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Change Of Physical And Mechanical Properties Of Twisted Yarn During Rewinding

Bobojanov Husankhon Tohirovich
Doctor Of Technical Sciences, Associate Professor, Namangan Institute Of Engineering And Technology, Namangan, Uzbekistan

Yusupov Alijon Abdujabbor O'g'Li
Assistant, Namangan Institute Of Engineering And Technology, Namangan, Uzbekistan

ABSTRACT

The article discusses the influence of the finishing process on the physical and mechanical properties of twisted yarn. The results of applied studies were analysed, and the resulting samples were analysed by constructing correlation coefficients of variation by strength and tensile strength. Based on the analysis, optimal options are proposed.

KEYWORDS

Relative tensile strength, spinning industry, technological process, textile, yarn.

INTRODUCTION

The decision of the President of the Republic of Uzbekistan Shavkat Mirziyoyev of December 21, 2016 "On the Program of Measures for the Further Development of the Textile and Clothing Industry for 2017-2020" opened the door to new opportunities in this area.

The program in 2017-2020 will attract more than 2.2 billion dollars (almost half of which are

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foreign investments). Within the framework of investment projects, special textile complexes specializing in the processing of raw cotton into finished products according to a four-stage system will be created, as well as more than 27 thousand new jobs will be created. It is also planned to create 120 new enterprises and modernize more than a dozen production enterprises. By 2020, the volume of delivery of finished products to foreign markets will increase 2.1 times. In this situation, there is a growing need for regular testing for trade with foreign countries, the development of international economic relations, science and technology, as well as for improving the quality of products (the result of certain activities or processes), improving its competitiveness [1].

One of the most important tasks in the implementation of the tasks set by the program of measures for the further development of the textile and clothing industry is to increase the production capacity of finished products by spinning yarn. Processing yarn, its direct impact on quality, requires scientific research. The quality and durability of painted and baked yarn are inextricably linked to the mechanical, physical and chemical properties of the fibres they consist of, and their listed parameters must be proportional to each other. In turn, a technical tool is needed to measure, evaluate or test the characteristics of the product and yarn. The more reliable and perfect this tool, the clearer the results of the experiment. Carrying out measurements or tests in means without the participation of the subject, that is, the desire to reduce the external impact is an important aspect of development.[3] The defining properties of yarns and yarns in the standards include linearity, toughness, resistance, elongation, flatness. The linear density of the yarn is determined by the value of tex in the fibres. The thickness of the yarn is determined by the weight of 1000 m of yarn in grams in the textile system. The higher the numeric value of the textile, the thicker the thread During the study, the process of dyeing yarn was evaluated based on mechanical tests of the effects of substances on it.

MATERIALS AND METHODS

To study the effect of the dyeing process on the yarn quality parameters, two half-kilogram yarns were selected for the sample, wrapped in textured twisted 25x2 yarn, which was divided into four equal samples. The prepared version 1 is painted black, version 2 is painted pink, version 3 is bleached, and version 4 is taken as untreated yarn. The physical and mechanical properties of each sample were then studied. The properties of all yarns in the experimental variant were checked for compliance with standard requirements and the results were summarized in Table 1.

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Table 1. Changes the mechanical properties of the yarn as a result of finishing.

T №	Yarn Properties	Raw yarn	bleached yarn	Black thread	Pink thread
11	The linear density of yarn, (tex)	25x2	25x2	25x2	25x2
22	An unevenness of thread on the mouth, Um (%)	8,57	9,27	8,6	9,25
3	Breaking force, mN	683,5	718,5	635	715
44	Coefficient of variation, (St)	10,82	11,7	10,87	11,65
55	Relative tensile strength, cH/tex	13,67	14,37	12,7	14,3
66	Relative tensile strength variation factor, CV%	5,52	6,58	4,55	7,04
77	Elongation at break,%	5,5	5,1	4,6	4,62
88	Coefficient of variation of elongation at break, CV%	6,09	6,03	4,81	6,59

The spinning industry is a collection of continuous technological processes, uncontrolled external and internal changes of which have a large number of interconnected and conditional factors that directly affect the quality of the processed products.[4] Due to the separate or combined action of these factors, the stability of the technological process is disturbed, which leads to a sharp change in the quality of the raw materials and finished products, that is, the appearance of irregularities. Irregularities can simply be called repetition of thick and thin sections along the length of the product. If the linear density, the number of fibres, the stiffness and the number of twists are analyzed in different areas along the entire length of the yarn, it can be seen that these parameters do not coincide in length. Therefore, these values change from one shift to another, depending on the structure of the yarn and resulting in unevenness.

Therefore, the concept of inequality theoretically represents how much the properties of the product (linear density, ultimate strength, number of turns) differ from the average value. The spinning industry is a collection of continuous technological processes, uncontrolled external and internal changes of which have a large number of interconnected and conditional factors that directly affect the quality of the processed products. As a result of separate or combined action of these factors, process stability is disturbed, which leads to sharp changes in the quality of raw materials and finished products, i.e., the appearance of irregularities. Baking is the twisting of individual threads that form a single plane of yarn to increase its strength and enhance the twist of the untreated yarn.

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Before baking, the yarn is soaked so that the surface is smoother. In the case of spinning yarn by combining three separate yarns, the yarn is twisted backwards to the twisting of the untreated yarn. When the coiled yarn consists of 6 single yarns, it is first twisted by adding two yarns of yarn, then by adding three pairs of twisted yarns and twisting the untreated yarn upside down.[5] Then the coil with the thread will not weaken. Well-reinforced reel threads form loops during sewing (the machine spins the thread) and often tear. The spinning process includes boiling, bleaching, dyeing, straightening and polishing. When determining the unevenness of 25x2 woven yarn, we compared four types (processed yarn, black yarn, pink yarn, untreated yarn) with each other. The roughness of the untreated yarn is 8.57%, bleached yarn 9.27%, black yarn 8.6%, pink yarn 9.25%.

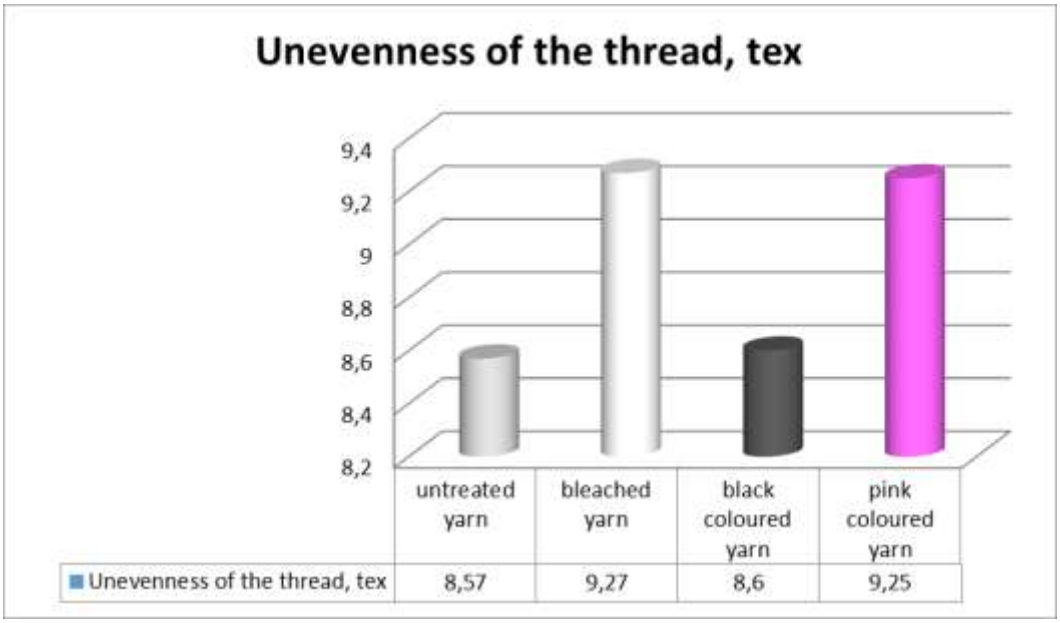

Figure 1. Graph of the unevenness of the thread.

The 25x2 tex twisted yarns obtained in the experiment after treatment by four different methods were also tested by the Uster standard for their elongation at break. Experience has shown that the tensile strength of the untreated yarn is 5.5%, bleached yarn-5.1%, black painted yarn-4.6%, pink painted yarn-4.62%. Elongation upon rupture became known with respect to the remaining quality indicators of the untreated yarn. On black and pink strands, a relatively small section extension was found. It turned out that the breaking elongation compared to black and pink strands are about 10%. It has been experimentally found that the elongation of the untreated yarn at break is higher than 16% compared to black and pink. So, in experiments, it became known that as a result of staining of threads with chemicals, their relative elongation is reduced.

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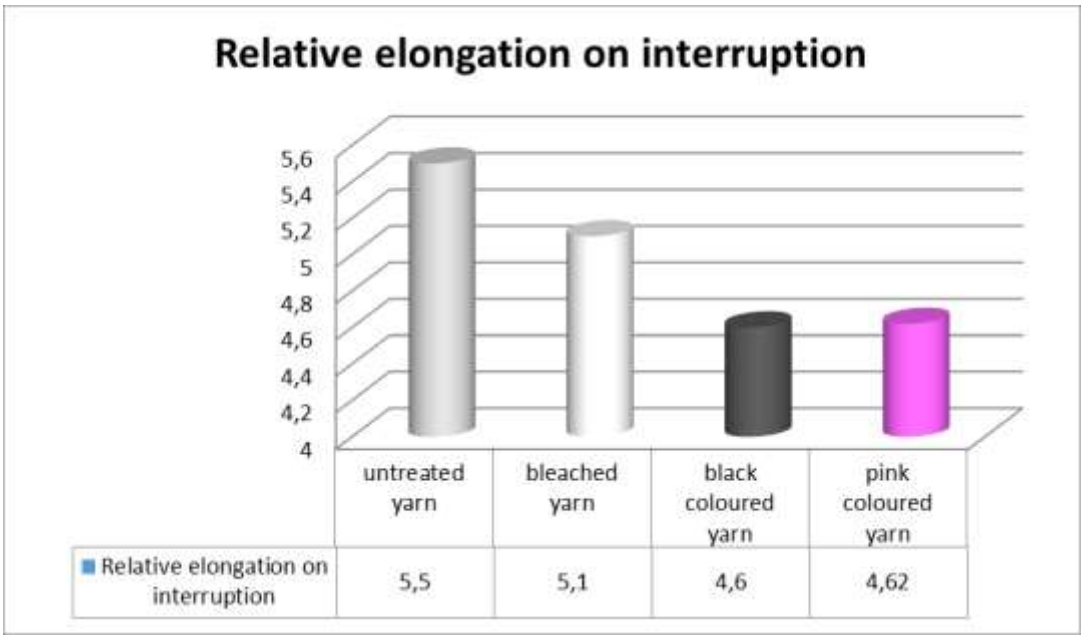

Figure 2. Relative elongation on interruption.

After the yarn samples, 4 were treated by various methods in the experiment, their properties were compared with each other. The properties of yarn treated by different colouring methods with the same linear density (untreated yarn, bleached yarn, black coloured yarn, pink coloured) differed from each other. According to the Uster standard, bleached yarn showed better results in relative viscosity, despite the high roughness. Experiments have shown that black yarn has a lower quality than pink.

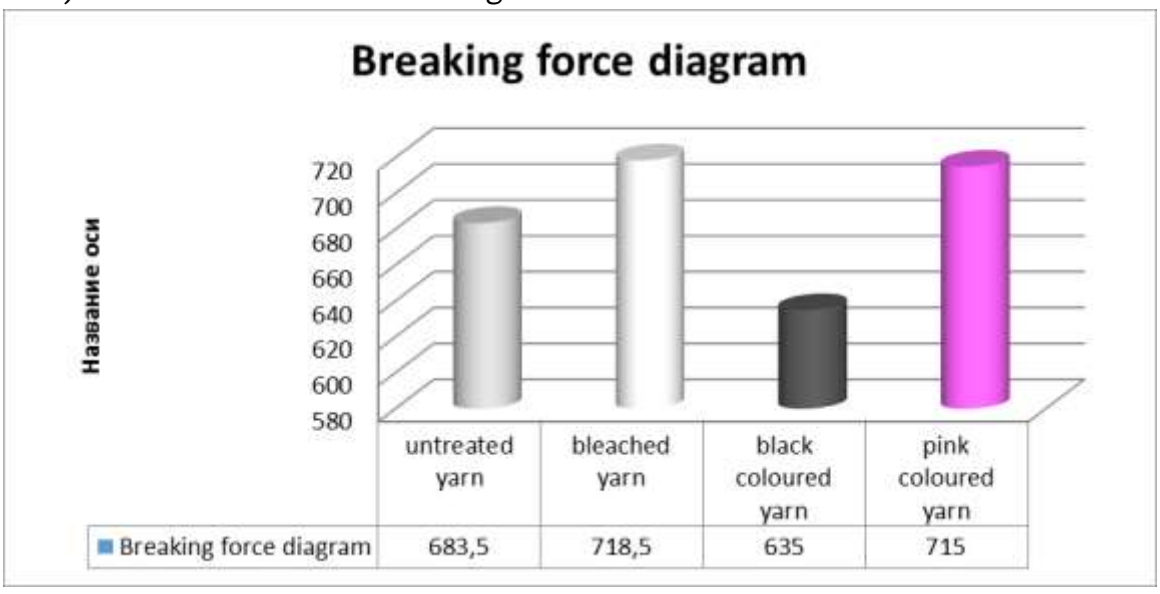

Figure 3. Breaking force diagram.

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RESULTS

It is desirable to take into account the time of exposure of different properties to chemicals in the dye yarns. Due to the fact that the black yarn was in the colouring liquid for a long time, it was found that quality indicators decreased compared to the rest of the samples.

In addition, it is desirable to colour the fibres with different dyes and the articles thereof with different dyes. The temperature and dye time of the fibres and yarn should be optimal. Theoretical and practical conclusions based on the study. Analysis of trends in the development of yarn production techniques and technologies, enrichment of domestic and external markets with competitive products by expanding the range of textile products of Uzbekistan using local raw materials.

CONCLUSION

According to the results of experiments, the tensile strength, which is one of the main indicators of the quality of yarn, is set at 683.5 cN for untreated (raw) yarn. tensile strength was found to have decreased by 635 cH or 7% using black and increased by 715 cH or 4.5% using pink.

These results show that in the process of dyeing yarn, dyes of different colours affect its durability differently.

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