Conclusion: The presence of an enzyme preparation in the composition leads to an increase in the softness and air permeability of cotton fabrics, but it results in a decrease in the hydrophilic properties of the textile material.

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INVESTIGATION OF THE DEPENDENCE OF THE QUALITY INDICES OF ROTOR SPUN YARN ON THE PROPORTION CONTENT OF REGENERATED FIBROUS WASTES IN THE MIXTURE

ИССЛЕДОВАНИЕ ЗАВИСИМОСТИ ПОКАЗАТЕЛЕЙ КАЧЕСТВА ПНЕВМОМЕХАНИЧЕСКОЙ ПРЯЖИ ОТ ДОЛЕВОГО СОДЕРЖАНИЯ РЕГЕНЕРИРОВАННЫХ ВОЛОКНИСТЫХ ОТХОДОВ В СМЕСКЕ

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Keywords: rotor spinning machine, fibrous wastes, regenerated fiber, yarn, physical-and-mechanical properties.

Ключевые слова: пневмомеханическая прядильная машина, волокнистые отходы, регенерированные волокна, пряжа, физико-механические свойства.

Abstract. The article studies the influence of the proportion content of regenerated waste on the quality indicators of rotor spun yarn. Empirical formulas were compiled, allowing to predict the quality of yarn and breakage on spinning machines when changing the content of components.

Аннотация. В статье приводятся исследования влияния долевого содержания регенерированных отходов на показатели качества пневмомеханической пряжи. Были составлены эмпирические формулы, позволяющие прогнозировать качество пряжи и обрывность на прядильных машинах при изменении долевого содержания компонентов.

The strategic direction of the further development of the textile industry in Uzbekistan is the introduction of the cluster model. In fact, it provides for the creation of a 100% waste-free production facility with a closed chain "production of cotton raw material-processing-finished products" on the basics of creating and implementing an industrial-type cluster scheme. In this regard, the problems of producing competitive products for calculating the deep processing of cotton fiber and the use of fibrous waste in the conditions of an external cluster model of the development of an actual and necessary universal training.

The use of expensive mixtures is economically unprofitable, it is necessary to process cheaper mixtures. It is important to reduce the cost of raw materials and at the same time ensure the normal passage of the technological process without reducing the quality of the yarn, and without increasing the breakage in spinning. One of the effective ways to reduce the cost of raw materials can be the rational processing of fiber waste from spinning production [1].

The possibility of producing a 50 tex (Ne 11.8) linear density yarn on an R-35 rotor spinning machine (Rieter) from a 100 % mixture of fibrous waste was investigated. The mixture was compiled to align the properties of the fibers. Waste regenerated by modern technology was mixed: st 7/11 (card sweeps and strips) and st 16 (combing noil). Experimental studies were carried out under the production conditions of the Shovot Texstil JV LLC.

The effect of the proportion of regenerated fiber in the blend on the quality of the yarn was studied in three variants: variant 1 – st 7/11 – 40 %, st 16 – 60 %; variant 2 – st 7/11 – 50 %, st 16 – 50 %; variant 3 – st 7/11 – 60 %, st 16 – 40%. The semi-finished product and yarn of all variants were produced on the same technological equipment, on the same spinning rotors sequentially.

The average indicators of the main physical and mechanical properties of the yarn of the three variants are shown in Table 1.

Table 1 shows that the relationship between the breaking tenacity of the yarn, the coefficient of variation in breaking force, breakage from the content of waste in the mixture has a linear form, which are shown in Figures 1–3.

From the obtained equation, it can be seen that with an increase in the content of waste st. 7.11 in the mixture for every 10 %, the breaking tenacity of the yarn increases by 0.24 sN/tex.

Table 1 – Indicators of physical and mechanical properties of yarn

№	The name of indicators	Variants		
		1	2	3
1	Share content st 7/11, %	60	50	40
2	Linear density of yarn, tex	50	50	49.9
3	Coefficient of variation of linear density, %	1.71	1.82	1.9
4	Breaking force, cN	462.48	450.18	438
5	Coefficient of variation of breaking force, %	9.5	10.54	11.53
6	Breaking tenacity, cN/tex	9.4	9.15	8.92
7	Elongation %	6.12	6.10	5.90
8	Work to break, N/Cm	7.81	7.58	7.14
9	Breakage per 1000 rotors/hour per 1000 km/yarn	26 5.82	35 7.84	42 9.41

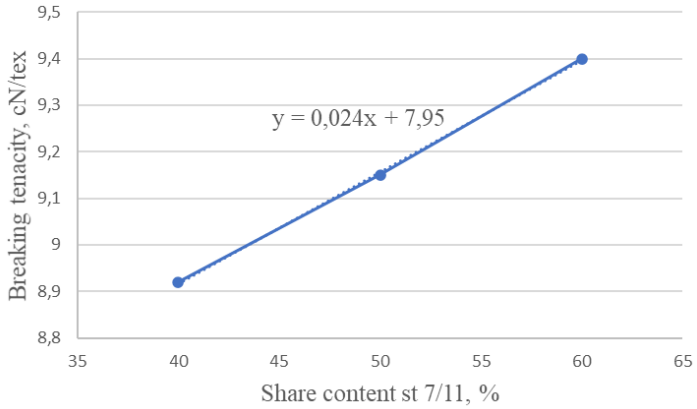

Figure 1 – Dependence of the breaking tenacity of the yarn from the proportion content in the mixture of st. 7/11

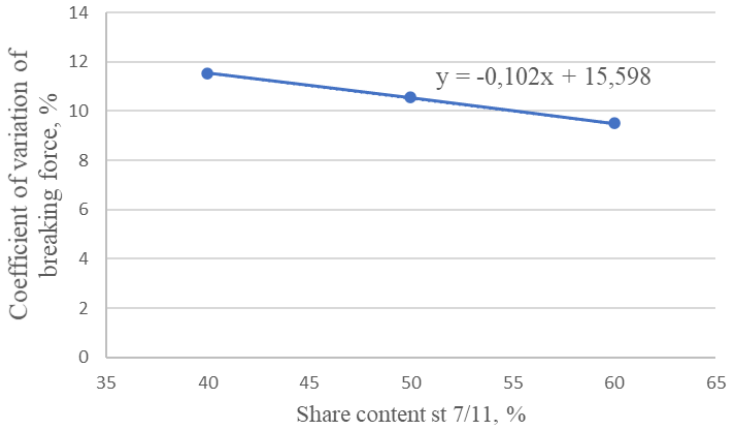

Figure 2 – Dependence of the coefficient of variation on the breaking force of the yarn from the proportion content in the mixture of st. 7/11

It can be seen from the equation that with an increase in the waste content for every 10 %, the coefficient of variation decreases by 1.02 %.

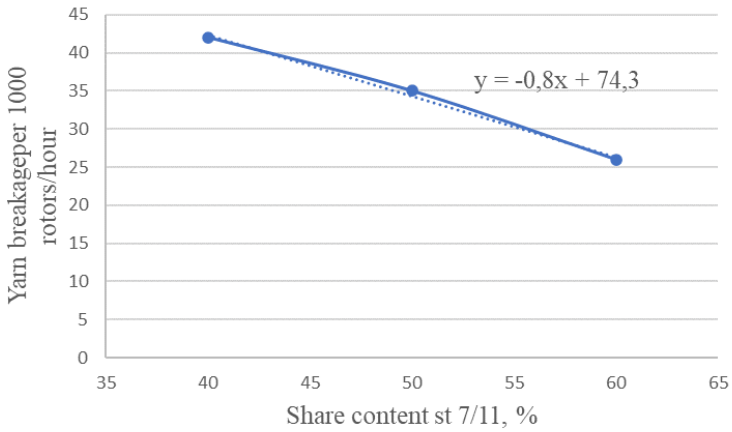

Figure 3 – Dependence of the yarn breakage on the percentage content in the mixture of st. 7/11

From the obtained equation, it can be seen that the breakage per 1000 rotors per hour decreases by 8 units for every 10 % increase in the proportion of regenerated fiber in the mixture.

The obtained empirical formulas allow us to predict the quality of pneumomechanical yarn and breakage on spinning machines when the proportion of regenerated fibrous waste in the mixture changes.

One of the most important indicators on the basis of which the yarn is evaluated is the breaking tenacity and unevenness in strength. From Table 1 it can be seen that the breaking force of the yarn increases and the unevenness in strength decreases with an increase in the share of st 7/11. Quality Score (Po/C1) when changing the proportion of st 7/11 from 40 to 60 % increased from 0.77 to 0.989.

It was found that an increase in the proportion of waste st 7/11 leads to an increase in strength and uniformity in the main indicators of yarn quality, an increase in the proportion of st 16 leads to a decrease in the number of imperfections.

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