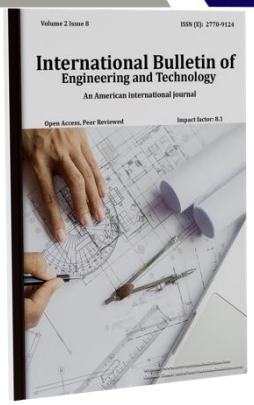

MADE FROM A MIXTURE OF FIBERS OF VARIOUS COMPOSITION STUDY OF PHYSICAL AND MECHANICAL PROPERTIES OF THREADS

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Annotation: This article defines and analyzes the quality indicators of yarn obtained from fiber blends of 100% cotton, 50% cotton and 50% polyester, 50% cotton and 50% modal, 50% cotton and 50% viscose, and 50% polyester and 50% viscose.

Keywords: relative tensile strength, tensile strength, elongation at break, coefficient of variation, homogeneity, uniform, dense and smooth fine thread, length, linear density

1. Introduction

At present, when producing textile products of various compositions, it is important to take into account quality indicators. In this regard, fashion designers pay special attention to the composition of yarn fibers to improve the quality of fabrics. Extensive scientific research is being conducted to improve the technology and technology of producing high-quality finished products, and to create their scientific foundations. In this area, much attention is paid, among other things, to the creation of effective technologies that improve the quality and competitiveness of fabrics, the development of methods for optimizing fabric parameters, and the creation of highly effective technical means and technologies at textile enterprises. Therefore, obtaining high-quality yarn and fabrics that meet consumer demand and tastes is of decisive importance for conquering the world market. At the same time, satisfying consumer demand for high-quality suit fabrics is one of the most pressing tasks today.

Clothes in general and suits in particular are very important elements of modern life. They are not only protection from external factors and everyday convenience, they are a whole set of symbols determined by society. Textiles have formed fashion, uniting and dividing people into social groups, introducing the language of social conventions and dictating norms of behavior. Each historical era is characterized by its own style of fashionable clothes, dynamic and plastically changing throughout time.

To ensure smooth operation of the technological process at the spinning plant, a separate spinning plan is developed for each yarn thickness. As a result, the economic indicators of the enterprise will improve and it will be possible to produce high-quality yarn.

In spinning mills, yarn is produced by twisting natural and chemical staple fibers. That is, relatively short fibers produce coarse yarn, uneven in strength, length, linear density and other properties, while long fibers produce strong, smooth, fine yarn, not very uneven in quality.

In the process of yarn production, the quality indicators of the yarn depend primarily on the properties of the raw material, as well as the fibers themselves. The properties of the fibers include their thickness, strength, evenness and maturity. For example, the thickness of the fibers is of great importance in the spinning process. The properties of the resulting yarn depend on the thickness of the fiber.

Long fibers that meet the requirements are used to produce thin, smooth, uniform and strong threads. Thin yarn is used to produce thin, light fabrics and knitwear. The thinner the fiber, the more fibers will be in the cross-section of the yarn of the same thickness.

The type of yarn obtained in the spinning process depends on the length and thickness of the spinning fibers. Long fibers of wool, cotton and natural silk are processed by combing, which results in a smooth, dense and silky yarn.

Machine-made yarn is a thick, loose and unevenly thick yarn produced from short cotton and wool fibres by machine. Carding produces a medium-thick yarn that is more uneven and coarse than combing, using medium-length cotton and staple fibres. The main spinning processes are: carding, beating, combing, straightening and drawing of fibres, partial spinning and continuous spinning.

One of the main characteristics of yarn is its unevenness. During the spinning process, various types of disturbances occur during mixing, cleaning, combing and carding of the raw material. For example, if the fibers are unevenly distributed during the mixing process, this will lead to unevenness during the combing process, since the fibers will not be parallel and will not stretch evenly during the combing process.

Unevenness is a negative characteristic of products manufactured at a spinning mill, often negatively affecting the technical and economic performance of the enterprise, as well as the physical and mechanical properties of the yarn.

2. METHODS

Testing and monitoring of unevenness in spinning production is important to determine the causes and timing of unevenness. The more yarn breaks during winding and spinning on spinning machines, the higher the yarn unevenness. An increase in yarn breakage increases the workload of workers and leads to a decrease in machine productivity.

Samples of yarn intended for knitted fabrics from mixtures of different fibers were selected at spinning mills, their quality indicators were determined, and the obtained test results are presented in Table 1.

Table 1

Study of physical and mechanical properties of yarns obtained from mixtures of fibers of different compositions

т/	Quality indicators	Composition of the mixture, %				
		100% cotton yarn	Yarn made from a blend of 50% cotton and 50% polyester fibers	Yarn made from a blend of 50% cotton and 50% modal fiber	Yarn made from a blend of 50% cotton and 50% viscose fibers	Yarn made from a mixture of 50% polyester and 50% viscose fiber
1.	Linear density of yarn, tex	20,2	20,00	20,4	20,1	20,3
2.	Breaking strength of the thread, cN	260,11	335,79	292,31	265,59	320,4
3.	Coefficient of variation in the tensile strength of the thread, %	3,56	3,02	3,75	4,23	3,10
4.	Specific tensile	12,88	16,79	14,33	13,21	15,78

	strength of the thread, cN/tex					
5.	Elongation of thread at break,%	6,95	7,46	7,47	6,88	7,12
6.	Coefficient of variation in elongation of the thread at break, %	6,06	5,20	5,72	6,45	5,36

Based on the results in Table 1, Figures 1-3 show graphs of changes in the physical and mechanical properties of yarns obtained from a mixture of fibers with different fiber content.

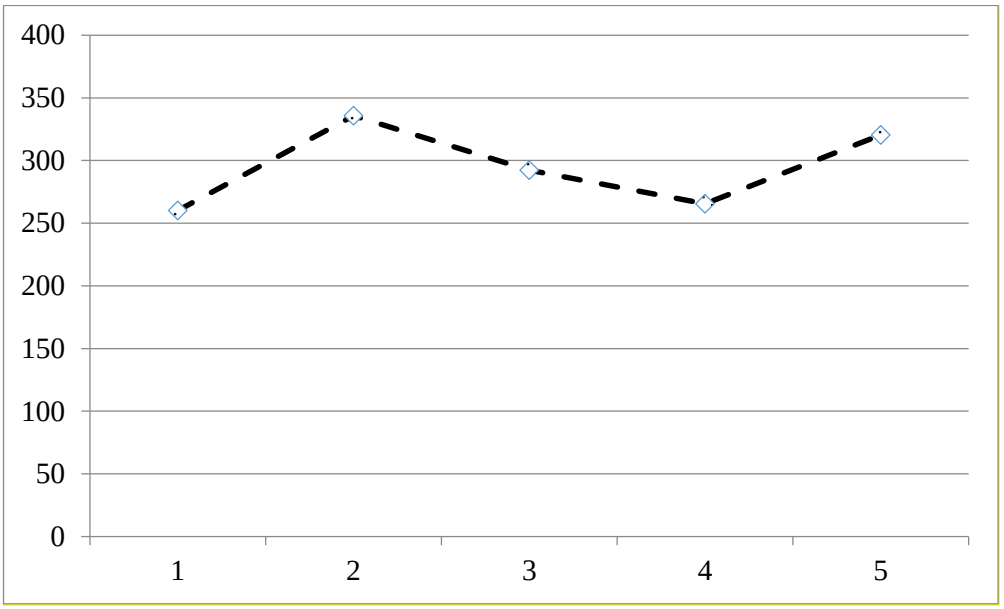
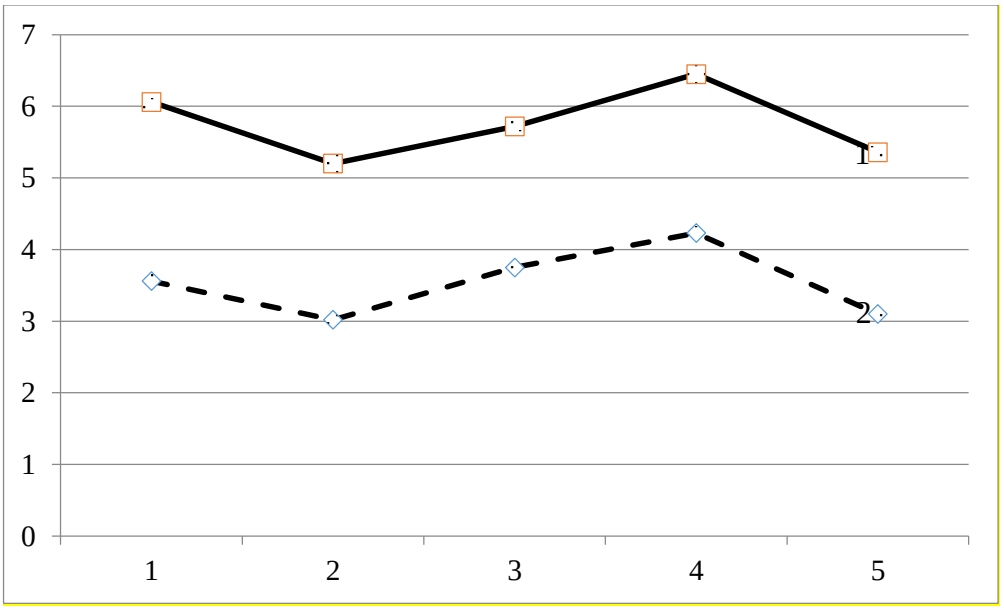
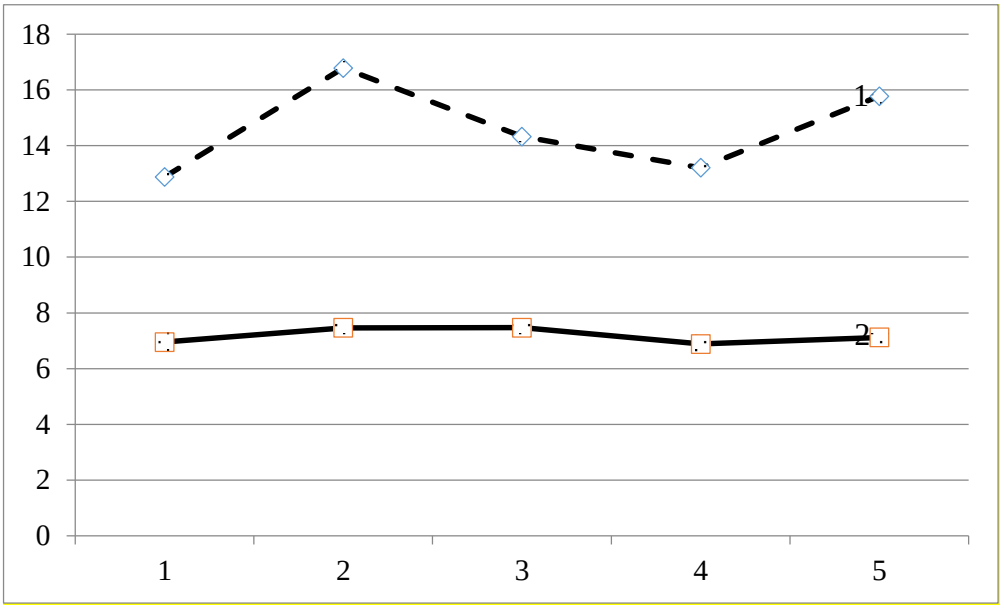


Figure 1. It is obtained from a mixture of fibers of different composition a study of the tensile strength of yarns.



1- coefficient of variation in breaking strength; 2- Coefficient of variation in elongation at break.

Figure 2. A study of the coefficient of variation on the tensile strength and elongation at break of yarns obtained from a mixture of fibers of different composition.



1- Specific tensile strength of the thread; 2- Elongation of thread at

Figure 3. It is obtained from a mixture of fibers of different composition a study of the relative tensile strength and elongation at break of yarns.

3. RESULTS

Physico-mechanical properties of yarns intended for knitting, obtained from a mixture of fibers with different fiber composition, were studied. Comparing the obtained test results with the indicators of 100% cotton fiber yarn, the breaking strength of the yarn obtained from a blend of 50% cotton and 50% polyester fiber increased by 22.5%, the coefficient of variation in breaking strength decreased by 15.2%, the relative breaking strength increased by 23.3%, the elongation at break increased by 6.8%, the coefficient of variation in elongation at break decreased by 14.2%. The breaking strength of the yarn obtained from a blend of 50% cotton and 50% modal fiber increased by 11.1%, the coefficient of variation in breaking strength increased by 5.1%, the relative breaking strength increased by 10.1%, the elongation at break increased by 7.0%, the coefficient of variation in elongation at break decreased by 5.7%. 50% cotton and 50% viscose The breaking strength of the yarn obtained from the fiber blend increased by 2.1%, the coefficient of variation in breaking strength increased by 15.8%, the relative breaking strength increased by 2.5%, the elongation at break decreased by 1.1%, the coefficient of variation in breaking elongation increased by 6.3%. The breaking strength of the yarn obtained from the blend of 50% polyester and 50% viscose fibers increased by 18.8%, the coefficient of variation in breaking strength decreased by 12.9%, the relative breaking strength increased by 18.4%, the elongation at break increased by 2.4%, and the coefficient of variation in breaking elongation decreased by 11.5%.

4. Conclusion

As it can be seen from the analysis of the obtained research results, the higher the amount of polyester fiber used in the thread, the breaking strength of the thread increased by 22.5%, the specific breaking strength increased by 23.3%, and the coefficient of variation of

the breaking strength and elongation at break decreased from 14.2% to 15.2% compared to the yarns of other variants.

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