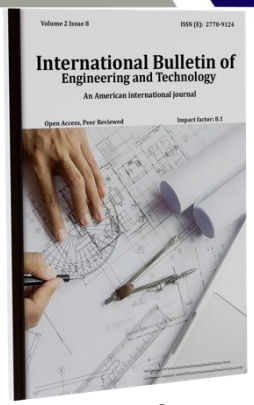

CHANGES IN THE PHYSICAL AND MECHANICAL PROPERTIES OF YARNS WITH DIFFERENT FIBER COMPOSITIONS FOR SHIRT-LIKE FABRICS

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In the spinning process, the mechanical properties of cotton fiber are of great importance in the production of yarn, namely, resistance to abrasion, compression, bending, and friction of fibers against each other.

In the production of quality yarn at a spinning enterprise, the length, strength, and linear density of the fiber are of great importance. The higher the quality of the fiber, the more demanding yarn can be produced from it. For this, it is necessary to correctly select raw materials, as well as create optimal conditions for storing, drying, cleaning, separating the fiber from the seed, and cleaning the fiber in ginning plants.

The quality of finished products largely depends on how smoothly the spun yarn is processed. If the unevenness of the yarn is high, its specific breaking strength decreases, which means that the durability of the fabric woven from it will also be low. One of the main reasons for the occurrence of unevenness is the fact that the amount of components in the fiber mixture is not constant, their poor mixing.

The more the yarn breaks during winding and forming on spinning machines, the higher the unevenness of the yarn. The unevenness indicators have a negative impact on the physical and mechanical properties of spinning and weaving products. Many factors, such as the unevenness of the properties of raw materials, often arise as a result of the technological process and the design of the machine, the violation of the working regime, as well as the absence of workers from the machines and their repair.

One of the main indicators of yarns is their square unevenness, relative breaking strength, work done during breaking, etc.

In order to study the factors affecting the quality indicators of yarns, samples were taken from yarns with different fiber compositions and their physical and mechanical properties were determined.

Based on the results of the research, the following symbols were used to construct graphs: 1-50% cotton + 50% polyamide; 2-50% bamboo + 50% polyamide fiber; 3-90% cotton + 10% polyamide fiber; 4-60% bamboo + 40% acrylic fiber; 5-90% bamboo + 10% wool fiber; 6-50% viscose + 50% modal fiber; 7-90% acrylic + 10% polyamide fiber; 8-50% acrylic + 50% wool fiber and 9-50% cotton + 50% viscose fiber blends.

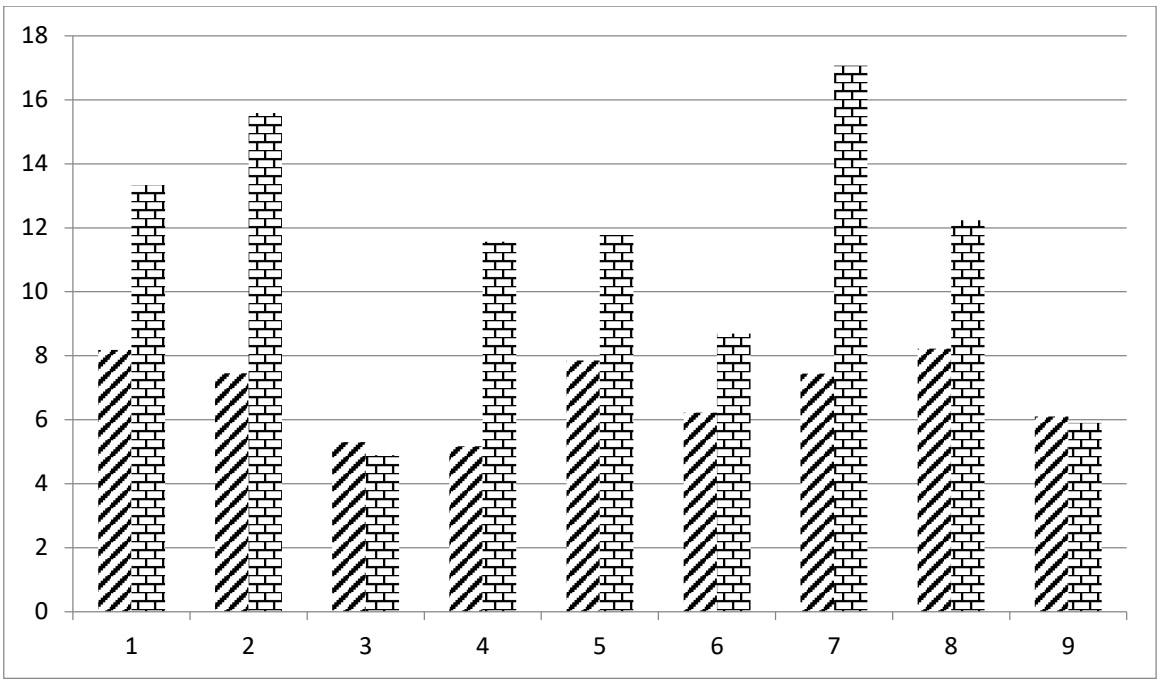
The results of the research are presented in Table 1.

Table 1

Changes in the physical and mechanical properties of yarns with different fiber compositions obtained for shirt-like fabrics

т/р	Fiber content	Breaking strength, gf	Quadratic inequality in breaking strength, %	Elongation at break, %	Quadratic inequality in the elongation at break %	Relative breaking strength, cN/tek	Quadratic inequality in terms of relative breaking strength, %
1.	60% bamboo +40% acrylic fiber	281,0	8,18	13,34	10,74	14,28	8,18
2.	50% cotton+50% polyamide fiber	235,58	7,45	15,59	20,26	11,97	7,45
3.	90% cotton+10% polyamide fiber	217,65	5,30	4,89	3,67	11,06	5,30
4.	50% bamboo +50% polyamide fiber	423,49	5,17	11,57	4,11	21,52	5,17
5.	90% bambuk +10% jun tola	265,95	7,85	11,78	10,49	13,51	7,85
6.	50% viscose +50% modal fiber	415,72	6,22	8,69	8,07	21,12	6,22
7.	90% acrylic +10% polyamide fiber	376,65	7,44	17,07	8,63	19,14	7,44
8.	50% acrylic +50% wool fiber	214,34	8,22	12,24	16,19	10,89	8,22
9.	50% cotton +50% viscose fiber	233,59	6,10	5,90	7,95	11,87	6,10

Based on the results of the research, histograms of the changes in breaking strength, root mean square of breaking strength, elongation at break, root mean square of elongation at break, specific breaking strength, and specific breaking strength of yarns with different fiber compositions are presented in Figures 3.3 and 3.6.



- quadratic inequality in breaking strength; -elongation at break.

Figure 1. Variation of the squared unevenness of breaking strength and elongation at break of yarns with different fiber compositions obtained for shirt-like fabrics.

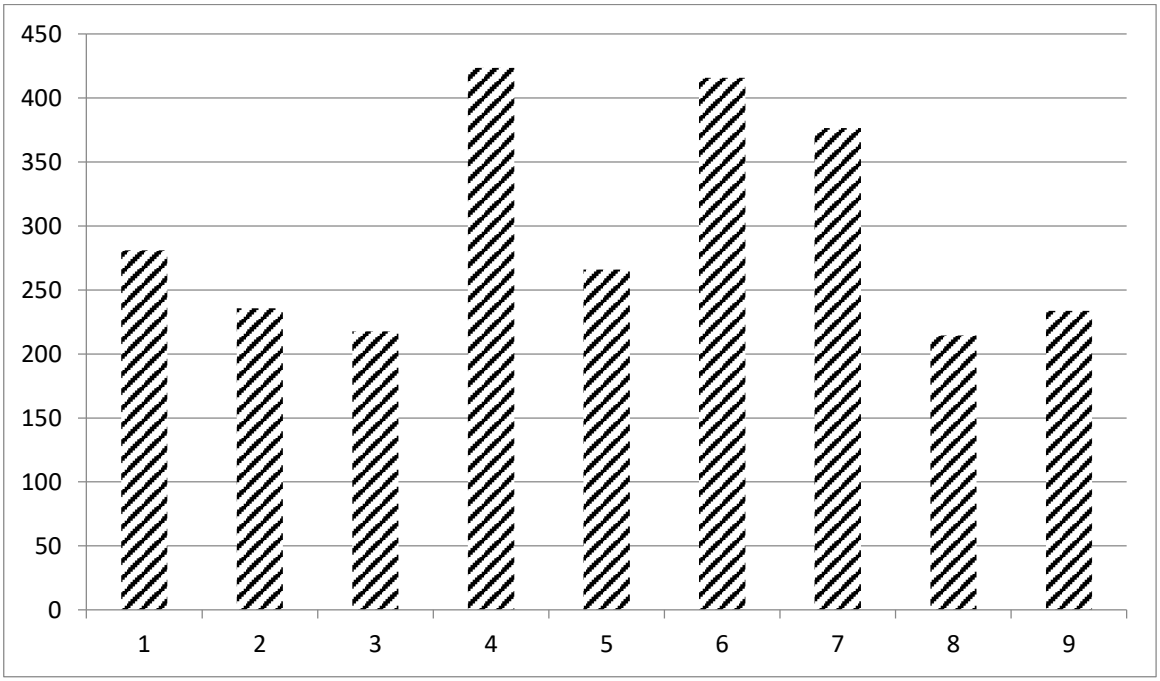
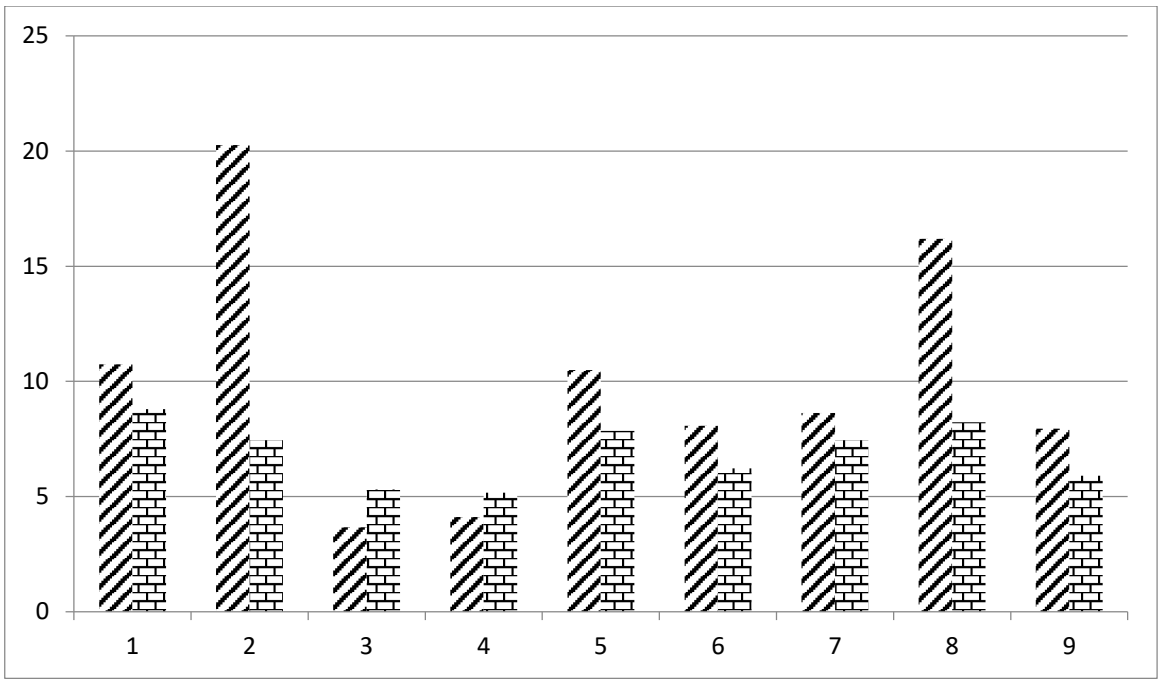


Figure 2. Variation in breaking strength of yarns with different fiber compositions obtained for shirt-like fabrics.



- quadratic inequality in elongation at break; - quadratic inequality in relative breaking strength.

Figure 3. Variation of the squared unevenness in the elongation at break and relative breaking strength of yarns with different fiber compositions obtained for shirt-like fabrics.

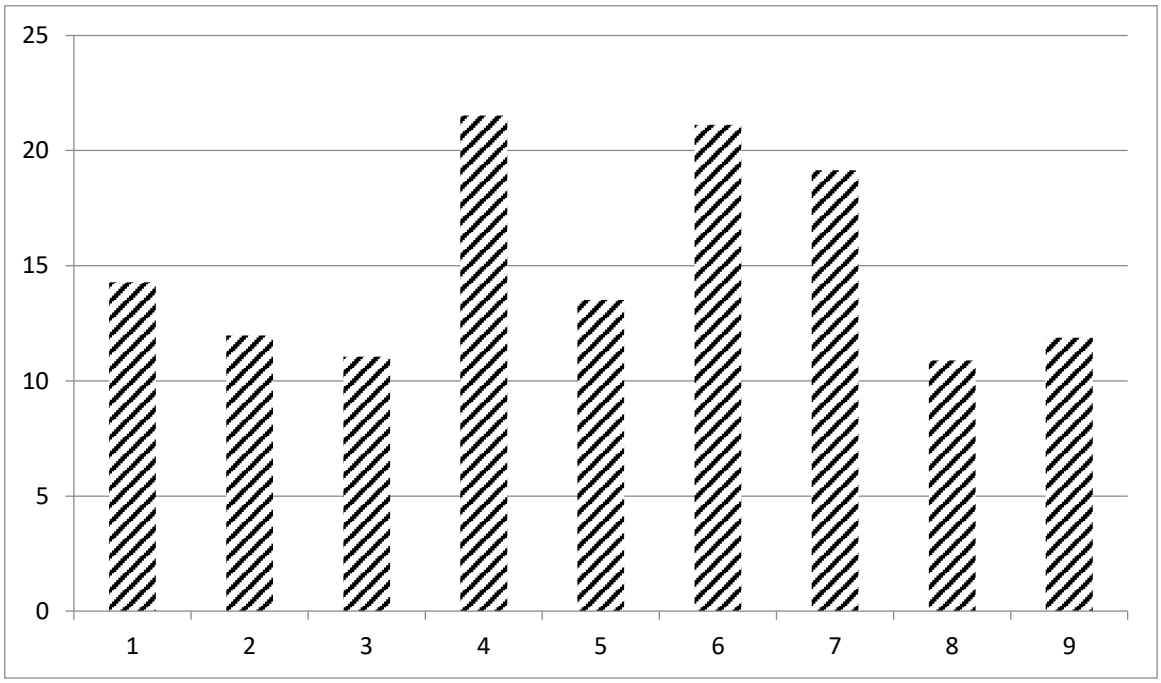


Figure 4. Variation in the relative breaking strength of yarns with different fiber compositions obtained for shirt-like fabrics.

Compared to the test results of yarns made from a blend of 60% bamboo + 40% acrylic fibers, the breaking strength of yarns made from a blend of 50% cotton + 50% polyamide fibers increased by 17.2%, the squared unevenness of the breaking strength decreased by 9.0%, the elongation at break increased by 47.0%, the squared unevenness of the breaking elongation increased by 17.2%, the relative breaking strength increased by 9.0%, the squared unevenness of the relative breaking strength, The breaking strength of yarns obtained from a blend of 90% cotton + 10% polyamide fibers increased by 23.6%, the squared unevenness of the breaking strength by 34.3%, the elongation at break by 68.2%, the squared unevenness of the elongation at break by 66.9%, the relative breaking strength by 33.6%, the squared unevenness of the relative breaking strength, decreased by 34.3%, the breaking strength of yarns obtained from a blend of 50% bamboo + 50% polyamide fibers increased by 34.7%, the squared unevenness of the breaking strength Elongation at break by 37.8%, squared unevenness at break by 14.3%, squared unevenness at break by 62.8%, relative breaking strength increased by 34.7%, squared unevenness at break by 37.8%, breaking strength of yarns obtained from a mixture of 90% bamboo + 10% wool fibers, squared unevenness at break by 6.8%, squared unevenness at break by 5.1%, squared unevenness at break by 12.7%, squared unevenness at break by 3.4%, relative breaking strength by 6.4% The squared unevenness of the breaking strength decreased by 5.1%, the breaking strength of the yarns obtained from a mixture of 50% viscose + 50% modal fibers increased by 33.5%, the squared unevenness of the breaking strength increased by 24.0%, the elongation at break increased by 35.9%, the squared unevenness of the elongation at break decreased by 25.0%, the relative breaking strength decreased by 23.4%, the squared unevenness of the breaking strength decreased by 24.0%, the fibers obtained from a mixture of 90% acrylic + 10% polyamide fibers The breaking strength of the yarns obtained from the mixture increased by 26.4%, the squared unevenness of the breaking strength decreased by 9.0%, the elongation at break increased by 22.9%, the squared unevenness of the elongation at break decreased by 20.0%, the relative breaking strength increased by 26.4%, the squared unevenness of the relative breaking strength decreased by 9.0%, the breaking strength of the yarns obtained from the mixture of 50% acrylic + 50% wool fibers decreased by 24.8%, the squared unevenness of the breaking strength decreased by 1.5% increased by 9.3%, elongation at break decreased by 9.3%, the squared unevenness of elongation at break increased by 34.7%, the relative tensile strength decreased by 24.8%, the squared unevenness of tensile strength increased by 1.5%, the tensile strength of yarns obtained from a mixture of 50% cotton + 50% viscose fibers increased by 17.9%, the squared unevenness of tensile strength increased by 16.5%, the elongation at break increased by 56.8%, the squared unevenness of elongation at break increased by 26.0%, the relative tensile strength increased by 17.9% The squared unevenness in the relative breaking strength decreases by 16.5%. The analysis of the results of the conducted research showed that the relative breaking strength of the yarns obtained from the blends of 50% bamboo + 50% polyamide fibers, 50% viscose + 50% modal fibers, 90% acrylic + 10% polyamide fibers was higher than that of the yarns from other fiber blends. In addition, it was found that the elongation at break of yarns obtained from a mixture of 60% bamboo + 40% acrylic fibers was 16.9% to 20.26% higher than that of yarns obtained from a mixture of 50% cotton + 50% polyamide fibers and 50% acrylic + 50% wool fibers, in terms of squared roughness.

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