildings

The aim of the project was to develop a manufacturing technology for integrating a sensor into a ribbon or rope-shaped textile structure. This sensory line is in the course of the use of a building occurring damage, for example measuring upcoming moisture and settlements, and detecting them by using TDR technology.
During project, textile sensor cables were developed which are constructed like a coaxial cable. The sensory inner line takes over the functionality of monitoring, recording and parameter transmission. In order to achieve a protecting function against external influences, this sensitive line was integrated into a textile structure by means of KEMAFIL® process, braiding and rope weaving. With these technologies it is possible to produce textile structures in which a core jacket material in combination with textile filling material is arranged around a core. In this way, targeted materials are combined with each other and equipped with special functions for their application.
As a measurement method for building's monitoring, the TDR method for long-term measurement was implemented and further developed. At the same time resistance measurements are possible to determine the moisture content.
The project results include rope-like textile constructions designed for specific applications. After installation and calibration of the system in the building, the sensory cable takes on its function. If a defined set point of humidity in the parameter range of the building is exceeded, the system gives an alarm message. A check can now be carried out with the appropriate measuring technology. The damage entry point can be exactly detected up to one meter.

Braided sensor line for building monitoring



Installation variants of the textile sensor line in brickwork

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- Romstedt, Gehring & Werner GmbH

Electrical conductive viscose fibre for Smart Textiles and Smart Home

Despite a large number of conductive materials such as metals or metal fibres are already available on the market, the further development of electrically conductive materials is in great demand. Constantly increasing quality demands claim, above all, wearer comfort and wash fastness/ long-life materials.
Therefore, Kelheim Fibres develops a static dissipative viscose fibre called Electra. This functionalized black fibre maintains the typical properties of a viscose fibre as the electrically conductive additives are incorporated into the fibre's core. The fibre's strength respectively the fibre production are dependent on the concentration of the conductive particles inside the viscose fibre matrix. Experimental results show that by intrinsic fibre modification, the fibre resistivity is limited to a kOhm*cm range. Therefore coating and functionalization of (conductive) viscose fibres with electrochemical methods like electroplating in a laboratory scale were investigated (cf. Figure 1).
A special challenge is the measuring of the electrical resistance of the fibres concerning to the European Standard "Textiles and textile products – Electrically conductive textiles – Determination of the linear electrical resistance of conductive tracks; German version EN 16812:2016.
With regard to the future trend of smart materials like Smart Textiles or Smart Home the Electra fibre is enhanced to an electrically conductive viscose fibre. First of all, the customer needs have to be defined as basis for a profile of requirements. In particular the integration of the conductive viscose yarns made of the fibres and the connection/ conducting to electronic components are the challenges in developing demonstrators.

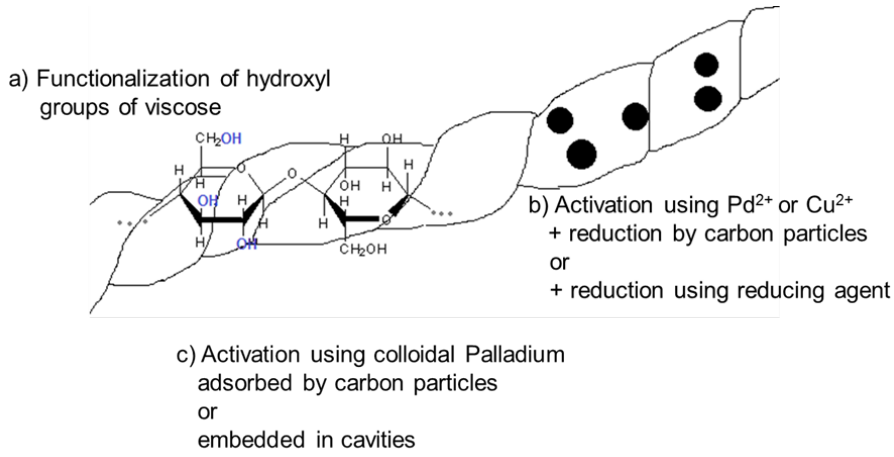

Figure 1: Options for coating and functionalization of (conductive) viscose fibres with electrochemical methods

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- Forschungsinstitut für Textilchemie und Textilphysik der Leopold-Franzens-Universität Innsbruck (Dornbirn, Austria)

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