INVESTIGATION OF THE EFFECT OF LOCAL RAW MATERIALS ON THE PHYSICAL AND MECHANICAL PROPERTIES OF KNITTED FABRIC

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Abstract: In this article, using the capabilities of flat two-needle knitting machines, the local raw material, i.e., the percentage of spun cotton thread in the knitted fabric, was introduced step-by-step, and the production technology was developed, and its physical and mechanical parameters were studied. 3 samples of knitted knitted fabric were taken, their technological indicators and physical-mechanical properties were studied experimentally, presented in a table and analyzed. Experimental samples of knitted fabrics were developed and graphed on LONG-XING LXA 252 12G (China) flat needle machine.

Key words: knitting, spun cotton yarn, patterned knitting, double knitting, yarn, yarn, flat, bulk density, yarn height, surface density, pattern, density, yarn length.

Production of knitted products with high hygienic properties, effectively using local raw materials in the production of knitted products, is one of the current problems. As the standard of living of the people living on earth improves, the demand for textile

products with high hygienic properties is increasing. Therefore, the knitting industry is considered the most important branch of the textile industry today. Knitted products are modern, practical, convenient and affordable. The knitting industry has the following specific advantages:

- in the field of expanding the product range, there is a wide opportunity to obtain various mixed fabrics that provide different properties and appearance of the knitted fabric;
- a unique consumer feature of knitted fabric, which is highly resistant to repeated deformation conditions, complex physical-mechanical properties such as friction, wrinkling, high hygienic properties (hygroscopicity, air permeability and properties that provide a number of comfort conditions), complex aesthetic indicators;
- the availability of a wide technological possibility for regular and semi-regular production of products.

It allows to develop new types of patterned knitted fabrics, to increase the share of local raw materials in knitted products, to expand the range of knitted fabrics, as well as to develop the production technology of patterned knitted fabrics in order to expand the technological capabilities of the LONG-XING LXA 252 12G (China) flat double-needle machine. 3 samples were developed by changing the type and proportion of raw materials. The developed patterns of knitted fabric differ from each other in the proportion of raw materials in the fabric. The technological parameters and physical-mechanical properties of the patterned knitted fabric were determined by the experimental method in the laboratory of the Namangan Institute of Engineering Technology, the measurement results are presented in the table. As a result of the conducted practical studies, the fabric structure, physical mechanical properties and external appearance were determined, which describe the quality indicators of the knitted product.

The parameters describing the structure of the knitted fabric include: surface and volume density, width and length density (number of loops per unit length), loop thread length, the angle between the rows of loops and loop columns, and the thickness of the knitted fabric. A graphic record of the newly produced two-layer knitted fabric is presented in Fig.

20 tex x 4 spun cotton yarn, 35 tex x 2 polyacrylonitrile 17 tex x 4 polyester yarn were used as raw materials.

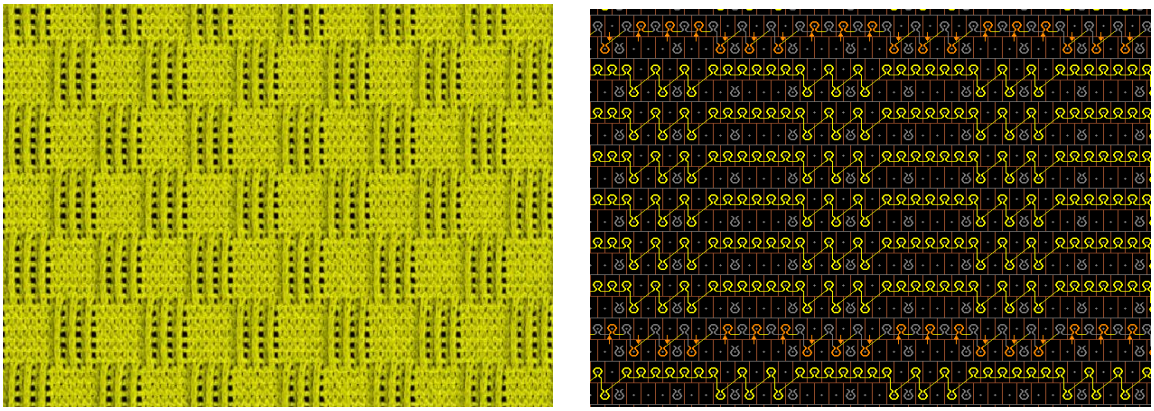

Figure 1. A graphic record of knitted fabrics in a new structure

LONG-XING LXA 252 12G flat double-needle knitting machine changes the position of loops, densities, length of loop thread and a number of other parameters automatically during the production of knitted products. This makes it easy to get a variety of knitted fabrics. In order to improve the air permeability of the obtained sample, patterns were created using front and back needles. As a result, it was possible to obtain a knitted fabric with a unique pattern, improved shape retention and air permeability. (Figure 1)

Due to the change in the percentage of local raw materials in the composition of the patterned knitted fabric, it was found that the volume density index of the patterned knitted fabrics of all samples changed significantly compared to the base fabric. The volume density of knitted fabric is one of the main technological indicators, which indicates the consumption of raw materials in the knitted fabric.

Technological indicators of knitted fabric

Table 1

Indicators	**Samples**		
	1	**2**	**3**
Thread type and linear densities	**Polyacrylonitrile 35 tex x2**	**Cotton 20 tex x4**	**Cotton 20 tex x4**
	Polyacrylonitrile 35 tex x2	**Polyacrylonitrile 35 tex x2**	**Cotton 20 tex x4**
Ring step A (mm)	1.79	1.79	1,79
Row height B (mm)	1.38	1.38	1,38
Horizontal density R_h	28	28	28
Vertical density R_v	43	43	43
Ring strip length L (mm)	6.22	6.44	6,74
Knitted surface density Ms (gr/m^2)	362	473	543
Knitting thickness T (mm)	2.41	2.52	2.61
Volume density δ (mg/sm^3)	150.2	181.5	226.4

Air permeability		28.68	39.32	43.052
Breaking force	height	489	543	548
	width	264	403	432
Узулишдаги чўзилиш (мм)	бўйига	158,6	98,1	100,7
	энига	234,4	239,3	231
Stretching to break (%)	height	79,3	45,35	48,35
	width	117,2	106,15	110,5
Узулишдаги сарифланган энергия (Ж)	бўйига	23,8	20	24,2
	энига	17,7	29	30,2
Revensible deformation , $\varepsilon_н$, %	height	23,5	20,7	21,8
	width	34,3	31,5	28

Due to the fact that the structure of the knitted fabric and the linear density of the threads are close to each other, a number of technological indicators have been improved.

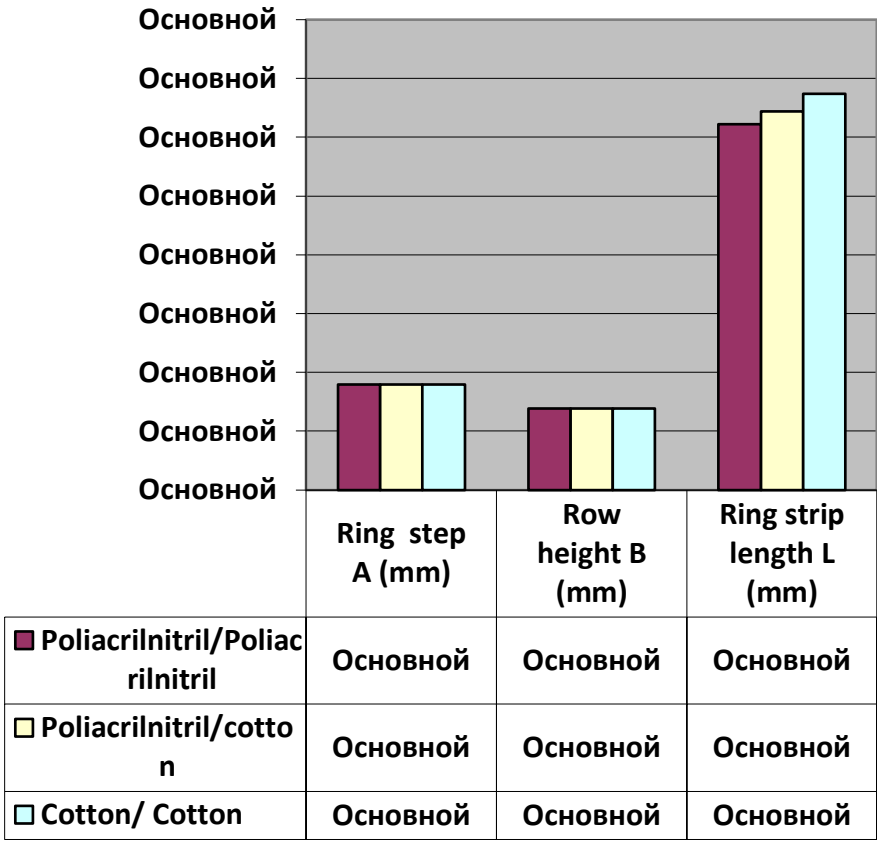

Figure 2. A histogram of the warp pitch, warp row height, and warp thread length of a patterned knit

In all samples, the pitch is 1.79 mm, and the height of the row is 1.38 mm. We can see that the yarn length has changed slightly due to the change in the composition of he raw material of the knitted fabric. (Figure 2)

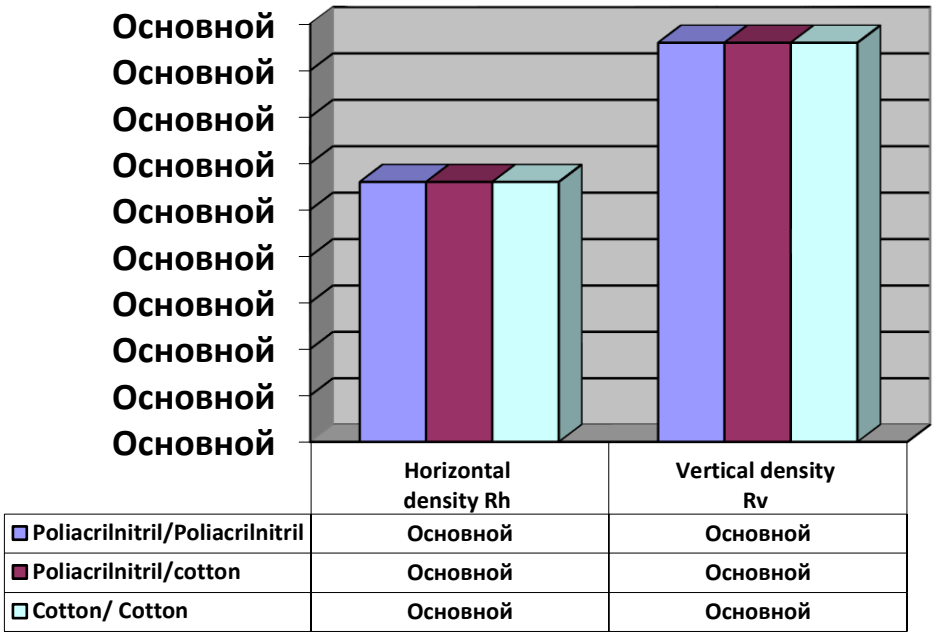

Figure 3. Horizontal and vertical density histogram of patterned knitted fabric

Horizontal and vertical densities are the same in all samples, that is, the number of 50 mm long rings is 28 and 43, respectively. (Figure 3)

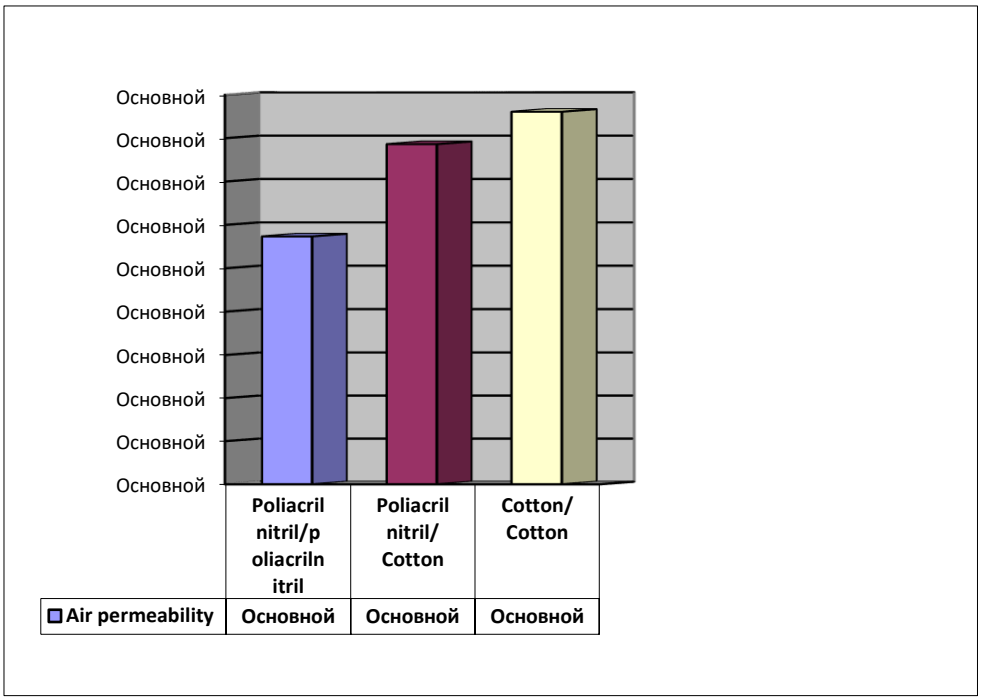

Figure 4. Air permeability histogram of patterned knitted fabric

The lowest air permeability was observed in sample I- of knitted fabric with a pattern and its amount was 28.68 cm3/cm2□sec. The highest air permeability was observed in sample III of knitted fabric samples and its amount was 43.052 cm3/cm2□sec, which is 43.4% more than that of fabric (variant III). (Figure 4)

From the analysis of the physical and mechanical properties of the knitted fabrics mentioned above, it was found that the air permeability of the knitted fabric was improved as a result of the change in the percentage of spun cotton raw materials in the fabric, as a result of its positive effect on the air permeability properties of the knitted fabric.

List of references

[1] Kholikov, K.M; Zhuraboev, A.T; Shogofurov, Sh.Sh; Abduvaliev, D.M. (2020) Comprehensive assessment of the two-layer knitwear quality. The Way of Science. 2020. № 1 (71).
http://scienceway.ru/f/the_way_of_science_no_1_71_january.pdf#page=24

[2]. F.Kh. Sadykova, D.M. Sadykova, N.I. Kudryashova. Textile materials science and the basics of textiles production. M .: Legprombytizdat, 219-225p. (1989).

[3]. Ш.Исҳоқов. Тўқимачилик кимёси. Тошкент “Ўзбекистон” 1995.192 бет.

[4]. А.И.Кобляков, Г.Н.Кукин, А.Н.Соловьев. Лабораторный практикум по текстильному материаловедению

[5]. N.R.Xanxadjayeva, Naqsh hosil qilish nazariy asoslari., Darslik. T.: “Aloqachi”, 2010, 214 bet.