

MANAGEMENT OF PROCESSING AND RECOVERY OF LEATHER WASTE

STAN Ovidiu Valentin¹, ALBU Adina Victoria², GHERGHEL Sabina³, ŞUTEU Marius⁴

^{1,2,3,4}University of Oradea, Department of Engineering and Industrial Management in Textiles and Leatherwork, Faculty of Energy Engineering and Industrial Management, B.St Delavrancea str., no 4, Oradea, Romania, E-mail: textile@uoradea.ro

Corresponding author: Stan Ovidiu Valentin, E-mail: stan.ovidiu@ymail.com

Abstract: *The leather and leather goods industry development is conditioned by the development of the supply of raw materials - animal husbandry and chemical industries, sectors that tend to develop intensive on vertical - which causes a shortage of raw materials in relation with the market demand for quality products. The leather is the basic raw material of the leather and leather goods industry, this raw material is the most substantial contribution to downstream sectors, giving them a competitive advantage and it is known that the leather has the greatest potential to add value to the products in which it is incorporated. The advantages of using leather are many, the most important qualities are its hygienic properties, flexibility and adaptability to a wide variety of applications. Leather is manufactured on demand for each type of application, such as shoes, clothes, gloves, handbags, furniture upholstery or car interiors, yachts and planes.*

It requires better use of raw materials by using new technologies and manufacturing processes based on non-invasive methods on the environment leading to increase the product life cycle. The leather and leather goods industry is a supplier of large amounts of waste from the production cycle, waste that has the same properties and qualities as raw material used in the base product. Leather waste represents a loss for the companies, an additional cost related to storage and environmental protection.

Key words: *leather industry, recycling, economic efficiency, environmental protection, pollution prevention and control*

1. INTRODUCTION

Throughout history man has realized so much, the qualities and capabilities that distinguish him from other species that he has forgotten his role and place in the planetary ecosystem balance. The cumulative intelligence and inquiring minds of man have created new machinery and technology that contributed to the development of industry and agriculture. At the same time ignoring their place and role in natural balance, man has become the only species that consumes more than it needs, the only species that produces waste in quantities so large that nature can not "recycle" by itself.

Man is part of nature and all the elements of nature, living or non-living, are in a close relationship and therefore create a natural balance. Man has used natural raw materials and created others without realizing that it damages the environment.

The discovery of new machinery, applying new technologies have facilitated the development of industries and due to the intense human activity the amount of waste has increased.

The project approaches the idea of using a raw material leather waste – which is abundant on the market – because it requires very low cost of processing and therefore can become a profitable business.

2. LEATHER WASTE, ENVIRONMENTAL PROTECTION AND SUSTAINABLE DEVELOPMENT

Environmental protection in the context of sustainable development, focus on combating pollution from human activities, preventing possible damages, assimilation, adaptation and application of environmental requirements, implementation of common international projects to protect biodiversity, monitoring the water quality and the condition of the forests and also solving acute

problems such as the decrease and recovery of waste and greening agriculture, promoting clean technologies and the transformation of human settlements into sustainable cities. Sustainable development includes environmental protection and environmental protection condition the sustainable development. The waste management has an important role within the concept of sustainable development, waste can be also a source of secondary raw materials, not only a potential source of pollution. [1].

The management strategy includes an analysis of the current situation of waste management and measures that need to be taken to improve environmental conditions and preparing for re-use, recycling, recovery and disposal of waste and an evaluation of how the plan will support the implementation of objectives.

Following the studies conducted before the beginning of the project [2], it can be concluded that in Romania are about 1200 manufacturing companies in the leather and leather goods industry that produces about 3% of GDP. There are no reliable statistical data on the amount of leather waste that is produced by these companies, but from existing data it can be estimated that in Romania are produced monthly about 5-7 tons of leather waste. A small amount, over a ton of leather waste is reintroduced into circulation, the rest being discarded in landfills or incinerated, which is in contravention with "Stockholm Convention on persistent organic pollutants" adopted by the European Union in 2004.

In 2003 in Romania was founded the Waste Stock, but it works as a commercial site rather than a stock system online.

3.PROJECT PURPOSE

The purpose of this project is to highlight the ways and means of processing and recovery of leather waste resulting from the production cycle in order to lead to:

- re-introducing the leather waste in the production cycle;
- use of non invasive procedures and processes on the environment;
- reduction of the loss of the companies;
- reduction of the storage costs of leather waste for the companies;
- reduction of the environmental protection costs;
- use the leather waste in leather goods industry, footwear, handcraft production, in the creations of visual artists and designers;
- create new jobs;
- expansion and diversification of the markets;
- introducing useless leather waste in non invasive products for the environment;
- research and technological innovation oriented in high efficiency;
- creating sustainable products for customer and consumer demand, manufactured under ethical rules, with a low environmental impact;

Using this approach the project wants to provide a possible alternative for recycling the leather waste that combines leather processing and leather engineering with industrial design and fashion for making leather goods, footwear, handbags, leather accessories that are produced from leather waste.

4. RECOVERY, PROCESSING AND RE-USE OF LEATHER WASTE

The project addresses to companies, artisans, designers - industrial, environmental, product and fashion - artists, disadvantaged socio-professional sectors and specialists in environmental management. [3]

This project was developed from December 2013 to April 2014 and offers a different perspective on recycling leather waste in manufacturing companies and where recycling is not possible, selling their leather waste to secondary and tertiary users.

The amount of generated leather waste can be classified in two categories:

- high and constant amount;
- medium-small, random amount.

Considering the high economic interest and the environmental impact, the focus is on the constant generators of large amount of leather waste, but it can't omit others, taking into account that for some activities, socio-professional categories the request for leather waste is relatively small. The use of leather waste as raw material for making products or accessories has attracted a real interest from private entrepreneurs, artists, designers, hand makers or folk. The selling mode is different from one manufacturer to another, but you can define specific common elements: classic trade conducted in

specialty stores, online shopping, direct trade in fairs and exhibitions, and trade on the basis of a contract made between the manufacturer of accessories or ornaments and their users.

In the past two years the market of handmade products made out of leather and leather waste has increased so that today there are hundreds of artisans who live only from this activity that brings a steady income of several thousands lei per month.

For the secondary entrepreneurs is required knowledge about leather types and quantities of leather waste available according to their needs. The correlation between different types of leather waste, quantity required, the type of product to be made, its design is a prerequisite for the efficient use of leather waste and a sustainable management strategy.

In the supplying with leather waste, there must be taken into consideration the following:

- the final product;
- the design of the product that will be produced;
- auxiliary materials (thread, lining, eyelets, snaps, buckles, soles, heels, etc.);
- the required quality and quantity of leather waste;
- technical and technological equipment;
- professional training of the workforce;
- costs (transport, utilities, handling, labor, etc.);
- technological losses.

For the documenting phase and implementing the project various companies from the leather industry were contacted, but also visual artists who use leather waste for making artistic articles with complex processing and high commercial potential.

One of the partners of this project is S.C. CLUJANA S.A., one of the most famous manufacturers of shoes in Romania, which showed interest and support for creating products from leather waste. With the support of the company manager and creative team, were made different types of footwear and leather goods with unique appearance and well received by customers. Production costs were much lower than in the classical production and economic efficiency and profit were superior.

The handbags made from leather waste by visual artist Gabriela Carp stand out with great quality, refinement and originality, being true artistic creations that attract public attention.

The project focused on the achievement of different products, such as:

- Handbags (Fig.1):



Fig.1: Handbags by Gabriela Carp, Visual Artist

- Footwear (Fig.2) and Belts (Fig.3)



Fig.2: Footwear by Stan Ovidiu Valentin (fashion designer), produced at S.C. CLUJANA S.A.



Fig.3: Belts by Stan Ovidiu Valentin (fashion designer), produced at S.C. CLUJANA S.A.

- Decorative ornaments made from leather waste (Fig.4)



Fig.4: Decorative ornaments by Gabriela Carp, Visual Artist

All products made in the project present an innovative approach in terms of technology, creation and design.[4]. To achieve these products we have followed a complex technological process which consisted of:

- designing the products;

- drawing the necessary patterns and templates;
- determination of the production costs;
- establish the technological process for each product;
- release the products for manufacturing;
- manufacturing the products;
- selling the products;
- reduction of costs and technological losses;
- minimize the environmental impact.

In this project to achieve the specific products were used different sewing techniques and refining such as patchwork (a technique that involves sewing, riveting together pieces of leather waste to create a larger design) and ornamental applications (by gluing, sewing or riveting). The products can be made in small series/quantities or unique and they may represent suggestions, directions in leather waste recovery and also attract labor in individual manufacturing business development.

The products made in the project can be sold in stores, art galleries, showrooms, trade fairs or online. The sale price of these products may be higher considering the high degree of manufacturing, bold design and their uniqueness. Therefore the development of this kind of products may represent an additional source of income for the companies that generate different amount of leather waste, costs reduction and an alternative solution for leather waste management and environmental protection.

5. ENVIRONMENTAL PROTECTION AND RECOVERY OF UNUSABLE LEATHER WASTE

Inevitably after any production process, including the use of leather waste, result an amount of waste that can't be used. This waste represents an additional expense for the manufacturer and have a direct impact over the environment, which implies difficulties to solve, both for producers and for environmental protection. The leather waste that results from the production process can be processed to obtain biofertilizers with protein additives, biofuels or surface-active materials for the construction industry.

Environmental protection in the leather industry occurs in two directions: pollution prevention and pollution control. There is a difference between "clean production" and the traditional pollution control strategy based on "end-of-pipe" technologies. The "clean production" is preventive, while pollution control strategy accepts waste and emissions as a "given" and try to find ways to treat and minimize them. Toward the end of technological process the amount of waste decreases but increase the complex composition of the waste. A modern technology management which proposes a "clean production" has three important aspects:

1. Pollution prevention through the use of appropriate chemicals [5]
2. The technological development of the company
3. Liquid and solid waste management

The waste treatment is an important component of management for a "clean production" because in the leather industry will never be totally avoided waste generation. Therefore, new methods of destruction, decontamination or neutralization waste to give less harmful substances, have a particular importance in the context of waste management. [6].

The unusable leather waste results from the production process or the recycling process can be processed in order to obtain advanced products for the production of:

- biomaterials used in human medicine, veterinary medicine, cosmetics, dermatology;
- biofertilizers with protein additives;
- biofuels;
- surface-active materials for the construction industry.

6. CONCLUSIONS

From the study and the practice of the project it can be concluded that leather waste is a major environmental risk factor - for aerobic and anaerobic environment - with harmful effects on the environment and human. The leather waste can be a source of raw materials for a wide range of activities and products, some of which have been exemplified in the project. By using leather waste, it

can reduce the consumption of raw materials, increase the level of general use and recovery. Equally it is a source of steady income for companies and an opportunity to create new jobs.

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