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DIFFERENCE IN THE LENGTH OF INDIVIDUAL YARN COMPOSITION OF TWISTED MIXED YARN AND COMPARATIVE ANALYSIS OF SINGLE-THREAD ELONGATION DEFORMATIONS

ATAMBAEV DILMUHAMMAD

Assistant of Namangan Institute of Engineering and Technology, Namangan, Uzbekistan
Phone.: (0833) 519-8989, E-mail.: dilmuhammad8988@gmail.com

Abstract: In this article, the mechanical properties of composite yarn , which is made from a mixture of synthetic and cotton yarn, are investigated. The all test results showed mechanical properties of composite yarn which is including lycra and polyester yarn better than simple yarn. Therefore, we offer this kind of composite yarn desirable to use for the production of highly elastic knitted fabric. Additionally, textile and knitted fabrics made from composite yarn were highly elastic and soft with good mechanical properties than other yarn. The effect of the difference in the length of individual threads on the quality of the thread was determined during the process of adding threads. These values were graphed and analyzed for the effect of the machine on yarn stiffness.

Keywords: Textile, warp, spinning, yarn, yarn boiling, twisting, yarn tension, yarn winding speed, length.

Introduction. Most of the spinning enterprises in the republic, equipped with advanced equipment and technology, are preparing yarns for knitted products, which are in great demand. In recent years, the demand for mixed fiber yarns used for knitted fabrics is increasing. Since the production of mixed fiber yarns is somewhat complicated both economically and organizationally, there are only a few such yarn enterprises in our republic. Products made of mixed fiber yarns are characterized by good color retention. Therefore, the leading knitting companies prefer to use mixed fiber yarns, even if the cost is high, in order to maintain the quality of their manufactured products. The leading enterprises of Chel El are sharply increasing orders for mixed fiber yarns. At the same time, the demand for products with high quality indicators, which are convenient for consumers, hygienic and aesthetically, is increasing significantly. Nowadays, the need for sports and therapeutic clothing is increasing. High stretch mixed fiber knit fabrics are used in the production of these garments. It is advisable to use a mixture of natural and synthetic fibers in their preparation. Natural fibers are considered beneficial for human health, while stretchable synthetic fibers provide comfort for sports and therapeutic clothing.

Elastic materials have been recognized to have good results in compressing human muscles, reducing muscle fatigue and improving muscle temperature. These clothes are used to prevent injuries to the skeletal muscle system of athletes during training [1].

Polyester and lycra fibers were used to produce such highly elastic yarns. Polyester threads are made from a solution of polyethylene terephthalate. Polyester threads are resistant to the effects of solvents, microorganisms, moths, mold, and termites. Clothes made of polyester threads can last a long time in the process of wearing, do not wrinkle,

are easy to wash and iron, and dry very quickly. All this is due to the low hygroscopic properties of polyester. Polyester threads are resistant to the effects of air and sunlight[2].

The purpose of mixing lycra yarn is that its fibers are thin, very stiff and stretchy, and very elastic. LYCRA® yarn is produced in various thicknesses. Used for all types of products, from very thin fabrics to thick heavy fabrics. LYCRA® fiber can stretch seven times its length and return to its original position like a spring [3].

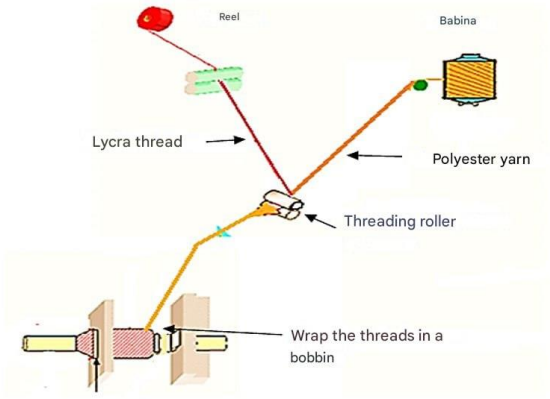

Figure 1. The working principle of the "FADIS" yarn splicing machine.

The percentage of fiber content of yarn samples is given in Table 1.

Table 1.

No	Name of threads	Polyester fiber (%)	Lycra fiber (%)
1	Option 1 thread	95	5
2	Option 2 thread	92	8

Table 2. Physico-mechanical property indicators of thread samples.

No	Indicator name	Unit of measure	Average values		Dispersion	Coefficient of variation
			Option 1 is string values			
1	Linear density	Tex	17 X 3 4.5X 2	55.6	-	-
2	Breaking strength	sN	1825.40		62.45	3.42
3	Relative strength	sN / tex	32.83		1.12	3.42
4	Elongation	%	23,27		1.99	8.56
			Option 2 is string values			
1	Linear density	Tex	17X2 4.5X3	42.2	-	-
2	Breaking strength	sN	896.97		79.47	8.86
3	Relative strength	sN / tex	21,26		1.88	8.86
4	Elongation	%	14.51		1.30	8.94

Elongation indicators of these yarns were experimentally measured in the "STATIMAT -S " instrument, which determines the elongation and breaking strength of the yarns in the " CentexUz " laboratory , under standard laboratory room temperature conditions. The results of the study obtained by this method revealed the following mechanical indicators. The linear density, dispersion, coefficients of variation and strain values of the thread were recorded. The obtained results are summarized in Table 2.

Corresponding graphs were constructed based on the values obtained from the experimental results (Fig. 2, 3).

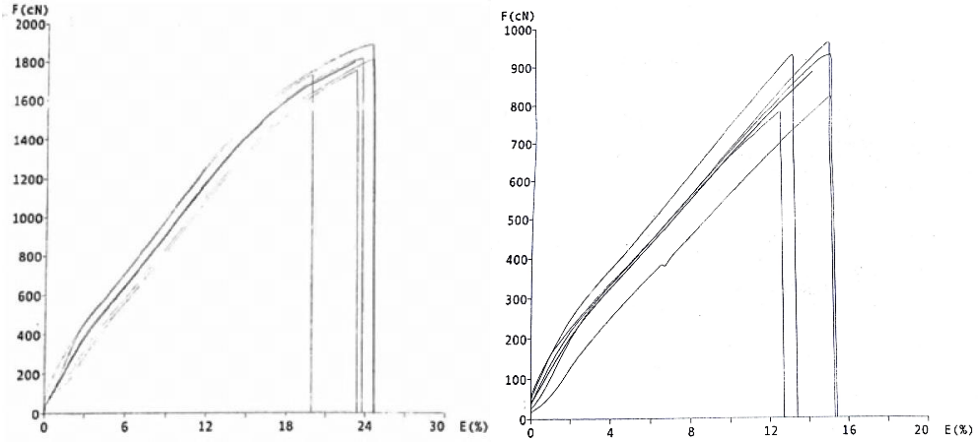

Figure 2. Option 1 indicator graph, **Figure 3.** Option 2 indicator graph

Tensile strength of the 1st option yarn samples was 1914.06 cN. The tensile strength of the 2nd option yarns was recorded as 914.93 cN, and corresponding elongation graphs were constructed. (Figure 4).

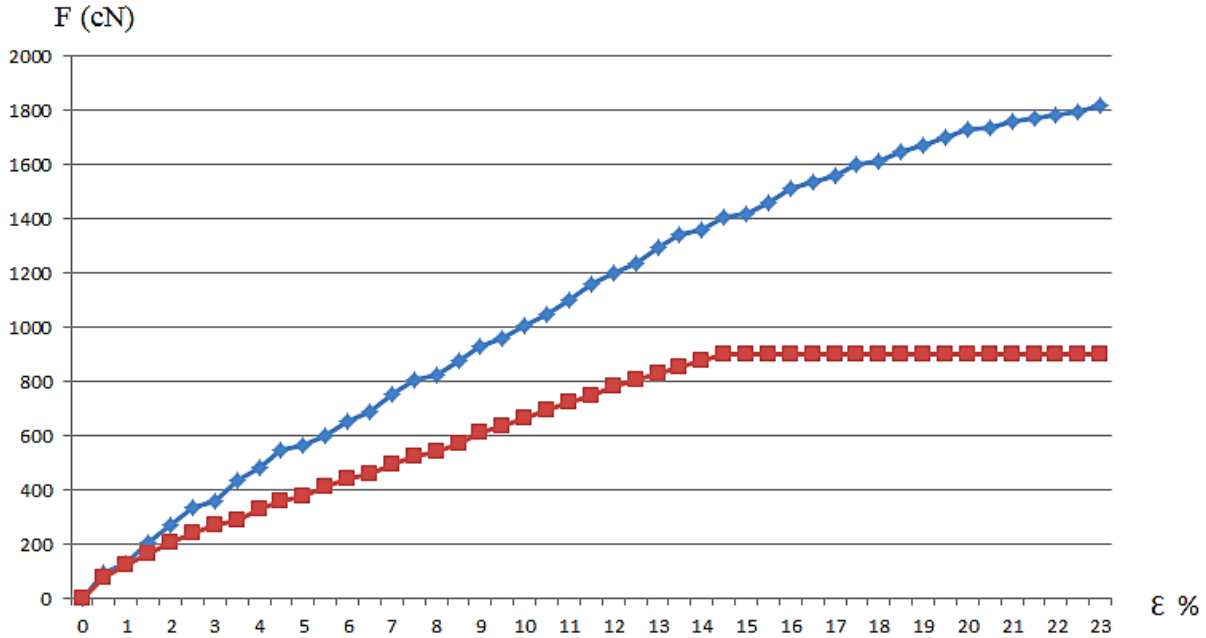

Figure 4. Elongation graph of yarn samples

The analysis of the results of testing the samples of yarns shows that the mechanical properties of the mixed fiber yarns with the addition of polyester and lycra yarns gave better than the norm. Therefore, it is desirable to use these yarns to obtain high-stretch knitted fabrics. Compared to other yarns, materials and knitted fabrics obtained from these yarns are characterized by high elasticity, softness and high mechanical properties.

If we take into account that the attention to the quality of 3-ply yarn in the production of new assortment products is increasing day by day, it is one of the most important issues to pay more attention to the process of adding and rewinding in the textile industry. The analysis of modern requirements for textile and light industrial products in the world market shows that the task of dramatically increasing the types and properties of single, spun and 3-ply yarns used as raw materials in order to increase the range of these products is manifested. It is known that any twisted yarn is produced by combining several single or monofilaments and giving them the necessary twist to ensure the expected properties of the yarn.

If we take into account that the attention to the quality of spun yarn in the production of new product ranges is increasing day by day, we can see that more attention is being paid to the re-winding process by adding single yarns, which is considered a crucial step in ensuring the main quality indicators of spun yarn. It is clear from practical experience that the process of adding and wrapping is very important, especially in the production of fine products [4.5].

study the technique and technology of wrapping and baking fiber materials . and improvement according to b Scientific noun works on Do you want to work ? and from cooked yarn cloth work what 's up and types to multiply k ' take will come [6] . H now in the day t arrow farming in enterprises basically cooked yarn double twist baking in cars work let 's go . In our country , in rotary cookers cooked various aimed at increasing the range of yarn and ensuring its competitiveness carry out research is going

Research works Namangan region "Popfen" Textile in LLC enterprise was carried out on spun yarns produced on an integrated SSM TW2-D splicing machine and Saurer Compact Twisting spinning machines. During the experiments, yarns with a linear density of T_{ip} =36×3 tex and T_{ip} =29.5×3 tex were taken, and the length differences of individual threads were determined. For this purpose, using the known methodology [7], in order to determine the difference in lengths of single threads under a certain initial tension placed on the thread, the initial 500 mm length of cooked thread twists between the clamps of the KU-500 twist-detecting device was completely returned, and the single threads were brought to a parallel state. The clamps holding the ends of the fully parallel single strands, i.e. the left side clamping clamps, are loosened and the length of each single strand is measured as the pointer on the instrument scale deviates from the "zero" position. After that, with a visual estimate of the length of the single threads, the thread in the tightest position was cut, and then the length of the single thread remaining in the equipment was determined.

The difference in the length of individual yarns in the cooked yarn of the sample was calculated in percentages compared to the cross-sections clamped in 500 mm long

clamps. Most experts believe that the difference in length of individual threads in cooked threads should not exceed 2.5% [7].

By comparing the results of the histogram shown in Figure 1, it can be concluded that in the process of winding single threads, the tension of the threads is uncontrolled and the tension of the threads is different when the tensioning device is unloaded. Therefore, the uncontrollable individual yarns during the splicing process lead to a large variation in the length of the individual yarns in the cooked yarns.

Also, in the process of additional winding, when the load of 8 and 16 g is placed on the tensioning device for T $_{thread}$ =36×3, the difference in the length of single threads in cooked threads is lower. This situation is considered good. On the other hand, when a load of 24 g is applied to the tensioning device during the additional winding, the length variation of the individual yarns in the cooked yarn remains high in all results.

In the process of additional winding, the difference in the length of the single threads in the cooked threads is lower when the load of 8.16 and 24 g is placed on the tensioning device. This situation is considered good.

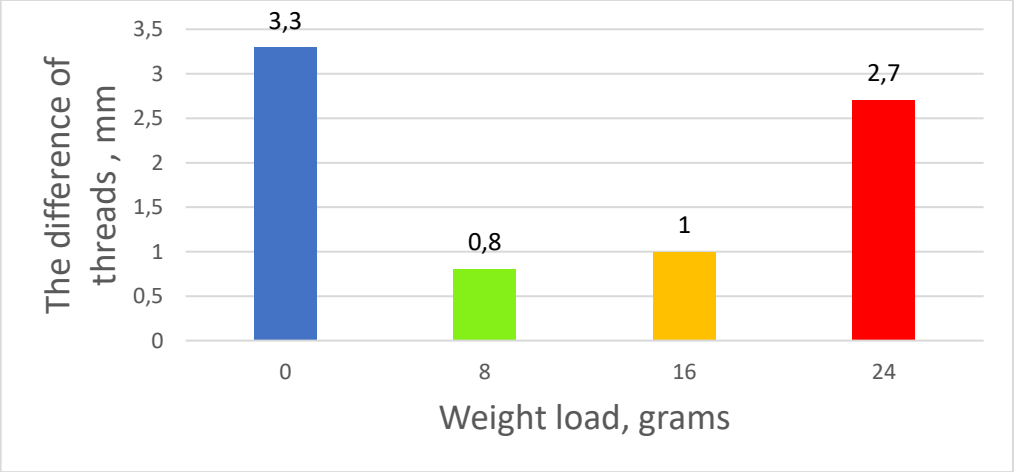

Figure 5. T yarn = 36×3 tex on the baked yarn (number of twists K=490 br/m) difference in the length of single threads as a result of weight load change

Therefore, excessive loading of the tensioning device depending on the linear density of the thread during the splicing process will inevitably lead to negative effects, because the excessive load on the tensioning device during the splicing process will lead to an increase in the length difference of the single strands being spliced due to the stretching of the fibers in the splicing threads (lojnaya vytyajka). This, in turn, causes the threads to become stiff during the cooking process.

In the case of different tension, the thread with the looser tension wraps around the thread with the higher tension, which leads to one of the defects of the cooked thread - threading.

The purpose of optimizing the technological parameters of the splicing process is to reduce the unevenness of the spun threads, to increase the abrasion resistance, and to

improve the toughness and flexibility. Hence, it is a necessary process to produce thread at uniform tension. As a result of the analysis of the features of yarn preparation techniques and technologies, taking into account that yarns of different assortments are produced on machines of different designs, it was found that the main drawback of yarn preparation techniques and technologies is that there are not enough recommendations and developments to adjust the devices of individual yarns being prepared for baking with the same tension. From the results of this study, we can conclude that in order to achieve the required quality result, it is important to pay attention to the tension of the threads in the process of adding, and in order to keep the tension of the thread uniform in the tensioning devices, T_{ip}=34×3 for threads with a linear density between 8 gr and 16 gr and For threads with a linear density of T_{yarn} = 29.5×3, it is appropriate to provide a tension of 8 to 24 grams.

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