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# RESEARCH INTO THE EFFECT OF STRETCHING COUPLES ON THE QUALITY OF THREAD IN A RING SPINNING MACHINE

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## ABSTRACT

*In the present study, compact melange yarn samples were obtained using a mechanical compact device. The study obtained samples of 800 b / m welding in the combing and snow-spinning systems, with a spinning rate of 14,000 min-1, and a linear density T = 20 (Ne = 30). The physical and mechanical properties of the obtained yarn samples were compared to those of standard yarn and standard indicators. Comparison of the strength, elasticity and inequality of the compact melange yarn samples obtained in this study was analyzed. The study found that high-quality characteristics of melange yarn obtained by machine-made compact device and melange yarn obtained by re-combing can have the same high quality.*

**KEYWORDS:** *Compact yarn, ring spinning, Hairiness, torsion, Unevenness, Tensile load, Product, quality, Mélange, carded, Combing, Spindle.*

## INTRODUCTION

Demand for textile products has always been high in the domestic and global market. There is always a high demand for products that meet the requirements of consumers, have high hygienic, aesthetic and operational properties. The yarns used to make these products should be of high quality. In order to obtain yarns with high-quality performance, several important types of research are being carried out by leading firms to improve the productivity of spinning machines, machine design and yarn quality. Examples of these innovations are the increase in the number of loops on ring spinning machines, the introduction of compact spinning machines and equipment into production, continuous and wasteless spinning. Changes in this appearance are still ongoing in ring spinning machines. In order to further improve the quality of yarn, the designers of spinning machines have recently been actively working on the creation of compact devices that spin the fibre and reduce the hairs on the surface of the yarn.

## MATERIALS AND METHODS

Compared to traditional loop yarns, the geometry of the compact yarn has been changed. During the formation of compact yarns, the baking triangle is almost not formed [1, 2]. We can see that the B-width varies in simple and compact ways. In the case of yarn formation in size b, we can see the formation of a baking triangle in ordinary yarns. In compact yarns, the baking triangle is almost lost, as mentioned earlier, and we can see that all the fibres are involved in yarn formation (Fig. 1). In the zone of yarn formation, the fibres become tense at the edges of ordinary yarns. Experts from ROTORCRAFT explained that the fibres in the middle part are less involved in the twist. In ordinary yarns, the tension of the cross-sectional fibres is greater, and the tension of the fibres decreases as they move towards the centre. Given this, because the fibres are of different stresses, the yarn structure is also uneven, with a low resistance to tensile forces. In compact yarns, however, we can see that the fibres are evenly distributed in the cross-section of the yarn. This arrangement of fibres also has a major impact on subsequent stage processes. Normal yarns have low tensile strength and high fluff. These problems have been eliminated in compact yarns.

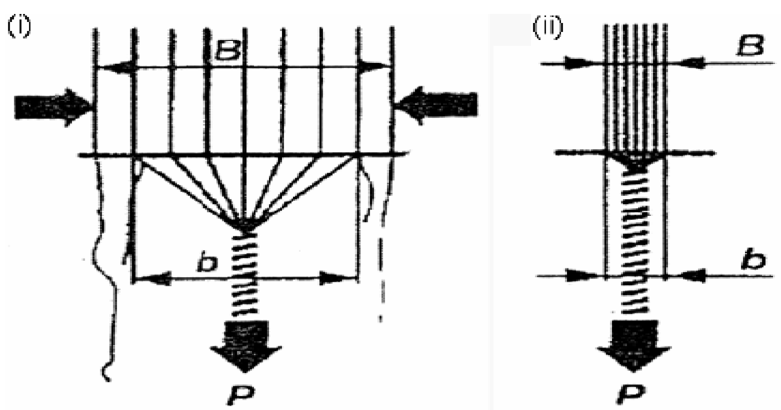



**Figure 1 The basic principle of compact and simple yarns. (I) yarn spun in a simple ring method. (II) yarn spun in a compact manner**

Some firms use air-sucking devices when making compact yarns, while some firms recommend mechanical compact yarns. The production of melange yarns also plays an important role in expanding the range and producing competitive products. However, during the dyeing and drying processes of cotton fibre, the curl of the fibres increases. It was noted that after dyeing, the strength of yarns decreased by 1.5-4, elongation by 7.5-11, elasticity by 20-40% compared to undyed yarns [3, 4]. In order to study the possibility of improving the quality of yarn as a result of obtaining melange yarns by compact method, compact devices were analysed and Rotorcraft's RoCoS compact yarn spinning device was selected for the experiment. It has been taken into account that this device has a high convenience with no need for additional power, air duct, electric motor, fan, perforated surface plate or drums. This device is placed on the front cylinder of the ring-spinning machine stretching tool. Its feature is that it has two loading rollers on the front cylinder and a seal that seals the width of the outgoing wool. Note that the sealant touches the cylinder because it is on a fixed magnetic plate. As the two loading rollers cover the front cylinder, the height of the cooking triangle also decreases, resulting in changes in yarn formation [5]. In the experiment, three different melange yarn samples were analyzed. The first example is a traditional melange yarn obtained by the snow method. The second sample is a compact melange yarn obtained using a RoCoS device in the snow method. The third sample is a melange yarn obtained in a re-spinning system. In this experiment, using the same selection cotton variety, Zinser 350 ring spinning machine with linear density T = 20 (Ne 30), yarn rotation speed 15000, maturity 800 b/m was obtained. The spinning plan is given in Table 1.

**TABLE 1. SPINNING PLAN**

| **№** | Machine name Shaving machine DK-903 | **Linear density, tex** | | **Stretching, E** | **Number of add** | **Twisting** | | **Speeds** | |
|---|---|---|---|---|---|---|---|---|---|
| | | **$T_{in.}$** | **$T_{out.}$** | | | **$\alpha_T$** | **K, b/m** | **$V_1$ m/min** | **n, $min^{-1}$** |
| **1** | Spinning machine HS-1000 | **-** | **4916,7** | | **-** | | | **145** | |
| **2** | Pilta Combination E-32 UNILAB | **4916,7** | **4916,7** | **6** | **6** | | | **450** | |
| **3** | Re-scraping E-65 | **4916,7** | **72000** | **1,63** | **24** | | | **70** | |
| **4** | II-transition HSR-1000 | **72000** | **4916,7** | **117,15** | **8** | | | **154** | **350** |
| **5** | Wicking | **4916,7** | **4916,7** | **8** | **8** | | | **400** | |
| **6** | Zinser-670 | **4916,7** | **617** | **9,08** | **1** | | **48** | | **1200** |
| **7** | Spinning | **617** | **20** | **30,4** | **1** | **36,4** | **800** | | **15000** |

Uster TESTER4, Zweigle D 314 PRs of physicomechanical properties of the samples were determined and the results were summarized in Table 2. The strength of the thread break is one of the important quality indicators of the thread. Taking into account this, from the results of the experiment obtained, the strength of the thread break was analyzed (Figure 2).

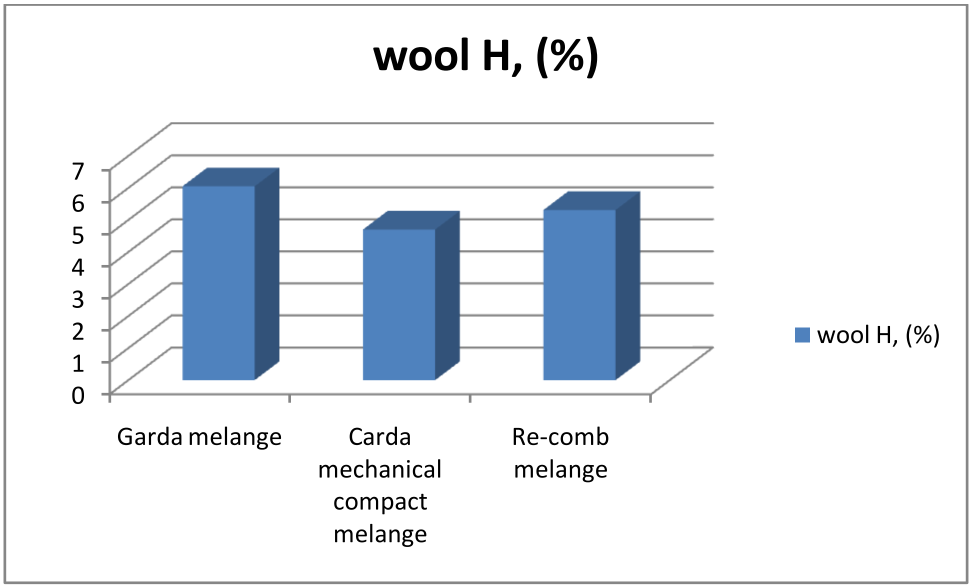
**TABLE-2 PHYSICAL-MECHANICAL INDICATORS OF TEKS YARN SAMPLES OF LINEAR DENSITY T= 20 (NE 30), OBTAINED BY THE METHODS OF CARDA TRADITIONAL, CARDA COMPACT AND RE-COMBING.**

| № | Spinning method | Frequency of rotations x$10^3$, $min^{-1}$ | Practical durability, $К_a$, b/m | Relative tensile strength of the yarn, (Rkm) | Elongation at break,ε, (%) | Hairy, H, (%) | Inequality in breaking strength, CV, (%) |
|---|---|---|---|---|---|---|---|
| **1** | Karda melange | **15000** | **800** | **14,98** | **4,12** | **6,05** | **10,7** |
| **2** | Mechanical compact melange in the snow | **15000** | **800** | **17,84** | **4,22** | **4,7** | **7,8** |
| **3** | Shaving melange | **15000** | **800** | **17,41** | **4,25** | **5,31** | **8,2** |
| **4** | Uster statistics 2013 | **15000** | **800** | **5%- 17,1** | | | **5%- 7,1** |
| | | | | **50%-14,7** | | | **50%-8,8** |
| | | | | **95%-12,7** | | | **95%-10,9** |

The elongation strength of the samples taken for the experimental test was examined for compliance with the standard requirements. It was found that the tensile strength of the yarn obtained by the re-spinning method (Fig. 2, 3) was 14% stronger than that of ordinary yarn. Experiments have shown that the tensile strength of the compact melange yarn obtained by the snow method (Fig. 2, 2) is 16% higher than the tensile strength of ordinary factory yarn. It can be seen that the strength of the yarn obtained by the simple snow method (Fig. 2, 1) is the lowest. In determining these indicators, quality indicators were identified and analyzed in the USTER TESTER4 device installed at OSBORN Textile.

**Picture-2 Carda melange, Carda mechanical compact melange, the relative tensile strength of re-comb melange threads., (Rkm)**

One of the important indicators of yarn quality is fluffiness. With this in mind, the fluff performance of the yarn samples was analyzed (Fig. 3).

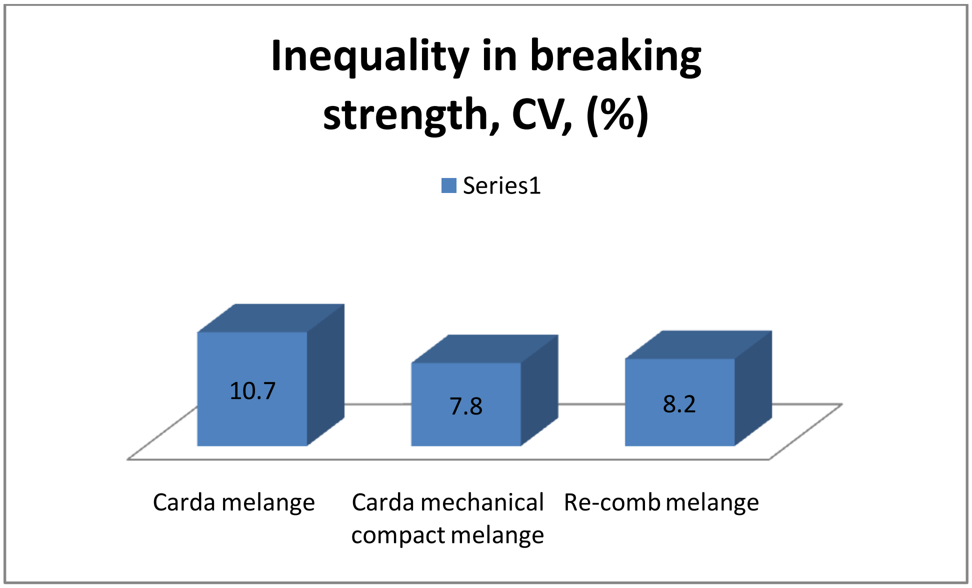



**Picture-3 The frequency of rotation of the bitch is 15000 m-1, ripeness 800 b/m, the linear density of the thread is 20 (Ne 30) indicators of the fluidity of the Tex threads (%).**

1-Garda melange rope; 2-Carda compact melange rope; 3-Re-combed melange thread.

It became known that the compact melange yarn (Figure 3, 2) obtained by the Carda method is 22% thinner than the ordinary melange yarn (Figure 3, 1), and the combed melange yarn (Figure 3, 3) is 12% less tolerant. In the process of spinning, there will be irregularities in the products of each appearance (Holst, pilta, Wick, thread). It can be said that by the length of the product by making the unevenness simpler, the creamy and thin areas can be repeated. In other words, if we take the desired cross-section of the product, the number of fibres in it will be different. If a deeper analysis of the unevenness of the product is made, it can be seen that it is a complex event. Theoretically, when taken, the unevenness of the product is due to the fact that the fibres have the main properties: they are not uniform in length, ripeness, moisture, creamy, friable, curly, and these basic properties deviate from the average arithmetic value. If the resulting thread is uneven, then the gauze from it also turns out uneven. Therefore, it is best to try to take a straight thread first. At the same time, unevenness is formed in the processes of weaving and finishing.

Therefore, it is necessary to try to reduce the unevenness of the product from the first stage to the last stage of processes in the textile enterprise [6,7]. The samples obtained in the experiment were analyzed in the laboratory and a histogram was constructed using computer software to determine the results obtained on the non-precision index. As can be seen in the histogram, it was found that the unevenness of the Carda melange thread (Figure 4, 1) is higher than that of compact melange and re-combed melange threads. The top of the unevenness indicator indicates that the quality of the thread is poor. Here it became known that the uneven index of compact melange yarn (Figure 4, 2) is less than the remaining yarn [8-17]. The uneven indicator of the melange thread (Figure 4, 3), obtained by the method of re-combing, is close to the indicator of the compact melange thread.




**Picture-4 The frequency of rotation of the bitch is 15000 m-1, ripeness is 800 b/m, the density of the Strip is 20 (Ne 30) uneven of textured threads, CV, (%).**

1-Carda melange thread; 2 - Carda compact melange thread; 3-Re-combed melange thread.

The properties of the compact, re-combed, and snow melange yarns analyzed in this analysis are important in improving product quality. The product is subjected to repeated bending, bending, stretching, friction during operation. In such processes, the re-spun yarn retains its shape relative to ordinary yarn. Due to the parallel and gypsum arrangement of the fibres in the re-spinning yarn, all the fibres in it are equally involved in the twist, which leads to an improvement in the structure of the yarn. As a result, the elongation resistance of the yarn increases, and in ordinary yarns many fibers are not fully involved in the twist. Therefore, the tensile strength of ordinary yarn is low, and the fluff is higher than that of re-shearing and compact yarns.

## CONCLUSION

In conclusion, it was found that the strength of melange yarn obtained in a mechanical compact device is 16% higher than that of factory yarn, compared with the tensile strength of melange yarns obtained by the simple snow method.

The results of the study showed that the strength of traditional melange yarns obtained by the method of re-combing with melange yarn using a mechanical compact device using the simple snow method is equal.

In the experiment, when the roughness values were compared, it was found that the roughness of the yarn obtained in a mechanical compact spinning machine was less than that of ordinary and re-spun yarns. Experiments have shown that melange yarns obtained in a mechanical compact device have a high potential for the production of competitive products in terms of physical and mechanical performance, good shape, consumer satisfaction and competitiveness.

**REFERENCES**

**1.** Akaydin, M. (2009). Characteristics of fabrics knitted with basic knitting structures from the combed ring and compact yarns.. p. 26-30

**2.** Korabayev, S. A., Mardonovich, M. B., Lolashbayevich, M. S., & Xaydarovich, M. U. (2019). Determination of the Law of Motion of the Yarn in the Spin Intensifier. *Engineering*, *11*(5), 300-306.

**3.** SH.Komilov, A.Sarimsakov, R. Muradov (2020). Jin mashinasida kalta tolalar chiqishini kamaytirish va chigitning shikastlanishini oldini olish yo'llari. //Тенденции развития легкой промышленности в Республике Узбекистан: проблемы, анализ и пути решения. – 2020. – №. 1. – С. 88-93. https:// doi: 10.47100/conference_textile/S4_12

**4.** Ataxanov Avazbek Komiljanovich, Korabayev Sherzod Ahmadjonovich. (2020). Influence of the improved design of the twist intensifier on the mechanical properties of the yarn. *International Journal of Future Generation Communication and Networking*. Vol. 13 No. 4.

**5.** Bobojonov, H.T.; Yusupov, A.A.; Yuldashev, J.Q.; Sadikov, M.R.; (2020) Influence of deformation properties of yarn on the quality of the knitted fabric. Test Engineering and Management. 83(8). pp. 29502-29513.

**6.** 6. Erkinov, Z., Zhumaniyazov, K., Parpiev, Kh., Fayzullaev, Sh., & Zhamalov, B. (2016). Influence of the number of folds of single threads, produced by different spinning systems, on the quality of the twisted thread. In Modeling in Engineering and Economics (pp. 201-203).

**7.** Jamshid, Y., Akbarjon, U., & Olimjon, S. (2020). Dynamics of Interaction of a Single Fiber with a Headset of a Sampling Drum. *Engineering*, *12*(6), 347-355.

**8.** Yuldashev, J. Q., & Bobojanov, H. T. (2020). Study Of The Influence Of The Parameters Of The Sampling Zone On The Condition Of The Capture Of Fibers By The Drum Teeth. *The American Journal of Engineering and Technology*, *2*(08), 75-78.

**9.** Sarimsakov, A. U., Kurbonov, D. M., & Khalikov, S. S. (2019). Study of the crucible of rotation of raw materials in a practical way. *Economy and Society*, (12), 67.

**10.** Turdialiyevich, T. S., & Khabibulla, P. (2020). The Influence Of Top Flat Speed Of Carding Mashine On The Sliver And Yarn Quality. *European Journal of Molecular & Clinical Medicine*, *7*(7), 789-797.

**11.** Jamshid, Y., Akbarjon, U., & Olimjon, S. (2020). Dynamics of Interaction of a Single Fiber with a Headset of a Sampling Drum. *Engineering*, *12*(6), 347-355.

**12.** Bobojanov, H. T., Gofurov, Q. G., Jumaniyazov, Q. J., & Raxmatulinov, F. F. (2019). New ways to measure yarn deformation. *Textile Journal of Uzbekistan*, *2*(1), 63-68.

**13.** Bobojanov, H. T., Jumaniyazov, J. Q., Gofurov, Q. G., & Gofurov, J. Q. (2019). The relationship between the properties of yarn and knitted. *Textile Journal of Uzbekistan*, *1*(1), 7.

**14.** Kosimov, A. A., Bakhriddinova, S. F. K., & Abdulazizov, S. A. O. (2020). Classification Of Terry Products Made Of Natural Fiber. *The American Journal of Engineering and Technology*, *2*(11), 133-141.

**15.** Erkinov, Z., Abduvaliyev, D., Izatillya, M., & Qorabayev, S. (2020). Theoretical studies on the definition of the law of motion and the equilibrium provision of the ball regulating the uniform distribution of the torque along the yarn. *Academicia: An International Multidisciplinary Research Journal*, *10*(11), 2338-2347.

**16.** Sarimsakov, A. U., & Ergashev, J. F. (2020). Modeling the motion of a mixture with weighty particles in a stationary flow of liquid. *SAARJ Journal on Banking & Insurance Research*, *9*(6), 20-24.

**17.** Ergashev, J., Kayumov, J., Ismatullaev, N., & Parpiev, U. (2020). Theoretical Basis for Calculating the Determination of the Optimal Angle of Rotation of the Slit and Air Velocity. International Journal of Advanced Science and Technology Vol. 29, No. 03, pp. 12776 – 12784.