WP T2 – INNOVATION ON TEXTILE WASTE MANAGEMENT

ACTIVITY A.T2.3 PILOT CASES

D.T2.3.4 PILOT CASES FEASIBILITY STUDY

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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

The Pilot case "Generation of waste from manufacturing of technical textiles"

In Czech textile industry, the highest share (about 2/3) of the value of economic indicators in 2016 had the manufacture of other textiles (CZ-NACE 13.9) - mainly manufacturing of non-woven and technical textiles. Technical textile manufacturing grew in recent years by an average of about 10% per year; today, technical textiles represent a significant majority (65%) of the outputs and revenues of textile production in Czech Republic. With respect to the long-term dominant position of the production of motor vehicles in Czech economy, there is also growth in the production of respective intermediates, including production of technical textiles used, inter alia, in automotive industry.

Whereas the recycling technologies for processing of textile waste such as the old clothing or home textiles are traditional and well available in Czech Republic (almost mechanical technologies as cutting and tearing), the processing and utilization of waste from technical textiles are often difficult or costly due to their technical nature (coatings, laminations, composites ...). This type of waste cannot be processed by these traditional mechanical technologies.

The three Czech companies producing the heavy coated textiles are looking for the processing and reuse opportunities for their waste. Two of them (Company 1 and Company 2) are producers of the technical textiles for abrasive, printing and bookbinding sector. The third company (Company 3) is the producer of bathmats. The generated waste consists of selvedges (edge strips), cuttings, pieces of yardage textiles with or without coatings, or yarns and fibers.

2. Recycling of textile waste in the pilot case company – state of art

2.1. Company 1

Company 1 produces the base abrasive-emery cloths. The cotton fabrics are coated with starch-glue coating or with synthetic coating based on polyvinylalcohol or resins (without use of phenol formaldehyde).

Several types of post-production textile waste are produced.

The waste of yarns from warping is currently reused: residues of yarns on warping bobbins are rewinded on another bobbin and further used as weft; in case of yarns where rewinding is not suitable, the residues are manually removed from the tube and sold for further processing. Other type of textile waste produced in a company are fabric pieces and cuts of selvedges of grey sized fabric coming from weaving; this waste is sold to producers of shredded rags.

The cuts of selvedges of grey sized fabrics coming from weaving are reused by third party.

The company faces problems with fabric pieces and cuttings of coated fabrics (dyed or not dyed); the coating is composed of starch or various polymers (resins, acrylics,...); they are

seeking for a solution of this waste; in the past, the company sold for reuse cuttings of dyed cloths with starch coating (reused by external comany as a filling material for punching bags), but actually they don´t have market for this waste. Also they don´t have any solution for waste of textiles with polymeric coatings (resins,acrylics, ...).

The cutouts of defective coated fabrics are collected as larger pieces of fabric – cutouts of defective parts (Fig. No.1, 2 and 3); company collects them all together in the yard (Fig. No. 7) as an yardage or pressed in bundles in a container, and then takes them away. Also the technological edge stripes from these fabrics are part of the collected textile waste (Fig. No. 4); because of the reduction of collected waste these stripes are cutted into small pieces (Fig. No. 5 and 6).

Company disposes annually 60 tonns of this waste of coated textiles by landfilling. The collected waste is disposed 3-4 times per month. The annual costs for the disposal are 5000 EUR/year.

Fig.No.1: Collected pieces of defective fabrics

Fig.No.2: Collected pieces of defective fabrics

Fig.No.3 Collected pieces of defective fabrics

Fig.No.4: Technological edge stripes

Fig.No.5: Technological edge stripes, cutted

Fig.No.6: Technological edge stripes, cutted

Fig.No.7: Collecting of waste in a container

2.2. Company 2

The post-production waste includes materials for printing (bookbinding cloths, layered papers and fabrics adapted for printing and security documents, laminated fabrics and papers for production of passports, print media – printable canvas etc.) or base fabrics for abrasive cloths.

Textile waste produced by the company are in a form of cuttings (selvedges of the fabrics and defective parts). This waste is composed from dyed or printed textile fabrics (cotton, viscose, polycotton) with various types of coatings or laminated with other material (paper). Chemical composition of the coating is variable, according to the technical specifications of the product (acrylic, styrene-butadiene, starch).

The post-production waste is represented by cutouts of defective fabric parts in form of large pieces of fabric, selvedges and technological edge stripes

Fig. No. 8: Waste from Company 2

Company produces also some textile materials which belong to the category “security” and therefore requires the special handling. An example is the buckram for passport production. The defective cutouts of the fabrics are collected as the fabric pieces in rolls and for easier handling cutted into sheets (Fig. No. 9). With respect to the customers demand (contractual agreement) this waste has to be destroyed and the recycling is not allowed. This fact was not known at the beginning nor during the work on the pilot case; this was explained by Company 2 when upcycling was proposed (as described in D.T2.3.3_Pilot Cases Technical Report_INOTEX technical textiles).

Fig.No.9: Collected pieces of defective fabrics

The company disposes annually about 500 tonnes of textile waste by landfilling**. The produced amount of waste is** 34 700 m^2 (**abrasive cloth**), 155 700/m^2 (**buckrams**), 102 000 m^2 (**fabric backed with paper**)**; it means** 300 tonns / year **of fabric p**ieces (yardage) and 200 tonns/year of selvedges.

2.3. Company 3

The post-production waste from production of bathmats includes polyacrylic fibres; yarns (PA, PES); cuttings of the bathmats (PA, PES together with PP textile) with or without the SBR latex back coating.

The residual fibers, yarns or selvedges are collected (Fig. No.10) and disposed in a mechanical press container, mixed with other textile waste (Fig. No.11).

Currently, the annual production of textile waste is about 2000- 3000 kg of waste of fibres; 6000 – 8000 kg of yarns; about 5000 kg of cuttings (yarns + PP textile) without the coating and approx. 20 000 kg of cuttings consisting of yarns, PP textile and SBR latex back coating.

All waste is disposed to the landfill. The frequency of disposal is every 1or 2 weeks. The total annual costs for disposal are approx. 25 – 30.000 EUR.

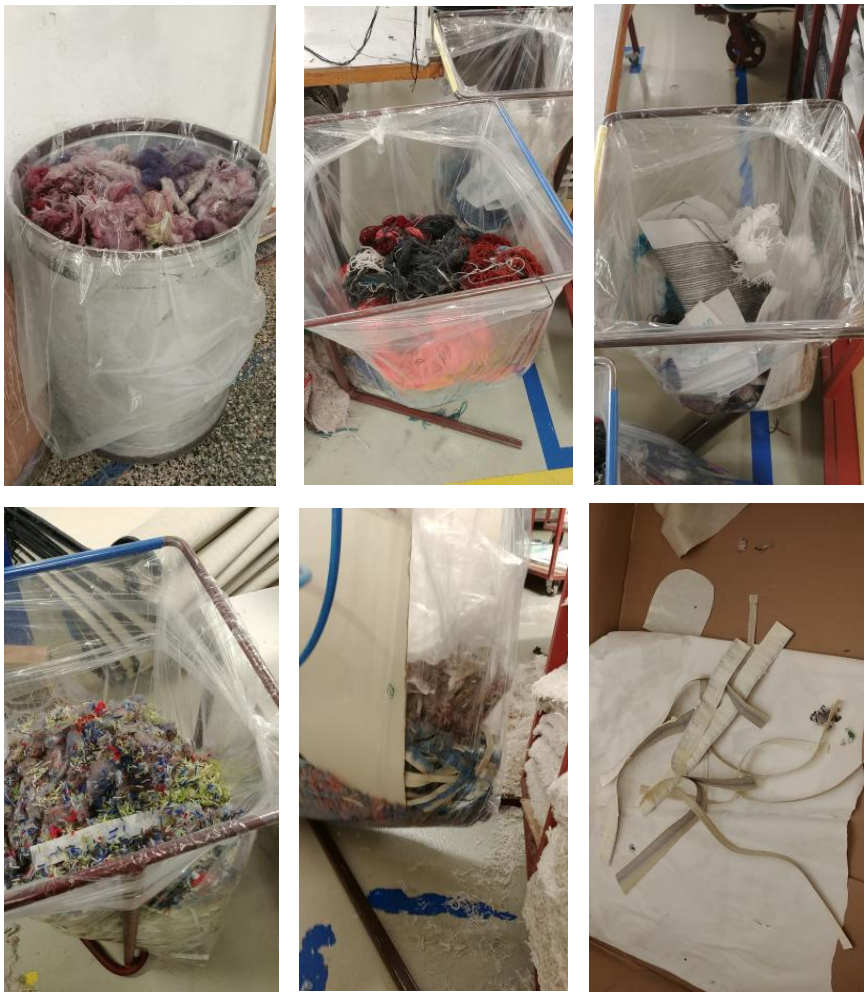

Fig.No.10: Collecting of waste in Company 3

Fig.No.11: Mechanical press container for collecting of waste

3. Feasibility study

As described in technical report (D.T2.3.3_Pilot Cases Technical Report_INOTEX technical textiles), many possible soluitions for processing of the pilot textile wastes were tested. Unfortunatelly, any of them was not succesfull.

There are still some creaticve ideas tested during the creative workshops organised by company IBCSD LAB s.r.o., Plzeň. The different solutions for different coated fabrics from companies Company 1 and Company 2 were tested. The idea is to use the selected materials both as parts of the packaging and within the creative activities and teaching. The idea how to use this materials is demonstrated at picture Fig.No.12:.

Fig.No.12: Proposed use of the coated textile residues