RESEARCH HIGHLIGHTS

DEUTSCHE INSTITUTE FÜR TEXTIL- UND FASERFORSCHUNG DENKENDORF

DITF REPORT

November 2026 – No. 2

25 Years of Medical Devices

ITVP Combines Experience with Innovation

The ITV Denkendorf Produktservice GmbH (ITVP) is celebrating its 25th anniversary this year. Originating from research, the company is now a specialist in textile medical devices.

On October 1, 2001, the ITVP was founded as a subsidiary of the German Institutes of Textile and Fiber Research Denkendorf (DITF). This spin-off company made it possible to consolidate medical technology expertise and significantly expand production, which had previously mostly begun in the DITF's cleanrooms.

Origins in Research

The ITVP emerged from the Biomedical Engineering Department at the DITF, where research was conducted on textile-based implants and their precursors. The team successfully completed numerous projects and brought many product developments into production. When the volume of orders exceeded the capacity of a research institute, the decision to establish the subsidiary was made and implemented in 2001.

Today: Production and Development in a Cleanroom

Today, products are manufactured by 40 employees in a cleanroom area of approximately 1,200 square meters. At the same time, the ITVP develops new, innovative products and processes that offer treatment benefits for patients. Its customers are primarily medical device manufacturers, under whose brand names the products are approved and brought to market.

A Portfolio Spanning the Value Chain

The portfolio includes medical implants and their precursors: from resorbable polymers to mono- and multifilament yarns to textile structures such as hernia meshes, resorbable surgical meshes and tapes, as well as warp-knitted and woven vascular prostheses.

For more information on milestones and achievements, see page 2.

The ITVP team in front of the production facility in Körschtal near Stuttgart

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DITF at the innBW State Parliament Lunch

On September 23, approximately 40 state legislators from the State Parliament's committees on Economic Affairs, Science, and the Budget accepted the invitation to the innBW State Parliament lunch. As a member institute of the Baden-Württemberg Innovation Alliance (innBW), DITF were represented in the state parliament's foyer. As applied research institutions, the innBW institutes make an important contribution to the state's economic and innovative strength by rapidly transferring scientific findings into practice. The discussion centered on the question: How can we strengthen Baden-Württemberg as a hub for innovation? A keynote address by Professor Dr. Alfons Dehé, Chairman of innBW, provided a wealth of inspiration by offering insight into innBW's expertise and achievements. Among the exhibits on display, the DITF's developments in security and defense drew considerable interest.

25 Years of ITVP: Experience Meets the Future

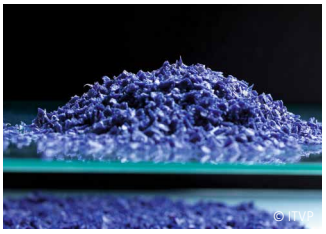
What Sets Us Apart: Quality, Expertise, and the Courage to Pursue New Solutions

For 25 years, the ITV Denkendorf Produktservice GmbH has combined the highest quality with state-of-the-art technology. Certification under EN ISO 13485, the international standard for quality management in medical devices, attests to this commitment. This achievement is based on the outstanding expertise and many years of experience of the employees, whom the team can rely on today.

ITVP is represented at numerous international trade shows, such as WHX in Dubai or, as shown here, at Medica in Düsseldorf

From the molecule to the finished product

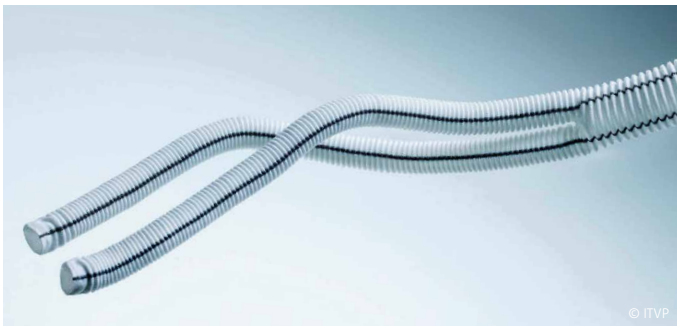
Production and development activities range from the molecular level all the way to a nearly finished medical device that the customer need only package, sterilize, and – once approved – bring to market. One area of focus is the manufacture of resorbable polymers. This is complemented by the extrusion and stretching of resorbable monofilaments, as well as the production of knitted vascular prostheses, such as those with bifurcations for the treatment of pelvic artery aneurysms. At the Körschtal site, located on the DITF campus, the teams work in a production area of approximately 2,000 square meters.



Production and development from polymer to finished medical device: One area of focus is the manufacture of absorbable polymers

Visible at International Trade Shows

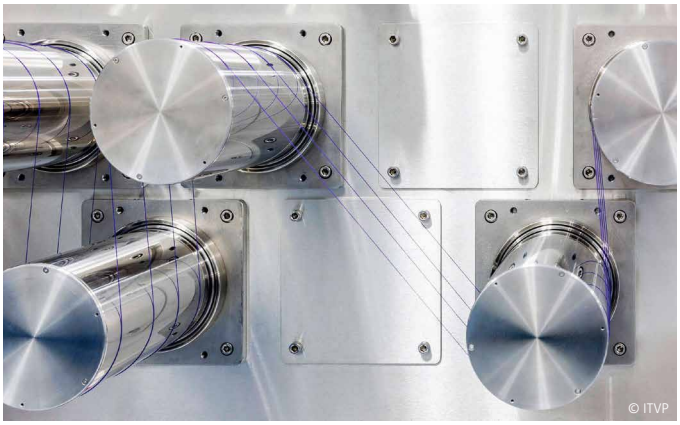
The ITVP is represented at numerous international trade shows, such as WHX in Dubai and Medica in Düsseldorf. The next opportunity for networking will be at Medica/Compamed from November 16 to 19, 2026, where the ITVP will be represented alongside DITF at the bw_i joint booth.



Warp-knitted vascular prosthesis with a bifurcation for the treatment of pelvic artery aneurysms

Looking Back on 25 Years Together

On October 1, the entire ITVP team celebrated the anniversary and reflected on the past 25 years. Professor Dr. Götz Gresser, Managing Director of the ITVP, took this opportunity to thank all employees, colleagues, and partners who have made this journey possible. "We are proud of what we have achieved and look to the future with confidence."



Extrusion and stretching of absorbable monofilaments

Ideas for textile implants?
Do you have ideas and visions for innovative textile implants? Get in touch with us! Our teams of experts will work with you to assess feasibility, identify paths to implementation, and provide professional and efficient support throughout the entire development process.

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REWIND: Recycling of wind turbine blades

DITF are developing textile reinforcement structures from recycled glass fibers

By 2026, Europe's wind energy industry has committed to reusing end-of-life rotor blades rather than disposing of them in landfills. The REWIND research project, involving 13 project partners from seven countries – including the DITF – is exploring ways to achieve this. The goal of the project is to make wind turbine blades recyclable instead of sending them to landfills or incinerating them. To this end, the partners are developing technologies for the dismantling, recycling, and reuse of composite materials.

The project consortium has validated a model that can predict the mechanical behavior of the recovered materials with an accuracy of over 90 percent. This makes them suitable for demanding applications, such as in electric vehicles or as insulation material.

At the DITF, yarns and fabrics are being developed from glass and carbon fibers recycled by the project partners for use in new components or repair kits for wind turbines. In the first step, the team examined the recycled fibers to determine their suitability for various processing methods. Further development is pursuing two different approaches:

Yarns manufactured from recycled glass fibers

Route 1: Glass fibers

In this process, recycled glass fibers are pre-opened, carded and spun into yarns. These yarns are then used to produce fabrics that are reinforced in either one or two directions. A first milestone was the development of a recycled glass fiber yarn (rGF/polyamide-6 yarn), which enables glass fiber-reinforced plastics (GFRP) with a fiber volume content of about 40 percent. It is suitable for thermoplastic composite applications, such as structural components in automotive engineering. Particularly noteworthy: Researchers succeeded in producing a yarn consisting of 98 percent recycled glass fibers. This yarn was used to manufacture a fabric with parallel fiber orientation (UD fabric). This demonstrated for the first time that specifically oriented reinforcement structures can be produced from recycled glass fibers.

Route 2: Rotor Blade Tapes

The second process route investigates the processing of long-fiber delamination (LFD) tapes. These are planed directly from wind turbine rotor blades and then processed into UD fabrics. LFD tapes represent a novel class of semi-finished textile products made from fully cured GFRP. The DITF are currently investigating the extent to which they are suitable as reinforcing structures for fiber-reinforced composites.

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ZIM Application Freeze

The Wrong Signal During an Already Weak Economic Period

ZIM
Zentrales Innovationsprogramm Mittelstand

In early July, the Federal Ministry for Economic Affairs and Energy (BMWE) imposed a temporary freeze on applications for the Central Innovation Program for SMEs (ZIM). Minister of Economic Affairs Katherina Reiche cited a sharp increase in demand and exhausted or limited budgetary resources as the reasons for the move. A resumption is not expected until early 2027 at the earliest – subject to negotiations on the federal budget.

The suspension of one of the most important programs for research and innovation in the German SME sector affects small and medium-sized enterprises as well as their transfer-oriented research partners. The DITF, as one of the leading ZIM research institutions in all of Germany with approximately 30 ongoing projects annually, are particularly hit hard by this. Planned projects, investments, and collaborations are coming to a standstill. Furthermore, there is a significant loss of confidence, as innovation projects often cannot simply be postponed.

"This is a disastrous signal from the Ministry of Economics in an already difficult environment that needs innovation and technology transfer more urgently than ever," says Peter Steiger, a member of the DITF Executive Board, assessing the suspension. "Anyone who wants to strengthen competitiveness must offer reliable prospects for research, technology transfer, and SMEs," Steiger adds. Together with research and business associations, the DITF are advocating for a swift lifting of the ZIM application freeze and is fighting against additional planned cuts to industry-related research in the 2027 federal budget. Please feel free to contact us if you'd like to join us in this effort.

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ALADIN: Connecting Circular Textile Production

Demand-driven, sustainable business models for a more circular economy

Sustainable textile production is achieved by keeping supply chains short and preventing overproduction as much as possible. This is where the ALADIN research project – Advanced LocAl and Digital Innovation Network for Circular Garments – comes in; it was launched in May 2026. It is co-funded by the EU with five million euros as part of Horizon Europe. The DITF serve as the coordinator. The project partners come from six European countries and bring a wide range of expertise in the fields of design, embroidery, digital printing, digitization, recycling, AI, and microfactory production. This diverse range of experience enables a high-performance, digital infrastructure for B2B and B2B2C relationships.

Kick-off meeting for Project ALADIN in Denkendorf

The ALADIN concept is based on four pillars:

> A digital platform for services provided by small and medium-sized enterprises (SMEs)
> Regional collaboration to promote local production
> Technologies for recycling strategies
> Local and renewable raw materials

The project is developing innovative technologies such as a module for a digital product passport and an AI-powered eco-design assistant. In addition, the project team is working on apparel textiles, including ring-spun yarns made from recycled cotton.
Three specific products are being created for validation: a semi-automated T-shirt, a children's parka that grows with the child, and a circular, versatile blazer dress. These products utilize sustainable materials such as bio-based fibers and recycled textiles, which are processed in a way that makes them easier to recycle at the end of their life cycle. Production takes place locally in microfactories, and the products are custom-made according to customer specifications.
Small and medium-sized enterprises as well as startups are being integrated into the project through two open calls for proposals. The long-term goal is to establish a Europe-wide network that shares infrastructure, builds microfactories, and thereby creates new jobs and regional economic value.

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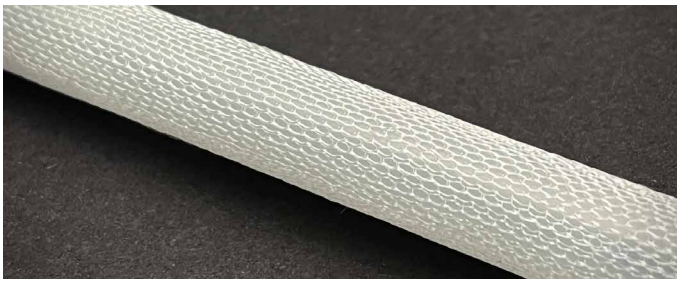
Smart textiles with reversible shape change

DITF develop Yarns from 2-Way Shape-Memory Polymers

Movable textile structures are found in many industries, such as shading nets in greenhouses that extend and retract depending on the intensity of the sun. Such shape changes are usually controlled by external mechanical components such as motors. This increases weight, energy consumption, and costs.
The DITF are therefore developing textiles made from shape-memory polymers that respond to changes in their environment with reversibly controllable geometry. So-called 2-way shape-memory polymers (2W-FGP) enable reversible shape change. External deformation is not necessary for this. This opens up possibilities for new, energy-saving textile actuators.
In collaboration with the Fraunhofer Institute for Applied Polymer Research (IAP), the DITF have developed multifilament yarns made from thermoplastic 2W-FGP. When heated, they shrink; when cooled, they return to their original length. This collaboration combines DITF's textile expertise with IAP's polymer expertise.
For use at room temperature, spinnable 2W-FGP were synthesized with transition temperatures of approximately 30 °C and 60 °C. After optimizing the spinning parameters on a pilot plant, yarns were produced with a dimensional stability of over 99 percent at 60 °C and a reversible elongation of 16 percent. Production was successful at 1,500 m/min, which points to the potential for cost-effective manufacturing.
Research is currently underway to determine how the yarns can be processed into textiles and thermomechanically recycled at the end of their useful life. One possible application is an agricultural textile that automatically adjusts its air and light permeability to the weather.



Circular-knit fabric made from multifilament yarns based on two-way shape-memory polymers

Multifilament yarns made from two-way shape-memory polymers

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Fresh air right against the body

StAirS Project: New Workwear with a Textile Climate Control System

During periods of high physical exertion, conventional protective workwear quickly reaches its limits. The removal of sweat and excess body heat is particularly problematic. This is where the ZIM project StAirS comes in, which the DITF have been working on together with Hero Textil AG.

The DITF are conducting research on flow-optimized, air-conducting textile structures that enable targeted climate control directly against the body. In the StAirS project, these structures are integrated directly into work safety clothing. The textile climate control system supports the body's natural thermoregulation, thereby contributing to greater workplace safety and comfort.

Demonstrator featuring insoles that function as pneumatic air compressors, pants with an integrated air conduit, a top with air-conducting structures for climate control, and a belt buckle to separate the pants from the top

The necessary airflow is generated without an external supply – exclusively through air-conducting textile structures. To achieve this, the research team has developed pneumatic pressure generators that harness everyday movements. A compressible insole in the shoe generates compressed air while walking. The system is thus self-sufficient and requires no external compressed-air connection. The air is routed through a tubing system in the work safety pants to the climate control element in the top.

A specially designed belt buckle makes it possible to intuitively separate the pants and top during the workday, thereby interrupting the airflow as needed.

The project demonstrated that the combination of air-conducting textile structures and pressure generators significantly improves heat and moisture management. This reduces the risk of overheating and has a positive effect on the wearer's comfort and performance.

As a successful example of industry-oriented research, StAirS was selected for the 2026 SME Innovation Day hosted by the Federal Ministry for Economic Affairs and Energy in Berlin. The system was presented there on June 11 in collaboration with Hero Textil AG.

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Innovation Campus for Security and Defense

DITF at the official opening at ARENA 2036

INNOVATIONS CAMPUS
SICHERHEIT UND VERTEIDIGUNG
BADEN-WÜRTTEMBERG

On October 12, 2026, the new Security and Defense Innovation Campus in Baden-Württemberg was officially opened at the University of Stuttgart. Approximately 300 guests from academia, industry, startups, the police, the fire department, the THW, and the Bundeswehr attended the kick-off event at ARENA 2036. Among the guests were Minister President Cem Özdemir and Minister of Science Petra Olschowski.

The campus is the state's sixth innovation campus. It is intended to foster closer collaboration between basic research, non-university research institutions, and companies. The goal is to bring innovations more quickly into practical application for national defense, civil protection, and resilience.

DITF demonstrator at the innBW booth

Key topics include space exploration and secure space infrastructure, cybersecurity and resilient energy grids, autonomous systems, drone defense, sensor technology and microelectronics, as well as clinical emergency care.

Marketplace of Expertise

An accompanying exhibition at the "Marketplace of Expertise" showcased projects from companies and research institutions, including specialized vehicles and communication towers, satellite projects, and textile sensor technology.

The DITF were represented at the Innovation Alliance Baden-Württemberg booth and showcased a demonstrator mannequin featuring numerous textile protective and functional solutions for emergency responders. With innovative materials, multifunctional high-performance textiles, and lightweight construction, the DITF can make an important contribution to security and defense. These include sensor-based clothing, integrated early-warning systems for hazardous substances, and flexible lighting and control systems for extreme conditions. The marketplace yielded numerous contacts, new connections, and points of collaboration.

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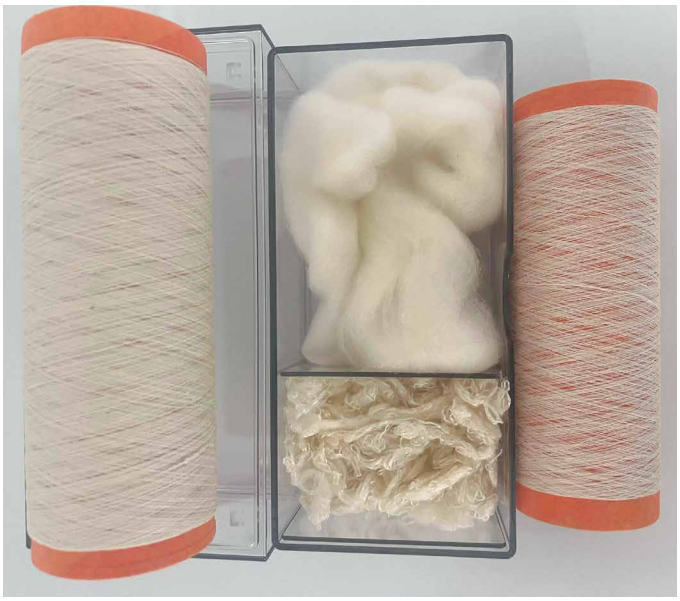
Breaking New Ground with HighPerCell®

Development of Cellulose Staple Fiber Yarns for the Apparel Industry

The DITF are breaking new ground with the production of sustainable staple fiber yarns from domestic, renewable raw materials. The research project is being carried out in collaboration with project partner Gebr. Otto Baumwollfeinzwirnerei and is funded by the UM Baden-Württemberg as part of the "Bioeconomy as a Driver of Innovation for Rural Areas" funding program. The basis for this is the HighPerCell® process, patented by the DITF, which produces high-quality yarns from cellulose continuous filaments. A closed-loop recycling system and a favorable CO_2 balance make the product particularly sustainable for the apparel industry and consumers.

Compared to the viscose process, which generates large amounts of waste, HighPerCell® has a clear advantage: the solvent is completely recycled. In addition, the fibers are less prone to fibrillation and pilling, making them attractive for apparel. The production of staple fiber yarns from the cellulose multifilaments obtained via the HighPerCell® process opens up entirely new applications – and thus new markets – for this fiber type for the first time. The process of producing yarn from staple fibers is technically challenging: It must be precisely tailored to the physical and mechanical properties of the fiber type to ensure a stable yarn that is easy to process. This step, as well as the yarn dyeing, is carried out by the project partner Gebr. Otto Baumwollfeinzwirnerei (Otto Garne).



Filament yarns spun on DITF machines using the HighPerCell® process

The new yarns and textiles are soft and have a pleasant feel, making them ideal for clothing fabrics worn next to the skin.

For industrial-scale production, regional beech wood – which is available in large quantities – is planned for use. Hemp and flax are also being evaluated for suitability. This makes the process CO_2-reducing and economically viable, while regional raw materials enable product placement with high environmental sustainability.

The yarns spun and dyed by Otto Garne are returned to DITF for further processing. There, the project is producing an initial prototype: a T-shirt that is extremely comfortable to wear and has an excellent environmental footprint.

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AI, Data, Digital Production

Projects at the Mittelstand-Digital Center for Smart Cycles

Mittelstand-Digital
Zentrum
Smarte Kreisläufe

The Mittelstand-Digital Center for Smart Cycles provides small and medium-sized enterprises with free, vendor-neutral support for digitalization and AI. The focus is on digital applications for value creation cycles, ranging from digital platforms to networked production. The DITF is a key transfer partner at the center and contributes numerous projects in collaboration with companies. We present three of them here.

Project 1:
Digital Made-to-Measure Clothing

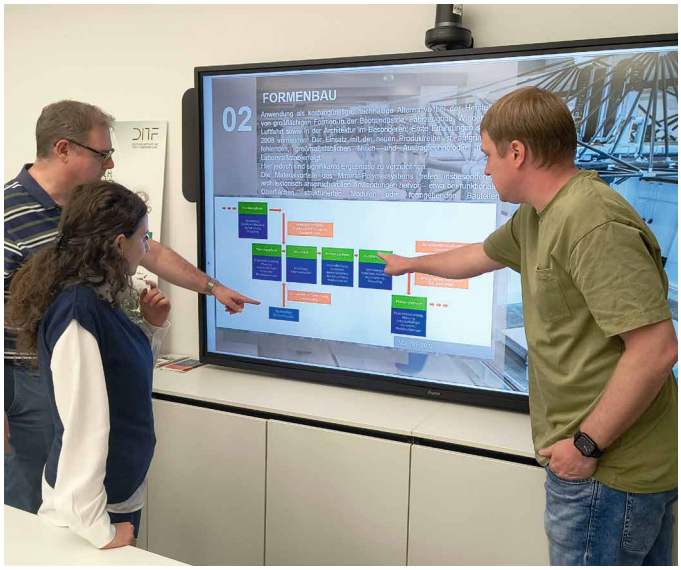
Deralife GmbH, based in Reutlingen, offers customizable premium dog coats in its online store. To further digitize its production, the company is leveraging DITF's expertise in patternmaking and AI. The project focuses on how analog patterns, measurement data, and variants can be integrated into a seamless digital process.

In an initial workshop, the project team analyzed what data is collected, how much of it is available, and how it can be transformed into an automated made-to-measure process. In addition, the existing patternmaking, measurement, and production processes at were analyzed, compared with ideal specifications, and jointly structured. Building on this, a concept for digital base patterns and variant logic, as well as requirements for suitable CAD and data structures, is currently being developed. The end result will be a roadmap for data-driven product development designed to prevent production errors and manual rework.

Project 2:
From Data to an AI Strategy

How does a specific AI use case become the starting point for a company-wide AI strategy? A project with RÖKONA Textilwerk GmbH & Co. KG from Tübingen explored this question. The company manufactures technical textiles, such as shading textiles for panoramic roofs in automobiles.

At RÖKONA, several IT systems operated in parallel without being fully integrated with one another. These data silos hindered automation and the deployment of AI. The goal was



DITF Project Team at the Smart Living Textiles Technology Center

therefore to establish the data foundation for future AI deployment within the ERP system. The first use case focused on AI-supported quotation calculation.

It became clear that not every data structure that had evolved over the years should be transferred unchanged into an AI application. Instead, a practical approach is needed. Generative AI is intended to help employees arrive at well-founded calculations more quickly through structured inputs.

The project also sparked cross-departmental collaboration. This led to the decision to develop a company-wide AI strategy and systematically build AI expertise.

Project 3:
AI-Ready for Composite Materials

The Hessian company FACTICS optimizes manufacturing processes for composite materials that also incorporate renewable materials. The components produced in this way are suitable for use as acoustic elements or wall cladding and can be combined with storage functions for energy, heat, or water. Together with the DITF, the company is investigating which process parameters are critical for reliable production. The use of natural fibers makes this search particularly challenging. In addition, the project is analyzing how data interfaces with the participating companies should be established to ensure efficient data exchange throughout the process chain.

First, the project partners evaluated potential AI applications. The DITF team then analyzed the current manufacturing steps with an eye toward the future target process and identified which data is generated where and how it can be exchanged with machine manufacturers and software providers. The goal is to detect errors early, speed up coordination, and ensure consistently high component quality.

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Service Life of Technical Textiles

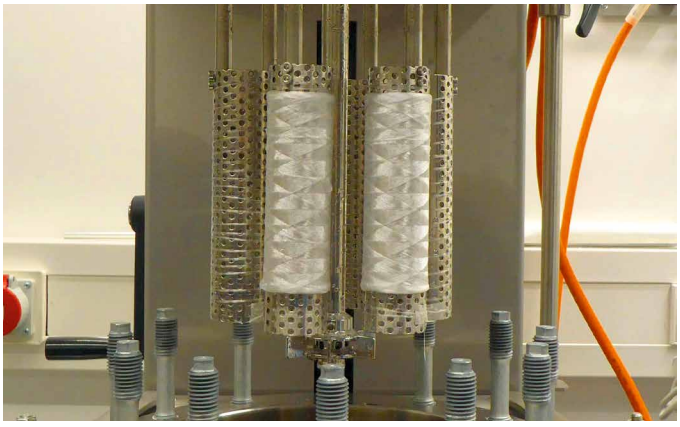
Significantly shortening aging tests with the high-pressure autoclave testing method

Stabilizers protect synthetic polymers in technical textiles from degradation caused by heat, oxygen, and water, enabling service lives of several decades. To reliably predict service life, accelerated and meaningful testing methods are required.

Geotextiles made of polypropylene (PP) and polyethylene (PE) are particularly relevant, as they are required to have service lives of up to 100 years, depending on their application. Conventional aging tests in an oven often take longer than a year. While higher temperatures do shorten the test time, they also alter the aging mechanisms: In PP, for example, the oxidation kinetics change at temperatures above about 80 °C.

This is where the high-pressure autoclave test method comes into play, in which oxidation is significantly accelerated by increased oxygen pressure. This allows for substantially shorter test times even at moderate temperatures. For geosynthetics, the method is established according to ISO 13438; however, reliable comparative data for textiles has been lacking until now. In an IGF project, the Barrier Textiles team at DITF has now established the methodological foundations for its application in the textile sector.

For the tests, PP yarns were produced from seven differently stabilized compounds and aged comparatively at 80 °C: for up to six weeks in a high-pressure autoclave, underwater at 50 bar O_2 pressure, and for up to 480 days in a dry oven. Aging in the autoclave resulted in a decrease in the residual ultimate tensile strength to 80 % within 10 to 30 days and to 50 % within 14 to 46 days. In contrast, after 480 days of oven aging, changes were detectable only in the thioether compounds examined.



Treatment coils mounted in full configuration on the autoclave bracket

The acceleration factors determined ranged from 32 to 35 for residual maximum tensile strengths below 80 %, depending on the material composition. A follow-up project is intended to translate the results into industrial applications. The project committee, which represents industry sectors ranging from masterbatch manufacturers to users of stabilized PP products, considers the results to be groundbreaking.

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DITF Sustainability Report 2025

The DITF's second sustainability report is now available online. It includes the key elements of sustainability reporting in accordance with the EU Sustainability Reporting Directive (CSRD) and, in its simplified form, the "Voluntary Sustainability Reporting Standard for SMEs" (VSME) for small and medium-sized enterprises. This includes a clear definition of goals based on state requirements and the Energy Efficiency Act:

1. Climate neutrality by 2030
2. Energy efficiency improvements of 2 % year-over-year through 2045

The European Union's guidelines on the Green Deal and the resulting sustainability measures have a direct impact on our research activities and our infrastructure across 25,000 square meters of research and production space.

To combat climate change, the DITF must also eliminate its CO_2 emissions as completely as possible in the coming years, which requires significant analysis and planning efforts as well as substantial investments in building technology.

The DITF have expanded the 2025 report to include topics from its research and development projects that focus on sustainability in the textile industry.

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SMART TEXTILES 2027 User Forum

Anwenderforum
SMART TEXTILES

The renowned event organized by DITF, FKT, and TITV on the topic of smart textiles will take place in Rankweil, Vorarlberg, in 2027. The program begins on the afternoon of March 17, 2027, with a guided tour of Getzner – one of the world's most modern fabric manufacturers. Getzner is known for its development of innovative fabrics and functional solutions in the field of smart textiles. During the forum, the company will present its latest developments and offer a glimpse into the technical weaving facility at TFE Textil GmbH in Nüziders, as well as the dyeing, finishing, and contract finishing operations at Getzner Finishing GmbH & Co. KG in Rankweil.

The following day will feature a comprehensive program of presentations on smart products, services, and technologies in the D-A-C-H region. The main topics of the 2027 Forum are applications of smart textiles in the following areas:

> Health
> Civil Protection & Defense
> Personal Protective Equipment & Safety
> Human-Machine Interaction

The forum is aimed at executives and developers who want to harness the potential of smart textiles.

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Denkendorf Innovation Day

The DITF event on February 25, 2027, will feature a wide-ranging program of presentations showcasing fiber-based research and development – from the molecular level to the finished product – and will offer insights into modern manufacturing processes in practice at the through a tour of the technical facilities and laboratories. It is aimed at specialists and executives, new employees in the industry, and partners from academia and business. Take advantage of this opportunity for in-depth knowledge and technology transfer.

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Fairs & Events

	2026
November 04 – 05	39th Hof Nonwovens Days, Hof – DITF Booth
November 10	GoTex, Reutlingen University of Applied Sciences – DITF Booth
November 16 – 19	Medica/Compamed, Düsseldorf – DITF and ITVP at the bw-i joint booth
November 17 – 18	Conference on Clothing and Personal Equipment for a Combat-Ready Bundeswehr, Bonn – DITF Booth
November 24 – 26	E-Textiles Conference, Pilsen (Czech Republic) – DITF booth, pitch, participation in poster exhibition
November 26 – 27	ADD International Textile Conference 2026, Dresden – DITF Booth, Presentations
	2027
January 24	Functionalization Forum, Denkendorf – Collaboration between DITF, Hohenstein, and AFBW
February 04	Official opening of Cyclotexum, Denkendorf
February 25	Denkendorf Innovation Day
March 01 – 03	EnforceTac 2027, Nuremberg – DITF at the bw-i joint booth
March 02 – 04	JEC World, Paris – DITF at the bw-i joint booth
March 17 – 18	SMART TEXTILES User Forum, Rankweil (Austria) – Collaboration DITF, FKT, TITV
April 22	Girls'Day, Denkendorf

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