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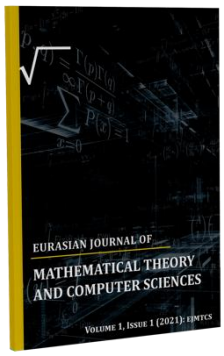

ANALYSIS OF PHYSICAL AND MECHANICAL PROPERTIES OF DIFFERENT COMPONENT YARNS

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ABSTRACT

The article presents the improved physical and mechanical properties of the produced yarn with different content of the fibrous composition. The coefficient of variation of the produced yarn with various components is compared with the coefficient of variation in terms of hairiness, specific breaking load, sN/tex, coefficient of variation in terms of specific breaking load, % with the indicators of yarn produced at the spinning mill and Uster.

The concept for the development of the knitting industry of the Republic of Uzbekistan for 2020-2024 identifies important tasks such as improving technology, saving raw materials and supplies, creating new equipment with high productivity, using automated electronic control systems, and increasing the efficiency of production of mixed fabrics. When performing these tasks, of particular importance is, for example, improving the technology for producing mixed yarn used in knitted fabrics, in particular, the production of multi-component yarn, increasing competitiveness in the world market for products obtained and multi-component yarn [1].

On a ring-spinning machine, uniform compaction rollers cannot be used to draw bundles of various fibers, including those containing polyester and cotton. The fact that the fibers have different deformation properties and different friction forces leads to unevenness in the amount of elongation.

To eliminate the identified shortcomings, the elastic coating of the ring spinning machine compaction roller has been improved compared to the standard rollers used. As a result, it was possible to reduce yarn breakage and enhance yarn quality in spinning machines due to the development of a roller seal design with different levels of rigidity of elastic coating pairs of various thicknesses and optimal parameters [2-3].

Using nitro-rubber rollers (control) installed on a Zinser 350 spinning machine and a new design of the optimal version of the compacting roller of the drafting device from pairs with different hardnesses of nitro-rubber and polyvinyl chloride elastic coating, a multi-component yarn with a linear density of 29 tex was obtained, and in Fig. Figure 1 shows a standard compaction roller and a two-part roller with an elastic coating of different hardnesses [4].

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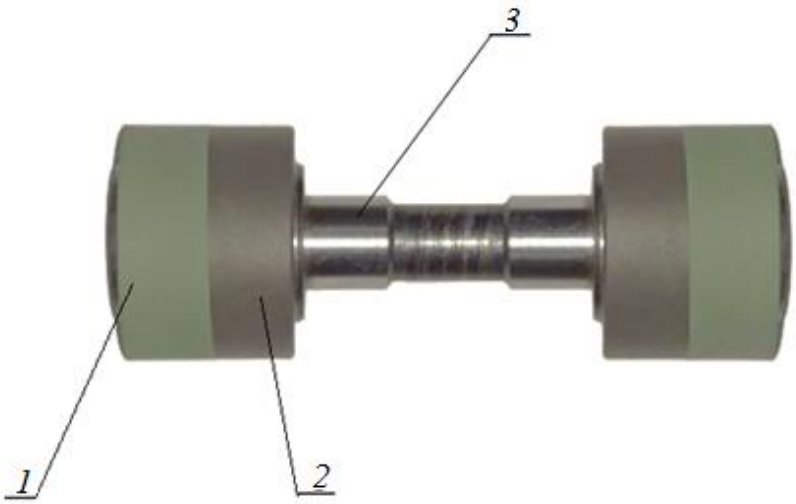

Fig.1. Compacting rollers in the output pair of exhaust devices

1 – nitro rubber; 2 – polyvinyl chloride; 3 – roller

b) Compacting roller with an elastic coating made of pairs of different hardness

The Zinser-350 machine, installed in the training and production laboratory of the Department of Spinning Technology, produced multi-component yarn with a linear density of 29 tex. A comparative assessment was carried out with the properties of single yarn produced by the OSBORN TEXTILE enterprise [5].

The main average values for the physical and mechanical characteristics of the yarn obtained in the control and experimental versions are given in Table 1. The following indicators were determined using the "Uster" device: linear density, coefficient of variation in the linear density of the yarn, breaking load and indicators related to the strength of the yarn [6].

Table 1. Physico-mechanical multi-component yarn

№	**The name of indicators**	Industrial version n=11000;	Experimental version n=11000; Improved compaction roller with elastic coating made of pairs with different hardness;
		Standard compaction roller;	Average
1	**Linear density of yarn, tex**	29	29
	Coefficient of variation in linear density, %	1,25	1,12
	Breaking load, cN	522	609
3	**Specific tensile strength, cN/tex,**	18	21
4	**Coefficient of variation for breaking load %**	9,82	7,083
5	**Level of quality**	1,83	2.96

6	**Elongation at break, %**	7,8	8,8
7	**Twist, cr/m**	782	748
8	**Twist coefficient αт**	42,2	40,4
9	**Precipitation,**	53	43

As can be seen from Table 1, the properties of multi-component yarn of all options were compared with the properties of 29 tex yarn produced at the private factory of OSBORN TEXTILE LLC. One of the most important indicators when assessing the properties of yarn is the specific breaking load and the coefficient of variation for the breaking load [7]. The dependence of these indicators on the compaction rollers is shown in Figure 2.

As can be seen from table. 1, when using the optimal parameters of an improved compaction roller with an elastic coating of pairs with different stiffness, it is possible to ensure an increase in the specific breaking load of the yarn from 18 cN/tex to 21 cN/tex, and the quality indicator yarn can be increased from 1.53 to 1.66.

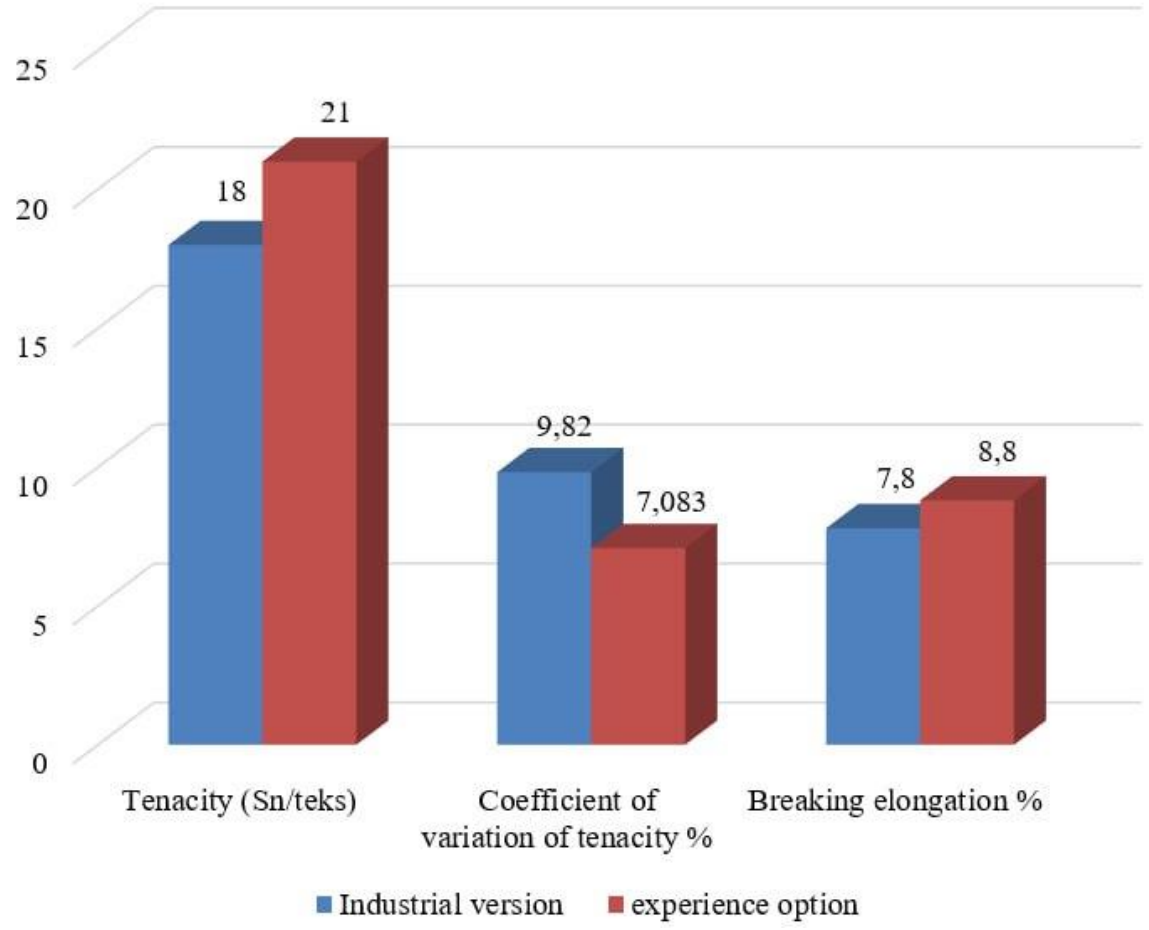

Fig.2. Diagram of the influence of the stiffness of a two-component compaction roller on the properties of the yarn

As can be seen from Table 1 and Figure 2, the quality indicators of yarn when using a draft pair with a new elastic coating from pairs of compacting rollers of different hardness compared to the control version, the quality indicators of yarn with different fiber composition produced in the experimental version were improved, including:

- the specific breaking load of the yarn increased by 3 cN/tex;

- the coefficient of variation for the specific breaking load of yarn decreased by 2.74%;
- elongation at the break of yarn increased by 1.27%;

Having studied the influence of the parameters of a two-part compaction roller with an elastic coating of varying degrees of rigidity, the following was established:

- the specific breaking load of the yarn increased to 21 cN/tex, respectively, and the yarn quality indicator increased by 1.66%;
- as a result of increasing the breaking load and reducing yarn unevenness, the number of breaks in spinning machines decreased by an average of 21%, in the industrial version 53 breaks per 1000 spindles per hour (in the experimental version 43 breaks per 1000 spindles per hour).
- conditions for twist distribution have been improved, the amount of twist has increased by 15.42%, and the uniformity of twist distribution has increased by 1.47 times, which has made the amount of thread vibration more stable [8].

When using optimal options for an improved compaction roller on a ring spinning machine under production conditions, it was possible to improve the properties of the yarn compared to the industrial version [9].

During the stretching process, it was possible to fairly evenly distribute the stretch to two parallel rovings due to the low deformation of one part of the elastic coating with the low rigidity of the compacting roller and the high deformation of the other part of the elastic coating. with a high degree of rigidity.

The multi-component yarn was obtained by installing an improved compaction roller with a pair of different degrees of stiffness on a Zinser-350 ring spinning machine. A comparative analysis of the physical and mechanical characteristics of the produced yarn with the properties of the yarn produced at the spinning plant and Uster was carried out [10-11].

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