COMPREHENSIVE EVALUATION OF QUALITY INDICATORS OF TWO-LAYER KNITTED FABRICS.

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Abstract: In the scientific work, research was conducted on a comprehensive evaluation of double-layer knitted fabrics made of pan yarn, with the aim of effectively using local raw materials.

Keywords : raw material, pan, knit, flat needle, double-ply, quality, diagram, histogram..

In the textile industry, issues such as increasing and improving the quality indicators of knitted products, expanding the assortment are of urgent importance. In this regard, in our country, the development of the theory of knitted fabrics, the creation of knitted fabrics with a new structure, and the achievement of properties with acceptable indicators are solved through high-quality production methods.

A comprehensive assessment of the quality indicators of fabrics determines whether the knitwear is suitable for further processing or in which direction it is recommended for use. The characteristics that determine quality are set in standards, based on consumer requirements.

To determine the best variant of knitted fabrics, it is recommended to take into account a number of factors that shape the structure and properties of the fabric and use evaluation methods. According to the analysis results, the quality indicators of the produced samples have priority in different variants. As a result, there was a need to determine the optimal variant with the lowest raw material consumption and the best quality indicators among the samples. Therefore, in order to compare statistical data and the obtained experimental results, a comprehensive evaluation method of the quality indicators of double-layer knitted fabrics from pan yarn was used. The obtained samples are compared in terms of quality indicators such as bulk density, air permeability, breaking strength, elongation at break, percentage of reversible deformation and penetration. Pan yarn with a linear density of 31 tex x 2 was used as the raw material. Variant I was produced as the base fabric.

Based on the analysis of technological indicators and physical and mechanical properties of glad fabric woven from pan yarn, research was conducted to identify high-quality options. The method of constructing a complex evaluation diagram of quality indicators was used to process statistical data.

To compare the experimental results obtained, a method of constructing a comprehensive evaluation diagram of the indicators of double-layer knitted fabrics woven from pan yarn and a histogram of comparative comparison of quality indicators was chosen.

The results obtained from the technological indicators and physical and mechanical properties of two-layer knitted fabrics woven from pan yarn, presented in Table 1, were used to construct diagrams and calculate the area of polygons

Table 1

Physical and mechanical properties of double -layer knitted fabrics

Options / Indicators		1	2	3	4	5	6	7	8	9	1 0	
Surface density of knitted fabric , M_s, g /m ^{2}		484.4	450	565.6	541.6	551.0	541.8	444.5	418.2	380.2	553.6	GOST 28554-9028554-90
Thickness of the knitwear , T mm		1.9	2	2.31	2.2	2.18	2.84	2.2	1.88	1.9	2.48	
Bulk density of knitted fabric gi δ , mg/cm ^{3}		255	2 50	245	246	253	190.8	202	222.4	200.1	223.2	
Air permeability , Vr cm ^{3} /cm ^{2} sec		44.46	29.52	51.83	37.35	49.90	52.8	93.1	100.8	89.9	48.3	GOST 1228-2014 100 (dm ^{3} /m ^{2} sek) as emas
Translate kuchi , Rr , N	My brother my brother	417	572	378	443	601	366	599	449	460	374	GOST 28554-90 80 N and how are they?
	This is how it is	330	466	657	721	818	359.5	548.5	439.5	419.5	968	
Elongation at break , L , %	Along the way	126	145	117	119	116	132.5	117.5	110	116	122	GOST 28554-90 I-0-40 % . II-41-100% III-100% from no
	By width	127	70	111	131	120	137.5	111.5	138	131.5	94	GOST 28554-90 I-0-40%.II-41-100% III- less than 100%.
Irreversible deformation , ε_n,%	Along the way	18	20	14	20	20	20	19	16	16	17	GOST 28882-90 5-20% more it's not
	By width	17	18	15	19	18	19	22	29	25	14	
Return strain , ε_o, %	Along the way	8 2	80	86	8 0	80	80	81	84	84	83	
	By width	83	8 2	85	81	82	81	78	71	75	86	
Elongation , %	By width	5	4	6	5	10	18	12	24	21	19	
Abrasion resistance, thousand rpm .		25	25	25	25	25	26.5	25	23.8	28.5	29.5	
Thermal conductivity %		4.6	10.8	11	9.6	6	45.9	45.9	45	47.2	38.6	
Input U, %	Along the way	+1.2	+3.1	+1.8	+1.2	+1.2	0	0	+4.3	+2.5	+1.7	
	By width	+1.2	-1.25	+2.5	+1.2	+1.2	+2.5	+1.9	0	0	0	

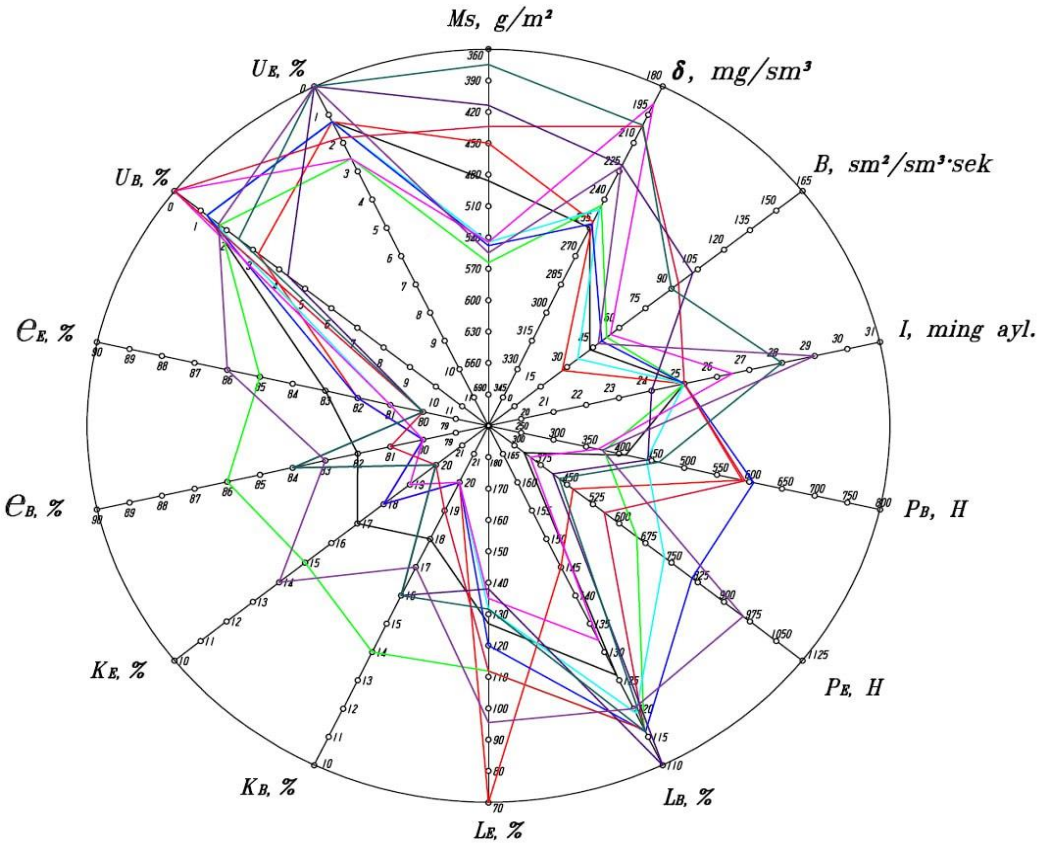
where: Ms - surface density of knitted fabric, gr/m ^{2} ; δ - bulk density, mg/cm ^{3} ; V-air permeability, cm ^{3} /cm ^{2} ·sec; I-friction resistance, thousand.rpm; R-breaking strength (along length and width), N; L-elongation to break (along length and width),%; ε_{qs} - irreversible deformation (along length and width), %; ε_{qt} - reversible deformation (along length and width), %; K-fabric shrinkage (along length and width), %. A comprehensive assessment of the quality

indicators of fabrics determines the suitability of knitted fabric for further processing or in which direction it is recommended to use it. The characteristics that determine quality are defined in standards based on consumer requirements [2-10] .

Based on the analysis of technological parameters and physical and mechanical properties of double-layer knitted fabrics woven from PAN yarn, research was conducted to identify high-quality options. To identify high-quality options, it is necessary to take into account many factors that shape the structure and properties of double-layer knitted fabrics. The method of constructing a complex evaluation diagram of quality parameters was used to process statistical data. This method allows you to determine the highest quality option from the total area of the constructed polygons.

Polygons that provide a comprehensive assessment of the quality parameters of double-layer knitted fabrics are formed by sequentially connecting points located on radius vectors.

To compare the experimental results obtained, a method for constructing a comprehensive evaluation diagram of the indicators of double-layer knitted fabrics woven from pan yarn and a histogram for comparative comparison of quality indicators was chosen.



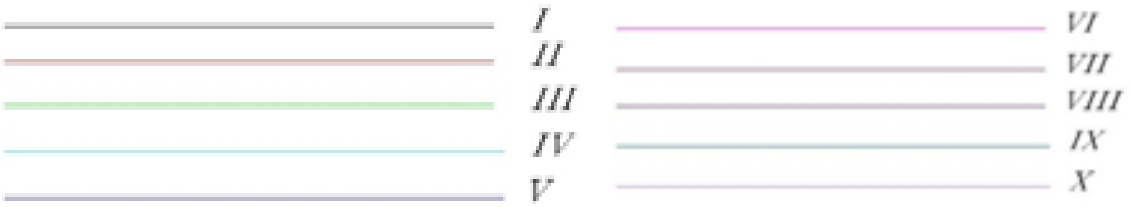


Figure 1. Diagram of a comprehensive assessment of the quality indicators of double-layer knitted fabrics woven from PAN yarn.

The value of the area surfaces obtained from the complex evaluation diagram is expressed through a comparative histogram of the quality indicators of knitted fabrics, and the optimal variants of knitted fabric samples are determined using the best results obtained according to the histogram indicators.

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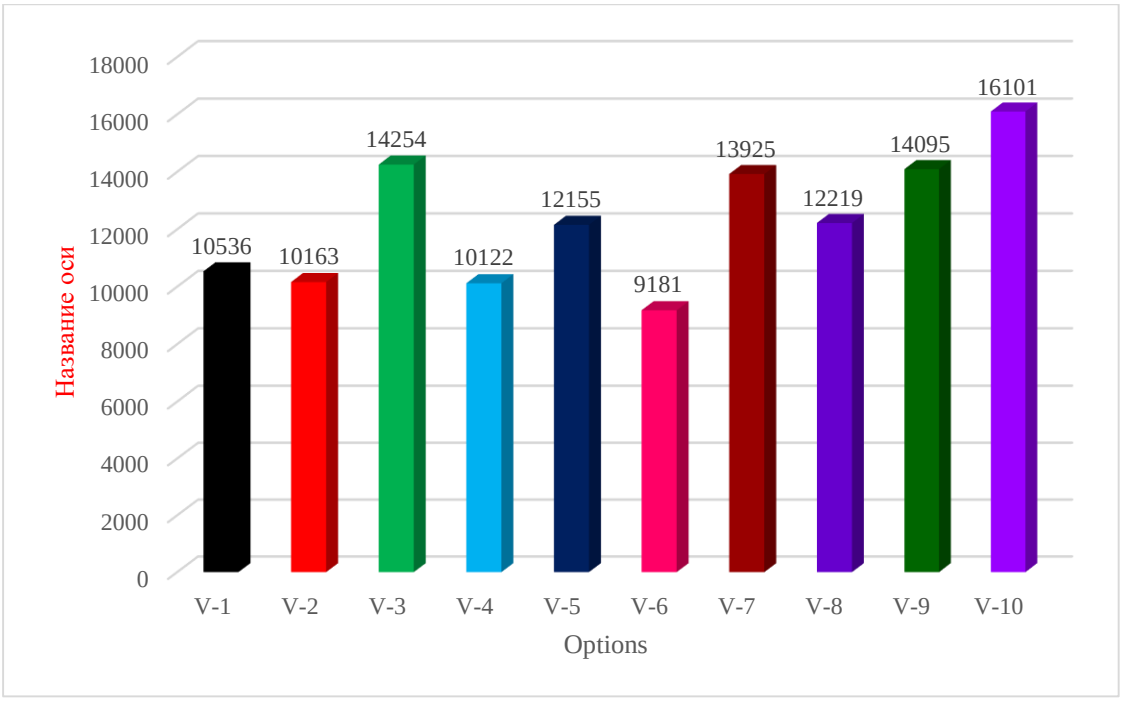

Figure 2 Comprehensive assessment of the quality indicators of double-layer knitted fabrics histogram.

As can be seen from the results of the comprehensive evaluation diagram and the comparative evaluation histogram of the quality indicators of the new structured double-layer knitted fabrics, the 10th variant of the knitted fabric is 16101 in terms of the evaluation histogram. It was found that the best option was $^{14254\ mm\ 2}$, option ^{9} 14095 mm ^{2}, option 8 12219 mm 2 ^{and} option 5 12155 mm

2 . The surface area of the samples was higher than the area of option 1 10155 mm ^{2}.

Conclusion

1.Research into new structures of double-layer knitted fabrics made of polyacrylonitrile yarn creates the opportunity to use local raw materials on a wide scale.

2.The production of double-layer knitted fabrics on flat-needle machines increases the technological capabilities of the machine and expands the range of fabrics and products.

3.Based on the results of the comprehensive evaluation diagram and comparative evaluation histogram of the quality indicators of the proposed new structured double-layer knitted fabrics, the 10th variant of the knitted fabric was evaluated according to the histogram indicators 16101 mm ^{2} was found to be the best option. Also, the fact that the surface area of the samples of option 3 (14254 mm ^{2}) , option 9 (14095 mm ^{2}) , option 8 (12219 mm ^{2}) and option 5 (12155 mm ^{2}) is higher than the area of the base option 1 (10155 mm ^{2}) indicates that the quality index of these options has achieved a good result.

4.Newly developed double-layer knitted fabrics are recommended for upper knitted products.

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