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STUDY OF PHYSICAL AND MECHANICAL PROPERTIES OF SILK FABRICS AND THEIR ANALYSIS

Sh. X. Muhammadrasulov
PhD in Technical Sciences, Fergana Polytechnic Institute, Fergana, Uzbekistan

M. X. Xoshimova
Assistant, Fergana Polytechnic Institute, Fergana, Uzbekistan

B. B. Mominov
Assistant, Fergana Polytechnic Institute, Fergana, Uzbekistan

Abstract
The composition, physical-mechanical and hygienic properties of silk fabrics were studied in the research laboratory of the institute and at a manufacturing enterprise. As a result of the study, an analysis of the results of choosing gauze for a blouse showed that the physical, mechanical and hygienic indicators of the selected materials fully meet the requirements of the consumer in all respects.

Keywords: mechanical properties, tensile strain, twisting deformations.

Introduction

The mechanical properties of gasification materials show their response to various forces. These forces are different, they can be large or small, and they can be affected once or repeatedly. As a result, bending, stretching, and twisting deformations occur in materials. Tensile strains often form in sewing materials. Mechanical properties include tensile strength, elongation at break, work at the break, relative tensile strength, etc. These properties are used to demonstrate the maximum mechanical ability and quality of the material [1].

To identify them, samples of materials are made in the form of four corners, 50x200 mm. These characteristics are determined separately by width and length in the trunk and dorsal directions. Detector work is carried out on a cutting machine RT-250. The distance between the clamps of the machine is different depending on the type of gauze, for woollen fabric it is 100 mm. Tensile strength indicates the strength of the material. The strength of gasifying materials depends on the structure and linear density of the threads formed in their fibrous composition, runout, density, and type of finish.

The group of physical properties includes hygroscopicity, air and vapour permeability, dust absorption, electrification, and optical and heat-saving properties of materials used in tailoring. Almost all of this is the ability of clothing to protect the human body from the sun and air, heat and cold, precipitation, dust and other environments, the timely removal of excess moisture, vapors and gases from the space under clothing, and now describes the maintenance of the necessary climate for the movement of the human body, i.e. clothing hygiene [2].

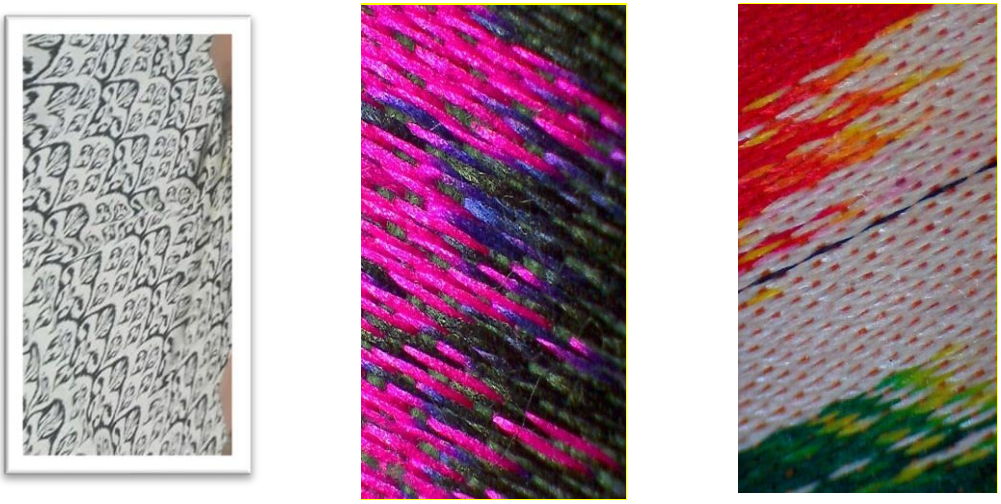
Physical properties can be divided into the following groups:

1. Characteristics related to the ability of materials to swell.
2. Properties associated with the ability of materials to pass air, water, steam, etc.
3. Characteristics describing the response of materials to various temperatures.
4. Optical properties of materials.
5. Electrification of materials [3].

Mechanical and physical properties of tissue samples

In experiments, the mechanical properties of rubber include hardness, elongation, friction resistance, crushing, hardness, and other properties.

Hygienic properties of the gas. The hygienic properties of silk gauze ensure its safety and harmlessness to human health. Accordingly, silk fabrics must have the properties of hygroscopicity, breathability and vapour permeability. Three fabrics were chosen for the pilot experiment: a-silk, b-adras, c-satin. Their appearance is shown in Fig. 1.



A **B** **C**

Figure 1. Samples of experience (in this case, A-silk, B-adras, S-atlas)

Prototypes of silk fabrics were tested at the Namangan Engineering and Technology Institute, and their physical, mechanical, hygienic and other indicators were determined.

The thickness of the fabric

It was measured with special equipment YG141D - thickness gauge [4]. A gas sample was placed between two shiny plates; one of the plates became movable and was attached to the arrow of the device. The arrow shows the thickness of the material in millimetres. The results of the indicator are presented in Table 1.

Table 1. Thickness indicators of samples

№	Indicators	Fabrics		
	content of the fabric, %	Silk	Adras	Atlas
1	The thickness of the fabric	0,65	0,68	0,38

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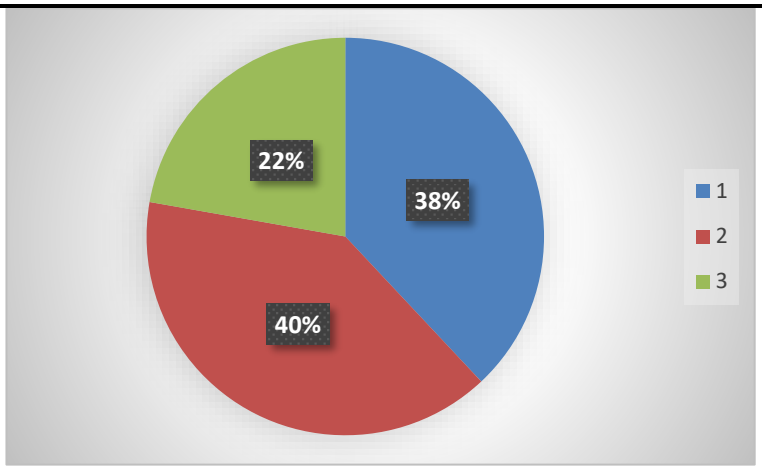

Figure 2. Fabric thickness results diagram.

Figure 3. The process of checking the thickness of the fabric.

Tensile strength of samples (kg·s). The elasticity of the fabric is one of the most important indicators that determine its quality. The tensile strength of the fabric is understood as its resistance to shearing force. The tensile strength of the fabric is determined by the AG-1 machine, which works with the help of a special computer program [5].

Before starting the work, the preliminary data necessary for the experiment is entered into the program. Samples are prepared in the direction of the body and the back in the size of 300 x 50 mm, according to GOST. The finished samples are clamped (the distance between the clamps is 200mm). Then the START button is pressed and the upper clamp starts to rise. After the sample was cut, the results of the experiment were presented on the screen in a graph (Fig. 4) and in Table 2. The process of testing samples for breaking strength is shown in Fig. 5.

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Table 2. The tensile hardness of samples (kg·s)

Indicators	Fabrics		
Tensile strength, kg·s	Silk	Adras	Atlas
Warp			
Force (N)	463	458	677
Elongation (mm)	91,7	38,6	29,7
percent %	45,85	19,30	14,85
Energy (J)	12,7	3,6	5,8
Time (S)	27,56	11,60	8,93
Weft			
Force (N)	301	295	299
Elongation (mm)	89	26,2	29,8
percent %	44,50	13,10	14,90
Energy (J)	8,6	2,8	3,9
Time (S)	26,70	7,86	8,96

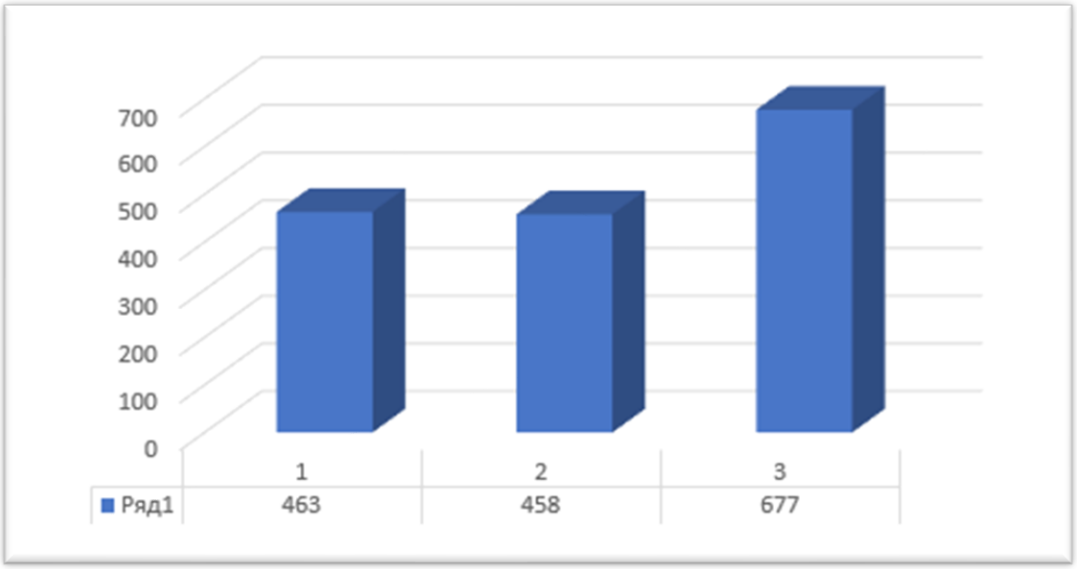

Figure 4. Diagram of tensile strength of samples (kg·s).

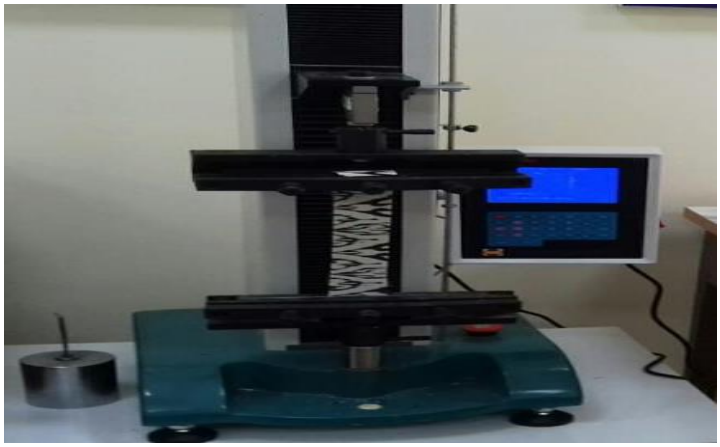

Figure 5. The process of testing samples for toughness.

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Abrasion resistance of samples

In this case, the resistance of the fabric to various erosive factors is called friction resistance. This indicator is performed in laboratory conditions using the M 235/3 machine [6].

The process of testing samples for abrasion resistance is shown in Figure 6. In this case, the samples are cut in the form of a circle with the help of a special cutter and fixed to the desired place. When the machine is started, the samples rub against a special solid and rotate. The punched pattern stops and the result is displayed on the screen.

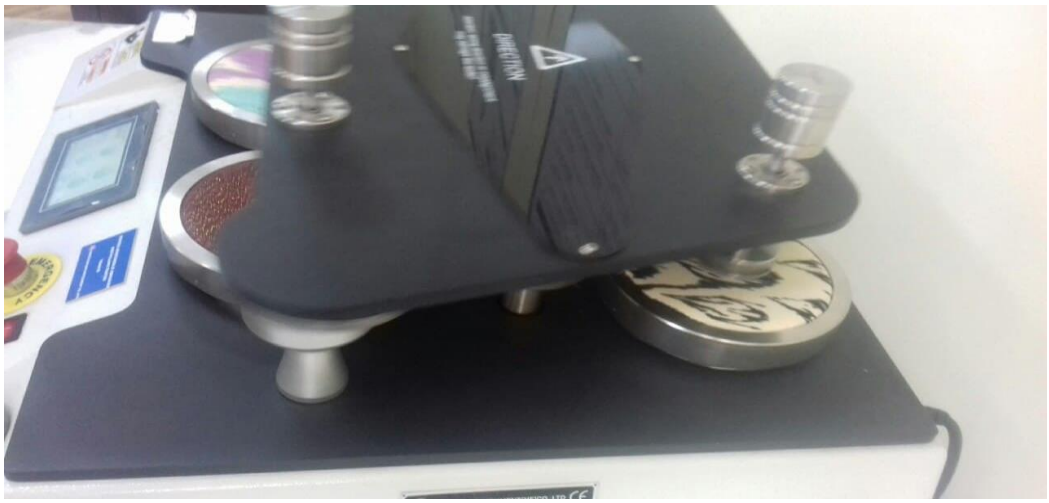

Figure 6. The process of testing samples for abrasion resistance.

Air permeability of samples

The air permeability of the samples themselves is different for each material. The air permeability of the materials was determined using the YG861E brand testing device [7].

Table 3. Air permeability indicators of samples

Indicators	Fabrics		
Air permeability	Silk	Adras	Atlas
(cm^3/cm^2 sec).	32,750	34,980	22,2

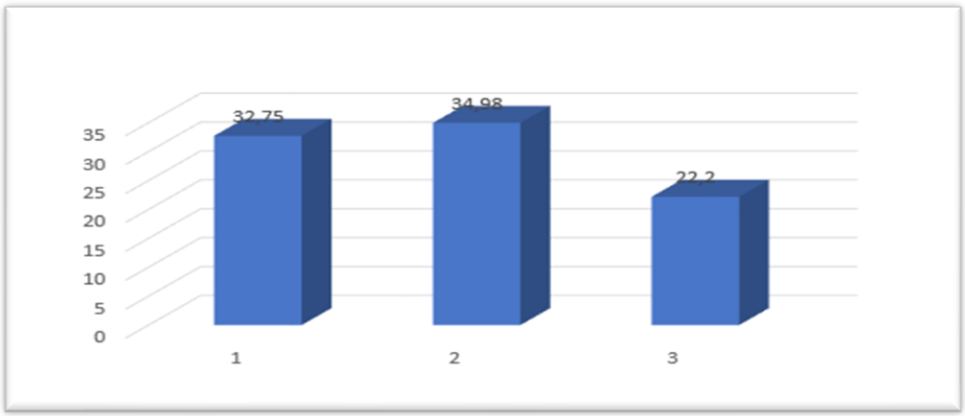

Figure 7. Air permeability diagram

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Figure 8. Air permeability testing process

Fabric elongation at break

Elongation at break "YG026A-III", 2019, is checked using the following special device [8] The checking process is shown in Figure 9. Table 4 below shows the proportions of the total deformation of the samples by composition.

Table 4. Results of Elongation at Break of Sample Fabric

№	Indicators	Fabrics		
1	Fabric elongation at break	Silk	Adras	Atlas
	Warp			
1	Load (kg)			
2	Time (minutes)	30	30	30
3	Initial position (mm)	20	20	20
4	Elongation (mm)	21,6	20,9	20,6
5	Return(mm)	20.2	20,3	20,3
	Weft			
1	Load (kg)			
2	Time (minutes)	30	30	30
3	Initial position (mm)	20	20	20
4	Elongation (mm)	22,5	20,3	20,8
5	Return(mm)	22	20,2	20,7

Figure 9. Fabric Elongation at Break Testing Process

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Conclusion

The experimental results obtained in the above diagram show that the physicomechanical and hygienic indicators of silk, adras and satin fabrics can meet the consumer's requirements in all parameters. After experimental research, it was concluded as follows:

Fabrics are tear-resistant and durable due to their high density and canvas shears; the elasticity of silk fibres causes the fabric to recover its shape after deformation, and increases the property of not creasing; made of natural fibres fully meets the hygienic parameters of the fabric, increases the level of hygroscopicity.

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