ANALYSIS OF SIMULATION OF THE TECHNOLOGICAL PROCESS DOUBLE-TWIST

«АНАЛИЗ МОДЕЛИРОВАНИЯ ТЕХНОЛОГИЧЕСКОГО ПРОЦЕССА ДВОЙНОГО КРУЧЕННЯ»

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Annotation: At present, twisted yarn is produced using double-twisting twisting machines complete with cane machines. For these purposes, enterprises use imported equipment. The set of equipment includes: winding machine, reeding machine and double twisting machine. This article describes the principle of torsion and analyzes the simulation of the double torsion process.
Keywords: Thread, yarn, twisted thread, twisting process, twisting machine.

Аннотация: В настоящее время крученую пряжу производят на крутильных машинах двойной крутки в комплекте с тростильными машинами. Для этих целей предприятия используют импортное оборудование. В комплект оборудования входят: мотальная машина, бердовая машина и машина двойного кручения. В данной статье описывается принцип кручения и анализируется моделирование процесса двойного кручения.
Ключевые слова: Нить, пряжа, крученая нить, процесс кручения, крутильная машина.

Twisting is one of the main technological processes in the production of textile materials. The torsion targets for different products are not the same. In spinning, the amount of twist depends on the purpose of the yarn. In the production of twisted products, various thread structures are created by twisting. At the same time, the twisting process is one of the most labor intensive in the production of twisted yarn.

Improving the quality indicators of double-twisted yarns using modern equipment is the main task of specialists and scientific institutes of the industry. Gradually, high-tech equipment is being introduced into textile production, which requires optimal technological adjustment based on scientific and practical research.

An analysis of the literature and information sources, studies conducted in the process of double twisting gives a general idea of the essence and state of this process, as well as directions for finding optimal modes for the production of double twisted yarn.

The presence of a mathematical model of the process and a process control algorithm provides conditions for faster engineering design of a rational system for automatic control of the technological process, creation of a system for automatic technical control of processes and control of units and production lines.

Knowing the mathematical model of the process or object, it is possible to predict the property of the incoming product, assess the degree of influence of input factors in order to develop a control scheme, and stabilize the most influential factors, as well as to optimize the process.

In this article, cotton threads "Lilac -1", obtained on a double twisting machine of the TDS -228-90X160 brand from pneumomechanical yarn, were chosen as the object of study. The investigated yarn was produced at the PNK them. Kirov on a pneumomechanical spinning machine brand BD - 200 and a twisting machine brand TDS-228 of the Italian company "Savio".

Investigated factors acting in the process of double twisting on a double twisting machine brand TDS -228-90X160:

- The position of the head of the thread tensioner regulator, (X1)
- Coefficient of friction of replaceable washers, (X2);

- Diameter of the feeding package with guided yarn, (X3).

The tension values were varied by changing the position of the tension regulator installed in the upper part of the spindle. The regulator allows you to fix the yarn tension in the inner area of the spindle at six levels, which makes it possible to obtain qualitative characteristics of the yarn indicators, depending on the filling option.

The base position was the position of the regulator - 6 (maximum tension), and the experimental one - 5. The experimental study revealed the instability of the technological process when the hollow channel of the spindle was released from the capsular thread tensioner. Also, the coefficient of friction of the thread unwinder on the replaceable friction washer was changed when winding the thread from the supply package by replacing the washer. The change in the coefficient of friction of the washer depends on the material of the prepared washer (Vulcolan or Bakelite). Let's conventionally designate the Vulcolan washer as "black" and the Bakelite washer as "red". (Coefficient of friction from the black washer f_{ch}=0.2, red - f_{kp}= 0.3).

The study shows that at a constant value of the winding angle, the value of some yarn indicators depends on the diameter of the bobbin. Thus, changes in the values of the twisted yarn at the beginning and at the end of removal (full and final bobbin diameter, respectively) were investigated.

We accept as optimization parameters:

- Relative breaking load,
- Coefficient of variation for relative breaking load,
- Elongation,
- Coefficient of variation in elongation,
- Yarn twist
- Coefficient of variation in twist.

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