INFLUENCE OF VACUUM EVAPORATION PROCESS ON THE INDEX QUALITY OF YARNS

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ABSTRACT: *In this article, samples were taken at a joint venture of the German firm Tryuchler, located in Tashkent, and some of them were vacuum evaporated and vacuum evaporated. The quality characteristics of the 24-tex yarn made from a mixture of 100% cotton and 30% polyester fiber with 70% cotton fiber were compared with the results of vacuum-stranded yarn testing.*

KEYWORDS *quadratic inequality, linear density and number of twists, coefficient.*

I. INTRODUCTION

The unevenness of the products is important in the process of spinning. This indicator is a negative characteristic of manufactured products, which often adversely affects to the technical and economic performance of the enterprise, and also to the physical and mechanical properties of the yarn. It is important to test and control the inadequacy of spinning products, helps to identify the causes and timing of the discrepancies [1]. The longer the yarn is wrapped up in yarn and the longer it takes to form, the higher is unevenness of the yarn. As a result of the ropes breakage, the employment of the workers will increase as well as the decrease in the productivity of the machines [2].Besides this, the degree of unevenness in combing machines is not the same as during the processing because of the degree of purification nad separation of the fiber. In addition, an uneven comb is formed. When a drawing device of a different machine extends into a product that is uneven in structure or linear density, the area of the tensile strength and friction force changes [3].At the same time, the unevenness of products adversely affects to the technical and economic performance of the work, as well as the physical and mechanical properties of spinning and weaving products. Many factors, such as inadequate raw materials, are often the result of technological processes and machine design, disruptions in the working regime, and workers' distance from device and repairing of machines.

The length of spinning products inequality includes in linear density, cross-sectional weight of different lengths, or volume weight of the product by the number of fibers in the transverse section, physical and mechanical properties and so on. As we know, the analysis of the unevennes of spinning products is very difficult. There are many types odf inequalities for spinning products: the formation of the first spinning phase and the subsewuent spacing and the addition of new types of inequalities [4].

II. METHODOLOGY

Soaking is carried out in cells with a temperature of 20-30 ° C and relative humidity of 95-100%. This technique has been called the cold fixation method. Any tube can be used with this method: wood, paper, glue and other tubes.

The disadvantages of the method are as follows: long periods of time and varying degrees of humidity death due to uneven air relative humidity in different parts of the chamber.

Evaporation takes place at a temperature of 65-80°C and relative humidity of 90-95%. Depending on the type of yarn, the amount of wear and the rolling mass, the time of steaming and strengthening is up to 2 hours. The working effeciency of the cell is around 300-450 kg for 8 hours depending on the evaporation time, quantity and mass of the package. It is possible to use a supplementary device, which increases the productivity by about two times. The air-suction cell or boiler is absorbed from the air, the vacuum is formed and then the boiler is filled with steam, which allows the vapor to penetrate inside the pack, allowing it to evaporate evenly.Vaporization is the most comfortable and perfect way to strengthen the threshold in the simplest vacuum-evaporator apparatus. In this method, the thickness of the yarn is fixed even in the desired layer, no matter how thick the package is [5].

Vapor temperature is higher than condensation temperature. Therefore, when you touch the rolls, vapor condensation and coating on the surface of the roll are formed. The absence of a waterproof curtain and the absence of air between the strands allow the vapor to penetrate through the inner layers of the packing faster and at the same time to evaporate the yarn.

Vacuum evaporation devices differ according to their design and principles of action. In modern vacuum-evaporator devices equipped with operating modes of operation, the yarn can be stepped up to a pressure of 6-105 Pa.

Research has been carried out to find out the discrepancy of the strip density and the number of twists. The results of the study are presented in Figures 1 and 2.

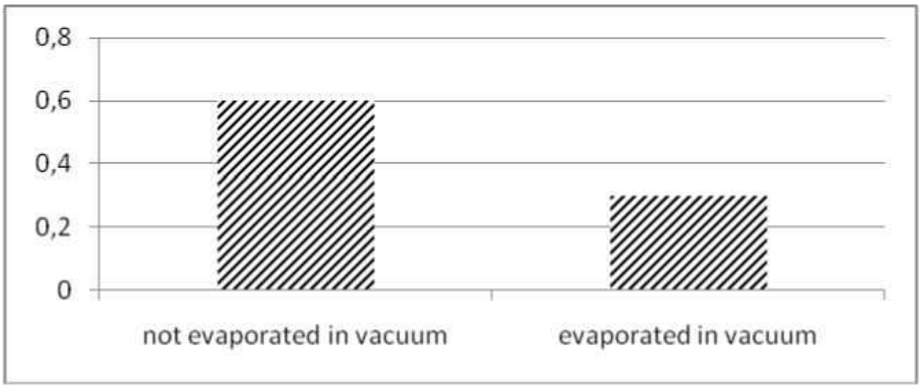

Fig.1. Influence of vacuuming process on the index of inequality of strands.

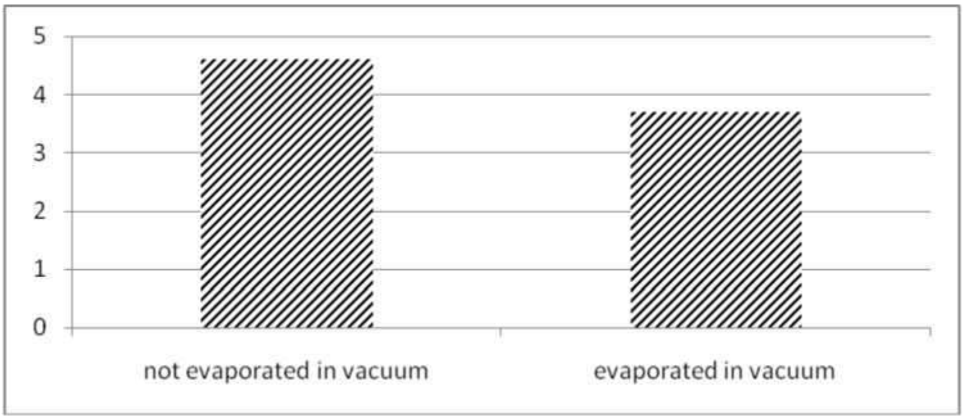

Fig.2. Effect of vacuuming on strips of the number of twists and turns.

In the analysis of the results of the study, compared to the results of vacuum-free threads, the linear density of the evaporation threads in the vacuum decreased by 50.0% and the number of folds in the folding number 19.

The results of the study show that if the thread is held in a vacuum process, the incidence of linear density and the number of twists will decrease.

In the process of vacuuming the yarn, there is a moderate distribution of moisture content in the yarn and an increase in the amount of moisture. However, in this evaporation process there is an extension of time.

The thickness, strength and length of the fibers play an important role in spinning. For example, the thickness of the fibers is important in the process of spinning. The nature of the threads to be removed depends on the thickness of the fiber.

Thin fibers are made of thin, flat and durable threads. Thin yarn is made of fine, light fabrics, knitwear [6].

The thinner the fibers, the more cross-section of the yarn of the same thickness. In this way, the structure of the yarn increases the contact surface of the fibers and increases the friction force, resulting in a higher strength of the yarn. The relative strength of the yarn is small, which is noticeable for thin threads.

There is a certain amount of fiber in the transverse section of the yarn in order to obtain standard quality yarn,

The linear density of the fiber is crucial for obtaining the minimum linear density strands. This means that the number of fibers in the cross-section of minimum thickness threads varies. There are also the disadvantages of very thin fibers. Such fibers are more compacted during spinning; knots are formed, resulting in a worse yarn appearance and quality.

The most important quality indicators are the unevenness of yarn. As a result of inadequacy, the products may become strands and distort their appearance.

The greater the yarn unevenness, the less the use of the strength of the fibers in the yarn and the single threads in the yarns, resulting in the deterioration of the mechanical properties of the yarn and the disruption of the weaving process.

During spinning mechanical properties of cotton fiber are important in the production of yarn, which is the resistance to breakage, compression, bending and fibers.

In addition, the length, durability and linear density of the fiber are crucial for the production of high quality yarn at the spinning mill. The higher the quality of the fibers, the better the production of demanding yarn. For this purpose, it is necessary to choose the right raw materials, as well as to store the cotton seeds at the ginneries, to dry them, to clean, to separate the fiber, to create optimal conditions for the cleaning of the fiber.

At the spinning factory, the tests were conducted to study the physical and mechanical properties of nonevaporated and evaporated vacuum filaments. The test results are presented in tables 1 and 2.

Table 1

Change of physical and mechanical properties of yarns (100% cotton fiber, T = 24,0 tex

n	Thread quality indicators	Not evaporated in vacuum	Evaporated in vacuum
1.	Strengthofthreads, N	292,08	315,78
2.	The relative tensile strength of the threads, N/tex	12,17	13,16
3.	Quadratic inequality of thread strength,%	10,73	6,73
4.	The elongation of the strands in the break	4,54	4,61
5.	Quadratic inequality in elongation of strands,%	15,36	8,45
6.	The work done on the broken strands, N-sm	371,55	426,83
7.	Quadratic unevenness of the strands in the interrupted work, %	23,85	15,51

Table 2

Changes in physical and mechanical properties of yarns (50% lavender fiber 50% cotton, T = 24.0 tex)

n	Thread quality indicators	Not evaporated in vacuum	Evaporated in vacuum
1.	Strengthofstrands, N	429,18	447,46
2.	Strength of joining of strands, N / tex	17,88	18,64
3.	Quadratic inequality of strand strength,%	5,07	2,17
4.	Fallingofthreads,%	8,73	8,57
5.	Quadratic inequality, as well as% of strands,%	5,87	3,75
6.	The work done on the strands, N • cm	1080,85	1111,18
7.	Squaredunevennessofstrands,%	9,55	4,87

III.RESULTS AND DISCUSSION

Analyzing the results of the study, we compared the index of 100% non-evaporative threads in vacuum, decreased by 3%, elongation at interruptions increased by 1.5%, quadratic inequality on the extension extension decreased by 44.9%, interrupted work increased by 12.9%, quadratic inequality has decreased by 34.9%, compared to the results of 50% lavender fibers with vacuum 50% cotton, compared to 50% cotton vacuum mix and 50% lavender yarn, the relative disruption strength increased by 4.1%, the quadratic inequality of the disruption decreased by 57.2%, the elongation at the disruption decreased by 1.8%, and the quadratic inequality on the discontinuity decreased by 36.1%, increased, work on interruptions quadratic inequality decreased by 49.0%.

Analysis of the test results shows that the quality of the threads is good as a result of evaporation of the yarn in vacuum.

IV.CONCLUSION

In vacuum is found that the linear density of the evaporated threads is reduced by 50.0% and the number of twists is 19.2%.

As a result of vaporization of yarn in vacuum over a period of time, the tensile strength of a mixture of 100% cotton fiber and 50% cotton 50% lavender fibers increased from 4.1% to 7.5%, and the relative tension strength increased from 4.1% to 7.5%, it was found that the quadratic inequality on the shear strength decreased from 36.1% to 37.3%.

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