

Влияние состава волокна на физико-механические свойства сорочечных тканей

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Аннотация. В данной статье показаны способы повышения износостойкости и улучшения качества ткани на основе изучения ее структурных параметров. Для достижения поставленной цели проводились исследования структуры и физико-механических свойств тканей, что способствует расширению ассортимента и улучшению качества сорочечных тканей. Показано, что изменение качества ткани, т. е. прочности и удлинения при разрыве, зависит в первую очередь от количества и плотности волокон в ткани, а также от ее толщины. Чем плотнее ткань, тем выше ее прочность, стойкость к истиранию и ниже воздухопроницаемость. Кроме того, большое значение имеет содержание волокна в тканях, так как прочность некоторых химических волокон выше, чем у натуральных волокон, особенно у хлопкового волокна.

Ключевые слова: волокно, состав, структура, сорочечная ткань, показатель качества, поверхностная плотность, полиэстер, основа, саржа

Effect of fiber composition on the physical and mechanical properties of shirt fabrics

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Abstract. This article shows ways to increase wear resistance and improve the quality of fabric by studying its structural parameters. To achieve this goal, research was carried out on the structure and physical and mechanical properties of fabrics, expanding the range and improving the quality of shirt fabrics. It is shown that the change in the quality of the fabric, i.e., strength and elongation at break, depends primarily on the number and density of fibers in the fabric, as well as on its thickness. Thus, the denser the fabric, the higher its strength, abrasion resistance and lower breathability. In addition, the fiber content of fabrics is of great importance, since the strength of some chemical fibers is higher than that of natural fibers, especially cotton fibers.

Keywords: fiber, composition, structure, shirt, fabric, quality indicator, surface density, polyester, warp, twill

1. Introduction

The existing textile industry in our country has been developing rapidly in recent years. These enterprises produce a wide range of fabrics for different purposes. In addition, the production of dress fabrics from pure natural fibers, chemical fibers or a mixture of natural fibers and chemical fibers has been widely introduced.

Particular attention is paid in our country to ensuring the rapid development of the textile industry, expanding the production of high quality and competitive finished products, its export to major foreign markets. Our main goal is to fill our domestic markets with high-quality garments produced in our country, as well as to increase the export potential of the Republic. This means that textiles must be able to compete in global and domestic markets. Improving the quality of products and increasing the range of their products at a high rate is one of the main tasks of today's market economy [1].

In order for the products produced by enterprises to be competitive, the quality indicators must meet the requirements of the world market for this product, ie state standards. At the same time, the introduction of advanced equipment and technologies in an enterprise with low production costs

should lead to high labor productivity. In solving these problems, it is important to increase labor productivity in textile enterprises, reduce labor costs, identify internal capabilities, and manage technology through computer systems.

2. Materials and methods

At present, the existing textile enterprises in the country differ in terms of fiber content, structure and quality of shirts.

The main raw materials for ready-made garments produced by garment enterprises of the country are imported from abroad [2].

Today, these shirt fabrics are made not only from natural fibers, but also from a mixture of chemical fibers. The main parameters of shirt fabrics are fiber content, density, strength, abrasion resistance and air permeability. If the density of the fabric increases, its air permeability decreases, its abrasion resistance and strength increase.

The structure of fabrics is understood as the relative position of the body and back yarns and their interdependence. The main recommendations of the fabric structure are the linear density (diameter) of the yarn, the body and back yarns, the structure and application phase of the body and back density in the fabric, the filling and replenishment parameters, the fabric thickness, the base surface. These descriptions can be conditionally divided into two groups — free and compulsory [3].

The free parameters of the fabric structure are initially given or accepted in the formation of the fabric structure. These parameters do not depend on other parameters of the fabric structure. They include parameters such as the composition of raw materials used in the manufacture of fabrics, as well as the type of fabric and yarn. Parameters such as the type and structure of the fiber, the structure of the yarn or fabric, the characteristics, dimensions and shape of the cross section, the physical and mechanical properties of the textile depend on it.

Fabric densities are divided into true, relative, and maximum densities. In addition, the number of yarns in the textile industry varies depending on the purpose for which the fabric is used. For example, high-density fabrics are used in the production of autumn and winter dresses, and low-density fabrics are used in the production of light summer and spring dresses [4].

The structure of the fabric includes the density of the threads in the fabric, the filling of the fabric with yarn, the structure phase and the base surface. The density of the threads in the fabric is determined by the body and back.

Today, exports of yarn, fabrics and other products made of natural and chemical fibers have grown sharply. This is evidenced by the sharp increase in demand for textile products.

Report on the linear density and diameter of the body and back yarns, the back section of the body and the back of the body, the number of layers of yarn in the fabric and the displacement of the sheets in the form of fabric [5].

Shirt fabrics are produced in a wide range, depending on the season, with different densities, textures and quality indicators

3. Results and discussion

Under the conditions of market relations, research was carried out in the textile industry for the production of high-quality fabric fabrics. For this purpose, samples of shirt fabrics with different fiber content were taken and their physical and mechanical properties were studied in modern equipment [6]. The test results are shown in table 1.

Table 1. Changes in the physical and mechanical properties of shirts with different fiber content.

№	Fiber content	Weave	Surface density, g/m ²	Consistency, N		Elongation at interruption,%	
				By warp thread	By weft thread	By warp thread	By weft thread
1.	100% polyester fiber	Sarja	134.5	515.0	425.6	9.0	13.0
2.	100% cotton fiber	Sarja	137.9	351.0	290.0	12.0	18.0
3.	100% cotton fiber	Sarja	142.6	342.0	286.0	11.0	19.0

Based on the test results, figures 1-3 show histograms of changes in the physical and mechanical properties of garment fabrics with different fiber content.

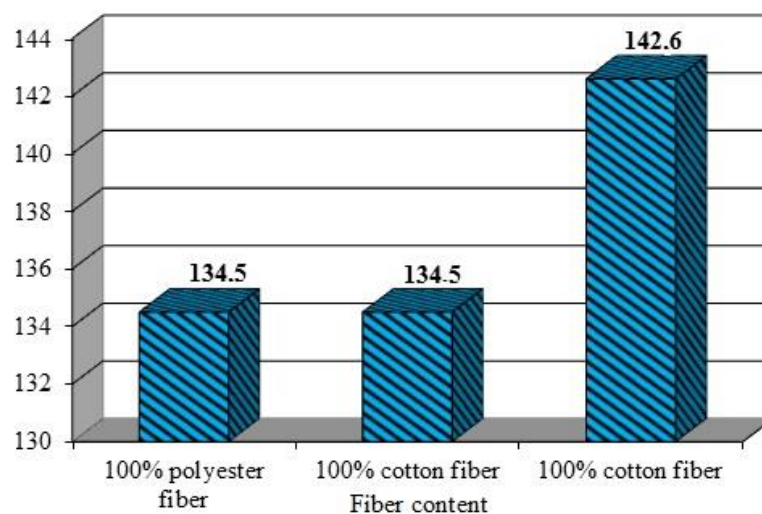


Figure 1. Changes in the surface density of shirt fabrics.

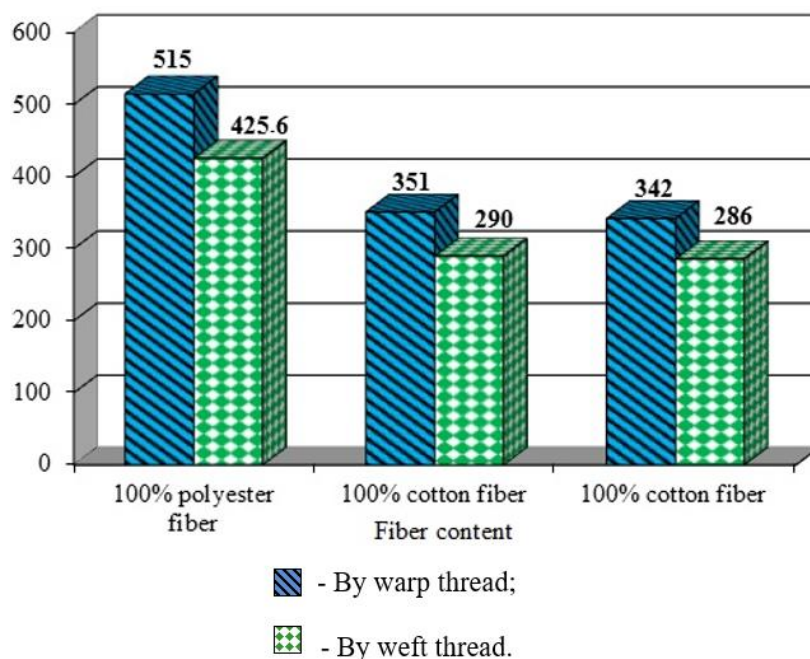


Figure 2. Changes in the strength of the fabric of the shirt in the direction of the body and back.

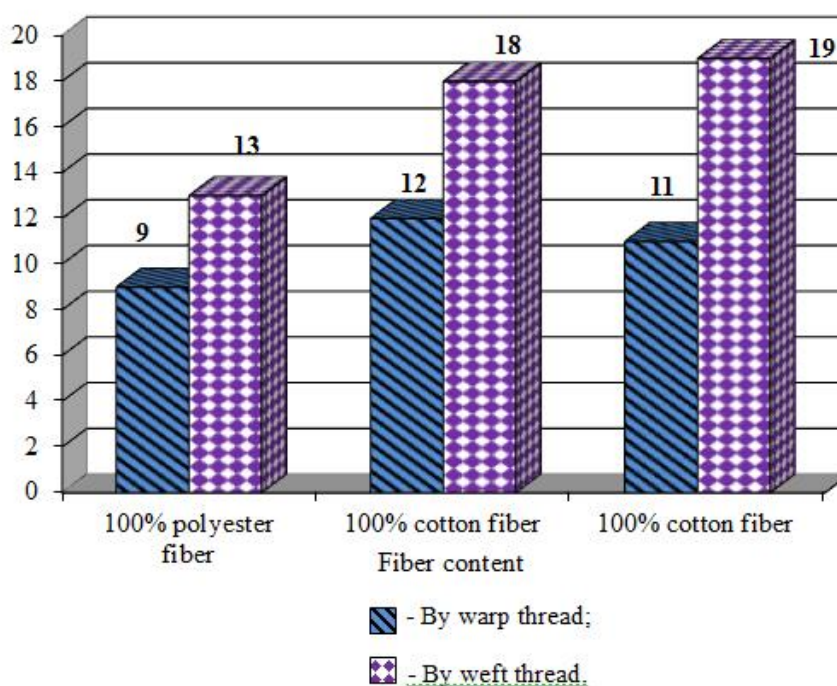


Figure 3. Changes in the elongation of the fabric of the shirt in the direction of the body and back.

The results of the test were compared with those of a woven fabric with a surface density of 134.5 g / m² made of 100% polyester fiber. strength increased by 33.8% in the lateral direction, decreased by 31.9% in the posterior, increased by 18.3% in the posterior, increased by 29.5% in the posterior, and increased by 100% in cotton. The surface density of the woven fabric with a surface density of 142.6 g / m² increased by 4.5%, the strength in the direction of the body increased by

37.5%, the strength in the direction of the back increased by 33.1%, the elongation at break in the direction of the body 18.3%, and the length of the backward break increased by 29.3% [7]. It can be seen that the physical and mechanical properties of shirt fabrics with a surface density of 134.5 g / m² made of 100% polyester fiber and a surface density of 137.9 g / m² made of 100% cotton fiber with a surface density of 100% cotton fiber 142.6 g / m² was found to be higher than the performance of the shirt fabric in the warp weave.

4. Conclusion

The change in the quality of the fabric, ie the strength and elongation at break, depends primarily on the amount and density of fibers in the fabric and the thinness or thickness of the yarn. The denser the fabric, the higher its strength, abrasion resistance, and low air permeability. In addition, the fiber content of fabrics is also important, as the strength of some chemical fibers is higher than that of natural fibers, especially cotton fiber [8].

In summary, the surface density of 100% cotton fiber is 142.6 g / m² compared to 100% cotton fiber fabrics with a surface density of 134.5 g / m² and the surface density of 100% cotton fiber is 137.9 g / m². The surface density of the shirt fabric increased from 2.7% to 43.2%, the strength in the body and back increased from 31.9% to 38.8%, and the elongation at the break in the body and back increased from 18.3%. Found to be as high as 29.5%.

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