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RESEARCH OF PHYSICAL AND MECHANICAL INDICATORS OF KNITTED FABRICS MADE OF DIFFERENT RAW MATERIALS

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ABSTRACT

In this article, 4 samples with high storage properties of modified two-layer form of raw material composition were taken, their technological performance and physical-mechanical properties were studied experimentally, tabulated and analyzed .. LONG-XING LXA 252 (China) 12- experimental samples of double-layered knitted fabric were developed on a class flat needle loom, and a graphic notation was given.

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

The production of knitted fabrics has the following specific advantages, which will allow the consistent development of this industry in the future:

- 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 physical 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;
- High technical and economic performance in the production of knitted fabrics, primarily associated with high productivity of knitting machines.

Indicators are selected for the list of tissue defects, depending on the intended use of the knitted fabric and the process of using the finished product, its structure and physical and mechanical properties, as well as the specified function and the type of machine used in production.

Properties and performance of cross-linked and longitudinally woven double-layered knitted fabrics with different structures can meet the requirements for technical and upper knitted products in production practice.

In order to reduce raw material consumption and expand the range of knitted fabrics, as well as expand the technological capabilities of the LONG-XING LXA 252 (China) flat needle

machine, 4 variants of double-layer knitted fabric by changing the raw material composition and its weaving method were developed.

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 and 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 polyacryl nitrile, 17 tex x 4 polyester, 20 tex x 4 viscose, 40 tex x 2 spun cotton yarns were used as raw materials.

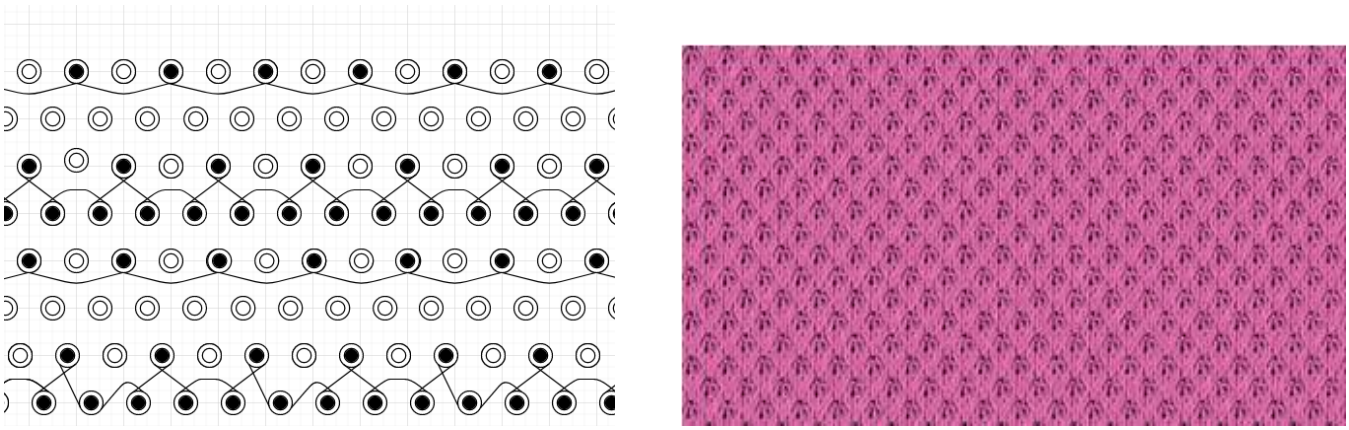

Figure 1. Graphic notation of double-layered knitted fabric

In the production of knitted products on the flat needle knitting machine LONG-XING LXA 252, the change of the location of the rings, densities, length of the ring strip and a number of other indicators is carried out 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. Combining the front layer with the back layer is 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 properties. (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

Table 1

Indicators		Versions			
		1	2	3	4
Thread type and linear densities		Polyacrylonitrile 35 tex x2	Polyester 17 tex x 4	Polyester 17 tex x 4	Spun cotton thread 20 tex x 4
		Spun cotton thread 20 tex x 4	Viscose 20 tex x 4	Polyester 17 tex x 4	Viscose 20 tex x 4
Ring step A (mm)		1,79	1,79	1,79	1,79
Row height V (mm)		1,16	1,16	1,16	1,16
Horizontal density Rg		28	28	28	28
Vertical density Rv		43	43	43	43
Ring strip length L (mm)		6,44	7,05	6,79	7,45
Knitted surface density Ms (gr / m2)		524	508	543	535
Knitting thickness T (mm)		2.6	2.5	2.71	2.4
Volume density d (mg / cm3)		201.5	203.2	200	223
Air permeability		31.32	54.06	62.43	37.57
Breaking force	height	573	622	1231	805
	width	430	810	827	333
Stretching to break L (%)	height	55	65	50	81
	width	126	109	71	87
Reversible deformation, $\varepsilon_н$,%	height	8	10	9	7
	width	9	11	10	8
Irreversible deformation $\varepsilon_н$ (%), %	height	92	90	91	93
	width	91	89	90	92

Due to the close proximity of the structure of the knitted fabric and the linear density of the yarns, almost the same technological parameters were achieved. its thickness and other technological properties change with the change.

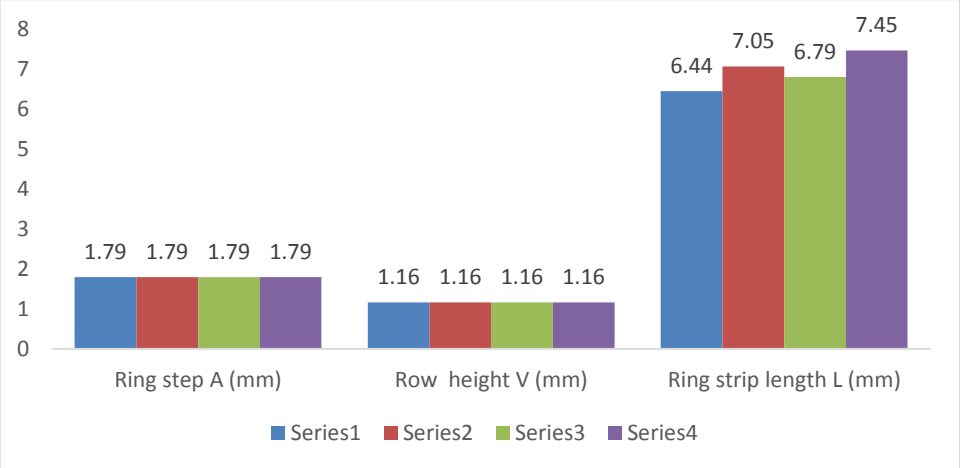

Figure 2. Histogram of loop pitch, loop row height and loop strand length of knitted knitwear

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)

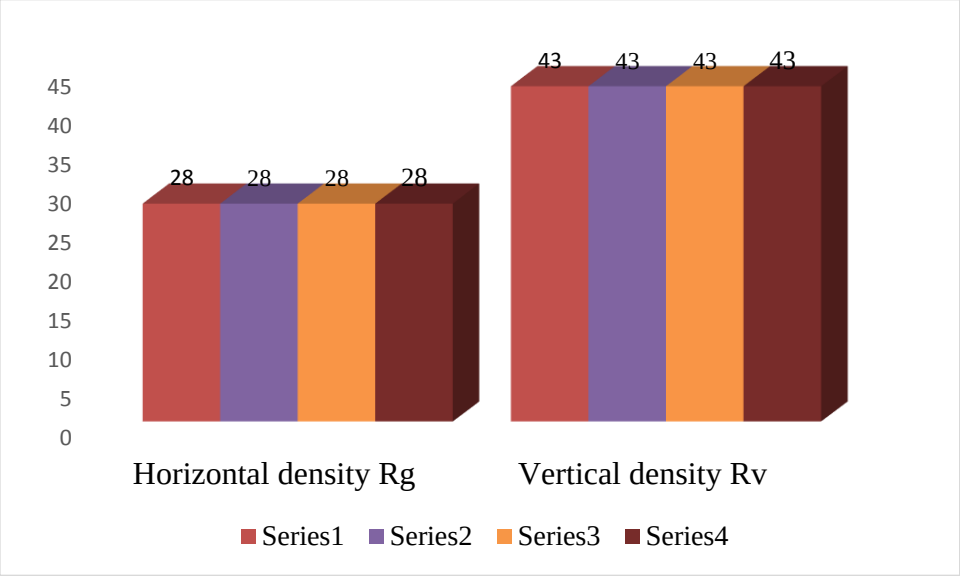

Figure 3. Histogram of densities on the horizontal and vertical of the knitted fabric

The horizontal and vertical densities are the same in all samples, 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 the knitted fabric, and its volume was 31.32 sm^3 /sm^2*s. The highest air permeability was observed in variant III of the knitted fabric samples and its volume was 62.41 sm^3 / sm 2*s is 50% more than that of the fabric (variant I). (Figure 4)

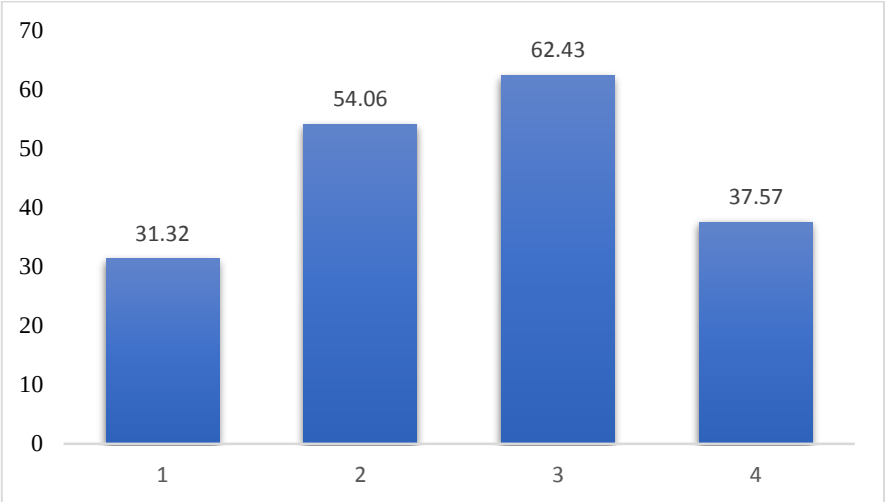

Figure 4. Air permeability histogram of knitted fabric

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 Newtonian units. The breaking

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

Tissue toughness, rupture strength analysis, showed that the most mature tissue in height variant III, with an index of 1231 N, was found to have a toughness of 54% higher than variant I (Table 1, Fig. 5).

Tissue width stiffness was also observed in variant III, with a tensile strength of 827 N, which is 48% higher than in variant I tissue.

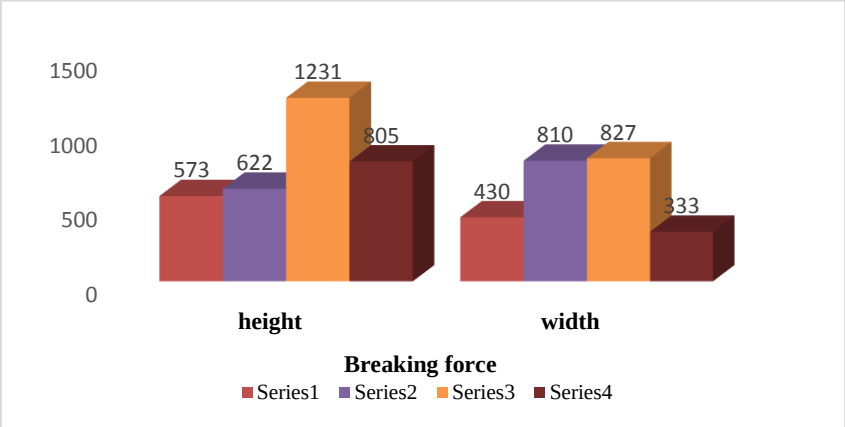

Figure 5. Histogram of tensile strength of knitted fabric

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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