WP T2 – INNOVATION ON TEXTILE WASTE MANAGEMENT

ACTIVITY A.T2.3 PILOT CASES

D.T2.3.2 PILOT CASES

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Partner:
PP5 Saxon Textile Research Institute
(Saxony)

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ENTeR – Expert Network on Textile Recycling

ENTeR works in five central European countries that are involved in the textile business, to promote innovative solutions for waste management that will result in a circular economy approach to making textiles.

The project will help to accelerate collaboration among the involved textile territories, promoting a joint offer of innovative services by the main local research centres and business associations ("virtual centre"), involving also public stakeholders in defining a strategic agenda and related action plan, in order to link and drive the circular economy consideration and strategic actions.

The approach of the proposal and the cooperation between the partners is oriented to the management and optimization of waste, in a Life Cycle Design (or Ecodesign) perspective.

CONTENT

1. Pilot case description – aim and scope

STFI contacted the company Textilausrüstung Pfand GmbH, Lengenfeld (DE) as partner for the Pilot case.

Company Textilausrüstung Pfand GmbH offers contract finishing and functionalization of high-quality home textiles, household textiles and textiles for public areas, functional fabrics for clothing and technical textiles. Novel and innovative finishings for technical products, functional textiles and high-quality home textiles coming from own research and development activities are the basis for a steadily improving product range of the company. The services offered by Textilausrüstung Pfand GmbH include finishing and functionalization of textiles by means of chemical (wet), thermal and mechanical treatments. In detail, the following can be offered: optical whitening finish, rinsing, tentering, softening, fixation, flame resistant treatment, stain repellency, antistatic or antibacterial finishing, stabilisation against environmental influences (UV radiation). Multifunctional finishings, such as combinations of flame retardancy and stain repellency together with antibacterial finishing are more and more increasing. Pre-treatments as well as after-treatments for printing and embroidering processes and also thermosol dyeing are carried out.



The company produces different types of textile waste: selvedges (edge strips), end pieces/ leftover pieces, mixed textile waste from products coming from customers for finishing, dust and pieces of thread and yarn waste. A part of the unmixed waste is taken back by customers to be reused again in the production process, but the major share is transported to disposal companies to be finally incinerated or landfilled; fees have to be paid for the waste disposal (approx. 185 €/ton).

The following needs of waste management for the future were defined by the company:

Technological needs	Shredding/cutting of waste directly at the point of origin (online processing) → technical development of such a shredding unit Find solutions where such chopped pieces can be used Finding solutions for the use of shearing dust (airlaid method, papermaking)
Economical needs	Economically reasonable solutions for waste disposal Disposal of unmixed (pure) waste free of charge
Logistical needs	Regular disposal/take away of waste by external providers to save storage capacities Easy and non-bureaucratic handling of waste
Environmental needs	Reduction of waste amounts to be disposed

2. Theoretical part

STFI has been dealing with the 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 of the art to enable a successful handling of projects and customer offers. This is especially valid for the different fibre nonwoven plants but also for the cutting, agglomerating, compacting and tearing machinery to prepare textile waste.
An airlaid plant has been installed as technical/technological basis for investigations of processing organic and inorganic short fibres. The production of random laid nonwovens allows processing of long natural, reclaimed and synthetic fibres in blends with thermoplastic binding fibres into nonwovens for civil engineering and the automotive sector. Following this and also due to the good cooperation with company Pfand during many years, STFI contacted the company and offers support in the field of waste management.

3. Catalogue of the waste covered by the pilot case

The company produces different types of textile waste: selvedges (edge strips), end pieces/ leftover pieces, mixed textile waste from products coming from customers for finishing, dust and pieces of thread and yarn waste.

WASTE GENERAL DATA	
GENERAL INFORMATION	
Waste name	mixed finished textile waste
EWC code	04 02 09 wastes from composite materials (impregnated textile) 04 02 22 wastes from processed textile fibres
Quantity of disposal per year in tons/y or equivalent units (l/y, m^3/y)	around 20 tons/year
Frequency of disposal	monthly
Management (actual disposal method)	incineration and landfill
Physical state	solid
Appearance	dust, fibres, textile fabrics (coated and uncoated)
Toxicity	n.a.
Outcoming sector (main activity or factory sector generating waste)	finishing unit
Tag	selvedges, end pieces, threads residues, mixed textile waste, dust, coated waste
ADDITIONAL GENERAL INFO	
Material type	textile waste
Composition 1 (major component, %)	polyester, polyamid, PVA, viscose, silk, linen (pure or blended)

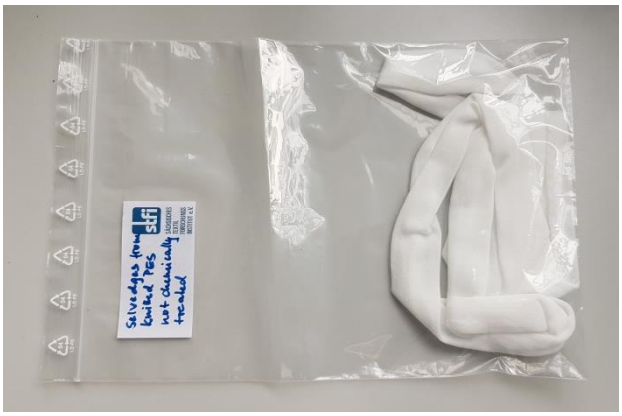
Size	selvedges are different metres long and randomly laid, end pieces have a fabric width of around 160 cm, mixed waste is mostly unsorted and contains grey, finsihed and coated pieces (undefined dimensions), dust comes form shearing processes
Containment (storage/disposal form)	bales, textile bags
Location	local waste companies nearby the company
Annual cost for waste collection and disposal	4000-5000 €/year
Functional properties	stiff and flexible, bulky
Tactile properties	hard, soft, smooth, coarse, fluffy
Visual properties	coloured, unsorted (mixed colours)
TEXTILE	
TEXTILE MATERIAL	
Composition	polyester, polyamid, PVA, viscose, silk, linen, (pure or blended)
Fibre nature	fabrics made from natural and synthetic fibres
Kind of textile	woven and knitted fabrics, coated fabrics, nonwovens, 3D structures
Kind of waste	selvedges, end pieces, thread residues, mixed textile waste, dust, coated waste
Weigth g/m^2	250 - 600 g/m^2
Dimension	fabric width mostly 160 cm, selvedges different metres long, thread pieces around 3 m long
Yarn	sewing threads from 100 - 300 tex
Current application	home textiles, household textiles and textiles for public areas, functional fabrics for clothing and technical textiles
UV resistance	treatment of fabrics against UV radiation
Fire resistance	non-flammable fabrics especially for home textiles and household textiles
Water resistance	n.a.
Antibacterial	antibacterial treatment of fabrics
Finishing	stain repellency and antistatic treatment of fabrics

During an on-site visit at company Pfand the follwoing types of waste could be detected and visually recorded:

No.	Description	Photo
1	Artificial leather	
2	Coloured selvedges of different composition	
3	Embroidery ground fabric made from PVA (polyvinylalcohol)	

No.	Description	Photo
4	Hometextiles (curtains) made from PES (poylester)	
5	Selvedges from knitwear	
6	Woven PPS selvedges, finished (undefined)	

No.	Description	Photo
7	Warp-knitted fabric made from PES (polyester)	
8	Yarn residues	
9	Dust from finishing processes	

No.	Description	Photo
10	Selvedges (from knitted PES fabrics), white, not chemically treated, slightly thermally fixed	

4. LCA of the textile waste covered by the pilot case

4.1. Environmental characteristics

The services offered by Textilausrüstung Pfand GmbH include finishing and functionalization of textiles by means of chemical (wet), thermal and mechanical treatments. In detail, the following can be offered: optical whitening finish, rinsing, tentering, softening, fixation, flame resistant treatment; stain repellency, antistatic or antibacterial finishing, stabilisation against environmental influences (UV radiation). Multifunctional finishings, such as combinations of flame retardancy and stain repellency together with antibacterial finishing are more and more increasing. Pre-treatments as well as after-treatments for printing and embroidering processes and also thermosol dyeing are carried out. Following this company profile and services offered by Pfand, environmental aspects especially for such treatments like flame retardancy but also in context with the used finishing agents need special consideraration. Thresholds are strongly observed and as far as possible only chemicals which are not critical for the environment are used. Two times per week the effluents are checked for quality (harmful substances). Liquors are re-used for finishing processes by recirculation into the production cycle. Concerning the textile waste no direct environmental danger can be stated. Problems occur more or less due to the disposal of the textile waste respectively the not existing solutions of a cost saving and easy re-use of the waste. Company Pfand is member of the “Environmental Alliance of Saxony” (initiative of a close cooperation between the Saxon government and economy to improve the environmental management in enterprises) and has been honoured for its ecological and sustainable actions.

4.2. Environmental impact assessment

Make estimations based on your practical experience. Where you have no information, think of general practices in the sector. Rate on a scale of 1-2-3. 1 is a process of slight environmental impact, 2 with a medium, 3 with a large environmental impact.

Process: Finishing of textile fabrics																
Environmental impact	**Energy consumption**			**Waste generation**			**Air pollution**			**Water pollution**			**Soil contamination / usage**			**Total**
Value of the stage	1 – Process or method with low energy consumption	2 – Average energy consumption	3 – Large consumption	1 – Little waste, no hazardous	2 – Average waste, no specially high volumes or risks	3 – High volumes, also hazardous waste	1 – No air pollution at this stage	2 – Some air pollution, but not considerably high	3 – Considerable air pollution	1 – No water pollution at the stage	2 – Some air pollution under control, (treated)	3 – The process often pollutes water, or high risk of that exists	1 – No potential to contaminate soil	2 – The process potentially pollutes the soil, but it is not likely	3 – Frequent occurance of normal or accidental soil contamination	Sum up the values in the row
Stages	**Before/After**			**Before/After**			**Before/After**			**Before/After**			**Before/After**			
Extraction of resources*	/			/			/			/			/			/
Transport of resources	3/			1/			2/			1/			1/			/
Storage of resources**	1/			1/			1/			1/			1/			/
Manufac-turing, assembly***	3/			3/			2/			1/***			1/			/
Storage of finished products****	2/			2/			1/			1/			1/			/
Use, useful life	/			/			/			/			/			/
Waste transport	3/			1/			1/			1/			1/			/
Waste disposal*****	/			/			/			/			/			/

* Not applicable for company Pfand since they process/finish goods which were produced by their customers.
** Regularly monitored by environmental authority
*** Regularly monitored by environmental authority (Wastewater association)
**** Not applicable for company Pfand since the use is in the responsibility of the customers.
***** Not applicable for company Pfand, the disposal is in the responsibility of the dixposal company.

5. Identification of the companies in the partner region with similar waste streams

Company Textilausrüstung Pfand GmbH offers contract finishing and functionalization of high-quality home textiles, household textiles and textiles for public areas, functional fabrics for clothing and technical textiles. In the Saxon and Thuringian regions there are further companies (see table) offering a similar service profile as company Pfand. As far as known at the moment no cooperation concerning waste management exists.
Company Pfand and company Thorey are partners in the nationally funded network project "RE4TEX – New technologies for Recycling" (coordinator: STFI) where research work is done to find solutions for recycling and reuse of textile production waste (www.re4tex-netzwerk.de).

C.F. Weber GmbH / Leutersdorf (OT Spitzkunnersdorf)
C.H. Müller GmbH / Heinsdorfergrund
Textilveredlung Erzgebirge GmbH & Co. KG / Sehmatal
Kunz-Textil GmbH / Treuen
VOWALON Beschichtung GmbH / Treuen
Thorey Gera Textilveredelung GmbH / Gera