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Research Article

ANALYSIS OF THE PROPERTIES OF COTTON KNITTED FABRICS FOR THE PRODUCTION OF WOMEN'S OUTERWEAR CLOTHES

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ABSTRACT

This article discusses the characteristics of cotton knitted fabrics, their parameters and optimal options in the production of women's outerwear.

KEYWORDS

Knitwear, raw material, two-layer, physical-mechanical, volume density, fabric, surface, absolute volumetric lightness, the base fabric

INTRODUCTION

Knitwear production in the world is highly efficient and resource-efficient Scientific and research work is being carried out aimed at the development of new scientific and technical solutions of technologies and technical means [1-3]. In this regard, including the development of a

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new range of knitted fabrics, researching their technological parameters, physical and mechanical properties and theoretical justification of the laws of their change, and developing mathematical models special attention is paid to scientific research works aimed at creating output and forecasting methodology, developing technological regimes for the production of knitted fabrics from new types of raw materials, improving existing techniques and technologies for the purpose of producing new knitted fabrics, expanding the technological capabilities of machines, automatic control of technological processes [4-9].

The main part

In our republic, comprehensive measures are being taken to reduce labour and energy consumption in the production of sewing and knitting products, to produce finished products with high added value based on deep processing of local raw materials, to ensure the competitiveness of national goods in domestic and foreign markets, and certain results are being achieved [8-11].

The Republic of Uzbekistan in 2017-2021 in the action strategy of development, including "...national increasing the competitiveness of the economy, energy in the economy and reduce the consumption of resources, save energy for production defining important tasks for the wide introduction of technologies"2 given In the implementation of these tasks, including textile and comprehensive analysis of the development of the sewing and knitting industry, the volatility of the world market in the context of increased competition in the field support from the state, as well as more stable and rapid development of development mechanisms and technical and technological It is important to create modernized machines is doing.

of the President of the Republic of Uzbekistan on February 7, 2017, No. PF-4947 "The Republic of Uzbekistan in 2017-2021 Decree No. 2 "On the Action Strategy for Five Priority Areas of Development", Decree No. PF-5989 of May 5, 2020 "On Urgent Measures to Support the Textile and Garment Industry" and "Encouragement of Further Development of Light Industry and Production of Finished Products" on measures" of September 16, 2019 PQ-4453 and other regulatory legal documents related to this activity, it will be necessary to implement the tasks [12-15]. Therefore, in the production of women's outer cotton knitwear, expanding the assortment of ricotta fabrics and SM 252 of Long Xing to make maximum use of the technological capabilities of class 12 flat needle machine, the technology of creating and obtaining knitted fabric was created. 2 sample options were developed using polyacrylonitrile yarn with a linear density of 35 tex x 2 for the patterned knit fabric. In the 1st knitting sample, rhombic knitting patterns were developed as a result of bending the loops to the right and left with the help of pliers. In the 2nd option knitting sample, the cross-shaped pattern of the cross-shaped columns was achieved due to the orientation of the columns to the right and left. In these 2 knitted samples, by changing the transverse and

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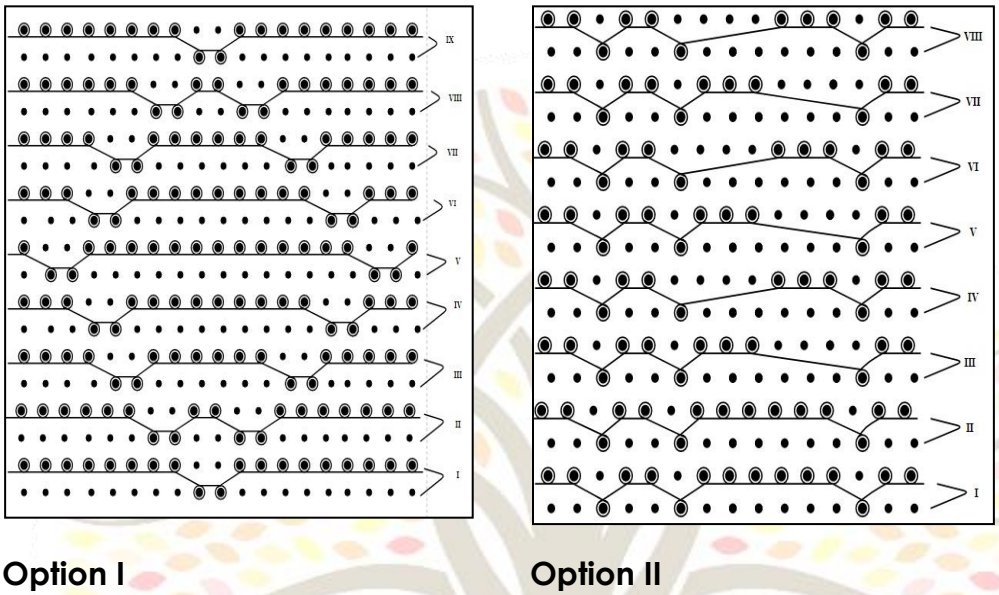
longitudinal knitting yarns, a positive change in the shape retention properties of the fabrics was achieved. The technological indicators of knitted fabrics are determined according to the standard style,



Option I Option II

Figure 1. Graphic notation and construction of knitted fabrics

The surface density of the fabric is traditionally considered a criterion of raw material consumption. It is known that reducing the surface density of knitted fabric leads to changes in operational and hygienic properties. Therefore, an indicator describing the consumption of raw materials and the quality of the fabric is included at the same time. Lightweight knitted fabric structure belongs to the type of indicators, in which the thickness of the fabric is taken into account, as well as the surface density. Volumetric density can be used as an indicator of lightweight knitted structure (1).

$$\delta = \frac{m_{mp}}{M} \qquad (1)$$

here: δ–volumetric density of knitting, mg/cm^3;

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m_{mp} –surface density of knitting, g/m²;

M- knitting thickness, mm.

Based on the results of the analysis, technical indicators such as ring pitch, ring row height, density in horizontal and vertical directions, and length of ring string are determined.

Table 1. Analysis of patterned knitted fabrics

Indicators	*Options*	
	I	II
Yarn type, linear density and % amount in the fabric	Polyacrylonitrile 35tex x2	
Ring pitch A (mm)	1.72	1.87
Ring row height V (mm)	1.47	1.69
Horizontal density Rg (number of rings)	29	23
Vertical density Rv (number of rings)	34	29
Loop thread length L (mm)	4.7	5.1
Knitted surface density Ms (gr/m²)	171.5	162
Knitting thickness, T(mm)	1.85	1.48
Bulk density d (mg/cm³)	93	109.5

Surface density Ms=93g/m², thickness T=1.85 mm, the option I of patterned knitted fabric, volume density 93mg/s equal to m³, Ms = 109.5 g/m² surface density and T = 1.48 mm thickness, the volume density of option II is 109.5 mg/s was m³.

Absolute volumetric lightness, when compared to the base fabric, consists of:

$$Dd = d_б - d = 109,5 - 93 = 16,5 мг / см^3 \quad (2)$$

here:

Δδ-absolute volume density, mg/cm³;

δ_b- volume density of base tissue mg/cm³;

δ- bulk density of experimental tissue mg/cm³.

Indicators of relative lightness include:

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$$q = (1-(d/d_{ó}))\cdot x\cdot 100 = \left(1-\left(93/109,5\right)\right)\cdot x\cdot 100 = 15\ \% \qquad (3)$$

Figure 2. Change in volume density of patterned knitted fabric

The volume density of knitwear is one of the main technological indicators, and it shows the consumption of raw materials in knitwear.

As the surface density of the knitted fabric changes, its thickness and other physical and mechanical properties change.

The bulk density of the knitted fabric varies considerably, depending on the type and thickness of the warp yarn used, the density of the knitting and the type of fabric and the class of the machine. The consumption of raw materials is reduced due to the change in the fabric structure of the proposed knitted fabric. The loop pitch has changed due to the change of the pattern ratio in the II variants of patterned knitted fabrics compared to the I variant. An increase in the density of knitting leads to an increase in its surface density and thickness.

The surface density of option II is reduced by 5.5% compared to the option I of two-layer knitting. The thickness of the two-layer knitwear changes as follows when the pattern ratio changes: compared to the I option, the thickness of the II option is 7% more.

To find out the consumption of raw materials of knitting, we analyze its volume density. Since the change in the surface density in the II variants of the patterned knitting is less than the increase in their thickness, the volume density of these variants was greater compared to the I variant of the knitting. Therefore, the volume density of the second version of the knitted fabric is 15% higher than that of the first version. This means that the consumption of raw materials in the production of the second option of knitted fabric is 15% less than that of the first option.

CONCLUSION

Thus, it is possible to reduce the consumption of raw materials, improve the quality indicators, increase shape retention and expand the assortment of knitted fabrics due to the calculation of changing the shear ratio of two-layer knitting, the production of two-layer knitted

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fabric with different structures, and the use of the base thread in the joining of knitted layers.

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