Dear customers and partners!

In 2015, building activities at STFI have been started to establish the Center for Textile Lightweight Construction. With this, the fundamentals for the development of new technologies in this research field are provided.

Based on our three pillars, which include the Center of Excellence in Nonwovens, the Innovation Center of Technical Textiles and as well as Testing and Certification Services, we will dedicate ourselves to further specialised tasks in the research and development of technical textiles in the future. In addition to this, the construction of all types of lightweight textiles is one of our main goals, starting with CFRP semi-finished products to functionally-integrated and process-optimised manufacturing processes based on textile technologies ranging up to the development of new hybrid textile material composites. Recycling of processing waste recycling at the "end of life" of these new materials, partially intensive in costs, resources and energy, will become more important. New materials and procedures also require the development of suitable testing procedures and complex evaluation criteria. Those tasks are concentrated at the Testing and Certification Department.

The objectives of our work are customers’ requests and requirements, which ultimately define the ongoing development and research. To achieve these challenges our institute is continuing to be a reliable and innovative partner meeting the interests of our customers and partners aimed at strengthening their competitiveness. You are invited to use the manifold technical and technological capabilities and services of STFI. The highly qualified and motivated staff of our institute is pleased to be at your disposal.

Furthermore, within the project “futureTEX - a future model for traditional industries within the 4th industrial revolution” STFI together with partners is developing visions and models for the future of the textile branch. The East German textile industry is on the way to industry 4.0, a digital smart crosslinking of textile value chains.

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Managing Director

Dr. Heike Illing-Günther
Research Director

International Competence in Technical Textiles - Nonwovens - Protective Textiles
Center of Excellence in Nonwovens

Competence areas

Web forming
- from fibres
- from filaments

Web bonding
- mechanical
- thermal
- chemical

Aftertreatment of nonwovens
- thermofixing
- laminating
- calendering
- coating
- impregnating
- spunlacing
- spraying

Nonwoven recycling
- cutting
- breaking

Tailor-made product development

Testing and certification services
- Accredited Test Laboratory of Textiles
- Certification Department for Personal Protective Equipment (PPE)
- Inspection and Certification Body for Geosynthetics

Current fields of research

Fibre nonwovens
- according to carded processing
- random laid web processing (Airlay)
  - short fibre nonwovens based on Airlaid processing
  - needle-punched nonwovens
  - stitch-bonded nonwovens type Maliwatt
  - stitch-bonded nonwovens type Malivlies, Kunit, Multiknit, HYCOKNIT®
  - spacer needle-punched nonwovens NAPCO®
  - nonwoven composites
  - nonwovens from high performance fibres (carbon, aramid, glass, metal, basalt)
  - nonwovens made of regrowing raw materials, like hemp, flax, abaca, nettle, sisal, coconut, jute, kenaf, kapok

Spunbonded nonwovens
- development of innovative nonwoven products
- testing of newly developed polymer materials for spunbonding procedure
- development of biodegradable spunbonded nonwovens
- optimising production processes for micro-filaments and hollow-filaments

Meltblown nonwovens
- development of innovative meltblown products
- production of composite nonwovens type SMS, CMC and further process combinations
- testing of newly developed polymer materials
- process development for the use of additives with adapted rheology

Spunlaced nonwovens
- process optimisation to reduce the specific energy consumption
- investigations to improve the service life of jet heads
- test of perforated belts, patterning screens, structuring screens and perforated screens
- development of innovative spunlaced nonwovens
- production of functional composite structures
- process water management
Electrospinning
- Production of nano-sized fine fibre layers by using Electrospinning type Nanospider®
- Testing of new polymer and resolvent systems
- Development of functional layers for filter media

Carbon manufacturing
- Processing of carbon fibre waste by use of modified cutting and tearing techniques
- Processing of recycled carbon fibres
- Web and sliver forming with 100% carbon fibres or out of blends made of carbon fibres and thermoplastic fibres
- In-line web bonding through stitch-bonding technology type Maliwatt, needle-punching or thermal bonding of carbon-hybrid webs

Textile recycling
- Cutting and tearing of textile waste, also from special fibres, like glass, aramid, carbon
- Material cycles and recycling friendly construction, e.g. for car interior, upholstery or textile packages
- Products made of tearing fibres, direct processing to form fabrics from nonwoven waste
- Cut-grinding and compacting, processing of short fibres

Fibre reprocessing and yarn production
- Reprocessing of natural and chemical fibres (particularly special fibres)
- Sliver production, yarn and twisted yarn production
- Quality assessment of fibres, semi-finished and final products

Technical equipment

<table>
<thead>
<tr>
<th>Fibre web plants (with needle-punching machine)</th>
<th>Plant 1</th>
<th>Plant 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>fibre fineness</td>
<td>1 - 28 dtex</td>
<td>1 - 28 dtex</td>
</tr>
<tr>
<td>working width</td>
<td>up to 2400 mm</td>
<td>up to 600 mm</td>
</tr>
<tr>
<td>working speed</td>
<td>max. 10 m/min</td>
<td>max. 4 m/min</td>
</tr>
<tr>
<td>mass per unit area</td>
<td>50 - 800 g/m²</td>
<td>80 - 600 g/m²</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Carbon fibre plant</th>
<th>processable raw materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>fibre fineness</td>
<td>100% carbon fibres blends with PP, PA, PPS, glass, natural fibres</td>
</tr>
<tr>
<td>working width</td>
<td>from 500 mm up to 1000 mm</td>
</tr>
<tr>
<td>working speed</td>
<td>max. 4 m/min</td>
</tr>
<tr>
<td>mass per unit area</td>
<td>40-1500 g/m²</td>
</tr>
<tr>
<td>web bonding (in-line)</td>
<td>- needle-punching</td>
</tr>
<tr>
<td></td>
<td>- stitch-bonding (type Maliwatt)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stitch-bonding machinery</th>
<th>Kunit/Multiknit</th>
<th>Maliplies/Maliwatt</th>
</tr>
</thead>
<tbody>
<tr>
<td>fibre fineness</td>
<td>1 - 10 dtex</td>
<td>1 - 10 dtex</td>
</tr>
<tr>
<td>working width</td>
<td>up to 1600 mm</td>
<td>up to 2500 mm</td>
</tr>
<tr>
<td>working speed</td>
<td>max. 5 m/min</td>
<td>max. 5 m/min</td>
</tr>
<tr>
<td>mass per unit area</td>
<td>80 - 800 g/m²</td>
<td>80 - 500 g/m²</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spunlace plant</th>
<th>configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>fibre fineness</td>
<td>0.7 - 7 dtex</td>
</tr>
<tr>
<td>working width</td>
<td>up to 1000 mm</td>
</tr>
<tr>
<td>working speed</td>
<td>max. 80 m/min</td>
</tr>
<tr>
<td>medium pressure</td>
<td>max. 42 MPa</td>
</tr>
<tr>
<td>jet heads (1st drum)</td>
<td>4</td>
</tr>
<tr>
<td>jet heads (2nd drum)</td>
<td>2</td>
</tr>
<tr>
<td>mass per unit area</td>
<td>25 - 500 g/m²</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spunbond plant Reicofit®4</th>
<th>processable raw materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>fibre fineness</td>
<td>PET, PP, PE, PA, biopolymers</td>
</tr>
<tr>
<td>working width</td>
<td>150 - 450 kg/h</td>
</tr>
<tr>
<td>working speed</td>
<td>single beam, bi-component technology, calender spunlace system, needle-punching machine, chemical treatment, dryer</td>
</tr>
<tr>
<td>configuration</td>
<td>side by side</td>
</tr>
<tr>
<td>bi-component types</td>
<td>core-sheath</td>
</tr>
<tr>
<td>filaments</td>
<td>segmented pie</td>
</tr>
<tr>
<td>working width</td>
<td>6827/m 4982/m 2634/m</td>
</tr>
<tr>
<td>working speed</td>
<td>up to 1000 mm</td>
</tr>
<tr>
<td>mass per unit area</td>
<td>6 - 400 m/min</td>
</tr>
<tr>
<td>PP/PE</td>
<td>8 - 500 g/m²</td>
</tr>
<tr>
<td>PET/PA</td>
<td>18 - 700 g/m²</td>
</tr>
</tbody>
</table>
Meltblown plant
- processable raw materials: PP, PBT, PE, PC, biopolymers
- material throughput: 5 - 90 kg/h
- configuration: single beam, calender
- working width: 600 mm
- working speed: 2 - 120 m/min
- mass per unit area: 3 - 300 g/m²

Electrospinning plant type Nanospider®
- raw materials: diverse polymer solution
- high voltage generator: U max. 80 kV
- working width: 600 mm
- fibre diameter: 50 - 500 nm
- substrate coating: 0.05 - 0.5 g/m²

Random web plant with thermofusion oven
- working width: 1100 mm, 300 - 3000 g/m²
- man-made fibres, natural fibres, recycling fibres

Needle-punching spacer machine NAPCO®
- working width: up to 1000 mm
- working speed: up to 25 mm
- surface distance: up to 25 mm
- filling: particles, tubes, profiles, films etc.

Contact

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Innovation Center of Technical Textiles

The Innovation Center of Technical Textiles provides important developments in the areas of lightweight construction, integrated sensor systems, mobile textiles, geotextiles, agrotextiles, ecotextiles, building textiles, lighting textiles, textile filter and protective textiles. For many years, the development of technical textiles with tailored properties used as protective clothing material, in automotive textiles, textile filter materials, in the transport sector, or in the hospital and care sector has been a main research focus in the field of finishing/coating/lamination at STFI. Furthermore, research and development activities of the Innovation Center of Technical Textiles include new materials and their testing methods as well as solutions of environmental problems of the textile industry.

STFI has often been awarded with innovation prizes. These innovations have already been transferred into practice. The development of a longboard was nominated for the Sports Fair Award ISPO BRANDNEW in 2014. The development of multilayer wood-based composite materials with 3D reinforcement was accomplished by the sports equipment manufacturer Buddy Buddy, Institut für Holztechnologie Dresden (IHD) and STFI.

Woven, Knitted and Composite Products

Current fields of research

The key activities of the department are the development of woven and knitted fabrics and the determination of technical textiles under various service conditions.

Efficiency and sustainability are the major requirements for the development of new structures and fabrics, with a special focus on composites and lightweight construction materials with functional elements made of high-performance carbon, glass or basalt fibres. The goal is the manufacturing of semi-finished preforms, ready-shaped for series production and the avoidance of cuts. The necessary textile machine elements, devices and tools are constructed by modern CAD systems.

Besides synthetic materials, renewable materials like hay or straw will be increasingly used for applications in landscaping or the recultivation of banks and mining areas.

The further development of optical fibres and sensors provides a broad research potential for safety applications, the early detection of hazards, the development of early-warning systems for bridge construction, embankment construction and flood protection.

The development of textile composite materials made of nonwovens and high-performance threads for applications in road construction or traffic route engineering was made on a Raschel machine with web feeder from Karl Mayer Malimo Textilmaschinenfabrik GmbH. Another focal point on this machine is the manufacturing of large-scale conductive, sensitive and cut-resistant structures with alert function.

Net and rope developments made of high-performance fibres for several applications (safety nets, cargo nets, aquaculture nets, ropes for conveying systems) can be listed here as further main areas of development.

Functional textile structures for medical, therapeutic and wellness applications were produced and brought into markets as a result of joint research projects with industrial partners, universities and other research facilities.

In cooperation with the TU Chemnitz architects, fibre composite producers and construction companies developed and tested a double-curved front panel, made as a sandwich construction of glass reinforced plastics and concrete, and modules for lightweight construction bridges with textile reinforcement.

A circular weaving machine was modified in a way that the diameter of a circular woven fabric can be varied continuously during production. This allows the manufacturing of seamless conical ready-shaped circular fabrics as semi-finished preforms for fibre composite profiles or drains.
Woven, Knitted and Composite Products

Technical equipment

Warp-knitting machines
- flat warp-knitting machines for single face and double face fabrics with a gauge ranging from F22 up to extra coarse machinery to process rope-like threads
- double-needle bar warp-knitting machine with a double multi-axial unit attached for textiles with diagonal path of the thread
- double face flat warp-knitting machine for spacer fabrics
- special circular warp-knitting machine to produce different tubular textiles and rope-like structures
- special attachments for processing rigid and flexible non-textile materials, such as rods and tubes
- straight-bar knitting machine with biaxial weft insertion
- Raschel machine with web feeder and with a magazine weft insertion device

KEMAFIL®-Technology
- sheathing and wrapping, core-sheath structures
- special rope-like structures with diameters from 2 up to 300 mm
- processing of strip-shaped and cut pieces of textiles as well as other loose and waste material

Stitch-bonding machine
- right/left stitch-bonding machine “Triaxial” for reinforced textiles containing threads inserted in diagonal direction

Embroidery machines
- STICKTRONIC SGW 0100 – 800 with W-head, universal module and actively driven material feeder for the processing of optical fibres and wires, for the application of functional materials and the manufacturing of embroidered preforms for fibre composite plastics, additional reel-to-reel unit
- STICKTRONIC Typ JAF 0115 – 500 with 15-needle universal unit for border and single item embroidery as well as embroidery of tubular fabrics for the development of functional textiles

Weaving machines
- circular weaving machine with special equipment for direct processing of uniaxially oriented laminations and high-performance materials
- wide weaving technology for technical specialties
- rope weaving machine
- 3D-spacer weaving machine ALPHA 500 Tech18 (Stäubli) for the production of plain, spacer and multilayered fabrics of carbon and other high-performance materials as well as conventional fibre yarns
  - fabric thickness 5-60 mm
  - weaving width 1048 mm

Cutting robot
- handling of woven fabrics and 3D-fabrics with sizes up to 50 mm thickness
- advancement of ready-made technologies for 3D-knitted fabrics
Knitting machines

- circular knitting machine for reinforcement of tubes and for the manufacturing of extremely coarse voluminous tubular textiles
- right/left wide circular knitting machine (gauge 3.5) for the development of tubular textiles with extremely spiraled weft threads
- right/right plain knitting machine for processing of high-performance fibres made of aramid, glass or PES and for the development of near-net-shape knitted semi-finished products as reinforcement textiles

Technical lab for fibre composites

- Hydraulic column down-stroke press
  - press area 900 x 600 mm
  - max. heating temperature 350 °C
  - press force up to 2000 kN
  - max. heating and cooling down rates 10 K/min
  - infrared preheating station with automated transport between preheating station and press

- Laboratory press
  - press area 320 x 320 mm
  - max. temperature 400 °C

- CNC-cutter
  - working area 1.5 x 1.3 m
  - three different cutter heads (actively driven round knife, drawing knife, oscillating knife)
  - cutting of different materials (fabrics, scrims, nonwovens, spacer textiles etc.)

Contact

Woven, knitted, warp-knitted and composite products, machine design and construction, lightweight construction, agrotexitiles, geotextiles, mobile textiles, industrial textiles, technical nets, ropes

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Technical equipment

For the realisation of research and development tasks and individual tests following technical equipment with working width between 200 mm and 2000 mm is available:

- padder
- spraying device
- stenter
- reverse roll coater
- three roll mills Exakt 80 E
  - homogenization of coating systems
  - reduction of particle sizes
  - dispersion of agglomerates
  - precise, controllable, narrow particle distribution

- Lab-scale coating and finishing plant for direct and transfer coating with corona pretreatment and UV-curing
  - working width: 40 – 500 mm
  - machine speed: 0.1 – 5 m/min
  - dryer length: 1.5 m
  - drying temperature: 25 – 230 °C
  - pressure: max. 6 bar
  - UV-LED 395 nm, Hg-medium pressure lamp

- flatbed laminating plant
  - working width: 10-800 mm
  - working speed: 0.1-20 m/min
  - temperature range: 25-240 °C
  - pressure (calender): 0-7 bar

- multi-purpose hotmelt laminating and coating machine with corona pretreatment and various engraved rollers
  - working width: 300-800 mm
  - working speed: 0.5-20 m/min
  - application volume: 5-150 g/m²
  - viscosity: 2000-80000 mPas

- low pressure medium frequency plasma system
  - size: DIN A4
  - intensity: 850 – 2800 W
  - duration of process: 3 s – 1 h
  - gases
    - argon (flow rate: 5 – 500 ml/min)
    - oxygen (flow rate: 5 – 500 ml/min)
    - third gas connection preinstalled
Current fields of research

Surface functionalisation
- direct and transfer coating using eco-friendly systems and integration of special additives for technical textiles with complex functionalities
- application of water-based inorganic-organic hybrid polymers onto textiles and threads in order to obtain a combination of hydrophobic/oleophobic, anti-static, flame-retardant and antimicrobial properties
- micro- and nano-structuring of textile surfaces by protein coating
- low add-on coating using spray techniques and foam application
- energy-efficient technologies with UV-curable coating systems
- low pressure medium frequency plasma and corona pretreatment for increasing wettability and adhesion
- functional 3D-printing

Textile composites
- hotmelt lamination with thermoplastic or reactive hotmelt adhesives
- flatbed lamination with hotmelt adhesive webs, films, nets or powders
- development of
  - high breathable and media-repellent laminates for protective and outdoor clothing
  - textile laminates for automotive interior
  - formable metal-textile-composites

Ecology
- application of bio-catalysts for the optimization of pre- and posttreatment processes in textile finishing
- process development to capture and treat problematic sewage and exhaust air emissions in textile industry (for example biological elimination of gaseous hydrocyanic acid emissions after flame-lamination processes)

Chemical and microbiological analysis
- spectroscopic, thermo-analytical and rheological analyses for characterization of materials
- analysis for harmful substances (heavy metals, azo dyes, plasticizers, solvents)
- environmental analyses (water, waste water, exhaust air)
- testing of protective effects of textiles against chemicals, cytostatics and plant protection products

Technological service for textile finishing
- product and process development for finishing, coating and laminating of textiles
- technology consulting
- consultation concerning environmental protection
- technological and chemical investigations for clarification of damage cases of textiles

Contact

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The development of new standard-based measurement, testing and evaluation methods and suitable materials are the result of longtime research work and expression of the professional competence of STFI.

Visionary ideas, excellently equipped research laboratories and the active participation in national and international standardization committees establish the basis for the consistent implementation of the research results.

**Electrostatic dissipative protective clothing**

The electrostatic charge through friction is a general material property and represents a high risk potential for many applications.

Therefore, protective clothing has to obtain special dissipative elements for its use in areas with potentially explosive atmospheres or for handling with static sensitive electronic equipment and devices.

Based on years of experiences in the field of electrostatics of textiles, the development of suitable testing methods and the implementation into measuring instruments is an important field of research with great future potential.

As example, the world-wide distributed test instrument ICM-1 was developed by STFI and is today part of the equipment at many research and testing laboratories. An enhanced version will be available soon.

A special challenge is a development project for the realization of testing dissipative protective clothing based on semi-automatic test equipment.

**Complex quality assessment of sun protection textiles**

The classification of the performance of sunprotective materials regarding the regulation of light transmission has been carried out according to DIN EN 14501, based on subjective assessments.

For extensions of the testing possibilities, a darkening measurement and evaluation unit has been developed which allows the normative visual assessment as well as the measurement using an artificial eye or illuminance level sensors.

The artificial eye simulates the day and night vision and the papillary response of the human eye with subsequent measurement.

Instrument and procedure represent an extension and specification of the standard-compliant method and were successfully accredited at STFI.

There is also the possibility of applying glazing in front of the textile sample and thus the reconstruction of real conditions of use.

**Protective textiles against laser radiation**

Personal protective clothing against the exposure of laser radiation is a highly innovative field for R&D.

Because of unavailable information for normative basements, a special testing rig and test methods for protective textiles (clothing and gloves) were developed together with Laserzentrum Hannover e.V. (LZH) and other industrial partners. Herewith, a chance for qualitative evaluation of protective textiles against exposure of high energy laser radiation exists for the first time.

In sequel of this research work, the know ledge about the field of laser physics and textile technology is used for the development of special thermo-optical sensors. Thereby, additional measuring parameters can be observed and analyzed for the improvement of protective textiles.

Based on the similarity of the physical basements regarding the thermal effects, a development of an innovative testing and sensor module for the measuring of gloves against the thermal exposure of an electric arc will be compiled.

**Development of materials with high-performance fibres**

High performance fibres have been successfully established in many application areas. More and more technical areas discover the fibres for themselves and try to use them. The term “high performance fibre” must not lead to the conclusion that each of these fibres (glass, carbon, basalt) can be a solution for every application. In addition to the economic aspects, the requirements for the specific application must be clearly defined.

To demonstrate the suitability for a specific application, STFI developed application-oriented test methods. Thus, material developments can be performed with high-performance fibres in a targeted manner.

**Contact**

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Safety nets, textile filters, technical fibres
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Human ecological safety
Confidence in textiles has to include human ecological safety of all relevant raw materials and should not be limited to function, protection and safety of the products.

Since 1995, the inspection body of STFI works as one of the Oeko-Tex® Standard 100 coopted institutions for companies in the textile chain from fibre production to assembly. As part of the Oeko-Tex®-Association grown in over 20 years, all relevant materials from baby articles as well as everyday clothing or workwear and protective equipment according to their human ecological safety are considered.

The strict criteria of the Oeko-Tex® Standard 100, textile chemical skills of the responsible test experts as well as modern analysing techniques are the basis of successful work.

Further information
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Lab for tensile tests at STFI
STFI expanded its testing capabilities in the field of composites. In a newly designed laboratory two tensile test machines were installed. Both of them are designed for forces up to 250 kN. Each device is configured for very specific testing tasks. One test machine is equipped with a special type of hydraulic clamps. The maximum width of the test sample here is 200 mm. By integration of a non-contact and high-resolution video-extensometer the measurement of elongation is realized. This machine is especially suitable for the testing of high-strength technical textiles and geosynthetics.

The other test machine is designed for the testing of composites. The installed hydraulic clamps (body through wedge) are specially designed for tensile tests on composites. By the possibility of adaptation of different testing tools, a change to other types of tests such as pressure or bending are possible. For the measurement of deformations here a universal high-precision contact-type extensometers is used. Where required, deformations are determined by means of strain gauges. A special feature of this machine is the temperature chamber. Tests in temperature range of -70 °C to +250 °C are possible.

Further information
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Characterization of cleanable filter media
The textile industry plays an important role regarding the reduction of emissions by technical solutions. Special types of filter media are cleanable filter media.

The guideline VDI 3926 has provided for the testing of cleanable filter media two test setups. In particular, the embodiment 2 with a horizontal flow offers advantages in laboratory testing with dusty conditions from practice.

Based on VDI 3926, DIN ISO 11057 was published in 2011 that lists the embodiment 1 as a reference and at the same time points out that the VDI 3926 still persists and the embodiment 2 is admissible as equivalence setup. In a joint research project with Palas® GmbH, a new test bench for cleanable filter media was developed, which integrates both embodiments in one system.

Therefore, measurements with the reference system can be conducted in one test system and the advantages of the more practical analysis with a horizontal flow can also be used.

Further information
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Testing capabilities for automotive industry
The testing laboratory of the STFI enhances its capabilities for upholstery materials and provides a wider range of testing procedures for seats and the textile interior for the automotive industry. From Summer 2015, a test device for determination of seam fatigue according to GMW 3405 and a Scott-Type-Crease-Flex-Abrasion test unit for determination of fringe resistance are available. Besides known standard testing procedures (static and permanent elongation test, tensile test, heat lamp aging), our customers can now also choose from a number of further tests like:

- stitch tear strength
- velcro fastening test
- formaldehyde emissions according to VDA 275
- soil and cleaning behaviour
- circular abrasion test (Schopper test unit)
- bending properties according to VDA 230-209
- snagging

This covers the majority of testing procedures for the quality grading of textiles in the automotive industry.

Further information
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Accredited Test Laboratory

Accreditations/registrations of STFI test department:

1991 Competence confirmation according to DIN EN 45001
1994 Competence confirmation for testing products in the sense of the EEC guideline for personal protective equipment (89/686/EWG) § 9, clause 2, of the Equipment Safety Law and observing DIN EN 45001
1995 Registration as co-opted Oeko-Tex® test institute

Within the scope of regular monitoring audits and re-accreditation procedures, these accreditations are constantly extended and prolonged. At present are relevant:

DAkkS Accreditation Certificate (until 2016)
ZLS Accreditation Certificate (until 2014, re-accreditation audit in April 2014, renewal until 2019 is requested)
The documents are based on DIN EN ISO/IEC 17025.

Management of test department

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Services of the Accredited Test Laboratory

- Physical testing of textiles
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  Dipl.-Ing. Petra Möller  +49 371 5274-166
  petra.moeller@stfi.de

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  berit.boehme@stfi.de
  Dipl.-Ing. (FH) Ute Meier  +49 371 5274-191
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- Geotechnical tests of geosynthetics, tests of filter media, air filtration tests
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- Testing of personal protective equipment

The internet presentation "Textilprüfung" of STFI provides information about standards, testing equipments, literature and others.

www.textilpruefung.de

At our website www.stfi.de under the heading "Services/Testing", information about standards which can be tested in STFI are listed.
Testing capability for the comfort of protective clothing

The STFI enhances its testing capabilities for thermophysiological comfort of textile surfaces with the initial operation of a Hohenstein skin model. Tests of textile materials regarding the water vapour transfer resistance ($R_{et}$), thermal resistance ($R_{ct}$) and the water vapour transfer index ($i_{mt}$) according to DIN EN ISO 11092: 2014-12 are possible, the results reflect the steady state. With this, the STFI now can test 99% of requirement parameters for the certification of personal protective equipment in its own testing laboratory, including safety wear and weather protection according to EN ISO 20471 and EN 343 respectively. The integration of the testing procedure into the existing accreditation of our testing laboratory according to DIN EN ISO/IEC 17025 is in preparation.

Further information
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Special Testing at STFI

Protective clothing against electrical arcs

During live working on electrical power supply equipment, the use of tested arc-resistant protective clothing is extremely important.

In co-operation with Hochstromprüfung Thomas v. Freyberg at International Institute for Product Safety in Bonn, STFI operates arc test equipment for testing flame retardant textiles.

Testing of arc-resistance refers to textile fabrics and garments according to IEC 61482-1-2, “Live working - Protective clothing against the thermal hazards of an electric arc”.

Besides the standardised testing conditions for Class 1 and 2, STFI can also perform special tests with higher incident energy (up to 10 kA).

Additionally, the equipment allows testing for other kinds of PPE, like head and facing protection, gloves and harnesses for fall protection.

Further information
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Spray test equipment for chemical protection

To substitute the 1999 installed apparatus for the whole suit test, since 2010 the Testing Department at STFI is using the new spray test equipment for the determination of resistance to penetration by a spray of liquid (spray test) according to EN ISO 17491-4:2008. It is used for the ready-garment test of chemical protective clothing according to EN 13034 and EN 14605.

A test rig, designed and manufactured by the institute, carrying both the 4 nozzles spraying the reduced amount of liquid (Type 6) as well as the 4 nozzles for the large amount of liquid (Type 4), is the core assembly of the new equipment. Each nozzle is controlled by an own regulator valve which guarantees the correct spray pressure.

An especially developed PLC-System controls all components of the new equipment from the pump up to the rotating plate where the test person stands.

Further information
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Test equipment for molten metal protection

The increased use of lightweight components in the automotive industry, a rapid-growing extension of mobile computers and devices as well as new concepts in machinery and plant engineering create an expanding field for the use of lightweight metals like aluminium, magnesium, zinc, as well as different alloys. This creates demands to the industry to offer protection to the employees against the risks in case of contact with these molten metals.

Besides all the usual tests for the determination of the protection performance of heat and flame protective clothing according to EN ISO 11612, STFI performs also special tests to assess the resistance of materials to molten metal splashes according to ISO 9185. The modernised test equipment allows offering the evaluation of the protection performance of many products by contact with nearly all industrially used kinds of metals and alloys.

Further information
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The accreditation for type examinations includes:
- protective clothing for workers exposed to heat (EN 11612)
- protective clothing for use in welding and allied processes (EN ISO 11611)
- protective clothing against limited flame spread (EN ISO 14116)
- protective clothing against thermal risks of an electrical arc (EN 61482-Serie)
- protective clothing for firefighters (EN 469, EN 13911)
- high visibility warning clothing (EN 471, EN 1150)
- protective clothing for rescue service personnel (GUV-R 2106)
- protective clothing against rain (EN 343)
- protective clothing against cold (EN 342)
- chemical protective clothing: Type 3, 4, 5, 6 (EN 14605, EN ISO 13982-1, EN 13034)
- protective clothing against radioactive contamination (EN 1073-2)
- protective clothing against pesticides (DIN 32781)
- protective clothing - antistatic properties (EN 1149-Serie)
- protective clothing for use where there is a risk of entanglement with moving parts (EN 510)
- workwear in food business (DIN 10524)
- protective gloves against mechanical and thermal risks (EN 388, EN 407)
- protective gloves against chemicals and micro-organisms (EN 374)
- protective gloves for firefighters (EN 659)
- protective gloves for welders (EN 12477)
- protective gloves for electrostatic properties (EN 16350)

Protective clothing for racing car drivers
STFI in Chemnitz is accredited by the Federation Internationale de L’Automobile (FIA) in Paris as one of only 9 test laboratories worldwide and as the only one in Germany for testing protective clothing for racing car drivers according to FIA-Standard No. 8856-2000. Since 1998, overalls of racing car drivers, special functional underwear, balaclavas and shoes for customers worldwide have been tested at STFI.
Certification Body Geosynthetics — Notified Body 0516

Accredited and notified Certification Body Geosynthetics runby STFI

On May 24th, 2013 STFI received the accreditation document for the Certification Body Geosynthetics. Its enclosure contains the note: "The demands corresponding to article 43 of the Construction Products Regulation to a Certification Body for the factory production control ... are fulfilled."

Therewith, the condition for a notification at the European Commission was fulfilled, which is carried out for construction products by the "Deutsches Institut für Bautechnik – DIBt" (DIBt-Newsletter 02/2013). The notification includes the accreditation information (System of attestation of conformity 2+ for geosynthetics) and was pronounced with the information of May 31st, 2013.

The notification of STFI at the EU was extended under number 0516 for the product field Geosynthetics. Besides the inspections for the CE-marking product, inspections according to “Recommendation for the implementation of the supervision and certification of geotextiles ...” and inspections according to DIN 18200 are also carried out by the Inspection Body of STFI.

CE-characteristics, upon which STFI’s Certification Body Geosynthetics acts

<table>
<thead>
<tr>
<th>Required characteristics for geotextiles and geotextile-related products</th>
<th>DIN EN 13249: 2014-06</th>
<th>Use in the construction of roads and other traffic areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIN EN 13250: 2014-06</td>
<td>Use in the construction of railways</td>
<td></td>
</tr>
<tr>
<td>DIN EN 13251: 2014-06</td>
<td>Use in earthworks, foundations and retaining structures</td>
<td></td>
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<tr>
<td>DIN EN 13252: 2014-06</td>
<td>Use in drainage systems</td>
<td></td>
</tr>
<tr>
<td>DIN EN 13253: 2014-06</td>
<td>Use in erosion control works (coastal protection, bank revetments)</td>
<td></td>
</tr>
<tr>
<td>DIN EN 13254: 2014-06</td>
<td>Use in the construction of reservoirs and dams</td>
<td></td>
</tr>
<tr>
<td>DIN EN 13255: 2014-06</td>
<td>Use in the construction of canals</td>
<td></td>
</tr>
<tr>
<td>DIN EN 13256: 2014-06</td>
<td>Use in the construction of tunnels and underground structures</td>
<td></td>
</tr>
<tr>
<td>DIN EN 13257: 2014-06</td>
<td>Use in solid waste disposals</td>
<td></td>
</tr>
<tr>
<td>DIN EN 13265: 2014-06</td>
<td>Use in liquid waste containment projects</td>
<td></td>
</tr>
<tr>
<td>DIN EN 15381: 2008-11</td>
<td>Use in pavements and asphalt overlays</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Required characteristics for geosynthetic barriers</th>
<th>DIN EN 13361: 2013-11</th>
<th>Use in the construction of reservoirs and dams</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIN EN 13362: 2013-11</td>
<td>Use in the construction of canals</td>
<td></td>
</tr>
<tr>
<td>DIN EN 13491: 2013-11</td>
<td>Use as a fluid barrier in the construction of tunnels and associated underground structures</td>
<td></td>
</tr>
<tr>
<td>DIN EN 13492: 2013-11</td>
<td>Use in the construction of liquid waste disposal sites, transfer stations or secondary containment</td>
<td></td>
</tr>
<tr>
<td>DIN EN 13493: 2013-11</td>
<td>Use in the construction of solid waste storage and disposal sites</td>
<td></td>
</tr>
<tr>
<td>DIN EN 15382: 2013-11</td>
<td>Use in transportation infrastructure</td>
<td></td>
</tr>
</tbody>
</table>

Contact

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Communication, supply of information, coordination of international cooperation as well as process and IT management are important requirements for a successful technology transfer and an active work of our institute at national and international level.

Since 2012, the two units “Communication/Process Management” and “International Cooperation/Research Transfer” have been fused within the Transfer Center of STFI.

Main fields

Communication
- Public relations
- Organization of conferences, symposia, workshops and training courses
- Search for special information and information transfer
- Development, maintenance and administration of databases, networks and internet platforms

Process management/Modelling
- Analysis of mathematical and statistical investigations of technological processes
- Test planning
- Process modelling
- Process optimization
- Mass Customization
- Application of RFID
- Product labelling
- Development of mathematical prediction models
- Visualisation of complex correlation

IT management
Development, maintenance and administration of specialized databases, networks and internet applications and platforms for:
- Research work
- Project management
- Technology transfer
- Process optimization

Laboratory process management
Application, maintenance and administration of the universal laboratory management system (TOLabIS-AX) including:
- a Laboratory Information and Management System (LIMS)
- an Enterprise Resource Planning (ERP)

ProHomeTex – New technology for the production-oriented RFID-setting of home textiles in manufacturing

Project start: 1st July 2013
Duration of the project: 24 months
Partner: 3 partners from 2 countries
Coordinator: STFI, Germany

Aim of ProHomeTex is to implement the RFID technology serially already within the textile production process and as a part of home textiles and household textiles. The complete textile product will act as a RFID transponder. All necessary RFID components will be integrated within the manufacturing. Both, the serial manufacturing and the RFID functionalization will be done depending on the various home and household textiles articles. Brändl Textil, Pfeil Nähmaschinen and Erteks (Turkey) are partners in addition to STFI. As a result, all home textiles and household textiles produced by this technology can be immediately identified electronically and used for further data processing, in consideration of a safe workflow. The overall project is divided into interrelated sub-projects which set priorities in the textile, serial manufacturing as well as ready-made clothing on the one hand and implement the necessary development of the RFID infrastructure on the other hand.

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**ResCoTex**

Resource-efficient coating technologies for improved durability of high strength textiles with special safety relevance

<table>
<thead>
<tr>
<th>Programme</th>
<th>CORNET (AiF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project start</td>
<td>1st January 2014</td>
</tr>
<tr>
<td>Project duration</td>
<td>24 Months</td>
</tr>
<tr>
<td>Main topics</td>
<td>2. Mobility 2.4 Enhancement of passive safety 3 Safety 3.9 Aging resistance</td>
</tr>
</tbody>
</table>

ResCoTex is a transnational project, in which STFI co-operates with the Belgian partner Centexbel. This IGF-project of the research association FKT is sponsored by the AiF (in the context of the program promoting collaborative industrial research (IGF) by the Federal Ministry of Economics and Technology based on a decision of the German Bundestag).

The aim of the project is to increase the life of high-strength fabrics with special relevance to safety through resource-efficient coating technologies. To evaluate objectively the resulting effects on load-securing elements like lashings, the research project aims to develop appropriate laboratory methods, which can simulate, examine and evaluate material-related the behaviour of safety textiles during their life cycle. To visualize degradation processes, technological ways to implement indicators in belts and nets are going to be tested.

**ProGeo**

Erosion protection by geotextiles made from renewable resources

<table>
<thead>
<tr>
<th>Programme</th>
<th>CORNET (AiF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project start</td>
<td>1st May 2014</td>
</tr>
<tr>
<td>Project duration</td>
<td>24 Months</td>
</tr>
<tr>
<td>Main topics</td>
<td>3 Safety 3.3 Geo- and landscape protection 3.9 Age-resistance</td>
</tr>
</tbody>
</table>

The CORNET-project ProGeo which started on 1st May 2014 is a transnational research project. Hereby, STFI cooperates with a Polish partner of the University ATH, the Institute of Textile Engineering and Polymer Materials and the Polish Association of Producers of Geosynthetics (Stowarzyszenie Producentow Geosyntetyków). This project (113EBR) is led by the Forschungskuratorium Textil e.V. and is funded via the German Federation of Industrial Research Associations (AiF) in the framework of Industrial Collective Research (IGF) supported by the Federal Ministry of Economics and Technology (BMWi). In the two End User Committees 16 enterprises and organisations are participating whereof 12 are SMEs.

Objective of the project is the development of geotextile grid structures made of regionally available raw sheep’s wool, sea grass or hay in combination with other natural fibres. Therefore, the cooperation with manufacturers and end-users is important. The prototypes to be developed shall combine an appropriate textile design for steep slopes and contain a barrier function for water and soil against erosion. A cost-efficient technology for installation is in focus as well.
PASTA
Integrating platform for advanced smart textile applications

The PASTA project will introduce new concepts on electronic assembly and modular interconnection technology for "smart textiles" to achieve a more comfortable and more robust integration of electronics in textiles and to improve functionalities. To integrate electrically conductive materials and electronic components into textile fabrics, embroidery, weaving and knitting technologies are suitable. Functional tests concerning the reliability and an efficient processing are in the focus of the project. The project contributes to the “Digital Agenda” of EU and forces the integration of smart and micro systems.

Project call: FP7-ICT-2009.3.9 Microsystems and smart miniaturised systems
Project type: Large scale integrating project
Project start: 1 October 2011
Project duration: 48 Months
Partners: 11 partners from 5 countries
Coordinator: IMEC, Belgium

FLY-BAG2
Objective of FLY-BAG2 is a further development of the blasteworthy textile-based luggage container for cargo compartments developed in the previous project FLY-BAG to make it suitable also for large aircrafts and to achieve a solution for cabins.

Again, STFI is responsible for textile material selection and the tests relevant for the technical functions to be fulfilled.

The Kick-off meeting of the European project having a duration of three years took place on 14 and 15 September 2012 in Berlin. Together with the German partners STFI and the company DoKaSch, 13 partners from 7 countries participated in the meeting organized by the European Aviation Security Center (EASC) to discuss the project planning and implementation.

Project call: FP7-AAT.2012.3.3. Aircraft Safety
Project start: 1 August 2012
Project duration: 36 Months
Partners: 13 partners from 7 countries
Coordinator: D’Appolonia S.p.A., Italy

2BFunTex
Boosting collaboration between research centers and industry to enhance rapid industrial uptake of innovative functional textile structures and textile related materials in a mondial market

2BFunTex is a European Coordination and Support Action (CSA) aimed at getting together all innovation stakeholders in the field of functional textile structures and materials and to strengthen the multidisciplinary cooperation between universities, research institutions, industry and industrial associations. Six different priority topics were selected for further discussion in expert groups. In these multidisciplinary teams solution approaches are developed, which will be also addressed in newly submitted EU projects together with industrial partners.

Project call: FP7-NMP.2011.2.3-3 Networking of materials laboratories
Project type: Coordination and support action
Project start: 1st January 2012
Project duration: 48 Months
Partners: 26 partners from 16 countries
Coordinator: University Gent, Belgium

BIOFIBROCAR
Melt spun fibres based on compostable biopoly-mer-s for application in automotive interiors

Aim of the project BIOFIBROCAR is the development of textile fabrics (wovens and nonwovens) for car interior made from biologically degradable poly-lactide (PLA) fibres which will substitute the currently used polyester fibres. The fibre production is done from re-growing material. Using special additives, improvement of product properties (such as abrasion resistance and flame retardancy) should be achieved to fulfill the material parameters required in the automotive industry. STFI is mainly involved in the textile material selection and the specification of product requirements as well as in testing the adapted PLA fibres in different nonwoven structures

Project call: FP7-SME-2012-1 Research for SMEs
Project start: 1st January 2013
Project duration: 30 Months
Partners: 9 partners from 13 countries
Coordinator: AITEX (Instituto Tecnológico Textil), Spain

These projects are supported by the EU within the 7th Framework Programme for Research and Technological Development.
futureTEX is realized within the scope of the programme “Zwanzig20 – Partnerschaft für Innovation” promoted by the Federal Ministry of Education and Research. Companies, scientific institutions and associations are working within the project consortium on the development of fundamental components of a future model for traditional industries. The textile industry is one of these traditional industries in Saxony and the basis for this future model.

futureTEX pursues the objective to achieve the leading position in the implementation of the 4th industrial revolution into textile machinery engineering and textile industry. Thereby, until 2030 the most modern value-added network of the textile industry in Europe is to build up.

Consortium

interdisciplinary – open – cross-linked

More than 170 partners from 14 Federal States have already evinced their interest in collaboration in futureTEX.

- 66 % companies (thereof 90 % SMEs)
- 26 % research institutions
- 8 % associations/other

Strategy

The primary goal is to establish basic principles for the restructuring of value-added processes in the textile industry according to the premises of the 4th industrial revolution. Here, a conscious focus is on following key topics:

- textile factory of the future
- digital production processes
- mass customization

The target is to develop new energy and material saving technologies along the textile chain and to increase sustainability significantly.

The concept “Industrie 4.0” is closely linked to a paradigm shift in human technology and human environment interaction. At the same time, the demographic change demands completely new quantitative and qualitative assurance of novel young talents. This leads to novel forms of work organization, which feature a high degree of autonomy and decentralized management.

Key topics are:

- human technology interaction
- novel organizational models
- new business models

Research Topics

The global market for textile products and particularly for technical textiles is distinguished by a continuous growth. To focus on sustainable products, it is necessary to find new application areas for textile materials, to develop new functions for existing products, to know the most dynamic growing markets and to concentrate on them. Following these assumptions, especially those strategic fields were chosen, where futureTEX partners have proven competences:

- textile electronics
- high-performance composites
- textile fabrics for energy generation and storage
- textiles for urban farming
- hybrid materials

The implementation of a systematic management of innovation and knowledge is to be shaped in a way that the whole process, from ideation to research transfer, is vitalized and becomes more target-oriented and efficient. Thus, the main challenge is to establish a professional open innovation system.

- systematic idea management
- interdisciplinary open innovation process
- transfer forum

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www.futuretex2020.de
STFI’s scientific symposia and exhibitions

Dec. 2nd-3rd, 2015

www.bautex.org
Jan. 20th, 2016

www.stfi.de/textile-filter

Erfahrungsaustausch
Abluftreinigung
2016

STFI at fairs and exhibitions

www.bautex.org
Jan. 20th, 2016

www.stfi.de/textile-filter

Imprint:
Sächsisches Textilforschungsinstitut e. V. (STFI)
Annabeger Straße 240
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Material studies by design students