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INVESTIGATION OF THE ERGONOMIC PROPERTIES OF FOOTWEAR FROM KNITTED FABRIC

Purpose. Investigation of mechanical properties of various types of knitted fabrics for the manufacture of blanks on the top of shoes.

Keywords: knitted fabric, workpiece of the top of shoes, shoes, mechanical properties of knitted fabric.

Objectives. The fashion industry increasingly prefers the direction of environmental friendliness and circular production of goods for various purposes [1]. The use of atypical materials for the manufacture of shoe upper blanks leads to changes in the design process of the model structure and manufacturing technology due to the specific properties of these materials. Determination of the special impact on production processes must be investigated in detail to improve the technology of making shoes from these materials.

Methodology. Investigations of the mechanical properties of knitted fabrics were carried out according to the method described in the standard GOST 8847-85 [2].

Research results. Footwear models of the world famous brands Balenciaga, Bottega Veneta and Chanel, made of knitted fabric, have been striking elements of the Fall Winter collections for several years (Fig. 1). Modern trends include the spread of the principles of "sustainable fashion" and the use of a wide range of materials for the manufacture of shoes, including knitwear in the form of residues / waste in the production of clothing. This makes it possible not only to create a unique design, but also to meet a number of requirements for the performance properties of shoes.

Considering the features of ergonomic properties, it should be noted that jersey differs significantly from fabrics due to its high elasticity, extensibility and elasticity. Shoes made of knitted fabric tightly fit the foot / lower leg, better match the dimensional characteristics, create a feeling of increased comfort during wear, are noted for softness and high heat-shielding properties. The buttonhole structure of knitwear has a special effect on the manifestation of various properties in the

process of modeling, design and manufacture of shoe blanks from knitwear, on their aesthetic properties and the reliability of shoes in general.



Fig. 1. Knitted shoes:

a) Balenciaga sneakers; b) mule Bottega Veneta; c) By Walid clogs; d) Adidas sneakers.

The main characteristics and properties of knitted fabrics depend on their raw material composition [3]. According to the task, the analysis of the main mechanical properties of knitted fabrics of various composition and type of weaving was carried out in order to determine the optimal option for making shoes (Table 1).

Table 1 - The main properties of knitted fabrics

Basic properties	Types of canvases		
	Natural	Synthetic	Combined
Breaking load, cN /tex	24- 27	7- 12	11- 14
Burst elongation, %	7- 8	45- 60	18- 22
Thickness, μm	15- 25	10-90	15- 20
Surface density, g/m ²	220- 420	250- 310	80-120
Elasticity, %	2-2,5	28-35	28-35

It was determined that the best properties are possessed by canvases of natural and combined composition. Combined fabrics are inferior to natural ones in strength and density, but have an advantage in terms of elasticity, which significantly affects the way shoe blanks are formed.

Conclusion. The results of experimental studies confirm the feasibility of using knitted fabrics for the manufacture of shoe uppers of a combined raw material composition.

References

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