BioCushion

Creation of an application-specific guideline for the development of recyclable spacer fabrics

We see them every day when we put on our sneakers, pack our laptop in our backpack or sit in our car seat. We are talking about spacer fabrics. Spacer fabrics are textile constructions consisting of two cover surfaces that are kept at a defined distance from each other by a woven layer and ensure greater comfort thanks to their cushioning and air permeability properties. However, the products available on the market are mostly petroleum-based fabrics. To change this, the Textile Research Institute Thuringia-Vogtland e.V. (TITV) is working with industry partners in the BIOTEXFUTURE project „BioCushion“ to find ways to replace petroleum-based spacer fabrics with recyclable product twins and to create guidelines for developers and for the use of these new solutions.

BIOTEXFUTURE is an innovation space funded by the Federal Ministry of Education and Science, aiming to contribute to the transition of the textile industry from petroleum-based to bio-based. Approximately 20 individual technical projects have already been or are currently being implemented within the innovation space, one of those is BioCushion. To ensure that the research leads as soon as possible to concrete economic results, partners from industry are also involved in every BIOTEXFUTURE project. In the case of BioCushion, these are adidas AG and zwissTEX Germany GmbH. You can find out more about the BioCushion project below.

Our motivation

Thanks to the large number of variable parameters for textile structures and their various properties, spacer fabrics are attractive for use in countless application areas. Due to their three-dimensional structure, these textile substrates are often used as upholstery elements and there are increasing requests from the industry to replace usual foam components with these spacer fabrics. But does the substitution also bring an improvement in terms of sustainability? Although the growing range of new yarn materials promises more sustainable production, the majority of textile products are still of fossil origin. There are many reasons for this situation. Due to tight order deadlines designers and developers often need to balance between the search for new raw materials and the requirement to comply with quality standards. The approach to a sustainable product solution often ends with the selection of a suitable yarn in order to avoid the risk of reduced functional reliability.

What we intend to achieve

The project aim is to develop an application-specific process description for the development of recyclable spacer fabrics that can be used on an industrial scale and may also be adaptable for other application areas. During the project period, available materials are to be catalogued, tested and compared with the determined requirements for various spacer fabrics from the upholstered furniture

sector. The development of a concrete illustrative object, from the field of sportswear is also planned in cooperation between the scientists and the project partners from industry. Predefined performance comparisons with conventional products are to be carried out and evaluated on this model, scientifically referred to as a demonstrator.

This is how we proceed

There are many material and application-related studies. Focused on one scientific sub-area, these reports often only provide approaches to solutions that we ourselves have to put together like pieces of a puzzle in correlation with other design parameters in order to achieve an optimal product result. If the transition to holistic and sustainable product development is to succeed, this resource-intensive process must be simplified for companies. For this reason, the BioCushion project team has set itself the goal of creating a development guideline focussing on the recyclability and CO2 reduction of the respective knitted fabric to facilitate for manufacturers and garment makers the research of new raw materials, such as environmentally friendly yarns, for product-specific applications. The work of the consortium is primarily intended as basic research in the field of spacer fabrics. Although these are already used in numerous areas of application, there have so far been hardly any research projects on environmentally friendly new developments in this field. BioCushion therefore intends to set a milestone in the direction of the bioeconomy.

Current status

For the first project year 2024, the focus has been primarily on setting up two databases (DB). In addition to recording the requirements for currently produced, petroleum-based spacer fabrics (DB1), a catalogue (DB2) will be created with bio-based and/or recycled yarns and with the petroleum-based yarns that are currently processed in the products examined in DB1. For the second database, not only information on the mechanical properties is recorded, but also those ecological decision parameters that can influence the life cycle assessment of the product outside of textile technology development processes. The next step is to combine the results from both databases in order to obtain a tool that, when queried, suggests suitable bio-based or recycled yarn products for the specific upholstery task in question. A particular challenge here is the fact that seven different yarn systems with different gauges are sometimes used to create a textile substrate to produce spacer fabrics. This will be followed by many proof-of-concept tests on a laboratory scale, which are scheduled to take place primarily in the course of 2025. To show that the substitution of petroleum-based yarns is feasible, a “demonstrator” from the sportswear sector is to be created as part of these tests. The guideline compiled as part of the project is primarily intended as a tool for designers and developers. The BioCushion project team is therefore always interested in input from experts in the fields of spacer fabric and yarn development, polymer research and sustainability.

Project partner

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About BIOTEXFUTURE

BIOTEXFUTURE is an innovation space for research on bio-based textiles funded by the Federal Ministry of Education and Research (BMBF). It is implemented in cooperation between RWTH Aachen University (ITA, Institute of Textile Technology and STO, Chair of Sociology of Technology and Organization) and adidas AG. The industry and research partners are working together on the conversion of textile value chain from petroleum-based to bio-based.

Website: www.biotexfuture.info

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