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Analysis Of Quality Indicators Of Recombing Threads

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Abstract *— In this article, two parameters of a re-spinning machine for spinning in a medium-fiber cotton re-spinning system, namely by adjusting the separation between the clamp separating cylinder and the upper comb and the comb drum. The comparative analysis of the quality indicators of the prepared rough products and the spinning yarn with a linear density of 19.6 tex (Ne = 30) spun from them. Taking into account the above, experimental work was carried out in the production conditions of the private enterprise "Jizzakh Textile". Experiments were performed to spin 19.6 tex yarn with a linear density. In the chain of technological equipment of the enterprise for sampling of yarn from raw materials on experimental options so both options (enterprise and experience) from the medium-fiber cotton mixture "LOT-P" used without changing the spinning plan and samples of combed yarn with a linear density of 19.6 tex (Ne = 30) were produced on the Zinser 351 spinning machine also yarn linear irregularity and CV irregularity as well as neps parametres were studied on the Uster Tester 5-S800. Due to the fact that the difference in yarn strength from the main performance of the spun yarn is very close to each other in the experimental variant, the yarn strength index was maintained due to the adhesion of the short fibers in the spun yarn [1,2]. The use of statistical methods in conducting experiments and processing their results reduces the number of tests and the number of operations to be processed. These methods also allow to link product quality indicators with changes in the technological process.*

Keywords: fiber, re-spinning, quality, wicker, spacing, medium fiber cotton, yarn.

INTRODUCTION. The bulk of cotton yarn spun at Uzbek textile enterprises is exported to foreign countries. One of the urgent tasks today is to increase the competitiveness of these yarns and effectively use the capabilities of spinning systems to ensure that the quality indicators are at the level of world market requirements. Ensuring an increase in the production of high quality products, the high level of development of high-tech industries and other sectors of the textile industry is the main source of achieving the set goals.

It is known that the quality of textile products is assessed by a number of indicators. In evaluating them, the experimental test results are compared with the approved normative values. The use of statistical methods in conducting experiments and processing their results reduces the number of tests and the number of operations to be processed. These methods also allow to link product quality indicators with changes in the technological process.

Regardless of the spinning system of the yarn and the method of spinning, the quality indicators are evaluated by different criteria. Each quality indicator: linear density, quadratic unevenness, number of neps, tensile strength, number of twists, linear density, tensile strength, etc. The quality indicators are determined on test laboratory equipment based on the criteria of yarn quality indicators according to the established international standard [3,4].

MATERIAL AND METHODS. It is known that the use of yarn in spinning yarn from medium-fiber cotton and, depending on the requirements for it, determine the amount of yarn output, play an important role in ensuring the purity and quality of raw products and yarn [6,7].

In order to achieve the set goal, the effect of the working parameters of the re-spinning machine on the quality indicators of the re-spun yarn and the yarn obtained from it was studied.

Taking into account the above, experimental work was carried out in the production conditions of the private enterprise "Jizzakh Textile". Experiments were performed to spin 19.6 tex yarn with a linear density. Using Truetzschler's technological equipment chain and spinning plan installed at the enterprise, the experiments on the CM 600N recycling machine changed two different wiring in two variants, sketched products and spun yarn, and their quality was determined on Uster Tester-5 S800, Uster Tensorapid 4.

In the research work, the separation between the clamping separator cylinder and the upper comb and the comb drum on the re-combing machine was adjusted to 13% in the experimental variant and 16% in the enterprise variant [8,9,10].

According to the research plan, fibrous wastes, returns and product output were studied on two experimental options in the production of raw products and re-spinning yarn from the mixture. In the experimental variant, the yarn yield from the mixture is 74.0%, and in the enterprise variant - 72.0%.

The linear and quadratic roughness indices of the raw products prepared in two different enterprise and experimental variants of the taranda in the re-scraping machine were compared with the international Uster Statistics 2018 norms and the results were summarized in Table 1 [11.12].

Table 1.

Indicators of linear and quadratic inequality of sketches made in enterprise and experimental variants

Indicators	Options					
	Enterprise			Experience		
	Re-combed wick	Drawn sliver	Roving	Re-combed wick	Drawn sliver	Roving
Linear unevenness, U%	2.88	1.88	3.19	2.55	1.78	3.05
Quadratic inequality, CVm %	3.61	2.38	3.99	3.18	2.27	3.87
Coefficient of variation of semi-finished product with a length of 1 meter by section, CVm 1m %	1.42	0.33	2.11	1.21	0.33	1.97
Coefficient of variation of a semi-finished product with a length of 3 meters by section, CVm 3m %	1.20	0.18	1.73	1.01	0.18	1.42

The analysis of this table showed that the quality indicators of the sketches prepared in the experimental variant are close to the quality indicators of the sketches prepared in the enterprise variant [13,14,15].

In the chain of technological equipment of the enterprise for sampling of yarn from raw materials on experimental options so both options (enterprise and experience) from the medium-fiber cotton mixture “LOT-P” used without changing the spinning plan and samples of combed yarn with a linear density of 19.6 tex (Ne = 30) were produced on the Zinser 351 spinning machine also yarn linear irregularity and CV irregularity as well as neps parametres were studied on the Uster Tester 5-S800.

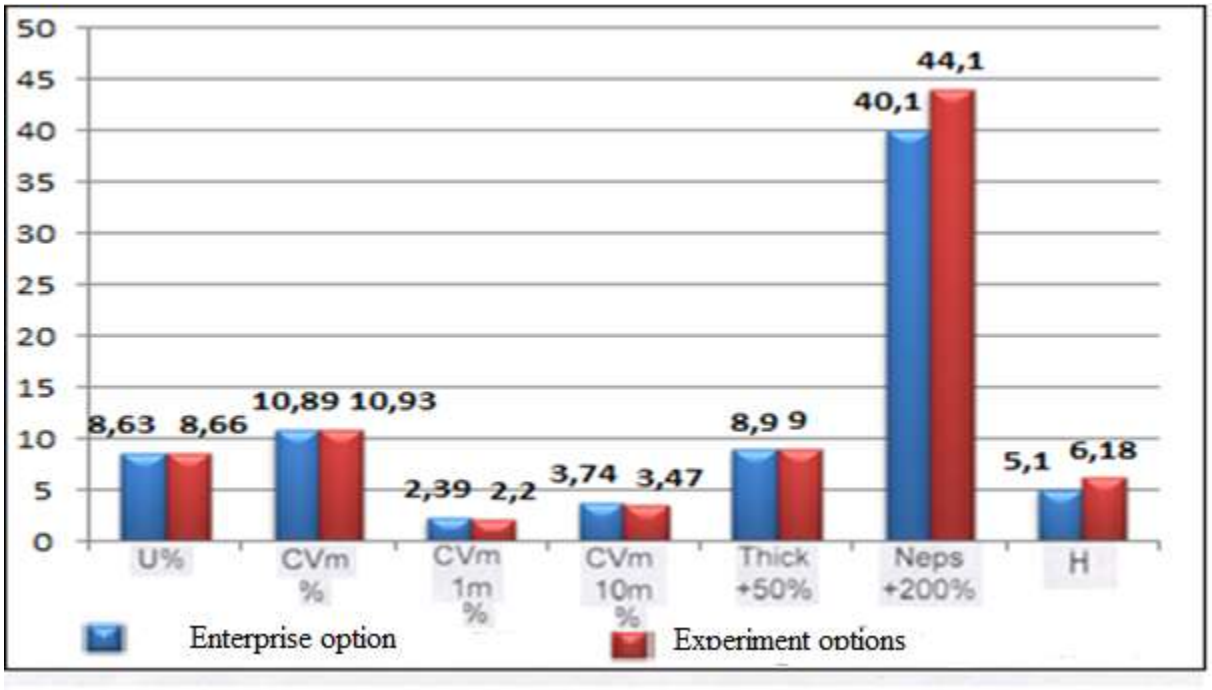
Table 3.4 shows the quality characteristics of re-spinning yarns with a linear density of 19.6 tex (Ne = 30) for both spun options.

Table 2.

Defects in the appearance of the rope

№	Indicators	Options		Uster Statistics-2018 International Standards
		Enterprise	Experience	
1	Linear unevenness , U%	8.63	8.66	-
2	Quadratic inequality, CVm %	10.89	10.93	11.19
3	The quadratic inequality of a 1 meter long rope, CVm 1m %	3.74	3.47	3.57

4	The quadratic inequality of a 10 meter long rope, CVm 10m %	2.39	2.20	2.18
5	Thin areas (-50%), corresponding to 1 km	0.0	0.0	1
6	Thick areas (+ 50%), corresponding to 1km	8.9	9.0	12
7	Knots (neps + 200%), corresponding to 1km	40.1	44.1	41



Total tests: 8/8 Single tests(s)

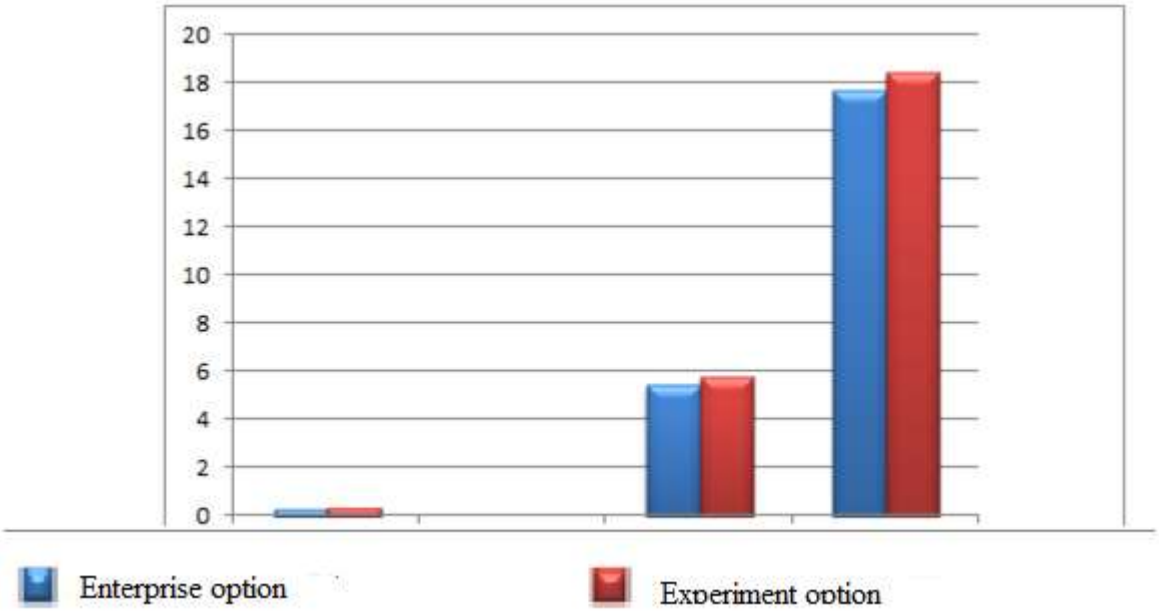
Nr	U%	CVm	CVm 1m	CVm 10m	Thin -30%	Thin -50%	Thick +35%	Thick +50%	Neeps +200%	Neeps +280%	Rel Cnt ±	H	sh
Enterprise	8.63	10.89	3.74	2.39	304.0	0.0	93.9	8.9	40.1	12.3	0.0	5.10	1.08
Experiment	8.66	10.93	3.47	2.20	335.4	0.0	94.4	9.0	44.1	8.8	0.0	6.18	1.36

Figure 1. Defects in the appearance of the threads

When comparing the average values given in the table, the indices of linear and quadratic inequalities are almost indistinguishable (8.63; 8.66 and 10.89; 10.93).

When comparing small and large neps, it was found that the amount of neps in the enterprise variant was 40.1, and in the experimental variant - 44.1, i.e. 9% more. The amount of large (+280%) nepses was also found to be 28.4% lower (12.3; 8.8). This indicates that the difference between the enterprise option and the experimental option is close to each other, and the parameters in their application should be adjusted according to demand[16,17].

At the next stage of the testing process, the physical and mechanical properties of the yarns spun in the enterprise and experimental variants were studied on the device "Uster Tensorapid 4".

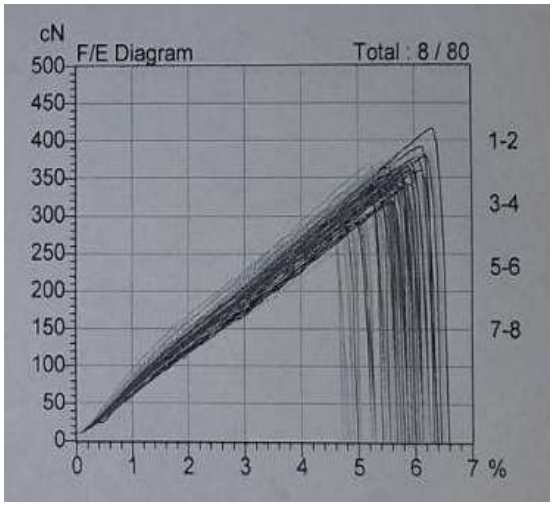


Total tests: 8/8 Single test(s)

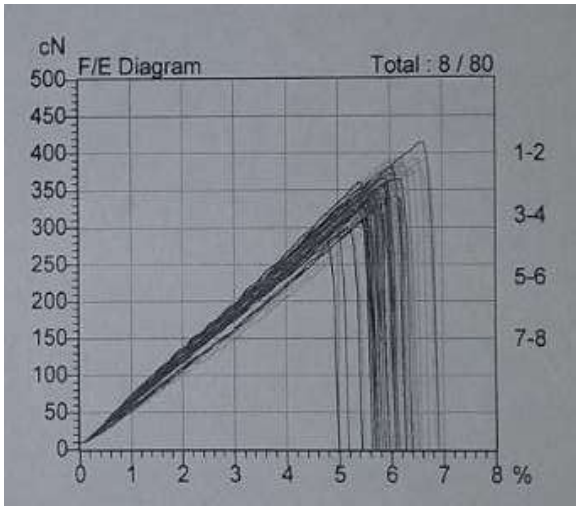
Nr	Time to break S	B-Force cN	Elong %	Tenacity Rkm	B-Work cN. cm
Enterprise	0.33	341.6	5.43	17.70	492.7
Experiment	0.35	356.3	5.80	18.46	528.2

Figure 2. Quality indicators of spun yarns in enterprise and experimental options.

In the enterprise variant, the elongation at break was 5.43, while in the experimental variant it was 5.80, in which case the experimental variant was 6% more. The relative tensile strength of the yarn is 18.46 in the enterprise variant, which is 17.70 in the experimental variant, and the relative tensile strength of the yarn in the enterprise variant is 4% higher. The elongation inequality (SV) was 8.24% in the experimental variant and 6.50% in the enterprise variant, in which case we can see the closeness of the enterprise variant to the experimental variant. In this case, we can see that the performance between the mechanical properties of the yarns is not high [18,19].



Experiment options



Enterprise option

Figure 3. Graphs of tensile strength of spun yarns in experimental and enterprise options.

Due to the fact that the difference in yarn strength from the main performance of the spun yarn is very close to each other in the experimental variant, the yarn strength index was maintained due to the adhesion of the short fibers in the spun yarn.

Conclusion.

It should be noted from the results obtained that, the adjustment of the amount of spinning yarn to 13% instead of 16% is due to the high homogeneity index of medium-fiber cotton fiber, which ensures the stable passage of technological processes, as well as the quality of raw materials and yarn at the level of applicable standards.

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