



Sächsisches Textilforschungsinstitut e.V.



Faszination **TEXTIL**





Our Mission

Textile materials will advancing the future. That is why your ideas and challenges are in the best hands with us. We address technical and social issues with an open, interdisciplinary and reliable approach. We give textile research a individual face. We turn ideas into textile reality, develop sustainable ecological solutions and ensure that your textile products are safe. This is how our experience becomes the basis for your economic success of tomorrow.



Center for Textile Sustainability



Dear customers and partners,

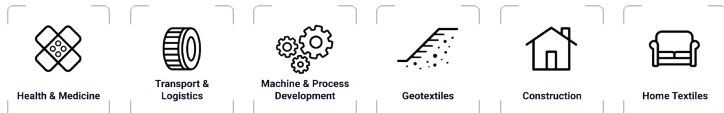
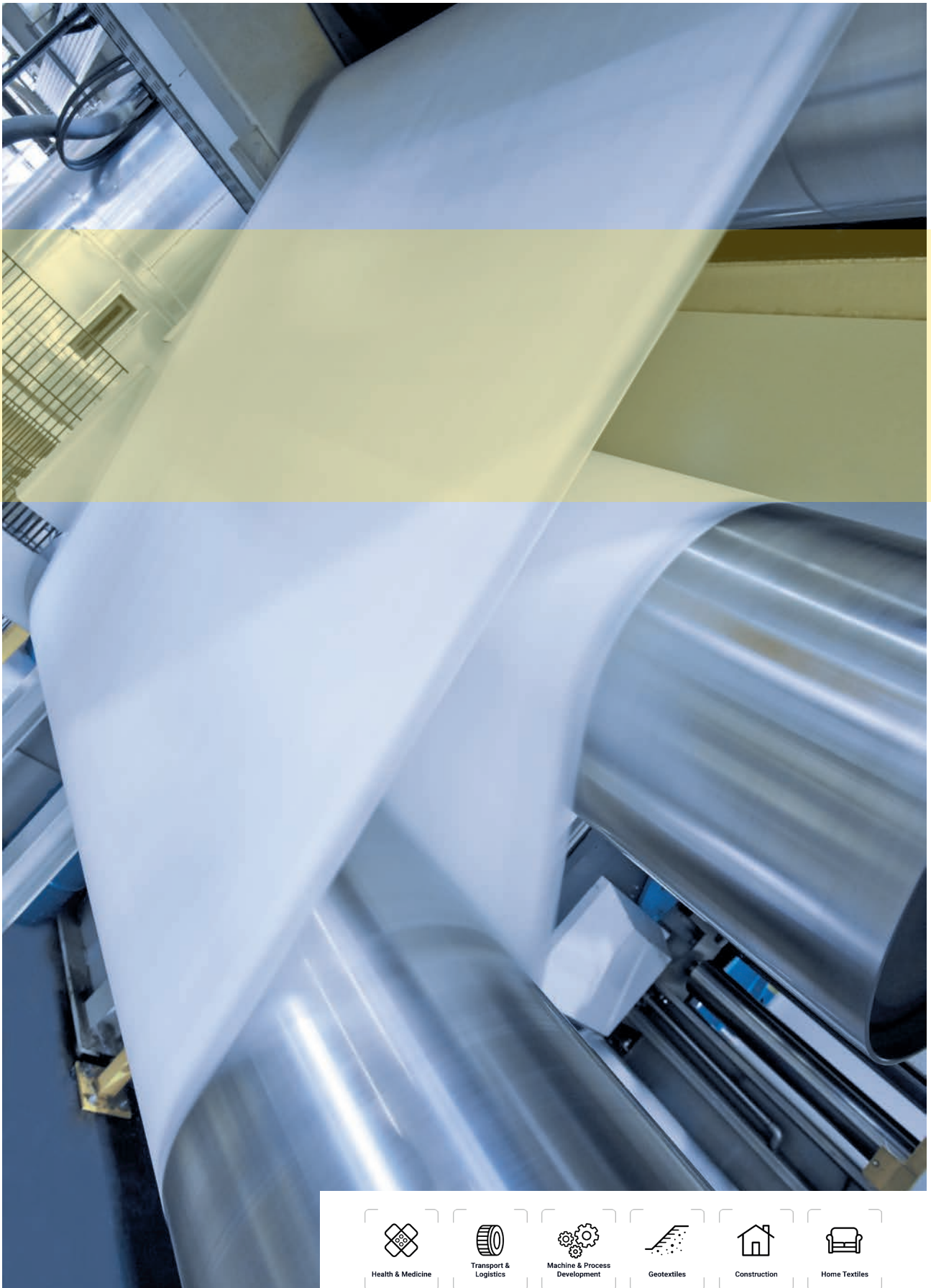
We immerse ourselves in the fascinating world of technical textiles every day. Be it in our industry-orientated research and development work, which shows us how we can push the boundaries of materials and processes. Be it the testing and certification services that we provide on behalf of our customers at highest level. It is our passion for textiles as a material that spurs us on to top performance time and time again. We always have our eyes on the future.

The STFI is a light house of application-orientated research and development in Europe, based in Chemnitz, which is currently in the process of becoming the Capital of Culture 2025. Our practice-orientated research is particularly evident in the semi-industrial plant technology that we use for research and development. R2R work plays a major role in making the transfer to industrial production as simple as possible. We also offer customers and partners start-up or replacement production. The STFI is a unique, oversized FabLab, so to speak. The latest addition to the plant park is a wet-laid nonwoven line, which has found its place in the Centre for Textile Sustainability.

The STFI also has many years of experience and expertise in the service sector. While the accredited testing centre carries out classic textile physical and chemical tests, as well as testing in accordance with OEKO-TEX® STANDARD 100, the certification body offers certification of personal protective equipment (PPE) (Notified Body 0516). The range of services is constantly being expanded – such as the current construction of new filter test benches for testing and certifying respiratory masks, among other things.

In terms of a shift in focus, the topic of sustainability will become even more important than it is today – be it through energy-efficient production technologies, biobased natural materials or biodegradable products. We are faced with the fascinating task of finding products for the wetlaid process that can be kept in the production cycle using various recycling methods. Almost anything is technologically feasible. But we need marketable, functional products based on recycled materials - as we know them today – and the willingness of people to use these products in the same way. Let's tackle this together!

Dr. Heike Illing-Günther
Managing Director



Technical Equipment

- Fibre web plants with needle-punching machine on lab and semi-industrial scale
- Wetlaid line with thermobonding oven and drum dryer
- Spunlace plant
- Meltblown plant

Center of Excellence in Nonwovens

- Spinnvliesanlage Reicofil® 4.5
- Stitch-bonding machines
- Random web plant with thermofusion oven

Processes, Technologies and Products

Fibre nonwovens

Carding processes

Random laid web process – Airlay (long fibre)

Random laid web process – Airlaid (short fibre)

- ▶ Needle-punched nonwovens
- ▶ Spunlace – nonwovens
- ▶ Stitch-bonded nonwovens type Maliwatt
- ▶ Stitch-bonded nonwovens type Malivlies, Kunit, Multiknit
- ▶ Random web nonwovens Airlay
- ▶ Random web nonwovens Airlaid
- ▶ Needle-punched spacer nonwovens Typ NAPCO®
- ▶ Nonwoven composites



Extrusion Fabrics

Meltblown Nonwovens

- ▶ Development of innovative meltblown nonwovens
- ▶ Production of composite nonwovens (like SMS, CMC)
- ▶ Process development for the use of special additives and newly developed polymer materials

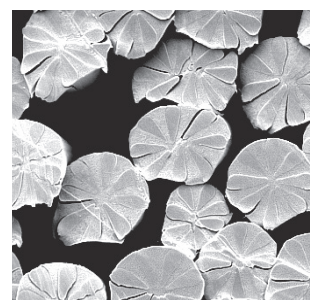
Wetlaid-Nonwovens

- ▶ Development of innovative Wetlaid-Nonwovens
- ▶ Testing of short fibres from mechanical recycling processes
- ▶ Testing and processing of technical fibre dust
- ▶ Development of innovative products in energy-, battery- and filtration applications



Spunbonded nonwovens

- ▶ Development of innovative nonwoven products
- ▶ Testing of newly developed polymer materials for spunbonding
- ▶ Development of biodegradable spunbonded nonwovens
- ▶ Process optimisation for micro-filaments and hollow filaments



Processes, Technologies and Products

Hydroentangled nonwovens

- ▶ Process optimisation to reduce specific energy consumption
- ▶ Improvement of the service life of nozzle bars
- ▶ Testing of screen belts, pattern, structure and perforation stencils
- ▶ Production of functional composite structures
- ▶ Process water management
- ▶ Ultrasonic dewatering



Textile recycling

- ▶ Mechanical recycling of textile waste, also from special fibres (like glass, aramide, carbon) with our equipment (Cutting machine, grinding mill, tearing machine and twin card opener)
- ▶ Material cycles and recycling friendly construction
- ▶ Products made of reclaimed fibres, direct processing to form fabrics from nonwoven waste
- ▶ Secondary use
- ▶ Recycling of smart textiles



Fibre reprocessing and yarn production

- ▶ Preparation of natural and chemical fibres (particularly special fibres)
- ▶ Sliver production, production of yarns and twists
- ▶ Quality assessment of fibres, semi-finished and final products



Load-bearing orientation of high-performance fibres

- ▶ Consisting of staple fibres (100 % rCF or fibre blends)
- ▶ Inline bonding method to obtain a strand-like product
- ▶ Manufacturing of doubled and stretched staple fibre webs (Mixtures with thermoplastic fibres)
- ▶ Thermal fixing into tape structures up to 300 mm width

Materials

Fibrous materials:

- ▶ Staple fibres from natural polymers (Viscose, alginates, acetate)
- ▶ Staple fibres from synthetic polymers (PP, PES, PLA, PBS, PA, special fibres)
- ▶ Special fibres from non-polymers (metal, glass fibres, basalt fibres)
- ▶ Organic animal natural fibres (sheep wool, alpaca wool)
- ▶ Organic natural plant fibres (cotton, kapok, flax, hemp, leaf fibres)
- ▶ Reclaimed fibres from textile production waste and old clothes

Granules for extrusion:

- ▶ Petrochemical polymers (PP, PES, PA, PEEK, PU)
- ▶ Polymers from renewable raw materials (PLA, PBS)



Seminar "Nonwovens"

The content of the two-day advanced training seminar, offered twice a year in March and October, also includes a tour through the STFI facilities and the opportunity to an open discussion with scientists and technicians.

The Center of Excellence in Nonwovens also organises the **"TEXTILE FILTER" symposium** and the **"recycling for textiles – re4tex" colloquium** every two years.

Further information can be found on:
<https://www.stfi.de/en/events>

Contact



Patrick Engel, M. Sc.

Manager Center of Excellence in Nonwovens

Fibre Nonwovens, Needle-punched Nonwovens, Spunlaced Nonwovens

Phone: + 49 371 5274-209

E-mail: patrick.engel@stfi.de

Johannes Leis, M. Sc.

Textile Recycling, Circular Economy, Textile Sustainability

E-mail: johannes.leis@stfi.de

Dipl.-Ing. (FH) Andreas Nestler

Spunlaced Nonwovens, Nonwoven Composites,

Carded Nonwovens, Measurement Technique

E-mail: andreas.nestler@stfi.de

Liana Lein, M. Sc.

Wetlaid Nonwovens, Textile Filters

E-mail: liana.lein@stfi.de

Dipl.-Ing. Tim Hühnerfürst

Spunbond and Meltblown Nonwovens, Materials

E-mail: tim.huehnerfuerst@stfi.de

Dipl.-WA Ralf Taubner

Spunbond and Meltblown Nonwovens, Biopolymers

E-mail: ralf.taubner@stfi.de

Dipl.-Ing. (FH) Mulham Tahhan

Spunlaced Nonwovens, Nonwoven Composites,

Measurement and Sensors

E-mail: mulham.tahhan@stfi.de

Dipl.-Ing. Chem. (FH) Johanna Spranger

Meltblown-Nonwovens, Textile Filters,

Chemical Treatment

E-mail: johanna.spranger@stfi.de

Dr.-Ing. Barbara Schimanz

Fibre Nonwovens, Stitchbonded Nonwovens,

Needle-punched Spacer Nonwovens

E-mail: barbara.schimanz@stfi.de

Dipl.-Ing./Dipl.-WI Ina Sigmund

Preparation and Quality Assessment of Natural Fibres,

Sliver- and Yarn Manufacturing

E-mail: ina.sigmund@stfi.de



Health & Medicine



Transport & Logistics



Machine & Process Development



Environment & Ecology



Construction



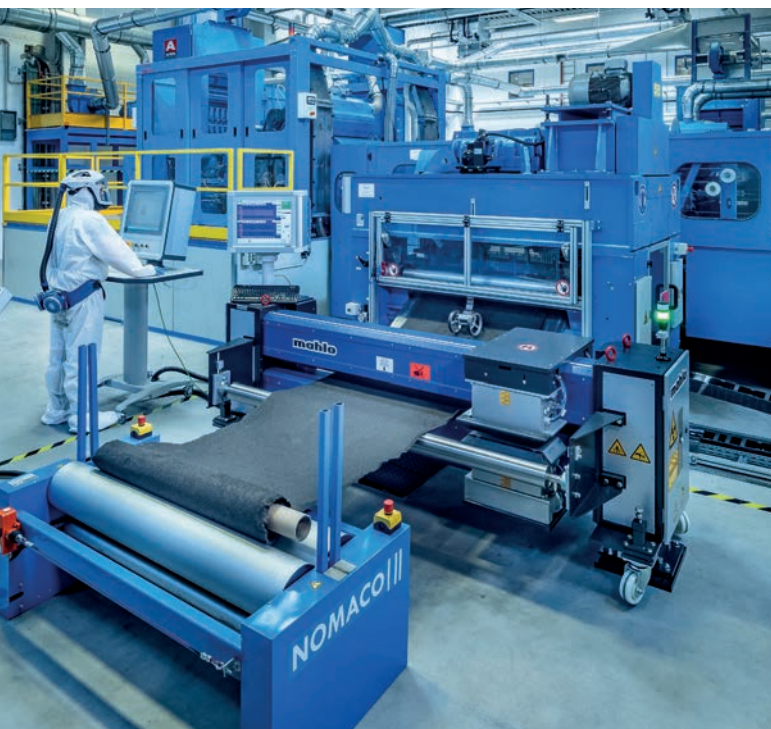
Sport & Leisure

Technical Equipment

- Nonwoven production line
- Production of rCF-slivers
- Continuous compression moulding system
- Mechanical processing of laminates
- CNC-Cutter

Center for Textile Lightweight Engineering

- Hydraulic downstroke press
- Laboratory press
- Injection Methods
- Heating and drying technology



Processes, Technologies and Products

Composites Production

At the Center for Textile Lightweight Engineering thermoset and thermoplastic materials can be produced as part of the recycling strategy and for customised material developments.

- ▶ Hand lay-up
- ▶ Resin Transfer Molding (RTM)
- ▶ Vacuum infusion (incl. VAP®-License)
- ▶ Continuous Compression Moulding



Carbon Fibre Recycling

The following technologies for processing carbon fibre waste into isotropic or anisotropic nonwoven structures are available:

- ▶ Fibre preparation by using modified (cutting and tearing technologies)
- ▶ Web forming technologies (Airlay and carding)
- ▶ Inline bonding methods
- ▶ Inline quality monitoring systems

Processes, Technologies and Products

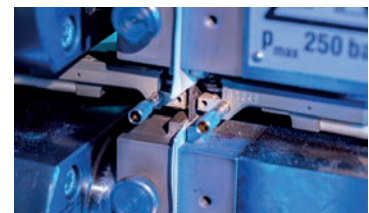
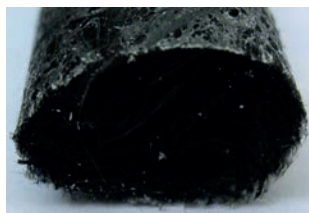
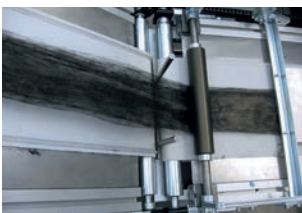
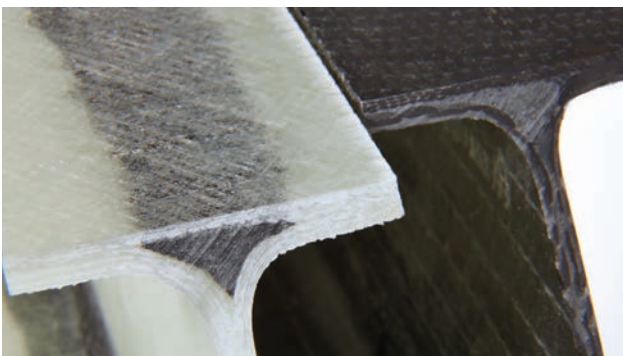
Strand and tape-shaped Structures from Recycled Carbon Fibres

Based on the research results of the STFI regarding the reuse of recycled carbon fibres in different nonwoven structures, further investigations were carried out on better fibre orientation in MD direction:

- ▶ Development and production of slivers
- ▶ Development and production of doubled and stretched staple fibre webs
- ▶ Different inline consolidation methods for the production of strand and tape structures

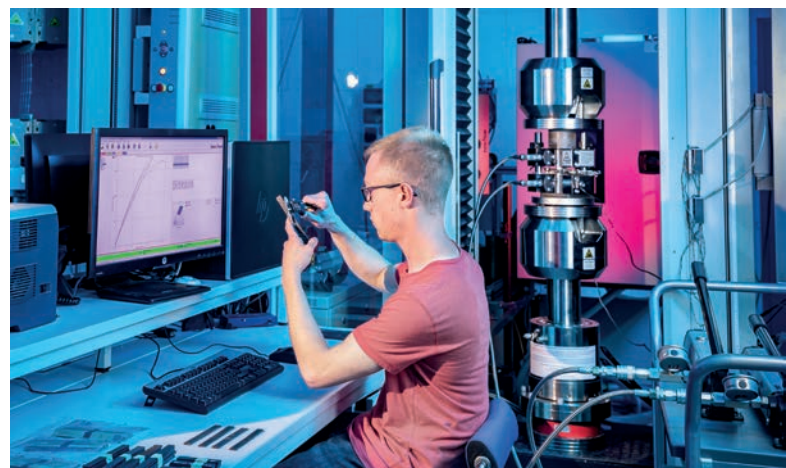
well as the precision cutting or machining of test specimens using a CNC milling machine.

- ▶ Composite testing
 - DIN EN ISO 10618 (tensile behaviour of impregnated yarns)
 - Tensile test according: DIN EN ISO 527-Serie, DIN EN 2561, DIN EN ISO 14129 (shear stress)
 - Tending test according: DIN EN 2562, DIN EN ISO 14125, DIN EN 2746
 - Interlaminar shear strength (ILSS) according: DIN EN 2563, DIN EN ISO 14130
 - Compression test according: ASTM D 6641, DIN EN ISO 14126
 - Energy release rate Glc: ISO 15024
 - Fibre volume content via TGA: DIN 16459



High Performance Fibres and Composites – Testing Laboratory

Based on the technological competencies, the area of testing fiber composite materials has been continuously expanded. Tests such as tensile, compression and bending tests according to various national and international standards are part of the standard program. The range of services also includes the production of test plates using common process technologies, as



Contact

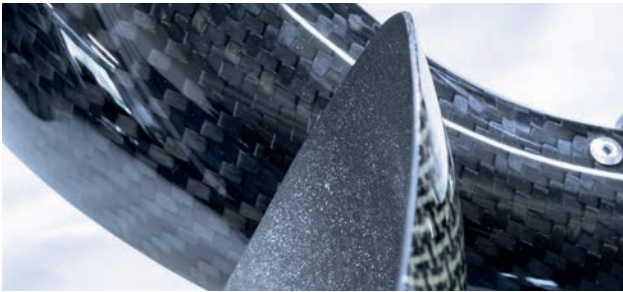


Christopher Albe, M. Sc.
**Head of Group Center for Textile
Lightweight Engineering**
*Carbon Fibre Recycling, Composite
Production*
Phone: +49 371 5274-241
E-mail: christopher.albe@stfi.de

Dipl.-Ing. Michael Eichhorst
Composite Production
E-mail: michael.eichhorst@stfi.de

Dipl.-Ing. Katrin Jobke
Thermoplastic Composites, Production Processes
E-mail: katrin.jobke@stfi.de

Dipl.-Ing./Dipl.-WI Ina Sigmund
*Preparation and Quality Assessment of Natural Fibres,
Sliver- and Yarn Manufacturing*
E-mail: ina.sigmund@stfi.de



Materials

- ▶ Reinforcement fibres: carbon, glass, basalt, aramid and natural fibers
- ▶ Thermoplastic matrix materials: PP, PA, PET, PEI, PPS, PEEK
- ▶ Thermoset matrix materials: epoxy resins, polyester resins, polyurethanes, acrylic resins, bio-based resins
- ▶ Elastomers Matrix systems: various EPDM-Compounds
- ▶ Mineral matrix systems: Concrete





Health & Medicine



Home Textiles



Protective Clothing



Packaging



Construction



Geotextiles

Technical Equipment

Production of textile fabrics – weaving and warp knitting

- Narrow fabric loom
- 3D Spacer Weaving Machine
- Rapiere weaving machine
- RL and RR knitting machine
- Compound knitting machine

Technical woven and knitted Fabrics

Production of textile fabrics – Flat knitting and embroidery

- Flat knitting machines type CMS and ADF
- Circular knitting machines
- Combination knitting machines
- Legs embroidery machines with roll to roll module
- Single motif embroidery machine

Production of textile ropes

- Various braiding machines
- High speed machine KEMAFIL®

Textile machine construction

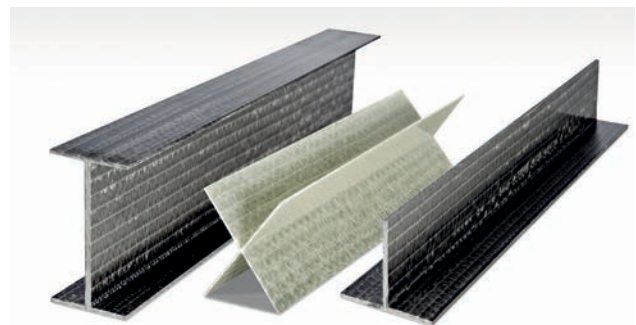
- Diagonal leger
- Test stand divisible guide bars and guide rails



Processes, Technologies and Products

Textile lightweight I reinforcement structures

- ▶ Textile structures, semi-finished products for composites for lightweight construction
- ▶ Development, construction and design of components/preforms/ reinforcement structures (e. g. warp-knitted fabrics, spacer fabrics, woven fabrics, knitted fabrics, etc.)
- ▶ Near-net-shape manufacturing (resource and material efficiency, high substance utilisation, waste avoidance)
- ▶ Local reinforcements
- ▶ Processing of high-performance materials (carbon, glass, basalt, aramid, etc.)
- ▶ Consideration of drape behaviour



Intelligent textiles in care and medicine

- ▶ Smart auxiliary and care textiles
- ▶ Monitoring of vital functions by textile structures
- ▶ Spacer fabrics for patient positioning
- ▶ Textile medical products and medical aids
- ▶ Orthoses and textile support structures for the musculoskeletal system
- ▶ Cooling and heating systems in bandages/ orthoses
- ▶ Textiles for filter systems/dialysis

Processes, Technologies and Products

Building | Environment geotextiles | Geosynthetics

- ▶ Textile reinforcements for building construction and civil engineering
- ▶ Double curved curtain panels
- ▶ Luminous concrete
- ▶ Components for lightweight bridges
- ▶ Urban greening/ landscaping
- ▶ Textile structures for frontage greening
- ▶ Textile mats for greening flat and pitched roofs
- ▶ Floating plant islands
- ▶ Use of renewable raw materials for slope stabilisation and renaturation
- ▶ Electrodes for the electro osmosis process for soil drainage
- ▶ Wick drains for soil and slope stabilisation
- ▶ Collector mats for solar thermal energy
- ▶ Modular heating and cooling systems
- ▶ Textile growth supports for water purification



Nets and ropes

- ▶ Net and rope developments from high performance fibres
- ▶ Nets for Protection and safety, cargo nets
- ▶ Nets for aquaculture
- ▶ Nets for securing loads in transport vehicles
- ▶ Safety nets for bridge railings
- ▶ Ropes for traction and carrying equipment as well as for special applications



Special textiles

- ▶ Sensor textiles with protection and alarm function
- ▶ Cut-resistant structures with alarm function
- ▶ Integrated product protection with RFID systems
- ▶ Smart luminous structures/smart shading systems
- ▶ Luminescent shading elements
- ▶ Sun sails
- ▶ Large-scale luminous textiles

Development of textile machines

- ▶ Development of multiaxial technology for series production
- ▶ Development of textile machines for the production of near-net-shape textiles
- ▶ Development of feeding, cutting and positioning technology on warp knitting machines – single yarn feeding
- ▶ Combination of textile technologies
- ▶ test machines for cut resistant tests
- ▶ Development of new textile machines/ technologies

Testing

- ▶ Development of testing methods and machines
- ▶ Combined development from technical textiles to testing
- ▶ Performance of special tests

Materials

Fibres and yarns:

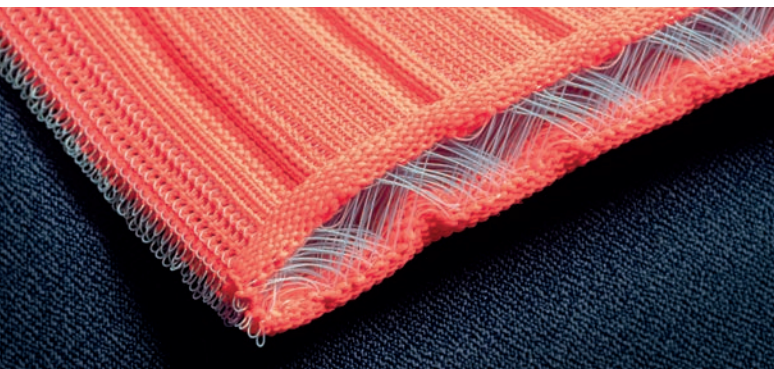
- ▶ Natural fibres (e.g. cotton, hemp, coconut)
- ▶ Man-made fibres (e.g. polyester, polypropylene, polyamide)
- ▶ High performance fibres (e.g. DYNEEMA®, Aramid)
- ▶ Mineral fibres (e.g. carbon, glass, basalt)
- ▶ Conductive yarns (stainless steel wire, mixed yarns, silver-plated yarns)

Sensors and actuators:

- ▶ Electrically conductive (e.g. stainless steel wire, sensor foil)
- ▶ Fibre optic material (e.g. polyester monofilament)

Non-textile materials:

- ▶ Wood, hay, straw, sand, gravel, ceramics, clay



BAUTEX – Building with Textiles

The two-day symposium with accompanying trade exhibition covers the topic of "Building with textiles". The focus is on geotechnics, civil engineering, building construction and innovations/environment.

Jens Stopp

Head of Technical Center Weaving and Knitting,
Head of Academy
E-mail: jens.stopp@stfi.de

Contact



Dipl.-Ing. Elke Thiele

Manager Technical woven and knitted fabrics

Sustainability, Smart Technical Textiles, Natural Fibre Composites
Phone: +49 371 5274-243
E-mail: elke.thiele@stfi.de

Dipl.-Ing. Heike Metschies

Building Textiles, Geotextiles, Composites
E-mail: heike.metschies@stfi.de

Dipl.-Ing. Corinna Falck

Natural Fibre Composites, Protective Textiles, Functionalization of Textiles
E-mail: corinna.falck@stfi.de

Sebastian Jobst, M. Sc.

Mechanical Engineering, Warp Knitting, Textile Rope Structures
E-mail: sebastian.jobst@stfi.de

Dipl.-Ing. (FH) Franz Klötzer

Warp Knitting, Sustainability, Geo-Textiles
E-mail: franz.kloetzer@stfi.de

Jenny Liebelt, M. Sc.

Medical Textiles, Sustainability, Smart Technical Textiles
E-mail: jenny.liebelt@stfi.de

Dipl.-Phys. Nadine Liebig

Medical Textiles, Textiles for care and nursing
E-mail: nadine.liebig@stfi.de

Dipl.-Biol. Jens Mählmann

Safety Engineer, Environmental Management
E-mail: jens.maehlmann@stfi.de

Theresa Meixner, M. Sc.

Medical Textiles, Sustainability, Smart Technical Textiles
E-mail: theresa.meixner@stfi.de

Dipl.-Ing. Uwe Metzner

Textile Rope Structures, Mechanical Engineering Design, Weathering Technologies
E-mail: uwe.metzner@stfi.de

Dipl.-Ing. (FH) Frank Weigand

Technical Smart Textiles, Warp Knitting/Net Development, Sensors
E-mail: frank.weigand@stfi.de



Sport & Leisure



Home Textiles



Protective Clothing



Environment
& Ecology



Machine & Process
Development



Transport &
Logistics

Technical Equipment

Material characterisation

- Rheology
- Bubble pressure tensiometry
- Differential scanning calorimetry (dsc)
- Contact angle measurement
- Inkjet printability (dropwatcher)
- Particle size analyser (dispersions and powders)

Laser processing

- UV-Lab laser
- UV-IR laser combination
- IR laser cutter M-1200
- NIR laser welding device
- Yarn finishing (slot die)

Functionalisation I Composites

Dispersing and compounding

- Twin-Screw Compounder
- Dispersing- and milling instruments
- Foam mixer

Coating and finishing

- Lab scale semi-automated coating unit
- Lab scale padding unit (foulard)
- Coating and finishing machine up to 0.5M fabric width
- Tensioning, drying and fixing machine up to 2 m fabric width
- Hotmelt extrusioncoating line
- Dyeing apparatus
- Yarn finishing

Lamination and joining

- Lab scale laminator
- Hotmelt coating- and lamination system
- Double belt press (flatbed)

Functional printing

- 3D printer 1
- Processing area 700 mm x 700 mm
- 3D printer 2
- Inkjet printing machine Flatbed 1200 mm x 1200 mm
- Roll-to-roll experimental module for digital coating
- Semiautomatic screen printing

Processes, Technologies and Products

Functional finishing and coating

- ▶ Direct and transfer coating (knife-over-air, knife-over-roller)
- ▶ Impregnation by padding
- ▶ Low add-on technologies (reverse roll coating, slot die coating)
- ▶ Foam-coating

Hotmelt and uv-curing

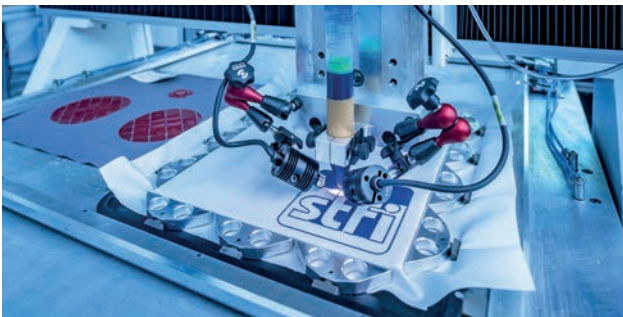
- ▶ Hotmelt compounding
- ▶ Hotmelt roller application (fully and patterned) for lamination and coating
- ▶ Hotmelt extrusion coating (slot die coating)
- ▶ UV-curing with inertisation (365 nm, 395 nm; Fe-doped Hg-medium pressure emitter)



Processes, Technologies and Products

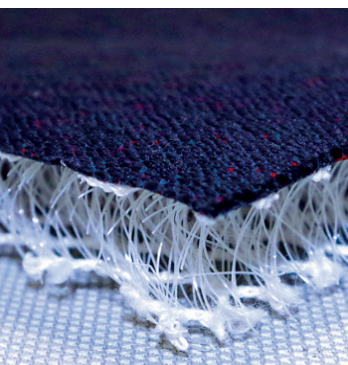
Functional printing

Development of novel manufacturing processes based on additive manufacturing methods and large-area printing processes, such as screen printing, inkjet printing, micro-valve printing and research into printed functional structures in textile composites.



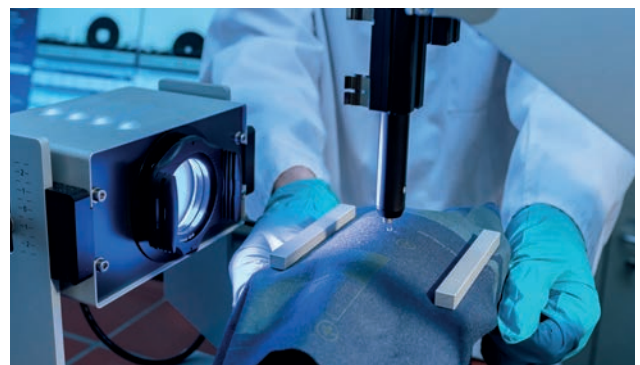
Textile composites

Development of functional textile composites for technical applications, personal protective equipment and extreme situations. Research new material combinations for artificial leather UV-curing and thermoplastic materials.



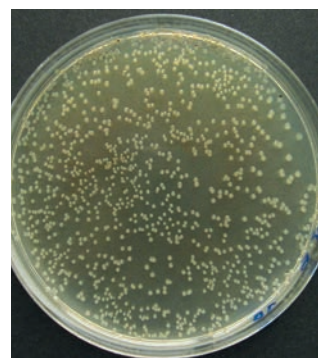
Material and material characterisation

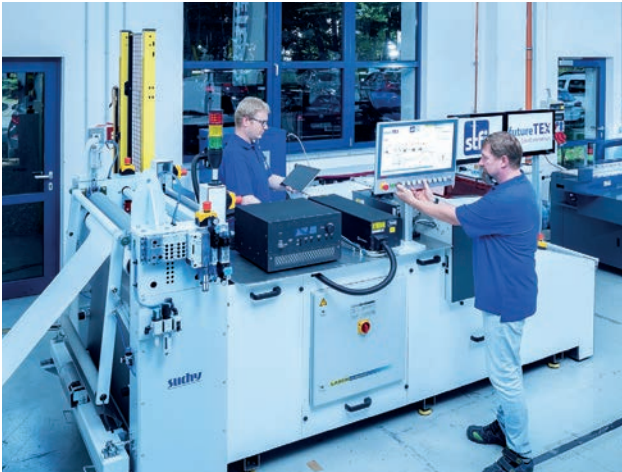
- ▶ Dispersion
- ▶ Hotmelt compounding
- ▶ Chemical-physical material characterisation, (DSC, rheology, contact angle and dynamic surface tension, droplet analysis for inkjet printing, particle size analysis)



Ecology and environment

- ▶ Material development (biobased and biodegradable materials)
- ▶ Application of Enzymes and proteins
- ▶ Microplastics origin and containment
- ▶ Analysis of biodegradation analysis (water, waste water, exhaust air)





Laser

- ▶ UV-Laser (wavelength 355 nm)
- ▶ IR-Laser (wavelength 10,6 µm)
- ▶ Cutting, surface patterning, surface cleaning
- ▶ Test procedures for testing textiles against laser radiation

Materials

- ▶ Waterborn coating, finishing and ink formulations
- ▶ 100 % coating systems (silicons, plastisols, hotmelts, UV-curable)
- ▶ Functional additives



Contact



Dr. rer. nat. Ralf Lungwitz
**Manager Functionalisation/
Composites**

*Hotmelts and Laminates, UV Curing
Material Characterisation*
Phone: +49 371 5274-248
E-mail: ralf.lungwitz@stfi.de

Dipl.-Ing. Marco Sallat

*Environmental Technology, Biodegradability, Biobased
Materials*
E-mail: marco.sallat@stfi.de

Tobias Richter, M. Sc. (FH)

*Additive Manufacturing, Functional Printing, Material
Characterisation*
E-mail: tobias.petzold@stfi.de

Dipl.-Ing. (FH) Dirk Wenzel

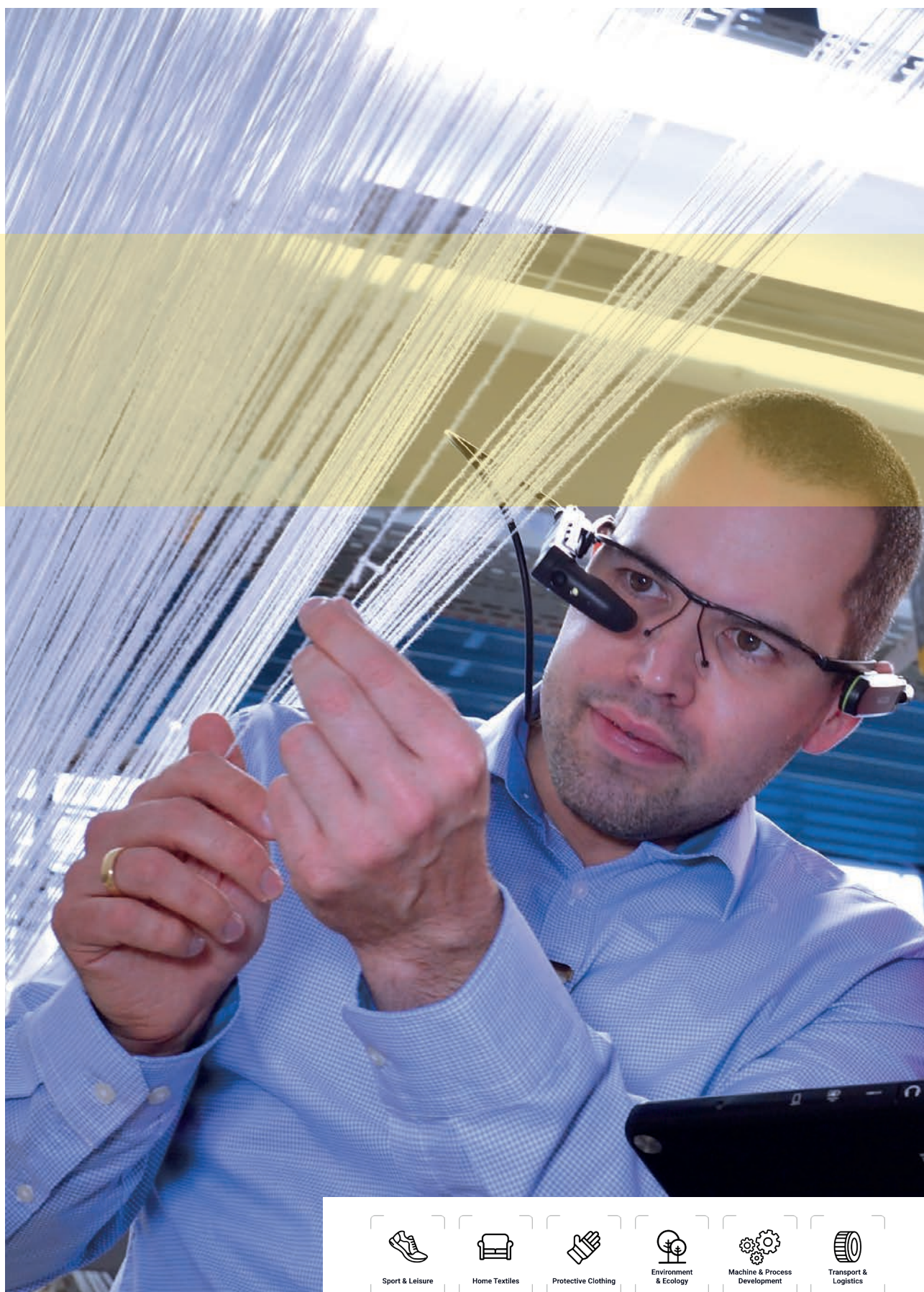
Laser Safety, Laser PPE, Laser Surface Structuring
E-mail: dirk.wenzel@stfi.de

Dr.-Ing. (FH) Sarah Lysann Zedler

Additive Manufacturing, Yarn Functionalisation
E-mail: sarah.lysann.zedler@stfi.de

Exchange of Experiences on Exhaust Air Purification

Innovative and successful developments in the areas of environmental protection, energy efficiency and process management are based to a large extent on the dialogue between all stakeholders involved: plant operators, authorities, researchers and developers and service providers. With our event Exchange of Experiences on Exhaust Air Purification, we would like to offer you a platform on which you can find out about technical innovations and legal changes relating to the topic of "exhaust air purification in the textile industry" and exchange ideas with experts and users.



Sport & Leisure



Home Textiles



Protective Clothing



Environment
& Ecology



Machine & Process
Development



Transport &
Logistics

Technical Equipment

Robot systems and smart logistics systems

- Stationary and mobile robot systems
- Driverless transport systems
- Mobile wrapping system

Assistance systems

- Tablets and wearables (incl. smart gloves

Digitisation I Artificial Intelligence

- watches & glasses)
- AR and VR environments
- Machine dashboards

2D, 3D printing and laser systems

- Inkjet system
- 3D printing system
- Laser-assisted dry pre-treatment
- Laser cutter

Software systems

- Open source software
- Production planning and control software
- Robotics simulation
- 3D modelling

Tracking and identification systems

- RFID systems
- Bluetooth systems
- NFC systems
- Indoor tracking systems

Safety technology

- Safety Eye

Special automation systems

- PLC
- OPC-UA
- Microcomputers

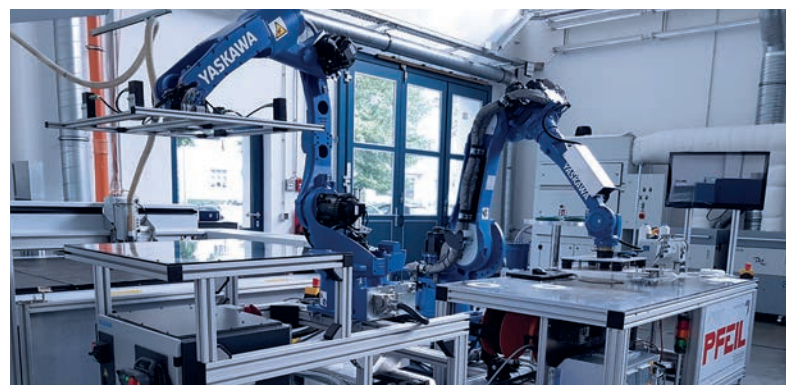
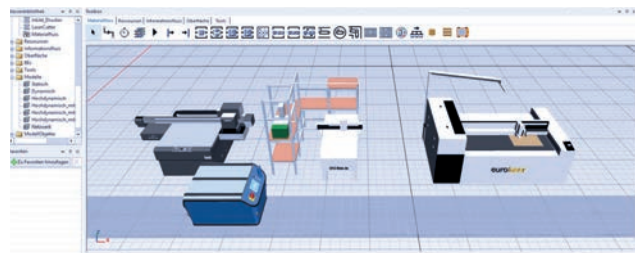
Topics

Networking machine systems

- ▶ Production planning and control along the textile value chain
- ▶ Derivation of machine parameters from product configurations
- ▶ Wireless communication (e.g. RFID) for identification, localisation and batch tracking

Digitalisation of manufacturing processes

- ▶ Modelling of machine parameters for the quality monitoring of textile products
- ▶ Simulation of material flows as a basis for increase in efficiency
- ▶ Continuous data evaluation for e.g. predictive maintenance
- ▶ Assistance systems for the provision of information on mobile devices
- ▶ AR and VR applications as learning environment



Automated customised textile production

- ▶ Use of driverless transport systems
- ▶ Robot-assisted handling of textile substrates
- ▶ Customised production by means of 2D, 3D printing and laser systems

Processes

Handling and logistics processes

- ▶ Digitally assisted and automated machine tending
- ▶ Automated handling of textile goods and substrates
- ▶ Robot-assisted tape binding and technical finishing
- ▶ Transport of finished goods by mobile robot systems
- ▶ Automated transfer of endless goods



Manufacturing processes

- ▶ Production planning and control
- ▶ Modelling of machine and product parameters
- ▶ Simulation of manufacturing processes
- ▶ Web-based, individual configuration of products
- ▶ Networking of software systems
- ▶ Retrofitting of machines (retrofit)

IT-processes

- ▶ Interface management
- ▶ Networking and visualisation of data sources and web-based services

Quality assurance

- ▶ Goods display system
- ▶ Automated error detection

Platforms

The "Textile factory of the future" research and test field

In the "Textile factory of the future" research and test field, digitalisation solutions for the automation and networking of a multi-stage manufacturing process are illustrated using the example of a customisable carpet (play mat). The research and test field internalises the Openlab principle. It is available for companies for development and testing purposes in order to create digitalisation solutions in the fields of automation, networking and AI.

The objectives for companies are a better understanding of manufacturing processes and products and their optimisation according to various criteria. AI methods are also used to take into account a wide range of optimisation criteria and influencing parameters as well as their complex dependencies.



The development of the research and test field was started as part of the BMBF Twenty20 project futureTEX. The starting point of the sample production is the creation of orders using a web-based product configurator for customised product design. After product configuration, this is transferred to an agile production planning and control system, which plans production and

Seminar

"Digitalisation in the textile industry"

The modularly designed seminar includes various topics on fundamentals, applications and industry-specific demonstrations of digitalisation in the textile industry. In addition to the general overview, the programme includes topics such as assistance systems, graphical programming, data acquisition, data evaluation, modelling, RetroFit, robotics and automation.

Contact

transfers the scheduled production orders to the machine-related order control system. This system in turn generates the machine programmes, handles communication with the machines and transport systems and distributes the orders. The production order passes through the machines for surface formation, finishing and assembly one after the other in accordance with the defined work sequence. A robot-supported belt edging system is used in the finishing area. The automation of the material flow is realised via an autonomous winding system, several handling systems and a mobile robot system.

With the production process shown, the research and test field clearly demonstrates the possibilities of future production within the textile value chain.

Technology transfer is the key pillar for the success of research and development projects. In the field of digitalisation in particular, the STFI has been an important player for the industry since 2016 with the establishment and operation of the "Textile Factory of the Future" research and test field. The Textile Factory of the Future has been an essential partner of the BMWK's SME Digital Initiative and the resulting network since 2018. The transfer work was started in the SME Textile Competence Centre. The activities are being continued and expanded in the SME Digital Centre "Smart Cycles". The circular economy, digital product passport and the Act on Corporate Due Diligence Obligations in Supply Chains (LkSG) are the new topics.



Mittelstand-Digital

Services & Transfer

- ▶ Labtours, workshops and trainings
- ▶ Trials and implementation projects
- ▶ Status quo analyses in companies



Dipl.-Ing. Dirk Zschenderlein
*Manager Intelligent production systems/
modelling and process management*
Digitalisation of manufacturing processes
Phone: +49 371 5274-283
E-mail: dirk.zschenderlein@stfi.de

Dipl.-Wirtsch.-Ing. Andreas Böhm

Networked Manufacturing, Assistant Systems, Low-code Programming, Technical Responsible for the Research and Test Field
E-mail: andreas.boehm@stfi.de

Dipl.-Geogr. Marco Barteld

Process and Data Management, Functionalisation of Textiles, Data Protection Officer
E-mail: marco.barteld@stfi.de

Dipl.-Ing. (FH) Sandra Döhler

Digitalisation of Manufacturing Processes, Working Environment 4.0
E-mail: sandra.doehler@stfi.de

Dipl.-Ing. (FH) Thomas Pfaff

Smart Logistic Systems, Mobile Robotics, Digitalisation of Processes
E-mail: thomas.pfaff@stfi.de

Dipl.-Betriebswirt (BA) Sven Reichel

Artificial Intelligence, Modelling, Simulation and Optimisation of Textile Products and Manufacturing Processes
E-mail: sven.reichel@stfi.de

Dipl.-Ing. Falko Schubert

Robotics and Automation, Retrofit of Machines
E-mail: falko.schubert@stfi.de

Dr. rer. nat. Steffen Seeger

Group Manager IT, Artificial Intelligence, Retrofit of Machines, Data Acquisition, Transmission, Processing, Evaluation and Protection
E-mail: steffen.seeger@stfi.de





What do cut-resistant structures with an alarm function, textile therapy and assistance systems, luminous structures, shading systems or integrated product protection have in common with RFID systems? All the applications listed have an integrated smart additional function and therefore belong to the category of smart textiles.

Smart Technical Textiles

Smart textiles and wearables are a market that has been growing steadily for years. Essential drivers are megatrends such as digitalisation, sport, medicine, demographics and mobility. The growth is driven by the now broad and still growing availability of the IT infrastructure.

In addition, the acceptance of smart products, especially in the outdoor, health and sports sectors and the associated provision of personal data by users is increasing. The combination of these developments also enables the establishment of new business models. For the development of production chains and business

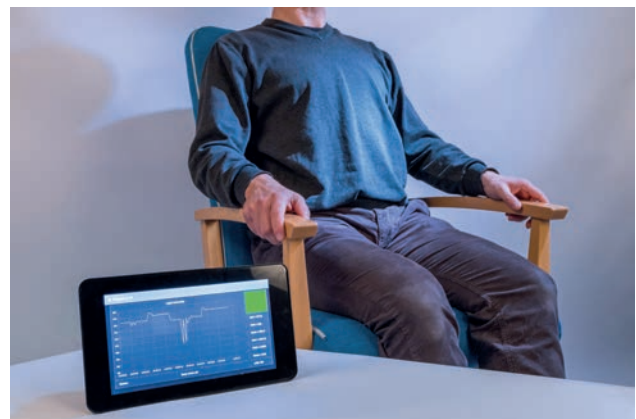


Development of smart materials

- ▶ Textiles with integrated functions (e.g. flat structures, net, grid and rope structures)
- ▶ Interactive and auxetic textile structures
- ▶ Functional coatings and customised 3D printed substances
- ▶ Contract research and customer-oriented product developments

Integration of functions

- ▶ Sensory and actuatorial
- ▶ Communicative
- ▶ Heating and cooling
- ▶ Luminous

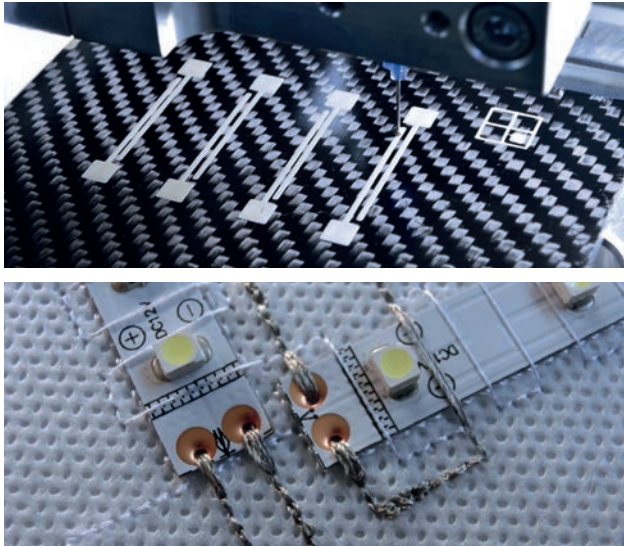


Systems engineering and technologies

- ▶ Warp knitting, weaving, embroidery, knitting, KEMAFIL® and rope weaving
- ▶ Coating and surface modification
- ▶ Digital and 3D printing
- ▶ Extrusion and compounding technology

Functional integration process

- ▶ Processing of fibre-optic and conductive materials
- ▶ Application of liquid and pasty substances
- ▶ Component and system integration
- ▶ Digital and 3D printing



Development of test methods

- ▶ Application-related and specific development and realisation of test methods
 - Example: cut protection (cut resistance, stab protection)
 - Application: safety engineering, Protective clothing, tarpaulins

Recycling smart textiles

- ▶ Mechanical processing of the waste
- ▶ Ongoing research (e.g. in the ZIM network RE4TEX®, Tricycle)
- ▶ Basic consulting and concept development
- ▶ Contact and partner mediation



Research and application areas

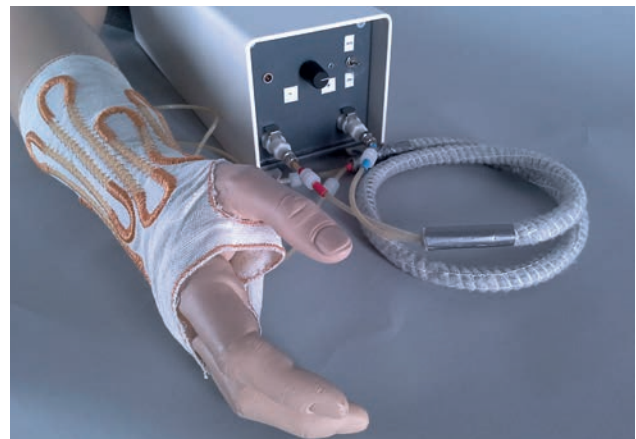
Geotextiles and building textiles

- ▶ Structural monitoring in geotextiles (e.g. dikes)
- ▶ Monitoring in buildings (e.g. moisture, bearing loads)
- ▶ Earthquake-proof construction



Medical textiles

- ▶ Thermal management in medical technology and orthopaedics
- ▶ Textile support structures for the detection and correction of postures
- ▶ Sensory textile systems for the care sector



Industrial textiles

- ▶ Technical net and rope structures made of High-performance fibres with sensitive properties for monitoring the load
- ▶ Protective and safety nets, nets for maritime applications, tension and load-bearing elements, rockfall protection nets
- ▶ Generation of photovoltaically (PV) effective layers on flexible technical textiles
 - Self-sufficient power supply for vehicles and silo roofs
 - Building-integrated photovoltaics with textil-based solar cells



Protective textiles

- ▶ Cut-resistant special fabrics for tarpaulins, covers, tents incl. alarm function
- ▶ Padding for sensitive materials (e.g. refrigeration for transporting medicines)



Contact



Dipl.-Ing. Elke Thiele

Smart textiles: geotextiles and construction textiles, medical textiles, protective textiles, industrial textiles, luminous and sensor textiles, knitting, processing of optical fibres

Phone: +49 371 5274-243

E-mail: elke.thiele@stfi.de

Dipl.-Ing. Corinna Falck

Smart Textiles: Geotextiles and Building Textiles, Functionalisation of Textiles

E-mail: corinna.falck@stfi.de

Dipl.-Biol. Jens Mählmann

Smart Textiles: Medical textiles, protective textiles, Textiles for water and exhaust air purification, engineering biology and applied hydrobiology, embroidery

E-mail: jens.maehlmann@stfi.de

Dipl.-Ing. Heike Metschies

Smart Textiles: Geotextiles and construction textiles, textiles for concrete reinforcement, textiles for gardening, landscaping and hydraulic engineering

E-mail: heike.metschies@stfi.de

Tobias Richter, M. Sc. (FH)

Smart Textiles: Additive Manufacturing, Functional Printing, Material Characterisation

E-mail: tobias.petzold@stfi.de

Dipl.-Ing. (FH) Frank Weigand

Smart textiles: Geo- and construction textiles, solar textiles, sensor technology, net development

E-mail: frank.weigand@stfi.de





Activities in internal
associations, platforms
and networks



When it comes to tapping international knowledge potential, cooperation with research institutions, companies and associations at European level is a valuable resource. In addition, for a better networking and the generation of new project ideas, the broadening of professional and cultural horizons is of great importance.

International Cooperation | Transfer



STFI has been involved in the Europe-wide research network and in regional and strategic developments for more than 20 years. Realising interdisciplinary cooperation across countries is the concern of the institute's international activities.

The International Cooperation/Transfer Department is the contact point for all European project activities at the institute. In addition to the acquisition and application of projects in European research programmes, the tasks also include technical and administrative project management as well as the transfer of knowledge and results. The staff's experience from coordinating and managing research projects at national level also flows into this.

Transfer activities include the utilisation of patents and other forms of commercial IP protection to protect the relevant research results of STFI and to market them with interested partners.

International funding programmes and Research projects

MC 4



Components made of carbon and glass fibre composites are essential for numerous technical applications, but difficult to recycle. In addition, during the production of composite parts, waste is produced that can be reintroduced into the production process for other components.

The project investigates circular approaches for the reuse of carbon and glass fibre composites and develops process technologies and quality assurance methods that enable the economic recycling of carbon and glass fibre components. MC4 will focus on different reuse and recycling processes along the life cycle of composite parts.

Duration: 01 April 2022 – 31 March 2025
Partners: 15 partners from 7 countries



BIONANOPOLYS



The project aims to improve technologies and processes for the application of nanomaterials. To this end, existing pilot plants across Europe will be adapted and offered in an Open Innovation Test Bed (OITB) for the processing of bio-based nanomaterials. BIONANOPOLYS will also provide a wide range of services to industrial partners for the introduction of new bio-based nanoproducts, such as the development of safety protocols for bio-based nanomaterials, the specialisation and training of personnel, or the development of standards. Within the framework of the project, a business model is to be developed that will enable interested industrial partners to access the pilot plants even after the end of the project.

Duration: 01 Jan 2021 – 31 Dec 2024
Partners: 27 partners from 11 countries



International funding programmes and Research projects

PESCO-UP



In Europe, 7–7.5 million tonnes of textile waste are generated every year. Only 30-35 % is collected separately and less than 1 % is recycled. Significant quantities, mostly PES/CO blends, are disposed because recycling is technically difficult and/or not economical. The aim of PESCO-UP is to develop a sustainable, economically/technologically viable process with which waste from PES/CO blends can be transformed into high-quality and unmixed materials for the subsequent utilisation cycle. The holistic approach of PESCO-UP includes innovative processes such as digitalised material identification, data exchange and efficient sorting. By developing chemical and mechanical separation processes, the aim is to achieve a material recycling efficiency of up to 90 %. Another focus of the project is the implementation of the aforesaid challenges in new business models. This is supported by strengthening the labour force potential with targeted qualification strategies and training materials.

Duration: 01.01.2024 – 31.12.2027
Partners: 20 partners from 10 countries



agents were either added directly to a dispersion and applied to the textiles by means of full-bath impregnation or reverse roll coating or first microencapsulated and then applied by means of impregnation. Due to their skin-protective, anti-inflammatory and health-promoting effects, textiles treated with Graviola extracts have a wide range of dermatological applications in the wellness and health sector, particularly in the treatment of inflammatory skin problems.

Duration: : 01.07.2021 – 30.11.2023
Partners: 5 partners from 2 countries



NANOHYB



The aim of the research project is to develop hybrid nonwoven structures with an integrated nanofibre layer. Meltblown nonwovens (M) are being developed as the backing and cover material. The nanofibre layer (NL) is produced by electrospinning. Composite structures are developed from the individual layers, for example as a sandwich structure M-NL-M. According to the state of the art, the layers are bonded together with the help of adhesives. In order to ensure the adhesion of the individual layers even without applying a joining component, the possibility of modifying surface layers by plasma or joining by laser or ultrasound treatment is being investigated. Pandemic protection (in the form of disposable protective and clothing textiles) is seen as a possible end application. For such applications, finishing the novel hybrid structures with antimicrobial or virological agents is being investigated and evaluated.

Duration: 01 Jul 2020 – 28 Feb 2023
Partners: 5 partners from 2 countries



GRAVIOLA



In natural medicine, the leaves of the tropical graviola tree are used to improve wellbeing and to treat many illnesses. The effect of graviola is mainly due to the active acetogenins it contains. The extraction, preparation and use of these active ingredients for textile applications have not been the subject of research. The aim of the GRAVIOLA project was to develop novel, dermatologically applicable textile structures. The Graviola

RECARBOSIZE



The main objective of the project is to develop a concept for the re-sizing of recycled carbon fibres (rCF) and the adaptation of the sizings for selected thermoset (epoxy resin, polyurethane) and thermoplastic matrices (polyamide, polyphenylenesulphide). The rCF equipped with chemically compatible and process-adapted sizings are processed into nonwovens, from which, in combination with the matrices, lightweight components with improved mechanical properties compared to unsized rCF are produced. The starting material is rCF obtained from pyrolysis and solvolysis processes.

Besides the aspect of fibre-matrix interaction, the project also considers the issue of sizing application. Recycled CF are not provided in the form of continuous rovings as in continuous sizing processes, but in the form of length-limited fibres derived from waste recycling processes. A new way of sizing application needs to be investigated, considered in terms of its effectiveness and tested for technical feasibility.

Duration: 01 Oct 2021 – 30 Sep 2023
Partners: 4 partners from 2 countries



Contact



Dr.-Ing. Yvette Dietzel

Research Director

Phone: +49 371 5274-223

E-mail: yvette.dietzel@stfi.de



Dipl.-Ing. Dirk Zschenderlein

**Manager International Cooperation/
Transfer**

Telefon: +49 371 5274-283

E-Mail: dirk.zschenderlein@stfi.de

Dipl.-Ing. Romy Naumann

EU projects, Project Management, Networks

E-mail: romy.naumann@stfi.de

Dr. rer. nat. Anna Große

EU projects, project management, networks

E-mail: anna.grosse@stfi.de

Tilo Bauch, M. A.

Public Relations

E-mail: tilo.bauch@stfi.de

Alexandra Köhler

Public Relations, Event Management

E-mail: alexandra.koehler@stfi.de

Dipl.-Des. (FH) Berit Lenk

Public Relations, Event Management

E-mail: berit.lenk@stfi.de

Kareen Pfab, M. A.

Public Relations, Press

E-mail: kareen.pfab@stfi.de





In order to meet the requirements for innovations in the expanding market of technical textiles, an application-oriented, industry-related research and development potential is a necessary prerequisite.

Research Services

The Saxon Textile Research Institute e.V. (STFI) is the partner for these increasingly complex tasks with the professional competence of qualified employees and modern technical equipment. Through close cooperation with other research institutes, numerous interdisciplinary fields of competence can be covered.

The wide range of possible applications for technical textiles and nonwovens requires constant improvement and modification of the technologies and thus further and new development of machines and systems. At the same time, new systems developed by the partners in the textile machinery industry must be tested and proven in their potential applications. On this basis, STFI cooperates very successfully with textile and nonwovens producers and various manufacturers of textile machinery and nonwovens equipment.

Center of Excellence in Nonwovens

The Center of Excellence in Nonwovens is always available to you as a reliable partner for your research and development work. We see the manifold know-how in the field of technical nonwovens, the extensive and complex equipment in three associated pilot plants as well as the interdisciplinary cooperation with the other research areas of the institute as a guarantee for successful cooperation.

The diversity of samples and experience from over 30 years of textile research, our technical equipment, which can be used for hand samples, small series and semi-industrial project tests, the in-house certified test lab for validating our research results and the variety of problem-oriented solution options are indispensable building blocks of our joint research and development work.

Thanks to our broad network of fibre, filament and nonwoven manufacturers, converters, finishers, research institutes and countless other stakeholders, we are happy to support you in transferring the results to commercial success.

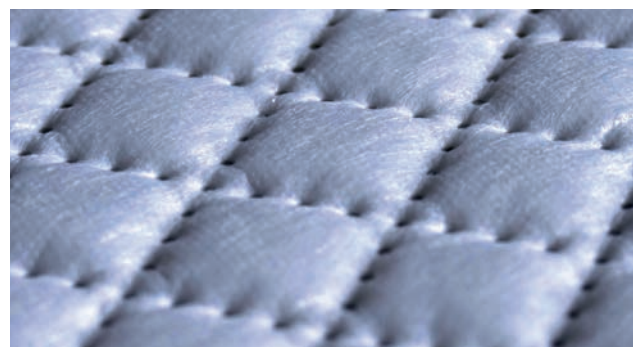
Contact



Patrick Engel, M. Sc.
Manager Center of Excellence in Nonwovens

Phone: + 49 371 5274-209

E-mail: patrick.engel@stfi.de



Center for Textile Lightweight Engineering

The Center for Textile Lightweight Engineering including its technology lines and existing know-how is available to one-time customer orders, bilateral research projects and small batch series as well as joint research activities within consortia and clusters.

Development tasks defined by the customer could be fully supported and solved by linking the existing in-house competencies. The Center for Textile Lightweight Engineering offers services, starting with the selection and characterization of raw materials, the development and testing of textile semi-finished products up to the development of composite materials and the determination of their characteristic values. Based on the test results, optimized processing parameters are provided and concepts for transferring from pilot scale to industrial scale are established.

The technical equipment is also used to produce small series, especially for SMEs, for the sampling of first customers and the subsequent market entry of new products.

Technical woven and knitted Fabrics

The research department for technical woven and knitted fabrics has a wide range of machines. Thereby customer enquiries, bilateral contract research and publicly funded research projects can be processed.

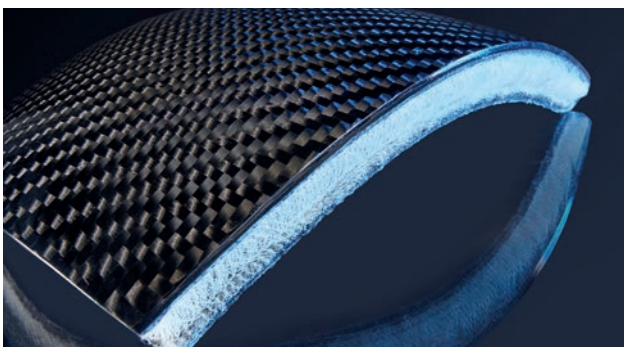
With our know-how in the field of textile surface formation from various materials it is possible, to support you actively and in an advisory capacity in the implementation of your development or research tasks. We are at your side from the selection of materials and machines to patterning and prototype production. Through a lively exchange with you, the desired product can be manufactured in optimisation loops from the preliminary tests. If desired, the results obtained can be adapted to industrial plants and thus a transfer to your company can be worked out.

For your innovative ideas we are a competent and a very well technically equipped partner with a wide-ranging know-how in the field of manufacturing technical textiles.

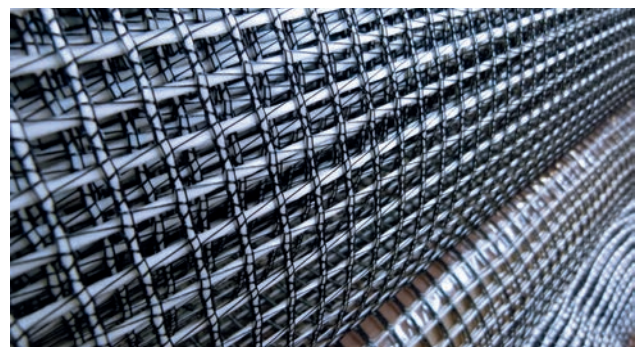
Contact



Christopher Albe, M. Sc.
*Head of GroupCenter for Textile
 Lightweight Engineering*
 Phone: +49 371 5274-241
 E-mail: christopher.albe@stfi.de



Dipl.-Ing. Elke Thiele
*Manager Technical woven
 and knitted Fabrics*
 Phone: +49 371 5274-243
 E-mail: elke.thiele@stfi.de



Functionalisation I Composites

With our experience we support you in the optimisation of process parameters and formulations as well as the transfer of the ideas in recent technical processes of your company.

Depending on material properties and requested effects we select and develop suitable coating, printing and laser structuring processes up to final semi-industrial roll-to-roll processes. We realise your research and development tasks within bilateral contract research or together in publicly funded projects in small or large consortia.

With our semi-industrial equipment, we are able to make samples, prototypes and small pilot productions. Please feel free to get in contact.

Digitisation I Artificial Intelligence

The Digitalisation and Artificial Intelligence research area has the "Textile Factory of the Future" research and test field for all aspects of networked production. It is equipped with state-of-the-art machines. A variety of software systems, primarily open source, are used. Many demonstrators show practical applications of digital technologies.

The technical expertise of the STFI staff is applied in research and practice on a daily basis. The close exchange with companies in the textile industry and with technology partners makes it possible to find solutions to today's digital challenges and thus contribute to the future viability of the industry.

In addition to feasibility studies, the STFI advises and supports companies in funded and individually commissioned research projects.

Contact



Dr. rer. nat. Ralf Lungwitz
*Manager Functionalisation/
Composites*

Phone: +49 371 5274-248

E-mail: ralf.lungwitz@stfi.de

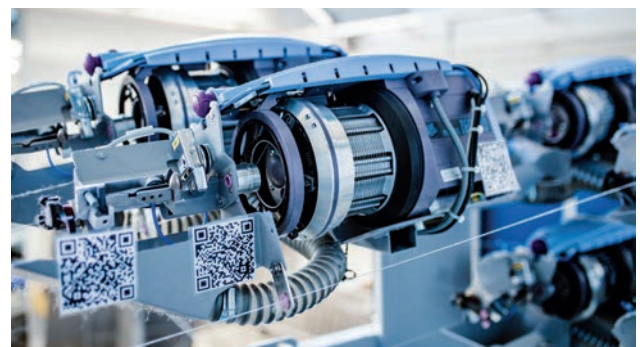
Contact



Dipl.-Ing. Dirk Zschenderlein
*Manager Intelligent production systems/
modelling and process management*

Phone: +49 371 5274-283

E-mail: dirk.zschenderlein@stfi.de





For you and the quality of your products – our range of services

The independent, accredited testing laboratory offers customers a wide range of testing services. The core of our range of services is the testing according to national and international standards, recognised standards for product

Accredited Test Lab

labels (OEKO-TEX® STANDARD 100), technical delivery conditions or industry-specific regulations (SAE). Beginning with the starting materials such as fibres and threads are also taken into account as well as semi-finished textile products as woven, nonwoven knitted, braided or composite structures. The test of final products as a "system test" complete this part of the range of services.

Individual products require individual solutions. Here we support customers with the characterisation and quality assessment of their products for which no normative specifications are available. Through the interdisciplinary cooperation of various test competencies, we try to transfer, adapt or develop new methods – development of test procedures. What if the quality is questioned? To this end, we offer a large pool of interdisciplinary skills for independent, neutral quality assessment of textile products – analytical competence.



Our Test Services

The range of our services and more information are available on our website: www.stfi.de



Fields of expertise

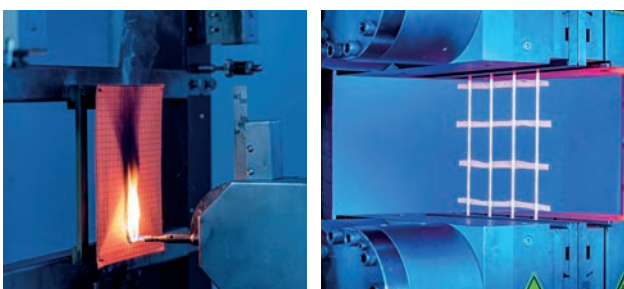
Additional to the listed standards, we are able to provide you with individual offers on technical delivery conditions for the German Armed Forces, automobile tests and others. We also can check national or international standards, which are not listed below, for their feasibility in our lab.

Competent advice on our fields of expertise can be received from the contact persons listed below. Our areas of expertise at a glance:

- ▶ Textile physical test
- ▶ Textile physiological and ergonomic testing
- ▶ Examination of penetration / protection behaviour



- ▶ Colour fastness
- ▶ Weathering test
- ▶ Burning test
- ▶ Heat protection test
- ▶ Electrostatic test
- ▶ Examination of care and usage behaviour
- ▶ Textile chemical and human ecological testing
- ▶ OEKO-TEX® test lab
- ▶ Special optical and physical testing
- ▶ Testing of personal protective equipment
- ▶ Testing of geosynthetics
- ▶ Testing of filter media
- ▶ Testing of fiber composites
- ▶ Cargo securing tests



OEKO-TEX® TEST LAB

- ▶ Tests according to OEKO-TEX® STANDARD 100
- ▶ Pollutant testing on textiles
- ▶ Advice on ecological problems in connection with the textile-technical process



Test method development

The range of services of the Saxon Textile Research Institute e.V. (STFI) includes not only tests according to international norms and standards, but also the development of product or application-related test methods. We understand how important a good test can be to the textile material or product development process. Depending on the level of complexity we either develop the procedures mid- and long-term oriented within various research projects or in short-time missions for applications especially designed for the client's needs. For each of your requirements an experienced, interdisciplinary team with a valuable competence in testing exists. Even for the production of possibly necessary parts and elements of the new method a comprehensive me-

chanical manufacturing lab with CNC machines exists. And all these activities are supported by colleagues coming from fields like electrical engineering, process or control techniques.

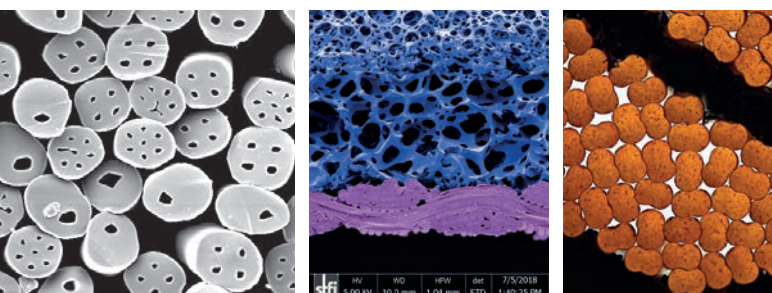
- ▶ Protective textiles against laser radiation
- ▶ Material development with high performance fibres
- ▶ Testing of safety nets and air cargo security network

Analytical competence



The STFI bundles its competencies from different Test areas. An interdisciplinary Analytic Group is responsible for processing of inquiries regarding Complaint and damage analysis.

The used measurement equipment is going from



preparation technology over several microscopes (e.g. digital microscope, scanning electron microscope, confocal 3D laser scanning microscope) to equipment of the chemical-physical analytics (e.g. rheometer, gas chromatography, dynamic differential calorimetry).

Information and consulting

- ▶ Training
- ▶ Research for standards
- ▶ Development/revision of test instructions and test standards
- ▶ Definition and implementation of technical delivery conditions

Contact



Dipl.-Ing. Marian Hierhammer
Manager Accredited Test Lab

Phone: +49 371 5274-242

E-mail: marian.hierhammer@stfi.de

Dipl.-Ing. (FH) Catrin Helbig/

Dipl.-Ing. (FH) Manuela Fritzsche

Textile Physiological and Ergonomic Testing, Examination of Penetration/Protective Behaviour, Colour Fastness Test, Weathering Test, Burning Test

E-mail: catrin.helbig@stfi.de/manuela.fritzsche@stfi.de

Mathias Kermer

Textile Physical Testing, Testing of Geosynthetics, Composites and Cargo Restraint Devices

E-mail: mathias.kermer@stfi.de

Dipl.-Ing. Ute Kreißig

Technical Assistance, Testing of Filter Media (air filtration)

E-mail: ute.kreissig@stfi.de

Dipl.-Ing. (FH) Susann Meier

Textile Physical Testing

E-mail: susann.meier@stfi.de

Dipl.-Ing. Ulf Niersmann

Testing of Filter Media (Air Filtration) and Particle Filtering Half Mask

E-mail: ulf.niersmann@stfi.de

Patrick Reinhardt, M. Sc.

Special Optical and Physical Testing, Sun Protection Textiles, Microscopic Analytics

E-mail: patrick.reinhardt@stfi.de

Dipl.-Ing. Christian Vogel

Certification Officer, Specialist Electrostatic, EPA Specialist - Requirements and Garments

E-mail: christian.vogel@stfi.de

Doreen Becker

Specialisation in Warning and Foul Weather Testing

E-mail: doreen.becker@stfi.de

René Beyer

Arc Flash Testing and Arc Protection

E-mail: rene.beyer@stfi.de

Dr. rer. nat. Antje Melzer

Head of Textile Chemical Testing and OEKO-TEX® STANDARD 100

E-mail: antje.melzer@stfi.de

Dipl.-Ing. Angela Geu

Testing according to OEKO-TEX® STANDARD 100

E-mail: angela.geu@stfi.de



CE 0516

As Notified
Body 0516,
STFI offers
you certifica-

tions in the fields of protective textiles (PPE).
Thereby, the range of services cover the most
relevant standards and product areas with
which you can demonstrate the protection per-

Accredited Certification Department

formance and competence in the European
but also in the worldwide market. Information
on the certification programme, the individual
standards, the application process, including
the rights and obligations of the applicant, are
available from any of our experts working in the
Notified Bodies.

Member of the European exchange of experience of notified bodies



The certification body of the STFI
was accredited by the Central
Authority of the Federal States
for Safety Engineering (ZLS) in
1994. In November 2014, the
German Accreditation GmbH

(DAkkS) carried out the current re-accreditation.
The accreditation covers the product certification
of personal protective equipment as well as the
surveillance of products of category III according
to Module C2 of the PPE Regulation (EU)
2016/425. As a Notified Body 0516, the STFI
certifies the main types of protective clothing and
gloves.



Certification department for Personal Protective Equipment (PPE)

The Notified Body at STFI combines a team of
experienced textile engineers, scientists of other
specialist areas, technicians and lab assistants.
The activities of all members of the Notified Body
are focussed on:

- Comprehensive assistance for companies in
all steps of testing and certification
- Active participation in national and international
standardisation and working groups
- Ongoing improvement of test equipment and
competence in testing
- Immediate use of newly gained knowledge in
assessing protective textiles and clothing



Testing of personal protective equipment

The Accreditation for type examinations includes

- ▶ Protective clothing for workers exposed to heat (EN ISO 11612)
- ▶ Protective clothing for use in welding and allied processes (EN ISO 11611)
- ▶ Protective clothing with limited flame spread (EN ISO 14116)
- ▶ Protective clothing against thermal risks of an electrical arc (IEC 61482-Serie)
- ▶ Protective clothing for fire fighters (EN 469, EN 13911, EN ISO 15348)



- ▶ High visibility warning clothing (EN ISO 20471, EN 17353)
- ▶ Protective clothing for rescue service personnel (DGUV-Regulation 105-003)
- ▶ Protective clothing against rain (EN 343, ISO 24232)
- ▶ Protective clothing against cool environments (EN 14058)



- ▶ 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-Antistatic (EN 16350)
- ▶ Protective gloves against chemicals and micro-organisms (EN ISO 374-1)
- ▶ Protective gloves for fire fighters (EN 659)
- ▶ Protective gloves for welders (EN 12477)



Workshop "Personal Protective Equipment"

As a comprehensive training package comprising theory and practice, the PPE seminar provides you with detailed information and specialised know-how on all the main types of protective clothing. In addition to general requirements, all the standards mentioned are presented in detail. The seminar is aimed at garment manufacturers, suppliers, the textile service and safety specialists who require comprehensive knowledge of laws and directives as well as the content and requirements of protective clothing standards.



Contact Quality Management

Dr. rer. nat. Sabine Kaufmann

Quality Management Representative
E-mail: sabine.kaufmann@stfi.de

Nico Winter, M. A.

Deputy Quality Management Officer
E-mail: nico.winter@stfi.de

Contact



Dipl.-Inform. Hendrik Beier

Head of Service Department and Certification Department for Protective Textiles PPE/Vice Managing Director
Phone: +49 371 5274-184
E-mail: hendrik.beier@stfi.de

Dipl.-Ing. (FH) Marion Dixneit

Certification Officer, Heat and Welding Protective Clothing, Against Electrical Arc and Chemical Protective Clothing
E-mail: marion.dixneit@stfi.de

Daniela Beck

Certification Officer, Heat Protective Clothing
E-mail: daniela.beck@stfi.de

Doreen Becker

Specialisation in Warning and Foul Weather Testing
E-mail: doreen.becker@stfi.de

René Beyer

Arc Flash Testing and Arc Protection
E-mail: rene.beyer@stfi.de

Dipl.-Ing. (FH) Berit Böhme

Certification Officer, Heat Protective Clothing, Chemical Protective Clothing
E-mail: berit.boehme@stfi.de

Dipl.-Ing. Sibylle Fritzsche

Certification Officer, Protective Gloves, Chemical Protective Clothing, Work Wear in Food Business
E-mail: sibylle.fritzsche@stfi.de

Dorothee Hofmann, Be. Eng.

High Visibility Clothing and Protection against Rain Rescue Service Clothing
E-mail: dorothee.hofmann@stfi.de

Dipl.-Ing. Linda Müller

Certification Officer, Heat Protective Clothing
E-mail: linda.mueller@stfi.de

Theresa Pietschmann, B. Sc.

Heat and Flame Protective Clothing
E-mail: thesa.pietschmann@stfi.de

Dipl.-Ing. Christian Vogel

Certification Officer, Specialist Electrostatic, EPA Specialist - Requirements and Garments
E-mail: christian.vogel@stfi.de



AKADEMIE

The training and further education of skilled workers as well as the qualification of lateral entrants are measures that are essential for the company's success. With its education program, STFI would like to contribute to the success of your textile company. We have been an innovation partner and service provider for our customers for over 30 years. For more information, visit www.stfi.de/en/.



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Sächsisches Textilforschungsinstitut e.V. (STFI)

An-Institut der Technischen Universität Chemnitz | Managing Director: Dr. Heike Illing-Günther
Annaberger Str. 240 | 09125 Chemnitz | Germany | Phone: +49 371 5274-0 | Fax: +49 371 5274-153 | www.stfi.de
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