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Influence of Dosing Mixing Equipment of Natural and Chemical Fibers on The Quality Indicators of Blended Yarn

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Annotation: Analysis of quality parameters of 20 tex (Ne 30/1) blended yarn from 70/30 cotton/polyester blend spun in plants equipped with Truetzschler BL-BO (Germany) and B143N Marzoli (Italy) equipment in the research study the results are presented. According to the results, the mixed yarn spun in the plant equipped with Truetzschler BL-BO (Germany) equipment has better unevenness and strength indicators compared to the mixed yarn spun in the plant equipped with B143N Marzoli (Italy) mixing equipment. however, mixed yarn spun in a factory equipped with mixing equipment B143N Marzoli (Italy) was characterized by low hairiness index.

Key words: Truetzschler BLBO, B143N Marzoli, mixed yarn, cotton/polyester.

Introduction

One of the rapidly developing sectors of our country's economy is the textile and sewing-knitting industry, which is greatly helped by the availability of its own raw material base and the ever-increasing demand for manufactured products. Due to its competitive potential, it occupies a leading position in attracting foreign investments in the creation of new enterprises, providing employment, exporting products, and is also considered one of the strategically important directions in the global specialization of the country's national economy. Uzbekistan is one of the world's largest producers of natural textile fiber, cotton yarn and knitted products.

Literature review. Various types of natural fibers (such as cotton, wool, and linen) and synthetic fibers (such as nylon and polyester) are used as raw materials [1]. The quality of the produced yarn is mainly influenced by the properties of raw materials, its preparation for spinning, the condition of the equipment and the optimal and well-coordinated aggregate machines during the spinning process [2].

In order to study the influence of cotton fiber properties on the quality parameters of spun yarn, Ne 30 compact yarn from four American, Aegean, Greek and Urfa selection cotton fibers was used in the following spinning system of Rieter (Switzerland) company, mainly UNIfloc A11, UNIclean B12 and UNImix B72 were passed through grinding, cleaning and mixing units. Carding of cotton fibers - C 70, carding I-otim SB-D-45, canvas forming E 35 Omegalab and E 76 carding machine. Pass II was directed to the RS-B-D45, then the Marzoli FT6-D carding machine, and the ring compact spinning machine K 45 was used.

According to the obtained results, the preliminary treatment of cotton fibers in the cleaning system led to an increase in the number of neps, which is related to the working parts of the machine affecting the fiber. According to the data, the waste parameters started to decrease in the processes after the carding process, and effective cleaning of waste fibers was achieved during the carding process [3].

In order to reduce the unevenness of the thread by improving the stretching device of the spinning machine, scientific research work was carried out at the enterprise "ARK EKO TEXTILE" LLC in Bukhara.

At the spinning plant, cotton fiber "Bukhara 6" 4-type II grade 60% and "Bukhara 8" 4-type III grade-40% is sorted and raw materials are formed using a series of technological machines of the modern company "Rieter " (Switzerland) with a linear density of 29, Yarns of 4 and 50 tex were spun. UNIfloc A11, UNIclean B11, UNImix B70 and Uniflex B60 have undergone preliminary grinding, cleaning and mixing units. Combing cotton fibers - C 70, carding I-grade SB-D-40 and II-grade RS-B-D40. Ring spinning - R 40 machines were used. The main goal of the research is to improve the stretching devices of the RS-B-D40 and Rieter R 40 ring spinning machines, and by aligning and parallelizing the ends of the fibers, the unevenness and hairiness of the yarns have been reduced [4].

Timely elimination of thread breakage in spinning enterprises allows to save production costs [5] by using variable asynchronous electric motors, it ensures saving of power consumption and increase of efficiency coefficient [6]. It is recommended to use the FMEA (Failure Mode and Effects Analysis) method to prevent product and production process failures that may occur in ring spinning enterprises [7].

The purpose of the research work. Many spinning enterprises in the Republic of Uzbekistan are equipped with equipment developed by Truetzschler (Germany) and Marzoli (Italy). Taking this into account, the goal of the research work was to analyze the quality indicators of the mixed yarn spun at the factories equipped with the Truetzschler BLBO (Germany) and B143N Rieter (Switzerland) equipment, a mixer of natural and chemical fibers.

Experiment procedure. Experiments were carried out in the production system of "Plant I" equipped with Truetzschler BL-BO (Germany) mixer of natural and chemical fibers and "Plant II" equipped with B143N Marzoli (Italy) equipment, cotton/polyester 70/30% mixed fibers 20 tex (Ne 30/1) yarn samples were prepared by ring spinning method.

Mixed thread quality indicators, unevenness indicators in laboratory conditions Uster® Tester 6 and mechanical indicators Uster® Tensojet 4 equipment, tests for 3000 m threads at a speed of 400 m/min are carried out in 3 repetitions, and the average of the results is obtained. .

In the scientific research, the technological process sequence of "Plant 1" equipped with Truetzschler BL-BO (Germany) natural and chemical fiber mixing equipment is shown in Figure

1, and the technological process sequence of "Plant 2" equipped with B143N Rieter (Switzerland) equipment It is presented in Fig. 1-2.

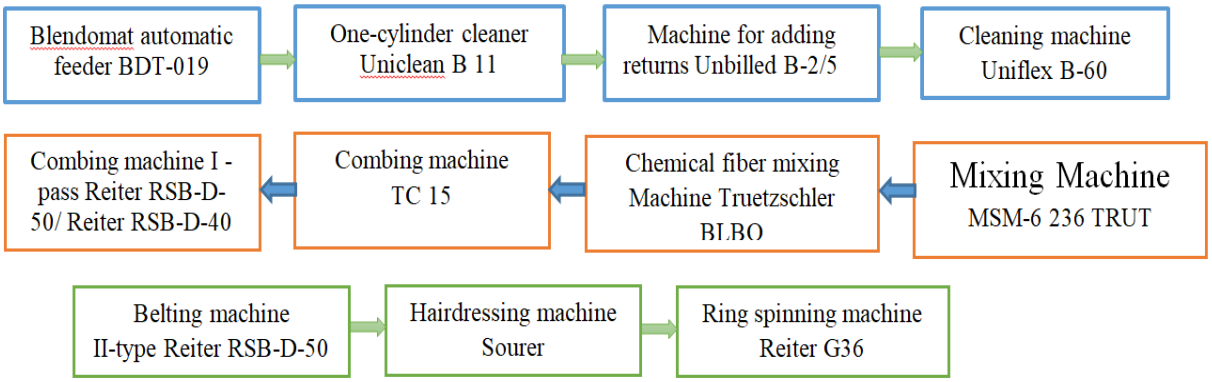


Figure 1. Rieter and Truetzschler BL-BO "I-plant" plan equipped with natural and chemical fiber mixing equipment

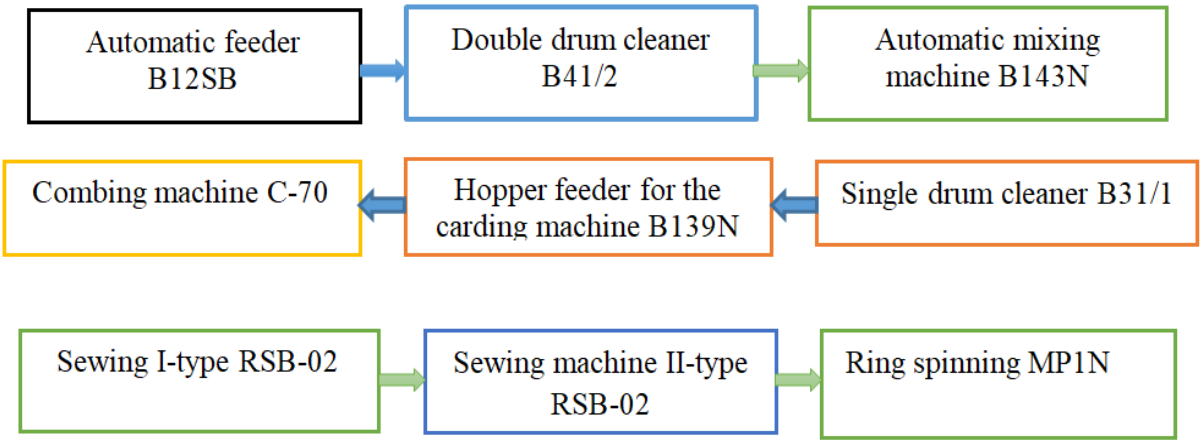
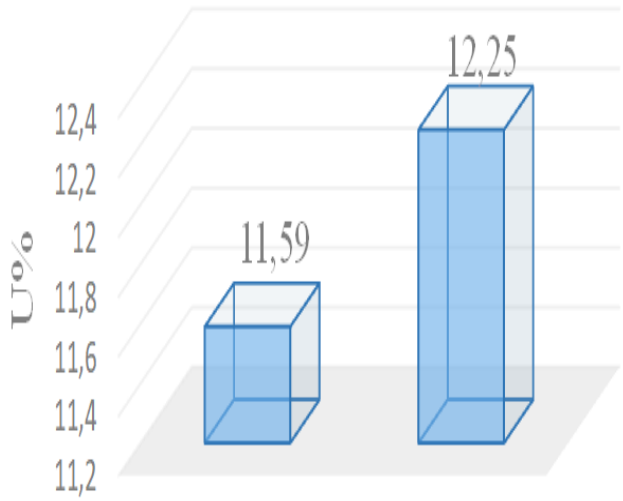


Figure 2. B143N is equipped with Marzoli and Rieter equipment
"II-enterprise" plan.

Analysis of results. Unevenness U% indicators of cotton/polyester 70/30% blended yarns are given in Figure 1, according to which the blended yarn unevenness of "Enterprise I" is 5.38% less than that of "Enterprise II", Figure 2 shows the mass of mixed yarns unevenness values according to CVm% recorded a lower result by 6.41%.



1- Enterprise 2- Enterprise

Figure 1. Unevenness of cotton/polyester mixed yarns, U %.

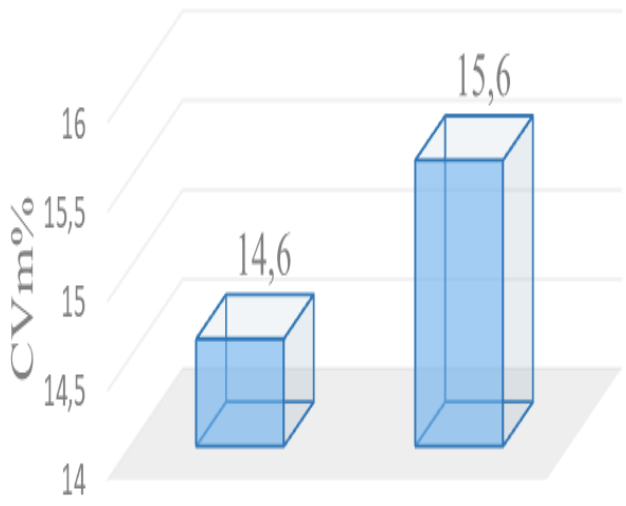


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Figure 2. Unevenness values by mass of cotton/polyester mixed yarns, CVm %.

In Figure 3, the parameters of the Cotton/Polyester 70/30% mixed yarns in Thick -50% thin areas showed the same result in "Enterprise I" and "Enterprise II", while in Figure 4, "I enterprise" we can see that the thinness of the mixed thread is 40.71% less compared to "II enterprise".

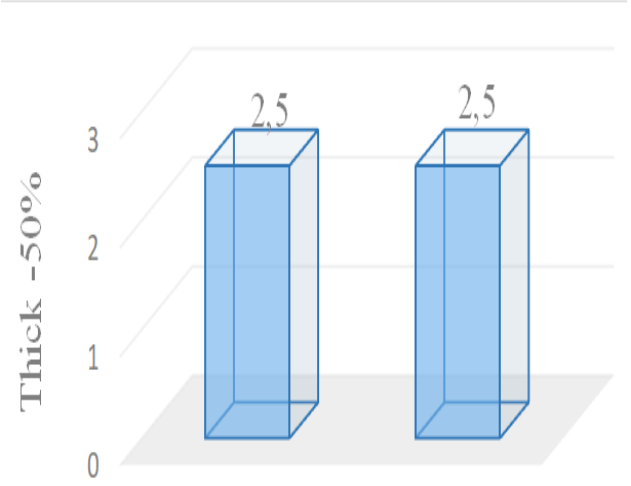

Figure 3. Thin sections of cotton/polyester blend yarns, Thick -50 %.

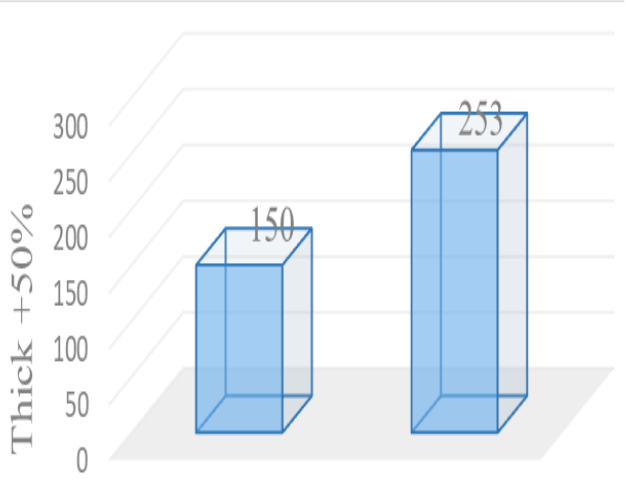

Figure 4. Thick areas of cotton/polyester blend yarns, Thick +50 %.

The results of the specific breaking strength of cotton/polyester 70/30% blended yarns are shown in Figure 7. "Enterprise I" is 14.17 sN/tex and "Enterprise II" is 13.11 sN/tex. Fig. 8 shows "Enterprise I" 2.79 N and "Enterprise II" 2.58 N. In comparison, "Enterprise I" achieved an 8% improvement over "Enterprise II" in terms of relative tensile strength and tensile strength.

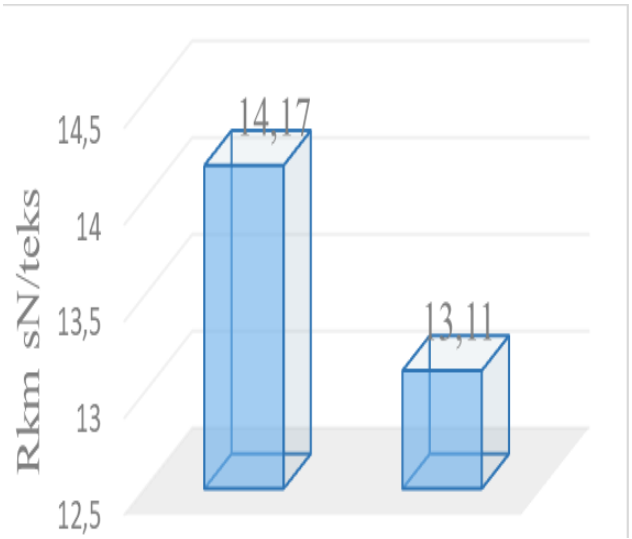

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Fig. 7 Relative tensile strength of cotton/polyester mixed yarns, *sN/tex*

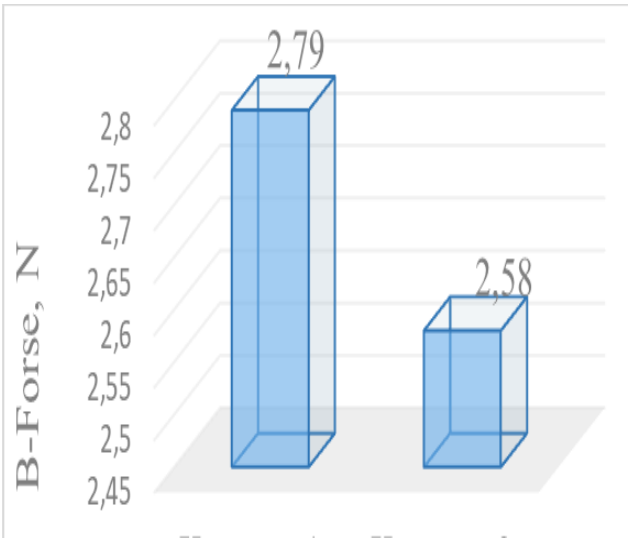

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Figure 8. Tensile strength of cotton/polyester blended yarns, *N*

Figure 9 shows the elongation at break of cotton/polyester 70/30% mixed yarns, according to which the elongation of mixed yarns of "Enterprise I" is 6% higher than that of "Enterprise II". Figure 10 shows a higher result of 22.2%.

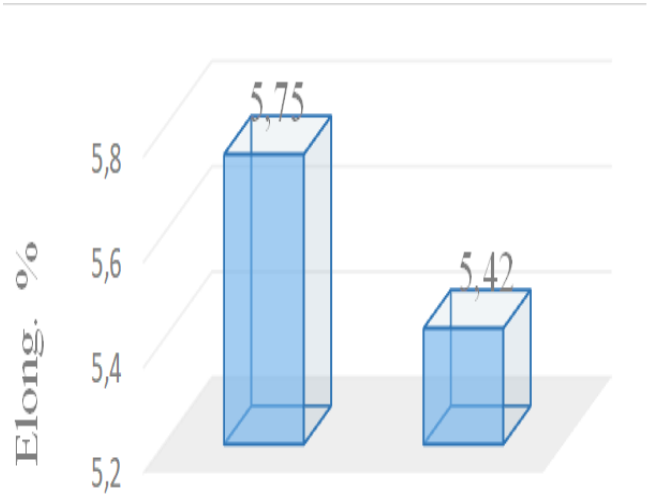

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Figure 9. Elongation of cotton/polyester blend yarns, Elong *%*.

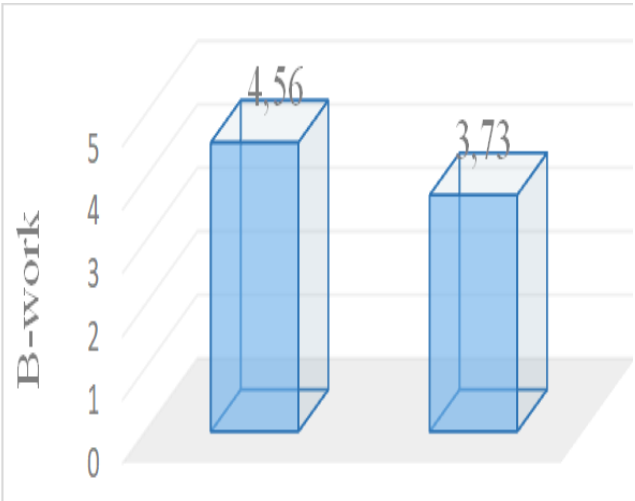

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Figure 10. Cotton/Polyester blend yarn breaking work, *B-work*

Conclusion: According to the results, the quality indicators of mixed yarn spun in a factory equipped with Truetzschler BL-BO (Germany) equipment, U% indicators compared to the mixed yarn spun in a factory equipped with B143N Marzoli (Italy) mixing equipment, by 5.38%, the unevenness values in terms of mass CVm% increased by 6.41%, in thin areas by 40.71%, in the number of neps by 26.97%, in tensile strength and tensile strength by 8%, elongation at break by 6% lsa recorded a high result of 22.2% in terms of breaking, while the mixed yarn spun in the factory equipped with mixing equipment B143N Marzoli (Italy) was characterized by low hairiness index.

REFERENCES

1. Goyal, A., & Nayak, R. (2020). Sustainability in yarn manufacturing. In Sustainable Technologies for Fashion and Textiles (pp. 33-55). Woodhead Publishing.
2. Tojimirzaev, S., Sadikov, M., Rasulov, S., Mirzaahmedov, J., & Plekhanov, A. F. (2021). Observation of Damage of Cotton Fiber in the Processes of Blowing, Cleaning and Carding. In E3S Web of Conferences (Vol. 320, p. 03009). EDP Sciences.
3. Günaydin, G. K., Soydan, A. S., & Palamutçu, S. (2018). Evaluation of cotton fibre properties in compact yarn spinning processes and investigation of fibre and yarn properties. Fibres & Textiles in Eastern Europe.
4. Khamraeva, S. A., Yusupova, N. B., Atambaev, D. D. O., & Hasanov, M. H. O. (2020). The Importance of the extension tool in reducing the inequality of yarn. The American Journal of Engineering and Technology, 2(08), 39-44.
5. Wang, W., Zhou, P., & Lin, X. (2017, October). Development of yarn breakage detection software system based on machine vision. In AIP Conference Proceedings (Vol. 1890, No. 1, p. 040093). AIP Publishing LLC.
6. Pirmatov, N., & Panoev, A. (2020). Frequency control of asynchronous motors of looms of textile enterprises. In E3S Web of Conferences (Vol. 216, p. 01120). EDP Sciences.
7. MUTLU, N. G., & Altuntas, S. (2019). Hazard and risk analysis for ring spinning yarn production process by integrated FTA-FMEA approach. Textile and Apparel, 29(3), 208-218.