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KICKup - Establishing AI-supported closed loops for B2B textiles made from cotton-polyester blends based on chemical upcycling

B2B textiles, such as those processed as flat linen (bed linen, table linen, terry towels) or workwear in industrial laundries (textile service), can make an important contribution to resource conservation and environmental protection at the end of their use phase if they are returned to fiber use. Textiles consisting primarily of cotton-polyester blends are already being downcycled in large quantities (e.g. into cleaning cloths, insulation materials), but the conversion into a circular textile value creation system and the necessary closing of the loop are still in their infancy.

However, certain used textile product streams can already be fed into a chemical fiber-to-fiber upcycling process. In this process, cotton and polyester fibers are separated. The cellulose pulp obtained from the cotton content can be used as an admixture to make new regenerated cellulose fibers, e.g. the lyocell fibers Refibra™ (Lenzing), and reused in this form as a cellulose component in reusable B2B textiles. The extent to which these textiles can be repeatedly recycled after use in the sense of the closed-loop system is unknown and will be investigated and evaluated in this project.

One of the biggest challenges for economically reasonable use is ensuring a defined and quantitatively large waste stream, separating the textiles in the textile service companies to deliver pre-sorted material streams and the subsequent logistics to the recycling company. There is currently no automatic sorting of used textiles, e.g. by fibre mix ratio, which has so far led to major obstacles in the realization of complete recycling with sufficient profitability (cost reduction).

This project aims to develop a standardized and simple solution for fully automated textile sorting for all companies as a logistical basis for a practical textile circular economy in order to increase the proportion of post-consumer waste that can be used for recycling and to significantly reduce the use of raw materials.

The following key objectives are associated with this:

- Ensuring defined and quantitatively large flows of used textiles via automated sorting processes supported by artificial intelligence (AI)
- Separation of textiles in the textile service companies to deliver pre-sorted material flows composed of definable cellulose material components
- Development of transport logistics to the recycling companies to ensure the transparency of the material flows (including transaction certificates)
- Design for circularity, i.e. construction and design of yarns, textile fabrics, finishing processes and end products for different generations of the circular economy, so that product life is increased on the one hand and recycling is supported on the other
- Life cycle analysis for the new parts of the cellulose cycle to identify the ecological benefits

Duration

01.01.2023 – 31.12.2024

Project consortium / Funding

Dibella GmbH in Bocholt is the consortium leader, other cooperation partners are VEGA Systems Wash Technology Germany GmbH in Badem and Reutlingen University, Teaching and Research Center Process Analysis & Technology (PA&T).
Lamme Textile Management GmbH in Bad Vilbel and Södra Skogsägarna ekonomisk förening, Group Sourcing in Väröbacka (Sweden) and Lenzing AG in Lenzing (Austria) are supporting this project as associated partners.
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Contact

Dr. rer. nat. Michael Korger
Surface modification of textiles, digital and 3D printing technologies
- Raum: Z 113 (Richard-Wagner-Str. 97)
- Telefon: +49 2161 186-6099
- michael.korger(at)hs-niederrhein.de

Prof. Dr.-Ing. habil. Maike Rabe
Head of Research Institute “FTB” Textile Finishing and Ecology
- Raum: Z 110
- Telefon: +49 2161 186-6110
- maike.rabe(at)hs-niederrhein.de

Contact

Dr. rer. nat. Esther Rohleder
Surface modification of textiles, plasma technologies, enzymes

- Raum: Z 112 (Richard-Wagner-Str. 97)
- Telefon: +49 2161 186-6008
- esther.rohleder(at)hs-niederrhein.de