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« ANALYSIS OF DEFECTS THAT OCCUR DURING THE TWISTING OF YARNS OF COMPLEX STRUCTURE »

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ANNOTATION

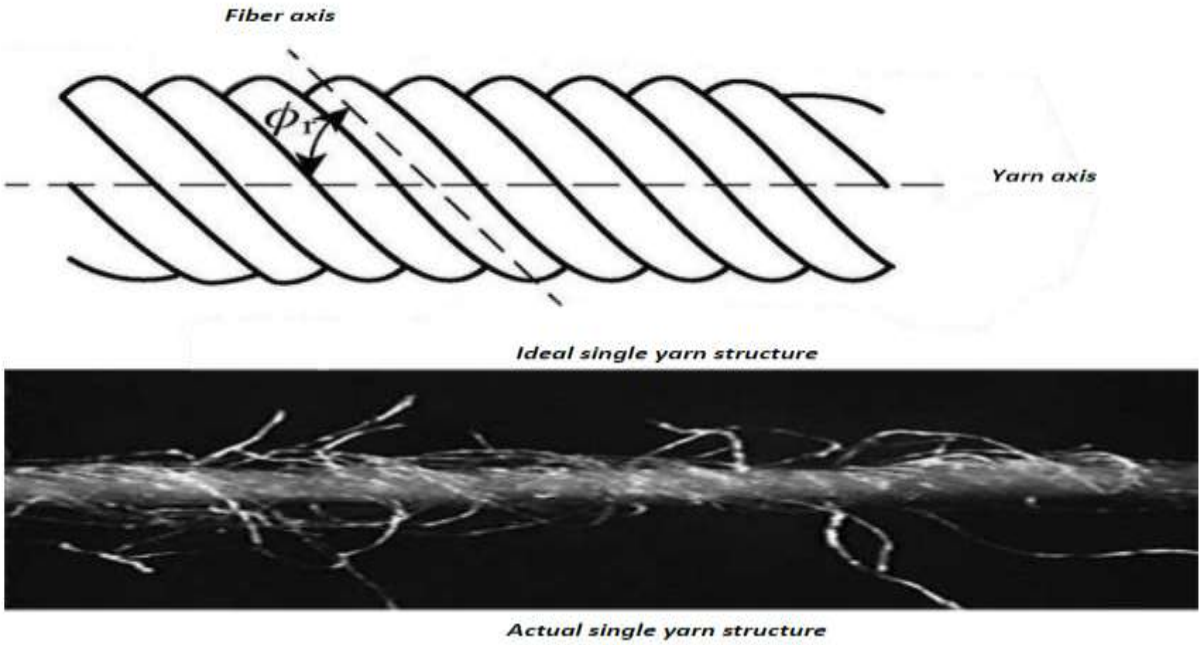
Yarn, in comparison with monolithic threads, consists of short fibers that are interconnected by twisting or gluing. This article analyzes the defects arising in the process of torsion of textile threads.

Keywords: Fiber, yarn, thread, single thread, twisting, twisting machine.

INTRODUCTION

The general term for yarn and thread, is a long, thin and continuous ribbon with a certain strength, which is made from textile fibers. Yarn is classified by structure, fiber composition and finishing and coloring. According to the structure (construction), yarns are divided into single-filament, twisted, warped, shaped, reinforced and high-volume.

Single strand yarn consists of individual fibers that are twisted during the spinning process. Single-filament threads are widely used in the manufacture of a wide variety of fabrics. A twisted thread is obtained by connecting or twisting two or more single threads.



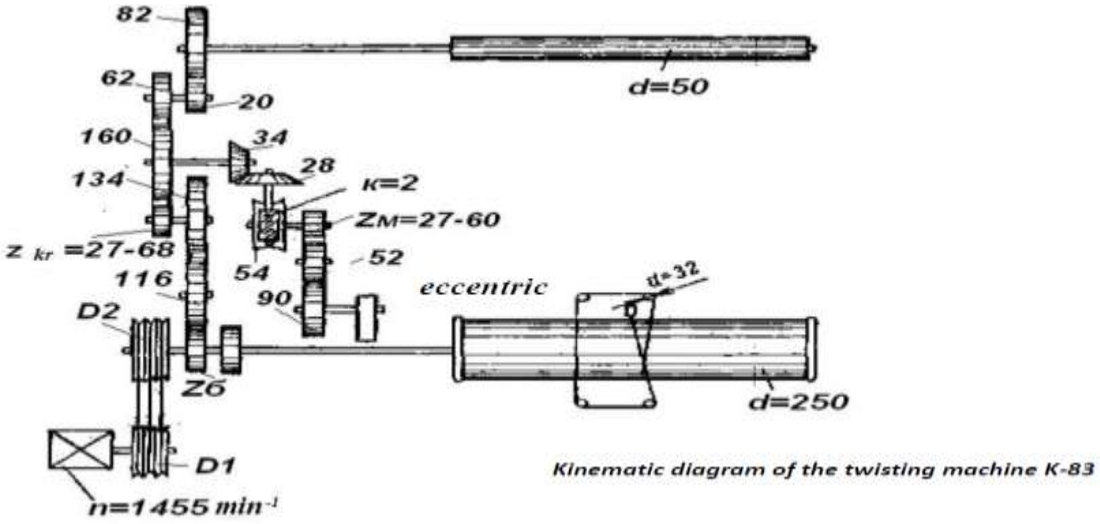
One of the main technological processes in the production of textile materials is the torsion process. The process of twisting is not a very simple process, since it requires the preservation of all the properties of the threads, which is not an easy task. The main properties of textile threads are their strength and extensibility, their unevenness according to these parameters, their thickness and strength.

The purpose of twisting for each product is unique, not the same, but the basis is to obtain a stronger, thicker and more uniform thread. But during the process of torsion, defects arise, the elimination of which, firstly, is very difficult and, secondly, it is almost impossible to avoid completely. The most important cause of thread defects is weed yarn made from poorly cleaned low-quality raw materials. Contamination of the thread is also a defect, it occurs when various contaminants and lubricating oils enter the mass of fibers.

One of the causes of twisting defects may be the uneven tension of the threads on the reeding machine, the thin skipping of threads during reeling, including the problem may lie in the twisting machine itself, namely its incorrect operation.

Using the example of problems associated with the tension of threads on twisting machines, we consider the technological calculation of the twisting machine K-83

The kinematic diagram of the twisting machine K-83 is shown in the figure below. The head gear is located in the frame of the machine, on the front side it has doors that open free access to interchangeable gears, lubrication and other transmission elements. The head gear can be set to cylindrical or conical winding by changing the eccentric, blocks, gears and guitar in gear to the winding eccentric. The spindles, through a braid that covers four spindles, receive movement from tin drums. The constant tension of the braid is maintained by tension rollers on ball bearings.



Kinematic diagram of the twisting machine K-83

1. The formula for determining the frequency of rotation of the spindles:

$$n_{ver} = n_{dv}\frac{D_{cm1} * d_{bar}}{D_{cm2} * d_{bl}}\eta$$

where D_{cm1}, D_{cm2} are the diameters of replaceable pulleys on the motor shaft, d_{bar} and d_{bl} are the diameters of the tin drum and spindle block, mm; η - braid slippage coefficient (0.97).

2. The speed and speed of the exhaust cylinder is determined by the following formula:

$$n_{vc} = n_{dv}\frac{D_{cm1} * z_b * z_{kr} * 20}{D_{cm2} * 13462 * 82} \qquad V_{vc} = \pi * d_{vc} * n_{vc}$$

3. The twist and number of teeth of the torsion gear is determined as follows:

$$K = \frac{31.6a}{\sqrt{T_{kr}}} \quad K = \frac{n_{ver}}{\pi d_{vc} * n_{vc}} = \frac{1 * 82 * 62 * 134 * 250 * 0.97}{3.14 * 0.05 * 1 * 20 * z_{kr} * z_b * 32} = \frac{1644154}{z_{kr} * z_b}$$

$$z_{kr} = \frac{1644154}{K * z_b}$$

4. The operating time of a complete removal and the productivity of the machine are determined by the following calculations:

- theoretical performance of one spindle:

$$P_T = \frac{n_{ver} * 60 * T_{kr}}{K * 10^6}$$

- theoretical performance of the machine:

$$P_{T.M} = \frac{n_{ver} * 60 * T_{kr} * a}{K * 10^6}$$

where T_{kr}- is the linear density of the twisted thread (tex), and is the number of outlets on the machine - the machine performance rate is determined as follows: (K = 0.96)

$$P_N = P_{T.M.} * K_{ne}$$

- operating time of full removal:

$$t = \frac{G * 100 * K}{n_{ver} * T_{kr}}$$

where G is the mass of yarn on the cob, g. T

In order to obtain a uniform twisted yarn with the properties we need, it is necessary that the same tension be provided when twisting the threads and that they evenly wrap around each other.

In the process of twisting, short thickenings also appear, which are commonly called "bumps"; they arise as a result of screwing fluff to the yarn. Thickening of the thread occurs when the roving breaks, the end of which is added and screwed to the adjacent one.

Also, often the disorder of mechanisms and not timely maintenance of machines leads to the appearance of defects in the threads.

Thread defects spoil the appearance, reduce the quality of fabrics and garments, which leads to a decrease in their prices.

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