

Methods for improving sustainable technology for the production of leather and fur products

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Abstract: In the article the attention is paid into the methods for developing the technology and methods of manufacturing products from natural fabrics like leather and fur. In the process of making clothes from natural leather and fur raw materials, an important issue is the waste-free use of the raw area. In the production of the product, various types of leather and fur patches are used, and the finished product is obtained. Before becoming a finished product, raw materials go through several processes, resulting in pieces of leather and fur of various shapes and sizes. In the process of making clothes from leather and fur, the problems of using raw materials on the basis of waste-free (resource-saving) technology are of great importance. Resource-saving technologies - include several options for environmentally positive economic activity, from direct resource saving to industrial and household waste and recycled products, product reuse. The basis of resource conservation is the rational use of energy and resources, the secondary use of non-renewable natural resources and the prevention of exceeding the limits of ecological sustainability. In addition, in order to limit resource loss and prevent pollution, it is necessary to consider the environmental impact of industrial and household waste. This, in turn, determines the practical importance of the article.

1 Introduction

The main raw materials of the leather industry are different types of soft and hard leathers, which, in turn, occupy an important place in the production of leather goods. Because leather has gained fame as a beautiful natural fabric with a unique appearance and high operational and maturity characteristics. Famous designers also widely used fur or leather in almost all of their collections of winter and seasonal models. Leather and fur not only improve the appearance of clothing, but also increase its beauty and value.

The contribution of chemists to the development of the leather and fur industry is incomparable, because the creation of new chemical substances is the basis for the improvement of leather and fur production processes as well as the increase in the range of products produced from them.

In the production of leather, only the dermis is used, while in the production of fur and sheepskin, the dermis, epidermis and wool cover are used.

Currently, it is important to create and industrialize new technologies for raw material processing, design and sewing in order to produce competitive products from local leather and fur raw materials.

Effective use of raw materials in the production of semi-finished leather and fur products is carried out with great difficulty, since their use is affected by many interrelated and unrelated factors.

Dozens of different types of leather and fur raw materials and leather-fur products are processed at leather-fur industry enterprises. In this, the skins differ as follows:

- the size, thickness and durability of the skin;
- at the expense of length, density, coloring, shine, softness and shearing of the fur layer [1; 2; 3; 4].

Natural leather and fur are also widely used as decoration in making clothes. The use of decoration depends mainly on the type of leather and fur, and it determines the service function of the garment. The purpose of the used leather and furs is to provide a high level of appearance to the clothing and give it a look. Accordingly, leather and fur decorations express the main idea in the composition, play different roles in the compositions that decorate and enrich the model.

2 Materials and methods

Waste in the production of leather and fur products is understood as pieces of leather and fur of various types and sizes, formed during the process of converting the starting material into a finished product [5].

Resource-saving technologies - include several options for environmentally positive economic activity, from direct resource saving to industrial and household waste and recycled products, product reuse. The basis of resource conservation is the rational use of energy and resources, the secondary use of non-renewable natural resources and the prevention of exceeding the limits of ecological sustainability. In addition, in order to limit resource loss and prevent pollution, it is necessary to consider the environmental impact of industrial and household waste [5,6].

Development of a new method. Making fur packages in this way allows for the development of a wide range of clothing [7-10].

Description of the technological scheme of the method. KTP (collagen-containing polymer) composition (Fig. 1, 4) under the skin tissue of fur (Fig. 1, 2) and leather (Fig. 1, 3) scraps to the base (textile fabric-gray) (Fig. 1, 1) laid down and glued. As a result, gaps of different sizes are formed between the edges of the fur and leather trims, and the empty surfaces in this gap are filled using a sewing machine that creates a one-thread chain popop stitch (Fig. 1, 5) AURORA A-10-1 (Fig. 1).

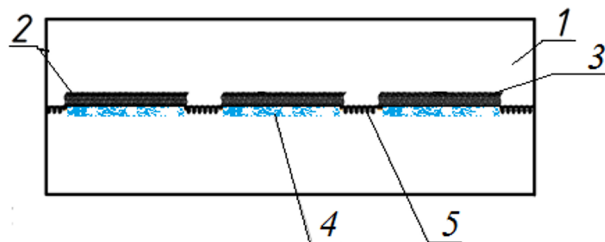


Fig. 1. The technological scheme of attaching fur and leather trimmings to a piece of fabric. 1- base (textile fabric-gray), 2- natural fur trimmings, 3- natural leather trimmings, 4- KTP composition, 5- one-thread chain popop stitch.

Technological sequence of the method. Fur and leather clippings are pre-sorted by configuration, size, color, hair length and thickness, curl and texture. These cuts are placed on the product detail along geometric lines (simple and complex) close to each other with a distance between their edges of $2 \div 150$ mm, (this is not necessary in principle, its amount is taken based on the model sketch). The edges of fur and leather scraps are attached to the details of the product with the help of sewing machines that create a chain-shaped popper, and as a result, the durability of the product increases during operation [11-13].

The developed method is illustrated by drawings, where the production wastes of the fur and leather industry are used as natural karakul fur (Fig. 2-a) and leather (Fig. 2-b) scraps, as shown in Fig. 2.

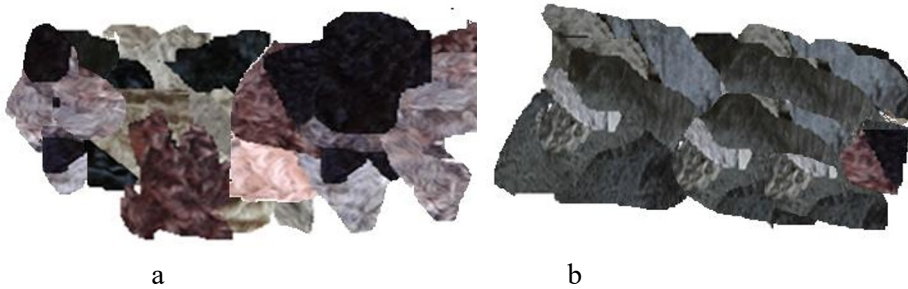


Fig. 2. Production waste of fur and leather industry.

Natural karakul fur and leather waste is cut into different shapes (Fig. 3).



Fig. 3. Samples of various colors and shapes cut from fur and leather.

KTP composition (Fig. 4) is laid under the skin tissue of the cut forms.

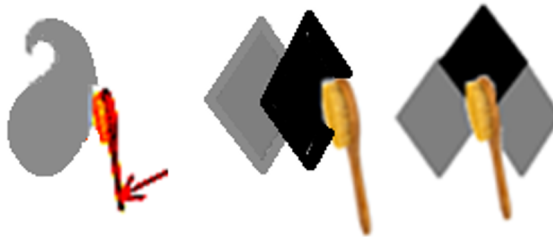


Fig. 4. Laying KTP composition on the skin tissue of forms made of natural fur and leather.

The adjustment mechanism of the resource-saving technology of clothing production is created using the location of the geometric lines of the configuration of leather and fur scraps, where the KTP composition is applied.

The requirements for the chemical composition used in the processing of details (samples made from fur and leather shavings) can be divided into 3 groups [11].

1. Technological: provides information on achieving the required complex properties of the weld; to have a positive effect from its use (reduction of displacement); do not change the appearance of the fabric; not to reduce the quality of the weld and filler.

2. Economical: having uniformity and stability during storage; not requiring a lot of work to prepare the solution.

3. Environmental: minimizing pollution as much as possible; should not have an unpleasant smell; it is required not to cause corrosion of the equipment.

If fur and leather scraps are placed next to each other (Fig. 5, a), a fur package with heat preservation properties is formed. If it is placed between the fur and leather scraps with gaps (Fig. 5, b), it becomes a package with air permeability. In this way, fur and leather scraps are glued to the details of the base (textile fabric-gray) (Fig. 5).



a-cuts with the edges touching each other (warm storage)



b-laying creating a space between the cuts (air permeable)

Fig. 5. The mechanism of gluing fur and leather scraps to the base placing

The constituent components of the proposed package of natural fur and chrome are presented in Fig. 6.

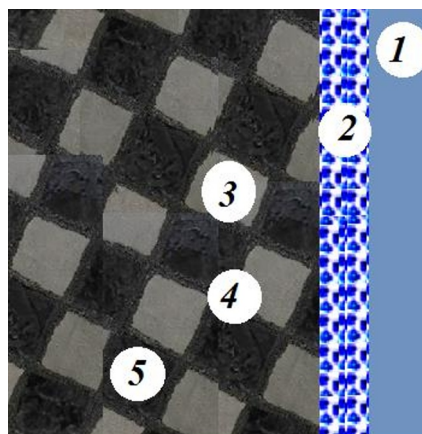


Fig.6. Components that make up the natural fabric (fur and leather) package.

1-Base (textile fabric-gray);

- 2-KTP composition;
- 3- Natural leather shavings of various shapes formed during the cutting process;
- 4-One thread chain popop stitch;
- 5-Various forms of black fur waste produced during the shearing process.

Gaps are created between the scraps glued to the fur and leather bag details, and a decorative pop stitch is used to fill the gaps. The chain stitch covers the edges, edges, and gaps of the seams, and at the same time increases the strength and decoration of the package details.

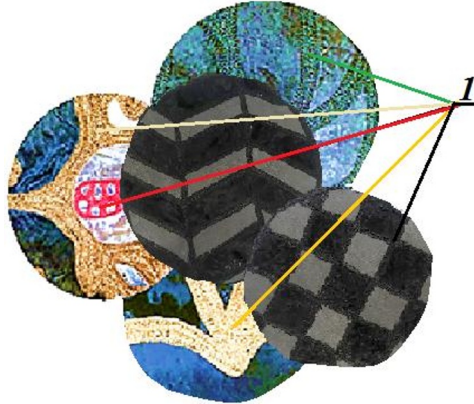


Fig.7. Decorative patterns made using a chain stitch.

This method of making a product from a fur and leather package allows to use fur as a material and to obtain a decorative product detail in accordance with the high aesthetic requirements of the consumer.

Thus, the use of the developed method for the preparation of sewing items from a natural fur and leather mixed package has high quality, hygienic properties, ensures shape stability, reduces material consumption, and requires the abandonment of a large number of technological processes.

3 Results

KTP technology simplifies product preparation processes, reduces production time and, as a result, improves the hygienic properties of the product.

It makes it possible to glue fur and leather scraps on the surface of the substrate covering at least a part of it, and to obtain large-scale decorative products made using a single thread chain stitch [13-16].

The use of chemical preparations in the production of clothing remains one of the most pressing issues today. The purpose of this KTP composition is to treat detail trimmings and textile fabrics, to protect them from damage to fiber structures and to increase their strength. During processing, spillage of threads from detail cuts is prevented, and it is also necessary for reliable stabilization of geometrical parameters.

As preparation, various clothing or decorative items can be obtained from any fur and leather package. The items to be prepared depend on the basis of the fabric and the type of fur and leather. Garment details (front piece, back piece, hem, etc.) have shapes made of black fur and leather trimmings along the edges (side cut, front center cut, hem cut, collar cut, etc.) available in large and small sizes can be placed in the spaces. The arrangement of such fur and leather scraps makes it possible to obtain samples that satisfy the aesthetic taste with low heat-retaining properties [17], but high air permeability (Fig. 7).

4 Discussion

In the production of leather and fur products, there are 2 different ways of making decorative ornaments: the first one is through shearing methods and by breaking the integrity of the skin.

In the process of making clothes from leather and fur, the issues of using raw materials on the basis of waste-free (resource-saving) technology are of great importance.

The proposed resource-saving technology offers the following solution to the given problem. Products made from fur shavings, i.e. textile fabric serves as a substrate here. This is done by injecting a collagen-containing polymer composition made from leather fragments into the dermis opposite to the hairy surface of the fur and gluing the fur scraps to the substrate. It involves filling the remaining open spaces (1÷10 mm) between the stitches with a thread (pop stitch).

Decorative patterns made using a chain stitch method also avoids environmental pollution due to efficient use of fur industry waste (fur and leather scraps). At the same time, in the production of fur and leather mixed products, additional details (lining, glue and non-glue joints, heating layer) are abandoned, and to increase and expand the assortment of fur and leather mixed package products, at the same time, different types of decorations are made and expensive fur and leather semi-finished products allow using the finished product on the basis of waste-free technology.

5 Conclusions

The disadvantage of this method is that it requires a lot of work, it leads to an increase in the amount of fringe and inter-stitch waste of fur raw materials, and it limits the range of high-cost fur products.

Also, this technology simplifies product preparation processes, reduces production time, and as a result improves the hygienic properties of the product. With the help of the method, it is possible to get fur ornaments of different colours and textures. It allows to glue the fur clippings on the surface of the substrate covering at least one part of the surface and to obtain large-scale decorative products made using a single thread chain stitch.

Based on the above-mentioned scientific theoretical analysis, the direction of this scientific research work creates a basis for the preparation of ornaments of various patterns from the scraps left over from the shearing process in the development of resource-saving technology of women's outerwear from natural fur.

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