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RESET

RESearch Centres of Excellence in the Textile Sector

ACTION PLAN

Supporting the Saxon Textile and Clothing Sector by Innovation and Know-how Transfer

Project Partner:
Saxon Textile Research Institute

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1 General information

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2 Introduction

2.1 Background of the Action Plan – T&C sector

The European textile and clothing sector is a highly relevant economical source for the EU, accounting for 4% of the total added value of the manufacturing sector, with 173.000 companies and a turnover of 165 billion €. Its competitiveness is linked to increased investments in innovation and research (public and private) which are key drivers for European companies to lead the market in the coming years. Due to its enormous environmental impact, sustainability and environment-friendly production it is emerging as a new driver of textile processes, product innovation and technology development.

The overall objective of the project RESET is to generate a policy change in the implementation of regional policies and programmes of the Structural Funding related to the strengthening of research, technological development and innovation to assure the sustainability of the T&C sector in the partner regions. It will be achieved through policy learning and capacity building activities in public policies supporting innovative, green and sustainable T&C production and processes. The learning potential embedded in an interregional exchange will result in the uptake of innovative Good Practices and projects by the partner regions enabling to support excellence in R&D, to promote investments by enterprises, to develop innovative skills of T&C stakeholders, and in a deeper integration between research and innovation policies for the sector's sustainability. Sustainability driven research and innovation will concern primarily the production processes and product development and addresses six key themes:

// Recycling in textile and waste disposal
// Water consumption and energy saving, sustainable company organisations
// New sustainable chemistry, including reduction of chemical substances
// Smart textiles and new ways of production
// Eco-creativity, natural fibres, short value chains
// New materials and new applications

Saxony is one of the traditional textile regions in Germany and Europe. With the German reunification substantial structural changes took place at the beginning of the 1990s. In the first half of the nineties, the number of employees in the German T&C sector was drastically declined by 92%. The downward trend in the T&C sector could be stopped from the year 1995 on. During the last decades, the Saxon T&C sector mainly characterized by small and medium-sized enterprises (SMEs) underwent a profound transformation process of the branch. The current number of companies with more than 20 employees is around 100. Currently, about 8.000 employees are working for the branch. (Source: Statistics of VTI (Association of North-Eastern German Textile and Clothing Industry)

The T&C sector in Saxony is gone through a stable and continuous development for the last years. In 2016, the total turnover has been increased by 1.5% and the export rate by 4%.

Saxony is one of the few European regions having a closed textile chain. It comprises spinning and weaving mills, nonwoven producers, finishing companies, knitting and stocking companies, producers of home textiles and household textiles, designers and ready-to-wear garment makers for protective clothing and fashion as well as producers of technical textiles. Furthermore, Saxony has a wide-ranging and high-performance academic landscape with 4 universities, 5 universities of Applied Research, 5 art academies, 32 non-university research institutions and 30 private non-profit branch-related research institutions.

2.2 Background of the Action Plan – RESET

One of the performance indicators of RESET for STFI is to increase the number of interested SMEs from the T&C sector and to initiate research projects between R&D centres & enterprises which is also the very own task of STFI as a research institution. Deriving from this, the activities of STFI in RESET are mainly focused on the dissemination and implementation of Good Practice examples learnt from the thematic workshops in project phase 1 aiming at the creation of new R&D projects. Based on the Interregional Learning Process with seminars/workshops (Key topics see below) and staff exchange events to deepen the knowledge, learning will be transformed into actions via the Action Plan in project phase 2. Following the thematic subjects of the RESET project and the lessons learnt from them, STFI is focusing on the priorities listed below to implement new technologies (GPs) and to initiate R&D projects.

Key topics
Recycling in textile and waste disposal: experience and knowledge in the management, processing, transformation and re-use of different sources of textile waste
Water consumption and energy saving/Sustainable company organisation: actions and measures to ensure an efficient use of energy and water to improve the competitiveness of textile companies
New sustainable chemistry, including the reduction of chemical substances: sustainable chemistry encompasses the design, manufacture and use of efficient, effective, safe and more environmentally friendly chemical products and processes
Smart textiles and new ways of production: key areas of development are nano-fibres, hybrid fabrics, miniaturisation of electronic components and the increased application of electronic textiles in innovative wearable products
Eco-creativity, natural fibres and short value chains: eco-friendly textile goods and technologies that minimize power consumption, CO_2 emissions and the volume of waste generated at every manufacturing stage, are a priority for the textile and clothing sector, stimulating the development of modern technologies in European regions
New materials and new applications: new materials are being developed with an incredible range of functionalities, capable of containing explosions, protecting firefighters, providing anti-bacterial protection, maintaining the structural integrity of built structures and providing high performing filtration and containment

Furthermore, through the support by regional stakeholders (branch-related associations, Chamber of Commerce, clusters) the project results will also be disseminated and policy recommendations for special research fields (such as textile recycling or smart textiles) can be given.

3 Policy context

The Action Plan aims to impact:

- ☐ **Investment for Growth and Jobs programme**
- ☐ European Territorial Cooperation programme
- ☐ Other Regional Development Policy Instruments

3.1 ERDF Regional Operational Programme of the Saxony Region from 2014-2020

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EFRE
Europäischer Fonds für regionale Entwicklung

The aim of the ERDF ROP 2014-2020 of Saxony (Priority axis 1) is to strengthen the research, technological development and innovation through the support of applied research to improve the innovative capacity of the Saxon economy and thus its competitiveness. To achieve this goal, the Policy Instrument shall strengthen the applied research at universities and other research institutions of Saxony. The Policy Instrument is designed to open up more research and development potential in the field of public research and to enhance its exploitation. The competitiveness of SMEs in the T&C sector in Saxony will be improved in particular by the support for increasing productivity, for the market introduction of new, innovative products and processes, and for the development of a strong technical infrastructure.

3.2 RIS3 Strategy (Research and Innovation Strategies for Smart Specialisation)

S3 SMART SPECIALISATION PLATFORM

RIS3 is a regional innovation strategy and an instrument to involve actors in regional policy development and implementation. It defines the „smart specialisation“ and the targeted use of funding in Saxony for the period 2014-2020 and is directed onto the interfaces between traditional and innovative branches, Key Enabling Technologies (KET) and future subjects with a high growth potential to transfer innovative ideas into a market success. For Saxony and its textile and clothing enterprises smart specialisation does mean: openness to novel technologies, cross-sectoral and interdisciplinary orientation to innovation activities and technology as well as orientation towards offer and demand. Priorities are innovation management, financing of innovations, thematic cutting-edge fields (environment, energy, raw materials, and sustainability) as well as education of specialists.

3.3 Central Innovation Programme for SMEs (ZIM)

The Central SME Innovation Programme (ZIM) is German funding programme for SMEs and research institutions co-operating with them. It is open to all technologies and sectors.

Under ZIM, cooperations between SMEs and research institutes can be awarded with grants for R&D projects focusing on the development of new products, technical services and better production processes. Funding may be provided for individual R&D projects focusing on the development of innovative products, processes or technical services. Apart from R&D projects undertaken by SMEs, funding may also be provided for services that support a market launch.

Funding may be provided for single R&D cooperation projects or cooperation networks undertaken by several companies or between companies and research institutes focusing on the development of innovative products, processes and technical services. The German Federal Ministry of Economic Affairs and Energy (BMWi) is acting as funding authority.

Cooperation projects funded under ZIM can also be carried out as international projects with partners from other countries (companies or research institutes). STFI is working very often with this funding scheme since it is an application-oriented and industry-driven research institute mainly working together with SMEs.

4 Planned Actions

The RIS3 Strategy (Research and Innovation Strategies for Smart Specialisation) defines the targeted use of funding in Saxony for the period 2014-2020. Following this direction, one main objective for STFI is to involve R&D partners and SMEs into innovative joint research projects. New inspiration and ideas for such collaborations were coming from the RESET project and the Good Practice (GPs) examples exchanged within the thematic workshops in the first two project years of RESET. As defined in the RESET project proposal, the performance indicator for STFI is to create 4 research projects between R&D centres and enterprises within the duration of the RESET project. Based on all outcomes and knowledge gained within the Interregional Learning Process in the project phase 1 (04/2016 until 03/2019), the following research projects and project proposals could be derived for the Action Plan of STFI to be implemented in the project phase 2.

4.1 Implementation of projects deriving from selected RESET GP examples into the Saxon region

Project 1: Development of a new technology to produce purpose–adapted reinforced nonwovens from recycled carbon fibres

1. The background

Innovative technologies for the reutilization of raw material from textile waste are nowadays very important to increase the recycling rate in the textile sector and to contribute to circular economy and an increase of the resource efficiency. To use recycled materials does not only save costs, it leads furthermore to a better exploitation of the material potential and promotes a "design-for-recycling" concept. The described project has mainly been influenced and inspired by the thematic seminar of RESET on "Recycling in textiles and waste disposal" held in Alcoi (ES) in October 2016 and the GPs presented there.

2. Action

The main aim of the project is the development of a novel technology to produce purpose-adapted reinforced nonwovens from recycled carbon fibres (rCF). Within the project, nonwovens made from recycled carbon fibres used as substrate for technical embroidery in Tailored Fiber Placement (TFP) are developed. In contrast to the state-of the-art, the nonwovens will be manufactured partly or completely from recycled carbon fibres without any binders. Besides the classical fibre-reinforced plastics (FRP) based on thermoset matrices also fibre-reinforced plastics with thermoplastic matrices are subject of the technical investigations. The substitution of currently used scrims and woven fabrics as embroidery substrate (5 to 50% of the total component volume) by rCF nonwovens will bring a significant reduction in costs of the components. Furthermore, the rCF embroidery substrate can be optimally reinforced by a specific placement of the roving via TFP technology. Thus, the production of high-performance FRP components with a share of recycled fibres up to 50% becomes possible. Advantages in using rCF nonwovens as embroidery substrate is given through decreased material expenses and also a varietal purity (rCF nonwoven/carbon roving) supporting the "design-for-recycling" concept for components. In summary, the project results will contribute to waste reduction/prevention, resource efficiency of used materials, an improved recyclability of structural elements and lower energy consumption.

3. Players involved

The project is a joint action between Saxon Textile Research Institute Chemnitz (STFI) and Leibniz Institute of Polymer Research Dresden (IPF). The results gained in the project are the basis for future service activities in consulting and development to support especially regional SMEs. Furthermore, the spin-off of a company and therefore the creation of new jobs are in the focus of the project.

4. Timeframe

The project has been granted in March 2018 and the project duration is from April 2018 until March 2020.

5. Costs

The total funding for STFI amounts to 189 000 €.

6. Funding sources

Funding is provided from the Saxon ERDF via the Saxon Development Bank (SAB).

Project 2: RE4TEX – New technologies for textile recycling (cooperation network)

1. The background

One of STFIs main fields of experience and research activities is the recycling of textile waste. Besides a lot of research activities in this field, STFI was participating 2018 in a so-called innovation forum named "TexCycle – New technologies and ideas for the recycling of textile production waste" funded by the German Federal Ministry of Education and Research (BMBF). It was dedicated to support Saxon SMEs in finding new ideas and approaches for the recycling of textile production waste. Furthermore, the first thematic RESET seminar on "Recycling in textile and waste disposal" held in Alcoi (ES) in October 2016 has been of special interest for STFI. Following the presented GP examples on "Textile Recycling Valley" and "Waste management in Prato District", a proposal for a national cooperation network "RE4TEX – New technologies for textile recycling" was initiated by STFI where 8 Saxon SMEs participate. The proposal was submitted under the "Central Innovation Programme for SMEs" (ZIM).

2. Action

The production of reclaimed fibres from worn textiles and their processing into textile products has been known for centuries as an effective recycling solution and is one of the oldest material cycles of the world. But textile products undergo a continuous further development and in the same context also the requirements for textile recycling are steadily increasing. Novel raw materials and material combinations and the rising specialisation of the textile industry lead to higher technical/technological and economic challenges for the textile recycling. Driven by these facts and based on one of its core competencies, STFI decided to bundle research and development activities in the field of textile recycling in a joint cooperation network together with interested SMEs from the Saxon textile and clothing sector. Aim of RE4TEX is the optimization of existing and also the development of new innovative recycling techniques. In the focus are methods of design for recyclability and sustainable management in the recovery of raw materials from textile waste and their reutilization, closed materials cycles, the increase of recycling rates by means of innovative methods and a reduction of the waste amount during the production processes. At least 4 technology-oriented or material-specific single projects will be elaborated by the participating SMEs and research institutions covering individual recycling solutions which will be implemented during the duration of the network project. The main research topics are: recycling of smart textiles, recycling of special and high-performance fibres (such as carbon fibres), direct processing of textile production waste into novel products, and processing of production waste (such as waste from nonwovens and coated textile fabrics) which cannot be processed into fibres.

3. Players involved

Core partners are: 2 research institutions (Saxon Textile Research Institute Chemnitz (STFI) and TITV Greiz), 8 Saxon SMEs, 2 SMEs from Thuringia and Bavaria, 2 associated partners (T&C sector and recycling sector)

4. Timeframe

The proposal has been granted in February 2019. The project duration of the project phase 1 is from April 2019 to March 2020. A project phase 2 (implementation of projects) with a duration of two further years (April 2020 until March 2022) will be applied for at the end of project phase 1.

5. Costs

The total funding for STFI amounts to 158 000 €.

6. Funding sources

The proposal was submitted under the "Central Innovation Programme for SMEs" (ZIM) and is funded by the German Federal Ministry of Economic Affairs and Energy (BMWi).

Project 3: "Wear2Go"Eco-Stitching Technology as recycling method

1. The background

During the thematic RESET seminar on "Recycling in textile & waste disposal" held in Alcoi (ES) in October 2016 a Good Practice example on "Wear2 Ecostitching Technology" was presented by RESET partner TCoE (GB). This GP example was selected by STFI for the staff exchange to gain detailed knowledge on the technology presented. STFI has been dealing with recycling of all kinds of textile waste for more than 25 years. The equipment and know-how concerning textile recycling available at STFI meet the highest international state. STFI did comprehensive research work on how textile production waste can be treated and re-used in the production process. Therefore, STFI is always interested in innovative technologies to treat textile waste and re-use it for textile products. The intention why the mentioned GP has been selected is to learn more about the microwave technology used for recycling processes and to prove how feasible the Good Practice example could be for Saxon companies (such as yarn producers, recyclers, textile manufacturers) cooperating with STFI. Technical background: Fabrics for garments are produced in a "normal way" within the textile manufacturing process. Special yarns/threads are used in the sewing process to join together various parts of the garment. These newly developed yarns replace the traditionally used cotton/polyester/nylon threads currently employed for the purpose. Following sustainability aspects, a garment has to be dismantled after the end-of life to use the textile material components for recycling or a secondary use. When the garments are subjected to the microwave plant, the tensile strength of the sewing yarn can be significantly reduced and the garments are separated into their various shapes. Labels, zips, buttons and other fastenings can be easily removed. Afterwards, the fabrics will be reassembled into new garments or easily returned back to a fibrous form for remanufacturing into yarns and fabrics or for the production of nonwovens applied as technical textiles.

2. Action

The implementation of the described Good Practice will be done with the Saxon company HILLCON. Company HILLCON (producer of cleaning/wiping products made from high-quality fibres) uses the WEAR2GO yarn to produce samples of cleaning wipes or mops. For separating the textile parts, the final products will be tested in the microwave plant of WEAR2GO in the Netherlands. STFI will be the accompanying research partner for this action and is responsible for organising the field tests in the Netherlands, the optimisation of product samples in cooperation with HILLCON as well as for the follow-up activities of the know-how transfer. If the technology transfer is proved as feasible, further companies (producers of garments or technical textiles) will be searched which are interested in this technology.

3. Players involved

The Saxon company HILLCON (producer of cleaning/wiping products made from high-quality fibres) was selected for the implementation of the Good Practice. Cooperation is done with STFI.

4. Timeframe

In September 2018, a technical meeting took place with the company WEAR2GO (NL) which is now the owner of the patent for the yarn and the microwave technology for separating garment parts. An on-site visit of WEAR2GO is planned for spring 2019 where some tests with technical products manufactured by company HILLCON are planned. Project phase 2 (until March 2021) is afterwards foreseen for the implementation of the Good Practice at industrial scale.

5. Costs

For the first test phase the occurring costs will be limited to material costs for the yarn. To build up a recycling concept using WEAR2GO technology will require investment costs for machinery and also involve the payment of licencing fees. This financial issue has to be clarified with company WEAR2GO.

6. Funding sources

Funding is not necessary by now. After approval of feasibility of the Good Practice, funding can be needed for investments into machinery or for development and research to find further applications.

4.2 Initiation of new R&D projects funded by the Saxon ERDF or other funding schemes

Project 4: Load bearing structures – Active areas with reactive structures for urban spaces

1. The background

The Free State of Saxony has a great variety of textile companies as well as R&D institutions with a high innovative capability. They develop textile products for the future with qualitatively novel functions and applications, for instance in the field of industrial and building textiles. Thereby, new closed value added-chains combining design, technology, economics and service are created. In the focus of R&D activities is the use of new raw materials, composites, innovative material alloys, and intelligent hybrid materials. Following the innovation strategy of the Free State of Saxony, the described project is assigned to the thematic future field "energy" with main focus on energy efficiency in all production processes, resource efficiency and reduction of energy consumption. The described project has been influenced and inspired by the thematic seminar of RESET on "New materials and new applications" which was held in Huddersfield (GB) in January 2018 and the GPs presented there.

2. Action

The aim of the project is the development of large-scale, multifunctional, modular, textile-based reactive structures for the application as lightweight plane load-bearing structures for urban spaces. Thereby, the active areas containing reactive structures can be seen as a novelty. Currently, structures/ fabrics are of static nature and not able to change/adapt their shape or geometry. Objective of the project is to develop a calculation model and different variants for implementation of thermally active and energetically closed structures to improve the functionality and the performance of the load-bearing structures. The entire industrial processing chain from the architecture, the production of textile fabrics (including sensors and functionalities) up to the construction of load-bearing structures will be investigated. Different components for energy harvesting, a reduction of snow load, heat absorption and reflexion and shading will be integrated to give the structure functionalities and a smart character. The following technical parameters are envisaged: free shapeability of the textile structures by means of "textile joints", functionalisation via integrated sensitive materials (for instance sensors detection cases of loading (such as snow) and able to react by appropriate measures (melting)), and hybrid design by combining classical steel construction with lightweight elements.

3. Players involved

The project is a joint action between the Saxon Textile Research Institute Chemnitz (STFI) and the Institute of Lightweight Engineering and Polymer Technology (ILK) at Dresden University of Technology and 3 Saxon SMEs.

4. Timeframe

The project has been submitted in September 2018 and has been approved in spring 2019. The project started on 1st April 2019 and the duration of the project will be 36 months.

5. Costs

The total funding for STFI amounts to 438 000 € (applied amount).

6. Funding sources

The funding is provided from the Saxon ERDF via the Saxon Development Bank (SAB).

Project 5: Health textile – cross-border cooperation in health management (CrossTEX)

1. The background

The market of health management is a prosperous one in Germany and also in the Czech Republic. In both countries a deep structural change in the textile and clothing sector from classical textile production towards the production of technical textiles happened after the German reunification at the beginning of the 1990s. Business chances are nowadays coming from the segment of technical textiles. These high-performance textiles gain more and more access to the health sector and offer a high potential for innovative products. The sector of health management requires complex solutions from one source. Furthermore, the market access is only possible through innovative products. Companies in Saxony as well as the Czech Republic have already been dealing with the topic health textiles and health management in previous years. The range of application fields and the similarities of both markets suggest a cooperation of SMEs together with research institutions and the cooperation within a strong network. The described project has been influenced and inspired by the thematic seminars of RESET on "Smart textiles and new ways of production" which was held in Chemnitz (DE) in June 2017 and "New materials and new applications" which was held in Huddersfield (GB) in January 2018 and the GPs presented there.

2. Action

Aim of the project CrossTex is

- The establishment of a bilateral cross-border cooperation network of SMEs and research institutions using the complementary skills and experience
- To become a cross-border provider for complex solutions for health textiles
- The development of joint R&D projects covering topics of interest for the health management sector in Saxony and the Czech Republic
- The market exploitation of small and medium-sized healthcare and wellness institutions in Saxony and the Czech Republic by cooperations with regional partners
- The increase in market opportunities through improved services and solution offers
- The increase in the level of awareness in the health management sector

Following the know-how of the participating companies and existing market trends the main technological topics for R&D will be textiles for orthopedics and rehabilitation as well as smart textiles for the care sector.

3. Players involved

Core partners will be 10 Saxon and 4 Czech SMEs from the textile sector.
Furthermore, 3 associated partners from Germany (among them the Saxon Textile Research Institute Chemnitz) and 2 associated partners from the Czech Republic will participate.

4. Timeframe

The project has been submitted in February 2019 and is now under evaluation. The proposal has been positively evaluated and is additionally supported by the Saxon Ministry of Economic Affairs, Labour and Transport. The grant notice is expected for summer 2019. After approval the duration of the project will be 18 months.
If the project, contrary to the expectations, will not be funded as bilateral cross-border cooperation network, the follow-up option is to organize/submit under the same funding programme single projects on national level.

6. Funding sources

The proposal was submitted under the "Central Innovation Programme for SMEs" (ZIM) and will be funded in case of approval by the German Federal Ministry of Economic Affairs and Energy (BMWi).

5. Monitoring the Action Plan

Monitoring activities for the Action plan are foreseen during the project phase 2 (April 2019-March 2021) and will be supported by regional stakeholders. The state of fulfilling the actions and the given performance indicators will be checked regularly.

Action	Planned output/ Key indicators	Monitoring tools
Action 4.1 Implementation of projects deriving from selected RESET GP examples into the Saxon region	Working progress of the running projects, number of new projects coming out from the cooperation network	Minutes of meetings, number of technical meetings, activity reports, demonstrator samples
Action 4.2. Initiation of new R&D projects funded by the Saxon ERDF or other funding schemes	State of the evaluation process, start date of projects, working progress (in case of approval)	Evaluation report, minutes of meetings, number of technical meetings, activity reports, demonstrator samples

6. Impact of the Action Plan and summary

The implementation of new technologies learnt from the RESET GPs via the initiation of projects or cooperation networks will be the main output of the Action Plan. The state of the fulfilment is proven via the set Key Indicator for STFI with 4 R&D projects. The Action Plan is directed towards strengthening the Saxon T&C sector by launching new technologies, sustainable processes, novel materials and applications. Influencing the Policy Instrument through fostering the participation of the textile and clothing sector in R&D and innovation projects aiming at the increase the competitiveness of T&C SMEs can be seen as main impact of the Action Plan. The idea behind the RESET project to improve regional strategies is also a good possibility for STFI to support the regional development in Saxony and to strengthen the region. So far, the territorial impact can be seen in the know-how and knowledge gained by the exchange of GPs and the mutual learning process within the RESET project supporting the creation of new innovative ideas and the initiation of new research projects for sustainability in the textile sector. Impact is also coming through the networking of regional stakeholders from authorities, associations, industry, R&D and branch-related clusters. Furthermore, the experience to be partner in a European project and to contribute with special competencies to the transfer of know-how between the participating regions is of great importance for STFI. To have intercultural communication and to build up new relationships with European partners are very essential project outputs for STFI also in the context of future regional and /or European cooperations.