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STUDY OF TECHNOLOGICAL AND PHYSICAL-MECHANICAL PARAMETERS OF KNITTED FABRIC IN A NEW STRUCTURE FROM MIXED RAW MATERIALS

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ABSTRACT: In this article, Double flat knitting machines using local raw materials that the inner cotton yarn, knitted jersey, the proportion of the structure of the fabric composition and step by step production technology are developed physical and mechanical properties in an experimental way, the table was delivered and analyzed. LONG-XING LXA 252 12G brand (China) bed flat machines will bring experimental patterns and graphics.

KEYWORDS: knitwear, cotton threads, knitted knitwear, two-layer knitwear, hoop, yarn, flat, volumetric lightness, hoop height, surface density, structure, density, yarn hoop length

INTRODUCTION

Textiles and light industry are important sectors of the economy that shape the budgets of many countries. Innovative opportunities are a strategic resource that determines the place of the national economy in the world economy. The application of the integration of scientific achievements in production is a necessary condition for improving the quality and competitiveness of domestic products that replace imports and expand the structure of exports.

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It is strategically important to ensure high and stable growth rates in the textile and clothing industry in the country, attracting and attracting foreign direct investment, production and export of competitive products, modernization of enterprises, technical and technological renewal, introduction of an improved "cluster model" Systematic work is being carried out to create new high-tech jobs through the implementation of projects. [1]

The problem to be solved and the problem to be posed. The production of knitted products with high hygienic properties, effective use of local raw materials in the production of knitted products, is one of the current problems. As the living standards of the world's population improve, the demand for consumer goods and textiles with high hygienic properties is increasing. Therefore, the knitwear industry is now the most important branch of the textile industry. Knitted products are distinguished 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; [2]
- 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 a regular and semi-regular manner. [3,4]

Experiment and analysis of the results obtained. Development of new types of knitted fabrics, increasing the share of local raw materials in the composition of knitted products, expanding the range of knitted fabrics, as well as the production of knitted knitting technology to expand the technological capabilities of LONG-XING LXA 252 12G (China) flat double-needle machine 3 samples were developed by changing the type and proportion of raw materials in the output. The developed patterns of knitted knitted fabric differ from each other by the proportion of raw material in the fabric composition. Technological parameters and physical and mechanical properties of 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 and mechanical properties and appearance, which characterize the quality indicators of knitted products, were determined. [5]

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. The graphic inscription of the newly produced two-layer knitted fabric is shown in the figure.

The raw material was 20 tex x 4 spun cotton yarn with linear density, 35 tex x 2 polyacryl nitrile 17 tex x 4 polyester yarn.

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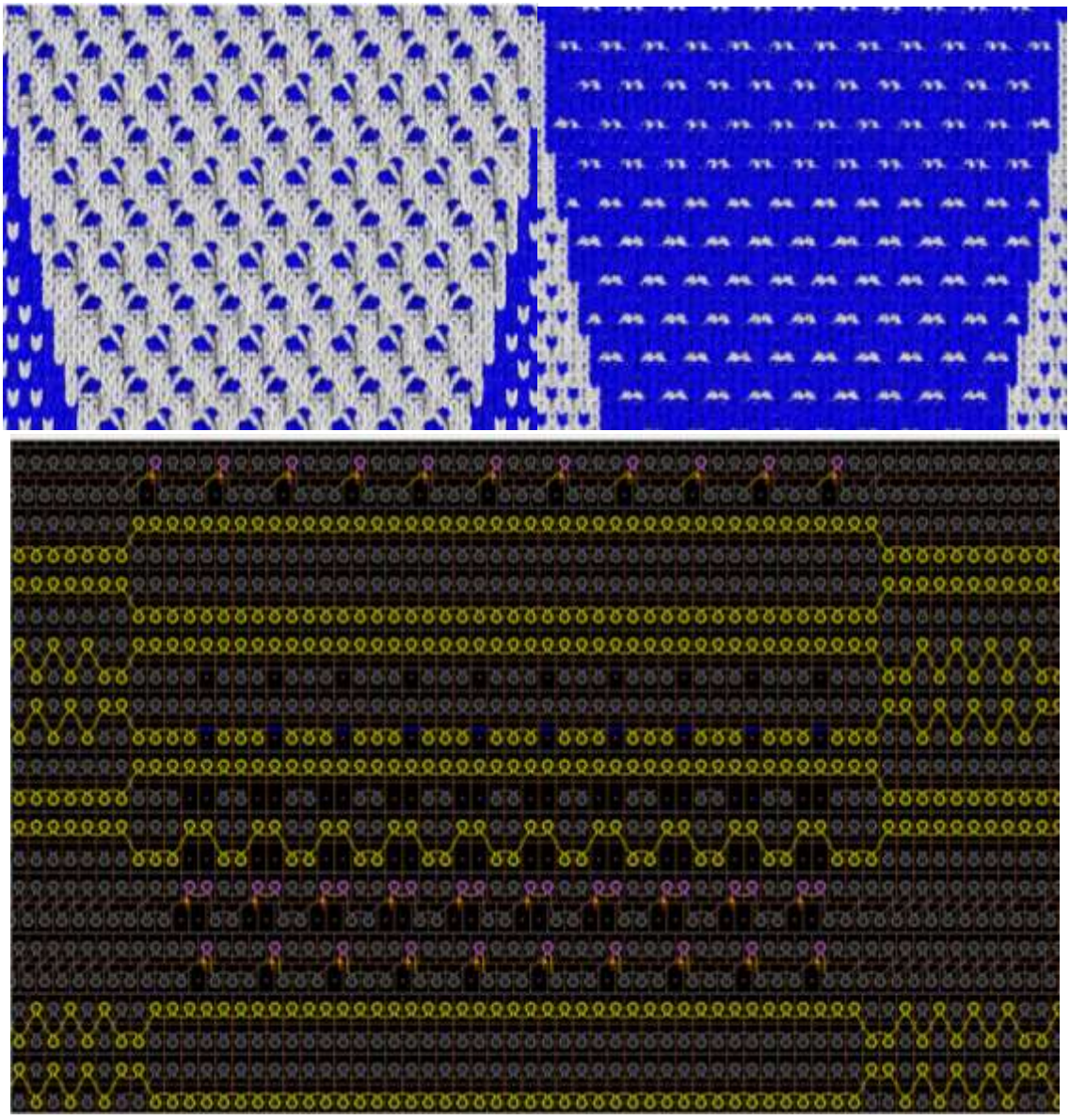

Figure 1. Graphic inscription of knitted fabric in a new structure

In the production of knitted products on the LONG-XING LXA 252 12G flat double-needle knitting machine, the change of the location of the rings, densities, length of the ring strip and a number of other indicators is done automatically. This makes it easy to get a variety of knitted fabrics. In the obtained sample, eye-catching patterns were created on the front side in order to improve the air permeability. Joining the front layer to the back layer was done using a rubber 2 + 2 texture. As a result, it was possible to obtain a knitted fabric with a unique pattern appearance, improved shape retention and air permeability. (Figure 1)

Due to the change in the proportion of local raw materials in the composition of the knitted fabric, it was found that the volume density index of knitted fabrics in all samples changed significantly compared to the base fabric. The volume density of knitwear is one of the main among

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the technological indicators, which shows the amount of raw material consumption in the knitted fabric. [6,7]

Technological parameters of knitted fabric

Table 1

Indicators		Options		
		1	**2**	**3**
Thread type, linear densities		Cotton thread 20 tex x 4	Cotton thread 20 tex x 4	Cotton thread 20 tex x 4
		Polyacrylonitrile 35 tex x2	Polyacrylonitrile 17 tex x 4	Polyacrylonitrile 20 tex x 4
Loop step A (mm)		1,79	1,79	1,79
Loop row height B (mm)		1,16	1,16	1,16
Horizontal density Rg		28	28	28
Vertical density Rv (number of rings)		43	43	43
Loop strip length L (mm)		6,44	6,34	6,76
Knitted surface density Ms (gr/m^2)		524	575	643
Knitting thickness T (mm)		2,6	2,56	2,61
Volume density d (mg/sm^3)		201.5	225	246.4
Air permeability V (sm^3 / sm^2*sec)		31,32	45,58	53,68
Interruption force R (N)	height	573	580	595
	width	430	444	447
Breakage elongation (mm)	height	110,1	102,3	114,7
	width	252.3	200.9	238
Intermittent elongation (%)	height	55,05	51,15	57,35
	width	126.15	100.45	120
Discontinued energy consumption (J)	height	20,3	31,9	33,6
	width	29	37,2	40,2

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, and the raw materials in the fabric composition have changed. [8]

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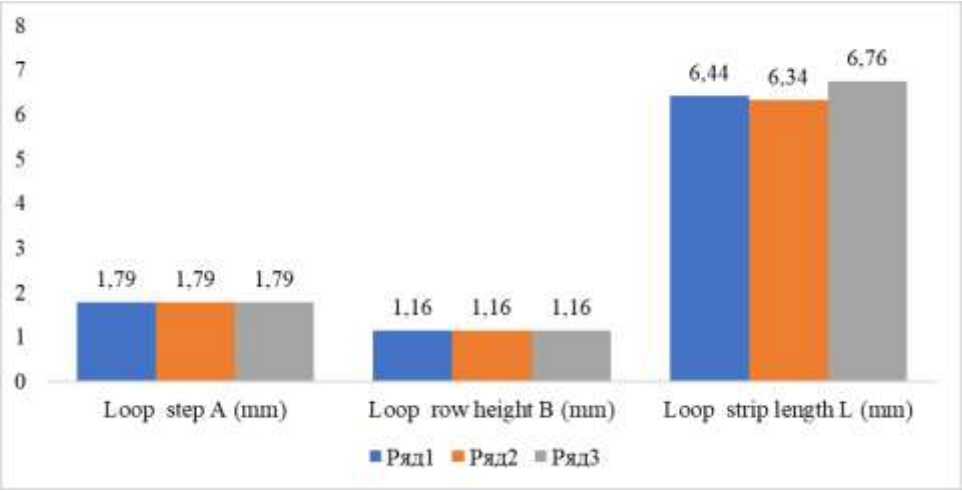

Figure 2. Histogram of loop pitch, loop row height and loop strand length of knitted knitwear

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

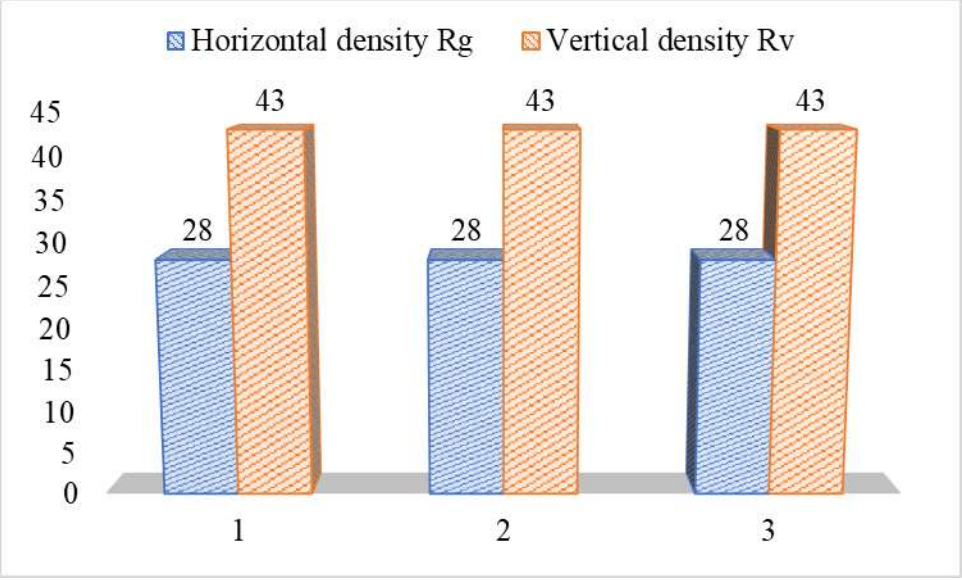

Figure 3. Density histogram of the knitted fabric on the horizontal and vertical

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

The lowest air permeability was observed in the I-sample of knitted fabrics and its volume was 31.32 sm^3/sm^2*sec. The highest air permeability was observed in sample III of the knitted fabric samples and its volume was 53.68 sm^3/sm^2*sec., which is 41.66% more than that of the fabric (variant III). (Figure 4)

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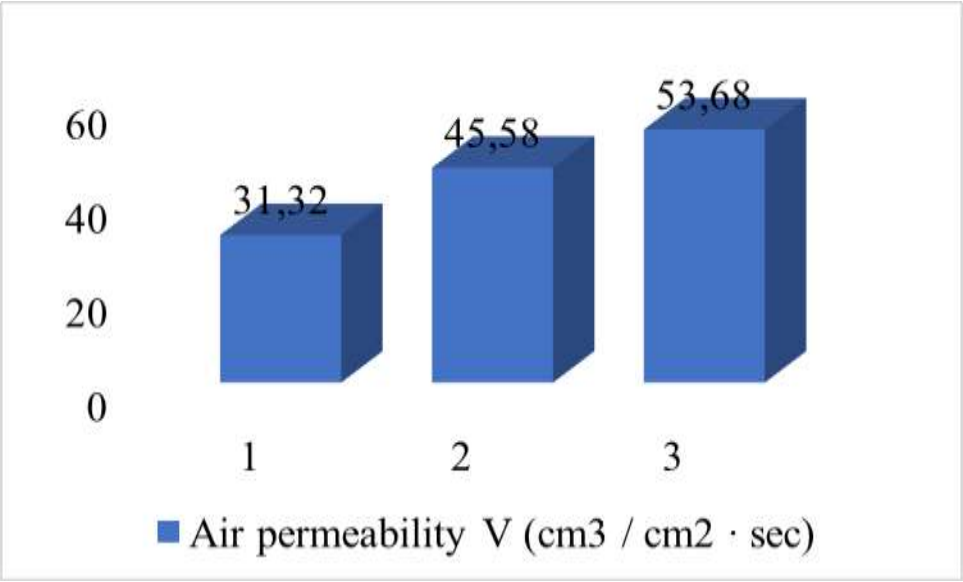

Figure 4. Air permeability histogram of knitted fabric

The breakdown characteristic 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. Breaking force is the force required to break a specimen at a given size and speed. The breaking force is expressed in Newton (N) units. The breaking 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 III, with a value of 595 N, had a toughness of 3.4% higher than that of type I (Table 1, Figure 5).

The strength of the tissue in width was also observed in sample III, which had a tensile strength of 447 N, which is 3.2% more than in tissue I.

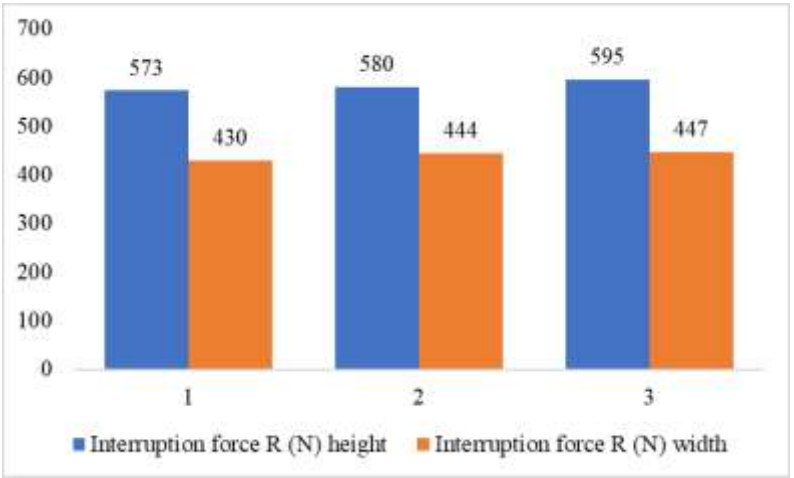

Figure 5. Histogram of tensile strength of knitted fabric

The energy consumed in a break is the amount of energy expended to break it when the specimens are stretched at a given size and speed. The energy expended on the break is expressed in units of Joule (J). The breakdown energy of the presented samples was determined using the standard method YG-026T dynamometer.

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Tissue toughness, ie the analysis of the amount of energy consumed at rupture, shows that the most mature tissue in height III, its energy consumption at rupture is 33.6 J, has a toughness of 39.6% higher than sample I (1 -table, Fig. 6).

Tissue width stiffness was also observed in Sample III, where the energy dissipated in the tear width was 40.2 J, which is 28.1% more than in the I-sample tissue.

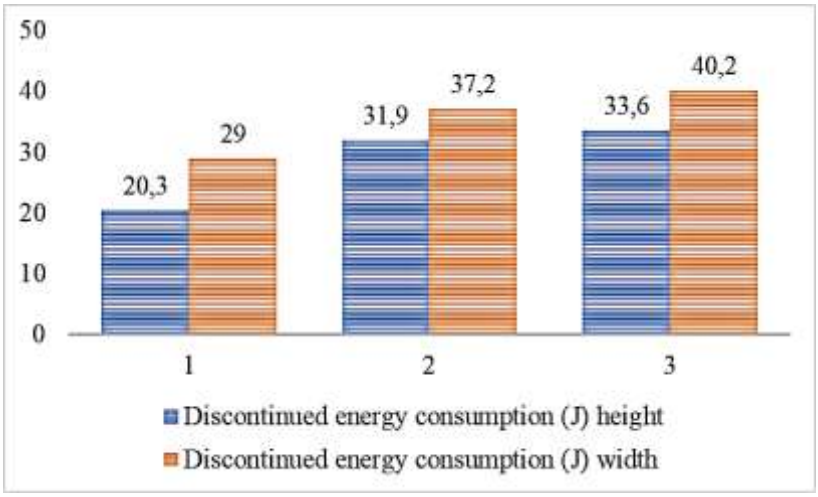

Figure 6. Consumed energy histogram at the break of knitted fabric

Areas of application of the obtained results. Summarizing the results of the above analysis, the main cases that allow the application of double-layered knitted fabrics to top-knitted products can be explained as follows:

- Analyzing the appearance of the sample, we can include it in the group of large knitted fabrics. This, in turn, means that it meets current market requirements.
- The technological and physical-mechanical properties of the samples show that the use of natural cotton yarn in the inner layer of the knitwear improves its hygienic properties.
- The change of polyacrylonitrile strip and tissue structure used on the outside improves its properties such as shape retention, abrasion resistance, toughness.
- As a result of the analysis of the samples obtained, it was found that the raw material for the upper knitwear is low-cost, high-efficiency knitted fabric and was recommended to manufacturers.

Conclusion. The above analysis of the physical and mechanical properties of knitted fabrics shows that the shape of the knitted fabric is strengthened as a result of changes in the proportion of raw cotton in the fabric, a positive effect on the air permeability, toughness and elongation properties of knitted fabric.

References

1. Shogofurov, Sh.Sh; Kamalova, I.I; Xoliqov, Q.M; Meliboev, U.X. (2020) Structure And Methods For Producing Refined Two-Layer Knitted Sheets. Solid State Technology. Vol. 63 No. 6 (2020). Pages 11798-11807.
2. Juraboev, A.T; Kholiqov, Q.M; Shog'ofurov, Sh. Sh (2020) The study of the technological parameters of double layer knitwear with various methods of connecting layers.

ISSN 2690-9626 (online), Published by "Global Research Network LLC" under
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ACADEMICIA: An International Multidisciplinary Research Journal. Year:2020, V10.Issue 4. Pages 397-404.

3. 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).
4. Jurabayev.N.N, Shogofurov.Sh.Sh, Kholikov.K.M, Meliboev.U.X (2021). Study of the fabric structure influence on the physical-mechanical and technological properties of knitted products. In E3S Web of Conferences (Vol. 304, p. 03030). EDP Sciences.
5. Shogofurov.Sh.Sh., Kamalova.I.I, Xolikov.K.M, (2021). Study of the Effect of Changes on the Technological and Physical-Mechanical Properties of Knitting in a New Structure. Engineering, 13(6), 287-299.
6. Shogofurov, Sh.Sh., Xolikov, Q. M. (2021). Research of pattern in a new structure knitting fabrics. In Экономика. Социология. Право (pp. 26-28).
7. Shogofurov, Sh.Sh., Xolikov, Q. M. (2021). Pattern effects of knitwear fabrics on jackard knitwear. In Экономика. Социология. Право (pp. 29-31).
8. A.T Juraboev, Q.M Kholiqov, Sh.Sh.Shogofurov, The study of the technological parameters of double layer knitwear with various methods of connecting layers. ACADEMICIA: An International Multidisciplinary Research Journal. Year: 2020, V10. Issue 4
9. Shogofurov.Sh.Sh, Umarjonovna.R.S., Ibroximovna.K.I, Madaminovich.K.K, (2021). Analysis of physical-mechanical performance of two-level. South Asian Journal of Marketing & Management Research, 11(2), 68-73.
10. Kholikov, K. M., Zhuraboev, A. T., Shogofurov Sh. Sh., & Abduvaliev, D. M. (2014). Comprehensive assessment of the two-layer knitwear quality. The Way of Science, 24.
11. Shogofurov.Sh.Sh, Kamalova.I.I, Xoliqov.Q.M, Meliboev.U.X, (2020). Structure And Methods For Producing Refined Two-Layer Knitted Sheets. Solid State Technology, 63(6), 11798-11807.
12. Juraboev.A.T, Kholiqov.Q.M, Shogofurov.Sh.Sh. (2020). The study of the technological parameters of double layer knitwear with various methods of connecting layers. ACADEMICIA: An International Multidisciplinary Research Journal, 10(4), 397-404.

ISSN 2690-9626 (online), Published by "Global Research Network LLC" under
Volume: 3 Issue: 5 in May-2022 https://grnjournals.us/index.php/AJSHR