COMPREHENSIVE EVALUATION OF DICTIONS OF TWO LAYER KNITTED TEXTILE FABRICS FROM COTTON AND POLYESTER YARN

Lazizbek Uralov
Basic doctoral student
of Namangan Institute of Engineering and Technology
Republic of Uzbekistan, Namangan
E-mail: Azizbekjaloliddinov551@gmail.com

Kurbanali Kholikov
Professor
of Namangan Institute of Engineering and Technology
Republic of Uzbekistan, Namangan
E-mail: qurbonalixoliqov@gmail.com

Umarjon Melibaev
Candidate of technical Sciences, docent
Namangan Institute of engineering and technology,
Republic of Uzbekistan, Namangan

Dilafruz Vakhobova
Basic doctoral student
of Namangan Institute of Engineering and Technology
Republic of Uzbekistan, Namangan

КОМПЛЕКСНАЯ ОЦЕНКА ПОКАЗАТЕЛЕЙ ДВУХСЛОЙНОЙ ТРИКОТАЖНОЙ ТКАНИ ИЗ ХЛОПКОВОЙ И ПОЛИЭФИРНОЙ ПРЯЖИ

Уралов Лазизбек Сойибназар углы
докторант
Наманганского инженерно-технологического института
Республика Узбекистан, г. Наманган

Холиков Курбанали Мадаминович
профессор
Наманганского инженерно-технологического института
Республика Узбекистан, г. Наманган

Мелибаев Умаржон Хайдарович
канд. техн. наук, доцент
Наманганский инженерно-технологический институт,
Республика Узбекистан, г. Наманган

Вахобова Дилафруз Гайратовна
докторант
Наманганского инженерно-технологического института
Республика Узбекистан, г. Наманган

ABSTRACT

The article used a complex assessment method to determine the quality of two-layer knitted fabric samples made of cotton polyester yarn. As a result of the analysis of the complex assessment diagram and histogram of the quality indicators of the studied samples, variant III of double-layered knitted fabric of cotton and polyester yarn was found to be the best option.

АННОТАЦИЯ

В статье рассмотрен комплексный метод оценки качества образцов двухслойного трикотажного полотна из хлопчатобумажной и полиэфирной пряжи. В результате анализа комплексной оценочной диаграммы и гистограммы показателей качества исследуемых образцов лучшим вариантом был признан вариант III двухслойного трикотажа из хлопчатобумажной и полиэфирной пряжи.

Библиографическое описание: COMPREHENSIVE EVALUATION OF DICTIONS OF TWO LAYER KNITTED TEXTILE FABRICS FROM COTTON AND POLYESTER YARN // Universum: технические науки : электрон. научн. журн. Uralov L.S. [и др.]. 2022. 6(99). URL: *https://7universum.com/ru/tech/archive/item/13972*

Keywords: raw materials, technology, products, polyester, complex, analysis, properties, diagram, physico-mechanical, polygon, radius-vectors**.**

Ключевые слова: сырье, технология, продукция, полиэстер, комплекс, анализ, свойства, схема, физико-механический, полигон, радиус-векторы.

In the production of knitted goods in the country, enterprises use mainly local raw materials, mainly cotton yarn. The technological capabilities of modern knitting machines installed in joint ventures are not fully used. Therefore, to make full use of the capabilities of knitting machines installed in joint ventures, efficient use of local raw materials, expand knitted products, knitwear that can meet the requirements of competitive, high-quality, domestic and foreign markets to replace imports production is one of the current problems.

In order to solve the above-mentioned problems and take full advantage of the technological capabilities of knitting machines installed in knitting enterprises, methods for obtaining double-layered backed knitted fabrics of a new structure have been developed.

Five variants of double-layered knitted fabric made of cotton and polyester yarn were woven on a 26-class double-loop needle knitting machine manufactured by Taiwanese company WELL KNIT [1].

Our cotton and polyester yarn double-layered backing knitwear was made using 20-ply cotton yarn and 300D polyester yarn. The report of the double-layered knitted fabric of cotton and polyester yarn consists of glad and press rows.

A photo of the proposed knitwear is shown in Figure 1.

The pattern of the two-layer knitted fabric of cotton and polyester yarn differs from each other by the pattern of the stitches used to attach the layers and the sequence of reports.

In order to study the effect of changes in the reports and the sequence of throwing the yarn on the new structure of double-layered knitted fabric woven from cotton and polyester yarn on the basis of glad and press two Technological parameters and physical and mechanical properties of 5 variants of layered knitted patterns were determined and analyzed experimentally on modern equipment installed in the laboratory for testing textile-knitted patterns at the Namangan Institute of Engineering and Technology.

The above-mentioned technological parameters of the two-layer backed knitted fabric of the new structure of cotton and polyester yarn showed that the volume densities of the fabric are relatively low compared to the base fabric (Option I), 131.6 mg / cm3 from 143.05 mg / cm^3. As the amount of press rings in the knitted fabric increases, the bulk density of the knit decreases (Figure 2).

I variant

II variant

III variant

IV variant

V variant

Figure 1. Photo of the new structure of the two-layer backed knitted fabric

From the above analysis of the physical and mechanical properties of the two-layer backed knitted fabric, it was found that the air permeability of the knitted fabric has a positive effect due to the use of press tissue in the two-layer backing. (Figure 2).

Table 1.

Physico-mechanical properties of two-layer back tissue

Parameters			Versions				
			Sample 1	**Sample 2**	**Sample 3**	**Sample 4**	**Sample 5**
Types of threads, linear density	Back layer		20 tex Cotton thread	20 tex Cotton thread	20 tex Cotton thread	20 tex Cotton thread	20 tex Cotton thread
	Front layer		20 tex Cotton thread	20 tex Cotton thread	20 tex Cotton thread	20 tex Cotton thread	20 tex Cotton thread
	weft		Polyester 300 D				
Air permeability V ($sm^3/sm^2 \cdot sek$)			59,2	66,3	51,8	54,4	84,4
Interruption power R (N)		along	262	311	425	151	232
		width	259	660	813	208	171
Stretch to break L (%)		along	72,9	67,75	87,65	67	136,1
		width	108,1	27	35,85	29,55	223,9
Irreversible deformation $\varepsilon_н$ (%)		along	9,4	9,4	23,8	26,3	20,5
		width	-27,7	17,6	23,5	14,2	30,7
Reversible deformation ε_o (%)		along	90,6	90,6	76,2	73,7	79,5
		width	127,7	82,4	76,5	85,8	69,3
The shrinkage of the fabric K (%)		along	1	2	3	4	4
		width	4	5	5	6	5
Friction resistance I (thousandth circle)			45,4	40	37,8	26,5	36,5

Table 2.

Technological parameters of double-layered knitted fabric

Parametres		Versions				
		Sample 1	**Sample 2**	**Sample 3**	**Sample 4**	**Sample 5**
Thread type, linear densities	Back layer	20 tex cotton yarn	20 tex cotton yarn	20 tex cotton yarn	20 tex cotton yarn	20 tex cotton yarn
	Front layer	20 tex cotton yarn	20 tex cotton yarn	20 tex cotton yarn	20 tex cotton yarn	20 tex cotton yarn
	weft	Polyester 300 D				
Ring step *A* (mm)	Back layer	0,91	0,96	0,89	0,89	1,1
	Front layer	0,94	0,94	0,89	0,81	1,1
Row height *B* (mm)	Back layer	0,76	0,73	0,6	0,60	0,69
	Front layer	0,71	0,74	0,58	0,67	0,73
Horizontal density R_g (number of rings)	Back layer	53	52	56	56	45
	Front layer	55	53	56	61	45
Vertical density R_v (number of rings)	Back layer	65	0,73	86	82	68
	Front layer	70	0,74	82	74	72
Ring strip length *L* (mm)	Back layer	4,35	3,46	3,2	3,58	3,7
	Front layer	3,81	3,56	2,83	3,13	4
Knitted surface density Ms (gr / m^2)		261	254,9	309	279	210,1
Knitting thickness *T* (mm)		1,74	1,79	2,16	2,12	1,59
Volume density δ (mg/sm^3)		150	142,4	143,05	131,6	132,1
Absolute volume relief Δδ (mg/sm^3)		-	7,6	6,95	18,4	17,9
Relative relief θ, %		-	5,06	4,6	12,3	11,9

A number of factors that shape the structure and properties of the fabric must be taken into account to determine the best options for a two-layer backed knitted fabric derived from glad and press fabrics. Therefore, a method for constructing a complex evaluation diagram and a comparison histogram of two-layer knitted fabric indicators was selected to compare the experimental results obtained (Figures 2-3). Physico-mechanical and technological indicators of tissues are shown in 1,2-th tables.

The complex diagram is constructed in such a way that its largest contour shows the best quality of the knitted fabric produced, i.e. the closer the contour is to the outer line, the higher the quality of the knitted fabric and obtained the area of the polygon is so large.

The indicators under analysis are those that have a significant impact on the physico-mechanical and hygienic properties and save valuable raw materials. Surface and volume densities, the proportion of reversible and irreversible deformations, and the penetration are among such indicators.

The construction of a complex evaluation polygon on the quality indicators of a two-layer backed knitted fabric consists of a series of joining of points separated by radius-vectors describing each property.

At the same time, the most economical technology, which allows you to produce high quality products, will have maximum space.

The area of a polygon is calculated as the sum of the area of a triangle, where the radius vectors divide the polygon into triangles.

The area of each triangle is determined by the following formula:

$$S = \frac{1}{2} \cdot a \cdot b \cdot \sin\alpha \ , \% \qquad (1)$$

Here: a, b-radius vectors forming a triangle, a is the angle between the radius vectors.

The value of the surface area obtained from the complex evaluation diagram is expressed by a comparative histogram of the quality indicators of knitted fabrics.

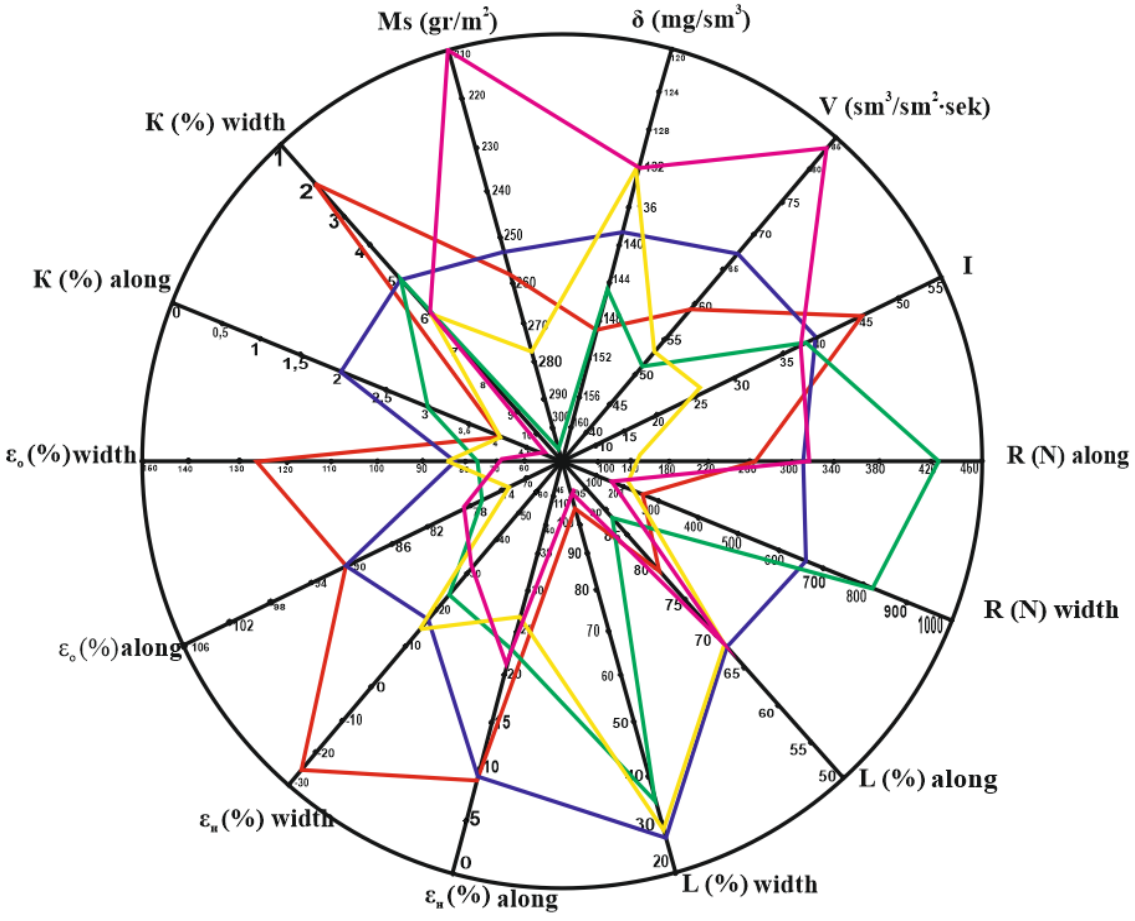

Figure 2. Diagram of a complex assessment of the quality of two-layer backed knitted fabric

-variant I -variant II -variant III -variant IV -variant V

The results of a complex diagram and comparative histogram on the quality of two-layer backed knitted fabric showed that the variant III of the knitted fabric consisting of 20 tex cotton yarn and 300 D polyester comparative histogram (3- picture) (2104 mm2) was found to be the best option. It is advisable to use it for domestic and household knitwear, as the shape, hygienic and air permeability properties of this fabric have been noted.

New types of knitted fabrics based on mixed fabrics with different consumption of raw materials, physical and mechanical properties and consumer properties to create a new range of high quality knitted products using

the presented tissue structure formation methodology was created [2, 3, 4, 5] .

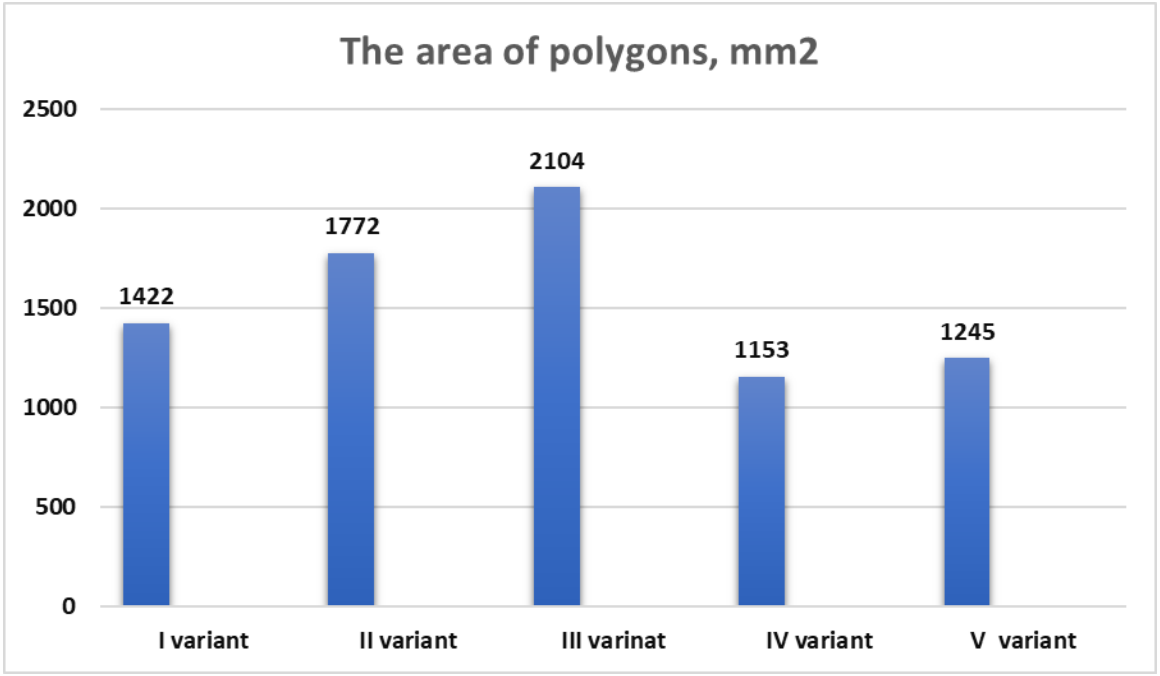

Figure 3. Comparative histogram of quality indicators of two-layer backed knitted fabrics

As a result of the analysis of the diagram and histogram of the complex evaluation of the quality indicators of the studied samples, it was determined that variant III of the double-layered knitted fabric was found as the best sample and recommended for production.

References:

1. Senthil Kumar B., Ramachandran T. Influence of knitting process parameters on the thermal comfort properties of eri silk knitted fabrics. Fibers and Textiles in Eastern Europe Volume 26, Issue **5**, 47-53p. (2018).
2. 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
3. Jurabayev N., Shogofurov S., Kholikov K., & Meliboev U. (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.
4. 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.
5. Shogofurov Sh.Sh., Xolikov Q.M. (2021). Research of pattern in a new structure knitting fabrics. In ЭКОНОМИКА. СОЦИОЛОГИЯ. ПРАВО (pp. 26-28).