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STUDY OF CHANGE OF PHYSICAL-MECHANICAL INDICATORS AT THE EXPENSE OF QUANTITY OF SILK RAW MATERIALS IN PATTERNED KNITWEAR

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ANNOTATION

In this article, 4 samples with high double storage properties of modified raw material composition were taken, their physical-mechanical properties and technological parameters were studied experimentally, tabulated and analyzed. LONG-XING LXA 252 12 G Experimental samples of double-layered knitted fabric were developed and graphic notation was provided on the class flat needle loom.

Keywords: knitwear, double knit, hoop, yarn, flat, dimensional lightness, hoop height, surface density, pattern, density, hoop strip length, polyacrylonitrile, silk, polyester.

INTRODUCTION

The knitting industry is today the most important branch of the textile industry. Knitted products are characterized by modernity, practicality and affordability. The knitting industry has the following specific advantages:

- In the field of expanding the range of products there is a wide range of opportunities to obtain a variety of mixed fabrics that provide different properties and appearance of knitted fabrics;
- High consumer resistance to repeated deformation, complex physical and mechanical properties such as friction, wrinkling, high hygienic properties (hygroscopicity, air permeability and a number of comfort conditions), a unique consumer property of knitted fabric, which characterizes the complex aesthetic performance;
- Availability of a wide range of technological capabilities for the production of products in regular and semi-regular methods;

In order to change the raw material composition and expand the range of knitted fabrics, as well as to expand the technological capabilities of the LONG-XING LXA 252 12G (China) flat needle machine, 4 variants of double-layer knitted fabric were developed by changing the raw material composition. The developed options of two-layer knitted fabric differ from each other

in the type of raw material. Technological parameters and physico-mechanical properties of two-layer knitted fabric were determined by the experimental method in the laboratory of the Namangan Institute of Engineering Technology, the measurement results are given in the table. As a result of practical research, the texture structure, physical properties and appearance, which characterize the quality indicators of knitwear, were identified.

Indicators that characterize the structure of knitted fabric are: surface and volume density, density in width and length (number of rings per unit length), length of loop thread, angle of intersection of loop rows and loop columns, thickness of knitted fabric. A graphic representation of the two-ply knitted fabric produced is shown in the figure.

35 tex x 2 polyacrylonitrile, 17 tex x 4 polyester, 20 tex x 4 silk yarns were used as raw materials.

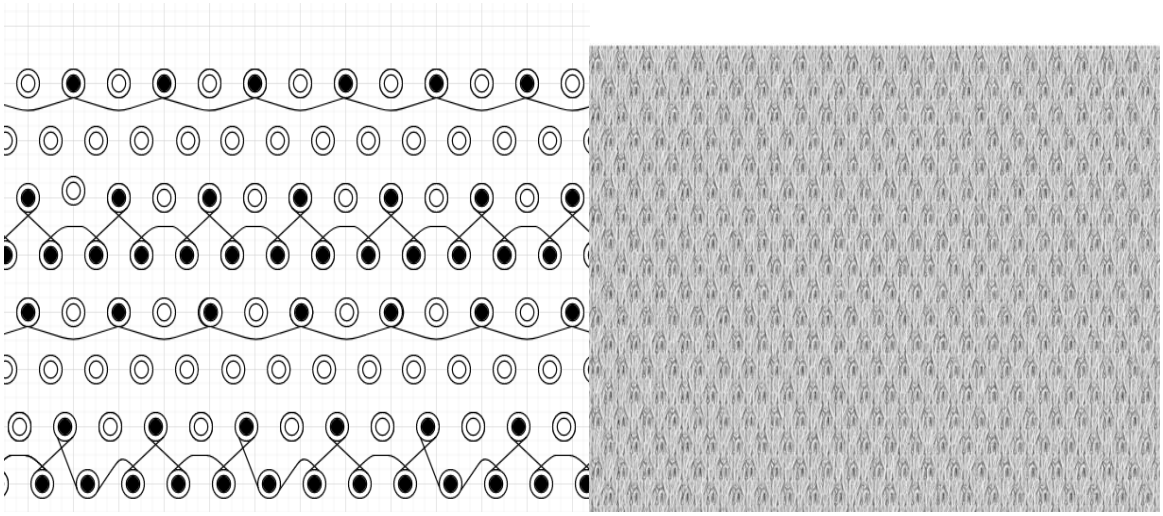


Figure 1. Graphic notation of double-layered knitted fabric

In the production of knitted products on the LONG-XING LXA 252 12G flat needle knitting machine, the change of the position of the rings, densities, the length of the ring strip and a number of other parameters is done automatically. This makes it easy to get a variety of knitted fabrics. In the obtained sample, eye-catching patterns were formed on the front side. The merging of the front layer with the back layer was done using a rubber 2 + 1 texture. The result was a knitted fabric with a unique pattern on the outside, improved shape retention and heat retention. (Figure 1)

It was found that the volume density index of two-layer knitted fabric in all variants changed significantly compared to the base fabric due to the use of different raw materials in the two-layer knitted structure. The volume density of knitwear is one of the main among the technological indicators, which shows the amount of raw material consumption in knitwear.

Technological parameters of knitted fabric

Indicators		Samples			
		1	2	3	4
Thread type and linear densities		Polyacrylonitrile 35 tex x2	Polyacrylonitrile 35 tex x2	Polyester 17 tex x 4	Silk 20 tex x4
		Polyacrylonitrile 35 tex x2	silk 20 tex x 4	Silk 20 tex x 4	Silk 20 tex x4
Ring step A (mm)		1,79	1,79	1,79	1,79
Row height B (mm)		1,16	1,16	1,16	1,16
Horizontal density R_h		28	28	28	28
Vertical density R_v		43	43	43	43
Ring strip length L (mm)		7,45	7,55	6,79	6,44
Knitted surface density Ms (gr/m^2)		372	409	421	434
Knitting thickness T (mm)		2.61	2.59	2.57	2.46
Volume density δ (mg/sm^3)		142,5	158	163,5	176,4
Air permeability		50,7	67,2	98,84	100,71
Breaking force	height	446	1016	1060	1256
	width	315	508	641	946
Stretching to break (%)	height	83,7	69,6	45,35	40,3
	width	58,9	145,5	61	110,5
Revensible deformation , $\varepsilon_н$, %	height	8	17,5	25	5
	width	19	27,5	35	5
Irrevensible deformation, ε_o, %	height	92	82,5	75	95
	width	81	72,5	65	95

A number of technological improvements have been achieved due to the fact that the structure of the knitted fabric and the linear density of the yarns are close to each other, the composition of the raw material has changed and the proportion of silk has increased.

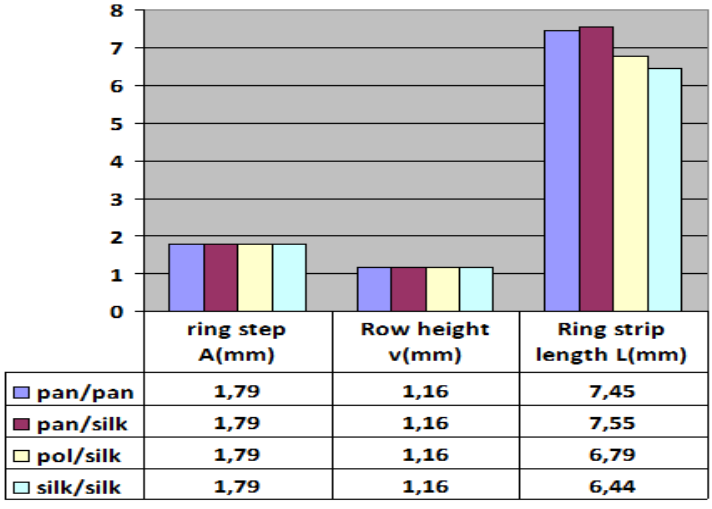


Figure 2. Histogram of loop pitch, loop row height and loop strand length of knitted knitwear

In all samples, the ring pitch was 1.79 mm and the ring row height was 1.16 mm. We can see that the length of the loop strip has changed slightly due to the change in the raw material composition of the knitted fabric. (Figure 2)

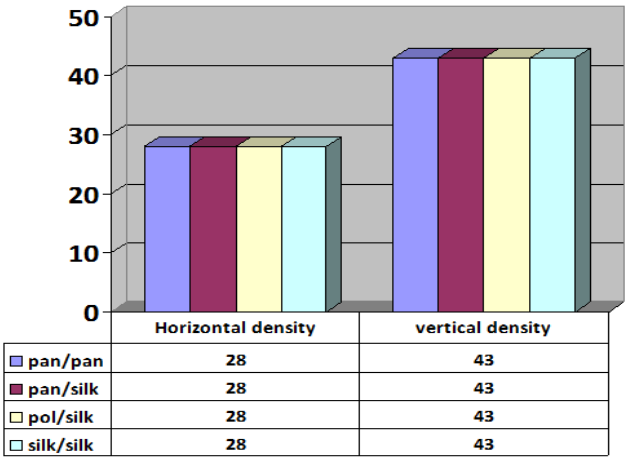


Figure 3. Histogram of densities on the horizontal and vertical of the knitted fabric

The horizontal and vertical densities are the same in all samples, ie the number of rings with a length of 50 mm is 28 and 43, respectively. (Figure 3)

The lowest air permeability was observed in variant I of knitted fabrics, and its volume was 50.7 sm^3 / sm^2*sec. The highest air permeability was observed in variant IV of the knitted fabric samples and its volume was 100.71 sm^3 / sm^2*sec, which is 50.3% more than that of the fabric (variant I). (Figure 4)

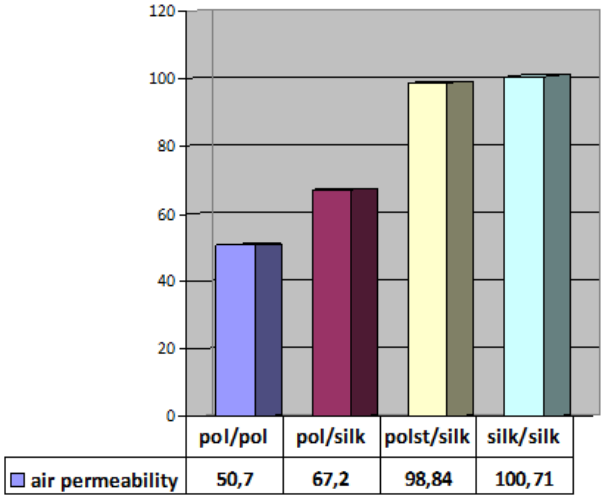


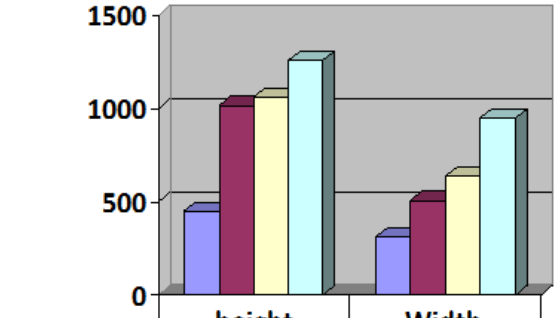
Figure 4. Air permeability histogram of knitted fabric

The description of the cut is an acceptable key indicator for assessing the quality of knitted fabrics. All GOST and TSh applicable to knitted fabrics include normative indicators on elongation and tensile strength. Tensile strength is the force required to break a specimen at a given size and speed. The breaking force is expressed in units of Newton (N). The tensile

strength of the submitted samples was determined using the standard method YG-026T dynamometer.

Tissue toughness, i.e., tensile strength analysis, showed that the most mature tissue in height, variant IV, had an index of 1256 N, which was 75% higher than in type I (Table 1, Fig. 5).

Tissue width stiffness was also observed in variant IV, which had a tensile strength of 946 N, which was 67% higher than in variant I tissue.



	height	Width
pan/pan	446	315
pan/silk	1016	508
pol/silk	1060	641
silk/silk	1256	946

Figure 5. Histogram of tensile strength of knitted fabric

From the above analysis of the physical and mechanical properties of knitted fabrics, it became clear that changes in the composition of raw materials in the fabric, the positive effect of knitted fabric on air permeability, toughness and elongation properties strengthen the shape of knitted fabric.

The shape-retaining properties of knitted fabrics allow to obtain knitted products with high durability and beautiful appearance.

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