Influence of the Twisting Triangle on Yarn Quality in a Ring Spinning Machine

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ABSTRACT

This article compares the Uster Statistics 2018 with the 50% indicators of the yarns obtained by changing the flow of fibres coming out of the output cylinders of the spun yarns from the ring spinning machine at different angles.

Keywords: spun thread, angle, linear density, number, Uster Statistics.

Introduction

Depending on the use of the spun yarn, which is the product of the spinning process, the type of raw materials used, and the spinning methods, the spun yarns differ from each other. Types of raw materials are selected depending on the twisting of the yarns and customer orders. Also, the quality of yarn is evaluated based on consumer requirements. Various additional works are performed in order to meet the demands of consumers. In addition to the properties of the thread and raw materials, it also depends on the alternation of the work of the technological equipment. It should be noted that in different spinning methods, spun yarns with different properties can be obtained from the same raw material.

The main function of the ring-spinning machine is to make yarn from the pile. It consists of making a coiled yarn with a convenient shape for further processing, ensuring the continuity and durability of the product, which is several times thicker than the yarn spun on the spinning machine. In the ring spinning machine, mainly three technological processes are performed - stretching, twisting and winding.

Spindle, prism and hanging reel handles are used in the supply devices. In the stud and prism supply devices, because the package rotates heavily under the influence of its mass, hidden elongation occurs in the pile. Therefore, spinning machines are mainly equipped with devices with hanging spool handles.

In the stretching tool, the hair is stretched and thinned to the specified linear density, and the fibres that make up it move relative to each other and are distributed over a larger

distance. As a result, the rear and front ends of the fibres are straightened and parallel to each other. Currently, the stretching devices of ring spinning machines are made in the structure of three cylinders, three rollers, and one or two belts.

The thin tuft coming out of the stretching tool is twisted to turn it into a thread [1.2]. When the thread is baked, the fibres that makeup it are located along spiral lines and are pressed together and become denser. As a result, there is a frictional force between them, which indicates the resistance of the thread to shearing forces. Thread baking is carried out using a baking-winding device [3.4.5].

Inherent connection of thread properties with the twisting process. When twisted by a twisting triangle the yarn spun in a ring-spinning machine, and the fibres in its cross-section take different positions. The edge, i.e., the fibres in the periphery located at the edge of the twisted triangle, as a result of the twisting of the thread, become more stretched and tense, and exert pressure on the inner fibres. If the fibres inside are not fully straightened and the tension is relatively low, they will be squeezed out and replaced by the straightened fibres. Thus, during twisting, the position of fibres in the cross-section of the thread continuously changes [6,7]. This process is the process of fibre migration, which leads to a change in the yarn structure

To improve the quality of the yarn, by changing the angle of the fibre flow coming out of the ring spinning machine, the bundle of fibres coming out of the burning cylinder is given at different angles, and by giving the necessary twist to the spinning yarn, the quality indicators of the obtained yarn meet the standard requirements. products are taken.

The research was carried out in the conditions of the skein thread production enterprise "Namangan tokimachi" LLC (Uzbekistan) located in the Namangan region. The skein yarn was produced on the ring spinning machine installed at the enterprise using the CSM 2114 ring spinning machine.

In the study, experiments were conducted to improve the quality indicators of spun skein yarn. It is known that today the stretching pairs of the ring spinning machine consist of a cylinder and a roller, and based on experiments, skein yarns were obtained by changing the twist angle of the fibres coming out of the spinning pair to 450 and 1350 degrees. By changing the twist angle, a spun yarn with the number N_e=32 was produced. Based on the experiments, three yarns were selected for the sample, and the quality of the selected 3 yarns was compared based on the Uster statistic 2018 50% standard.

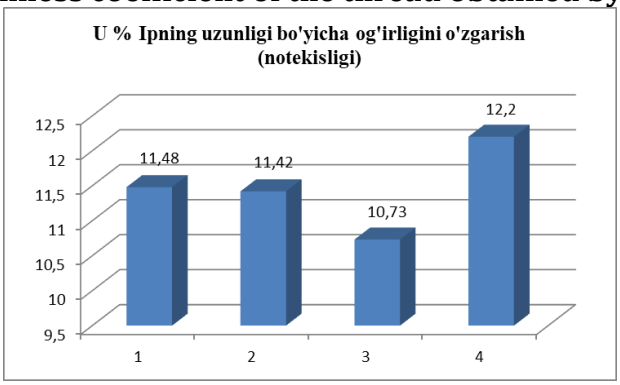
Table 1. Quality indicators of yarn with the number of spun yarn N_e=32

	Quality indicators of spinning yarn	Traditional spun yarn	A spun thread, obtained by turning the angle of twisting to 45°	A spun yarn, obtained by turning the angle of twisting to 135°	Uster statistic 2018 indicator
					50%
1	U %	11,48	11,42	10,73	12,2
2	Thin (-50)	19	14	2	12
3	Thinck (+50)	121	190	101	160
4	Elongation	4,03	4,5	4,32	5,44

As a result of the research, the unevenness of the spun threads is a negative feature of the production products at the spinning enterprise and often has a negative effect on the technical and economic indicators of the enterprise, as well as on the physical and mechanical properties of the yarn. It is important to test and control the unevenness of the products in spinning production, and it determines the causes and time of the unevenness. In spinning

machines, the higher the number of interruptions during the winding and forming of threads, the higher the unevenness of the thread [8.9]. In carding machines, the character of unevenness during processing, i.e., the level of fibre cleaning and separation, is not the same. In addition, an unevenly combed braid is formed. If a product with uneven structure or linear density enters the stretching tool of a different machine, the area size of the stretching force and friction force will change. Unevenness has a negative effect on the technical and economic indicators of the work, as well as on the physical and mechanical properties of spinning and weaving products [10.11]. Many factors, for example, uneven properties of raw materials, often due to the technological process and the design of the machine, violation of the working regime, and poor quality repair work. Unevenness in the change of product properties along the length is determined based on the following forms: unevenness in linear density, the weight of the cross-section of different lengths or volume weight (density) of the product in terms of the number of fibres in the cross-section of the product, roughness and roughness in terms of physical and mechanical properties.

Fig. 1. The unevenness coefficient of the thread obtained by the ring method



Changing the angle of the twist and comparing the yarns obtained in the carpentry with uster statistics 2018. We can see that the unevenness of the spun yarn obtained by the conventional method is improved by 6% compared with 50%, the unevenness of the spun yarn obtained by turning 45° is improved by 7%, and the yarn obtained by turning the spun yarn by 135° is improved by 12%.

Elongation at break of spun yarns. Textile fibres are flexible and elastic. When determining the maturity of the fibres, it is fully stretched. This property is called elongation at break. Its amount is taken from cutting tools. Textiles do not stretch until they break when the fibres are recycled, because the amount of force acting on the fibres is less than the breaking load. The full elongation of fibres consists of three parts: elastic, elastic and plastic.

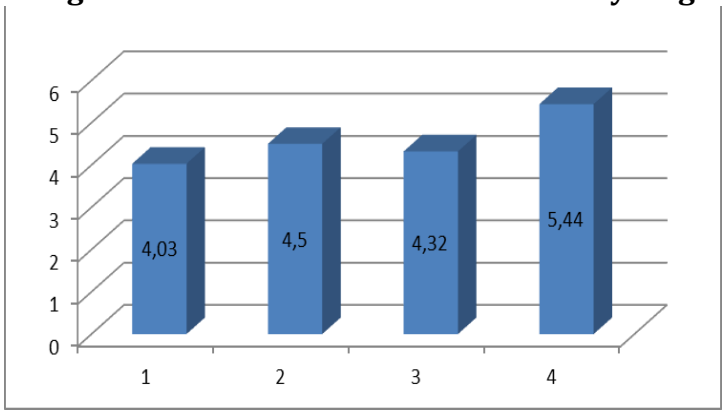
The belt part returns faster, its speed is considered to be equal to the speed of sound. But in practical work, the length of the fibre changed in 1-3 seconds is conditionally taken for the belt extension part.

Elastic elongation takes place over a period of time. In practical work, the length of the fibre changed for 1-3 hours is taken as part of the elastic elongation.

The plastic part of fibre elongation is residual elongation and does not return.

If the fibres have a lot of rebound in elongation, the clothes made from them will wrinkle less and be durable for a long time.

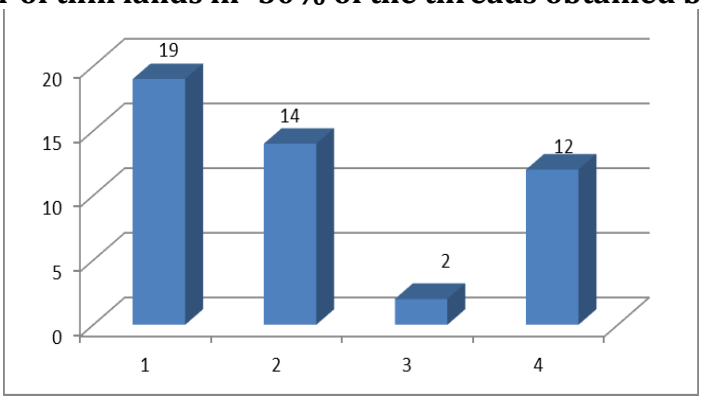
Fig. 2. Elongation at break of threads obtained by ring method



In order to improve the indicators of elongation at the break of spun yarns produced in enterprises. The elongation at break of the conventionally spun yarn was improved by 26% compared to 50° uster statistic 2018, and by changing the flow of fibres from the stretching pairs to 45°, the elongation at break of the yarn was improved by 18%. by changing the flow of fibres coming out of the stretching pairs to 135°, the elongation at break of the yarn was improved by 21%.

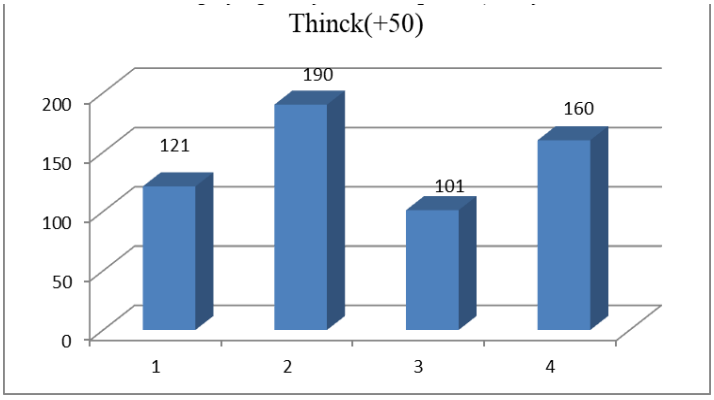
When determining the quality indicators of one km of yarn, it was found that the thin -50% places in the yarn compared to the 50% of uster statistic 2018, compared to the 50% of uster statistic 2018 of the yarn obtained by the traditional method, it deteriorated by 42%. A 16% improvement was observed for yarn exiting the take-off cylinder with a 45° twist compared to the uster.

Fig. 3. The number of thin lands in -50% of the threads obtained by the ring method



When determining the quality indicators of one km of yarn, the thickness of +50% in the yarn is compared with Uster statistic 2018. 25% improvement compared to 50% of uster statistics 2018 of conventional yarn. 18% deterioration of yarn coming out of the take-off cylinder compared to the uster, 37% improvement was seen for the yarn coming out of the take-off cylinder 135° compared to the uster.

Fig. 4. The amount of coarse ground in +50% of the threads obtained by the ring method



Conclusion

It was found out from the research work that the yarns were compared by turning the flow of fibres coming out of the spinning cylinders to a certain angle. In summary, the unevenness of the obtained skein yarns was improved by 12% compared to the 1350 twisted yarn obtained by uster statistics 2018 by 50%. The elongation at the break of the spun yarns was 26% of the elongation at the break of the yarn obtained by the conventional method, and it was improved by 21% after twisting the resulting spun yarn to 1350.

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