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Experimental Studies Of Shirt Tissue Structure

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ABSTRACT

The article examines the properties of existing and new tissue samples. It has also been studied that the manufacture, structure and characteristics of fabric are directly related to the properties of the backing yarns used in it and that the shortening of the backing yarns increases as the weave modulus of the support yarns increases. The breathability, strength and abrasion resistance of the new fabric were studied and the cost-effectiveness was calculated.

KEYWORDS

Body, compression, elongation, fabric, friction, mechanical, physical, strength, structure and characteristics of fabric, weft.

INTRODUCTION

The main factors in the development of the textile and light industry are an increase in the volume of processing of local textile raw materials, the introduction of the latest technologies and equipment at enterprises in cooperation with leading foreign companies [1]. Cotton yarn fabrics account for over 70% of other commonly produced fabrics. Depending on their use, such fabrics are divided into for underwear - grey fabrics, chit, malmal, chiffon; satin is used as women's and children's clothing, corporate clothing, cotton, sheets, men's jackets, lining elements; textures of shirts - scotch tape, crepe, reps, marquise, paper, cambric, flannel, etc.; The texture of the outerwear is a diagonal sarya. Such fabrics

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include textiles, technical fabrics, etc. for enterprise wear.

Also, cotton fabrics include the following fabrics: lining fabric; woolly tissue; furniture textiles; individually made fabric [2].

MATERIALS AND METHODS

Certification laboratory "CENTEX UZ" (Uzbekistan) determined some properties of existing and new samples of fabrics - air permeability, abrasion resistance, surface density, tensile strength and elongation at break of fabrics. To determine the air permeability of the samples, an AP-360SM air permeability device was used. This is a special device for testing the breathability of various types of fabrics. The room temperature should be 20 ± 3 °C, and humidity 60 ± 5%.

Sample 160x160mm. During the experiment, the tip of the desired diameter should be selected based on the thickness of the tissue. When using the equipment, the water level should be at the specified location. The machine is powered from a 220 V network with a frequency of 50 Hz.

When determining the frictional properties of the samples, a friction device of the M235 / 3 brand was used. This device is used to test the abrasion resistance of various types of fabrics. The air temperature in the room should be 20 ± 3 °C, humidity 60 ± 5%. Sample sizes 38 mm and 140 mm, cutting is performed using special cutting equipment. During the experiment, the applied loads (9 or 12 kPa) should be selected depending on the thickness of the tissue. When pouring the top of the machine, make sure that the metal balls fall correctly. When determining the quality of a fabric, the parameters that determine its elongation deformation are of great importance. This property is usually defined in cN or kg/force and is characterized by the longitudinal (along the body) and transverse (along with the back) strength of the tissue, i.e. tear resistance. Strength testing is recommended for almost all fabrics. The reason for the interest in this metric is that, although it is easy to determine, it can also be used to determine the quality of raw materials and the effect of the finishing process on the strength of fabrics.

The tear stitch (fabric strength) is often used to study the kinetics of tissue abrasion. Research has always shown that a product made from it can last longer, even if the initial strength of the new fabric is less than that of the new fabric. In the test for tissue resistance to tearing, as well as the determination of its elongation to break - this indicates the importance of the indicator [3].

RESULTS

The increase in the length of a tissue sample during rupture is called elongation at break and is expressed as a percentage of the initial sample length. Like tissue hardness, elongation at break depends on the type of starting material and factors that determine the structure of the tissue [4].

The tensile strength is the same, and the elongation of the high elongation woven fabric is better than the low elongation fabric. The experimental results are shown in Table 1.

Table 1.
Factors and properties of the produced tissue plaque

T/p	Name	Unit of measurement	Indicators of tissue samples	
			I (available) Raw tissue	II (new) Raw tissue
1.	Linear density of the Tanda band	tex	29 (cotton)	29 (cotton)
2.	Linear density of the reverse (transverse) thread	tex	29 (cotton)	13 (100% lavsan)
3.	Width of the finished fabric	cm	150	150
4.	The width of the raw fabric	cm	166	166
5.	Width of fabric on the blade	cm	171	180
6.	The density of the fabric around Tanda	threads /dm	210	220
7.	The density of fabric along the back	threads /dm	160	180
8.	Number of threads in Tanda	Pcs.	3486	3652
9.	Tiger number	tooth/dm	105	95
10.	The number of threads passed through the blade	Pcs.	2	2
11.	Density of fabric	g / m^2	120	100
12.	Fabric bonding ratio		4,9	3,6
13.	Air permeability	cm^3/ cm^2s	127	193
14.	Friction resistance	cycle	16500	22000
15.	Tissue tearing force on Tanda	H	247	214
16.	Strength of tissue rupture on the back	H	189	537
17.	Elongation at tissue rupture throughout the Tanda,	%	10	9
18.	Elongation in tissue rupture	%	12	32
19.	Tissue contraction across the Tanda	%	2,5	7,5
20.	Tissue contraction	%	7,5	5,0

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Experimental tissue tear tests were performed on an AG-1 tearing device. The uniqueness of this device is associated with its personal computer. It simultaneously creates a rupture chart and also shows tensile strength, minimum, maximum, mean elongation at break, and coefficients of variation. From the analysis of table 1, it can be seen that in the second (II) fabric sample, air permeability increased by 34%, strength by 72% and abrasion resistance by 33%. The law of such change causes a decrease in the surface density of the tissue and lavsan arc threads.

1. The average value of the experimental values is found on the basis of the following equations.

$$\overline{X} = \frac{\sum_{1}^{n} X_i}{n}$$

Here: X_i is the value of each experiment; n is the number of experiments.

2. The variance can be found on the basis of the following equation.

$$G^2 = \frac{\sum_{1}^{n} (X_i - \overline{X})^2}{n-1}$$

Here: X_i - the value of each of experiences; $\overline{X}$ - the average value of the experience; n- number of experiments.

3. The standard deviation of the experimental values is found by the following equation.

$$G = \sqrt{G^2}$$

Here: G^2- dispersion

4. The coefficient of variation is calculated by the following equation.

$$C = \frac{G}{\overline{X}} \cdot 100$$

5. The absolute error of the arithmetic mean.

$$m_{\overline{X}} = \frac{t \cdot G}{\sqrt{n}}$$

The relative error in mean arithmetic value.

$$\delta_{\overline{X}} = \frac{t \cdot C}{\sqrt{n}}$$

Here: $t\{P_D = 0{,}95,\ f = n - 1 = 5 - 1 = 4\} = 2{,}776$, The value of the Styu'dent

criterion. The error of the calculated indicators did not exceed 5% [5].

The results of the calculated indicators are given in Tables 2 and 6.

Table 2.
Tissue shrinkage is the result of computational indicators

№	Tissue samples	Yarn shortening indicators					
		the average value of quantities $\overline{X}$ (%)	Dispersion G^2 (%)	average squared deviation G (%)	coefficient of variationC (%)	the absolute error of the mean value (%) $m_{\overline{X}}$	the relative error of the mean value $\delta_{\overline{X}}$ (%)
1	I (available) raw tissue	2,5	0,01	0,1	3,4	0,1	4,2
2	II (new) raw tissue	7,5	0,09	0,3	4,0	0,4	5,0

Table 3.
The reduction in fabric per weft is a calculated result.

№	Tissue samples	Yarn shortening indicators					
		the average value of quantities $\overline{X}$ (%)	Dispersion G^2 (%)	average squared deviation G (%)	coefficient of variationC (%)	the absolute error of the mean value (%) $m_{\overline{X}}$	the relative error of the mean value $\delta_{\overline{X}}$ (%)
1	I (available) raw tissue	7,5	0,09	0,3	4,0	0,4	5,0
2	II (new) raw tissue	5,0	0,04	0,2	4,0	0,3	5,0

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Table 4.
The result of calculating the parameters of air permeability of fabrics

№	Tissue samples	Air permeability indicators					
		the average value of quantities $\overline{X}$ (%)	Dispersion G^2 (%)	average squared deviation G (%)	coefficient of variation C (%)	the absolute error of the mean value (%) $m_{\overline{X}}$	the relative error of the mean value $\delta_{\overline{X}}$ (%)
1	I (available) raw tissue	127	18,5	4,3	3,4	5,3	4,2
2	II (new) raw tissue	193	37	6,1	3,2	7,6	4,0

Table 5.
The result of calculations on the abrasion resistance of the tissue

№	Tissue samples	Friction resistance indicators					
		the average value of quantities $\overline{X}$ (cycle)	Dispersion G^2 (cycle)	average squared deviation G (cycle)	coefficient of variation C (%)	the absolute error of the mean value (цикл) $m_{\overline{X}}$	the relative error of the mean value $\delta_{\overline{X}}$ (%)
1	I (available) raw tissue	16500	88209	297	1,8	368	2,2
2	II (new) raw tissue	22000	123904	352	1,6	436	2,0

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Table 6.
The result of calculations on the surface density of the tissue

№	Tissue samples	Surface density indicators					
		the average value of quantities $\overline{X}$ (gr/m²)	Dispersion G^2 (gr/m²)	average squared deviation G (gr/m²)	coefficient of variation C (%)	the absolute error of the mean value (gr/m²) $m_{\overline{X}}$	the relative error of the mean value $\delta_{\overline{X}}$ (%)
1	I (available) raw tissue	120	11,5	3,4	2,8	4,2	3,5
2	II (new) raw tissue	100	7,8	2,8	2,8	3,5	3,5

As a result of the introduction of the new shirting fabric recommended in the study, economic efficiency is expected based on the following - increasing the productivity of the loom and reducing the cost of the fabric [6].

Table 7.
Expected cost-effectiveness of tissue production

№	Name of indicators	Ўлчов бирлиги	Кўрсаткичлар
1.	Number of loom models		СТБ-180
2.	The number of revolutions of the machine head shaft	min^{-1}	300
3.	Tissue width	cm	150
4.	Knitting machine productivity	m/h	8,64
5.	Raw material type and linear density	tex	29 13
6.	-tanda (cotton)	meters	36098
7.	-weft (100% lavsan)	kg	3610
8.	Production volume in 1 year	USD ($)	6962
9.	Consumption of raw materials	USD	0,19

10.	Cost of products produced in 1 year	USD	0,29
11.	Cost of 1m product	USD	10433
12.	The selling price of 1 m product	USD	3481
13.	The selling price of the product produced in 1 year	%	33

CONCLUSION

In short, the production, structure and characteristic parameters of the fabric directly depend on the properties of the backing threads used in it. As the modulus of primary elasticity of the back yarn increases, the shortening of the back yarn decreases. In addition, some properties of the new fabric were identified and their bias was found to be close to those of the existing fabric. The new fabric was found to increase breathability by 34%, durability by 72% and abrasion resistance by 33%. The law of such a change causes a decrease in the surface density of the fabric and threads of the lavsan arc. The profitability of producing shirt fabric is $ 3,481 a year per loom.

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