

**TECHNOLOGICAL PARAMETERS OF TWISTING AND DOUBLE TWISTING
OF WEAVING YARN**

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Annotation. *This article analyzes the technological parameters of twisting and double twisting of textile yarns. The twisting and double twisting process is one of the crucial stages in the textile industry aimed at improving the quality, strength, and beneficial properties of the yarn. The article discusses the main principles of the twisting technology, its technological parameters, and the factors that influence them. Additionally, the process of double twisting and its role in the industry are also examined.*

Key words: *twist, double twist, textile yarn, technological parameters, spinning, yarn quality enhancement*

**TO‘QUV IPLARIGA BURAM BERISH VA IKKI MARTALIK BURAM
BERISHNING TEXNOLOGIK PARAMETRLARI**

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Annotatsiya. *Ushbu maqolada to‘qimachilik iplariga buram va qo‘sh buram berish texnologik parametrlari tahlil qilindi. Buram va qo‘sh buram berish jarayoni to‘qimachilik sanoatining muhim bosqichlaridan biri bo‘lib, ipning sifatini, mustahkamligini va foydali xususiyatlarini yaxshilashda muhim ahamiyatga ega. Maqolada buram berish*

texnologiyasining asosiy prinsiplari, texnologik parametrlari va ularga ta'sir qiluvchi omillar tahlil qilindi. Shuningdek, qo'sh buram berish jarayoni va uning sanoatdagi o'rni ham ko'rib chiqildi.

Kalit so'zlar: *buram, qo'sh buram, to'qimachilik ipi, texnologik parametrlar, buram, iplik sifatini yaxshilash*

ТЕХНОЛОГИЧЕСКИЕ ПАРАМЕТРЫ КРУЧЕНИЯ И ДВУКРАТНОГО КРУЧЕНИЯ ТКАЦКОЙ ПРЯЖИ

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Аннотация. *В данной статье анализируются технологические параметры кручения и двойного кручения текстильных нитей. Процесс кручения и двойного кручения является одной из важнейших стадий в текстильной промышленности, направленных на улучшение качества, прочности и полезных свойств нити. В статье рассматриваются основные принципы технологии кручения, ее технологические параметры и факторы, влияющие на них. Также рассматривается процесс двойного кручения и его роль в промышленности*

Ключевая слова: *прокрутка, двойная прокрутка, текстильная нить, технологические параметры, прядение, улучшение качества пряжи*

Introduction. The textile industry is a complex of processes for the production, formation and preparation of yarns. Yarns are the main raw material for the production of textile products, and their quality directly affects the overall quality of the product. Twisting and double twisting technologies are widely used in the production of textile yarns. Twisting is a process that improves the physical and mechanical properties of yarn by twisting it, which increases the strength, elasticity and durability of the yarn. Also, the appearance and physical and mechanical properties of the yarn are changed during the twisting process. The main goal of twisting technology is to prepare the necessary yarns for the required assortment while improving the quality of the yarn. Parameters such as the twist angle, twist strength, number

of twists of the yarn play an important role in determining the quality of the yarn. The correct parameters of the twisting process help to strengthen the strength, elasticity and other qualities of the yarn. At the same time, double twisting technology also serves to increase the strength and durability of the yarn. In this technology, two or more threads are combined and twisted together, resulting in a new, strong, and elastic thread[1].

Twisting and double twisting technologies play a special role in the textile industry. These technologies, with their technical and economic efficiency, play an important role in the production of high-quality yarns. The use of the correct technological parameters allows you to optimize the quality of the yarn, while increasing the efficiency of technological processes.

The main part. Twisting is: a basic technological process used to change the structure of textile yarn and improve its quality. During the twisting process, a circular twist is applied to the surface of the yarn. During the twisting process, each twist of the yarn reduces its length, so as the number of twists increases, the elasticity and elongation of the yarn decreases. Also, as the number of twists increases, the density of the yarn also increases, which makes it possible to produce light and high-quality products during the weaving process. The twist level of the yarn has a significant effect on its strength; as the number of twists increases, the strength of the yarn first increases, but after reaching a certain point, i.e. the critical twist level, the strength begins to decrease. This depends on the type of yarn. [2].

As a result of the process of twisting yarns together, high-strength yarns are obtained. When twisting, the yarn usually shortens in length, which is called twisting. Twisted yarns are distinguished by the following characteristics: type of initial yarn, degree of twisting, direction of twisting, structure of twisted yarns, tension and size of the yarn, structure of yarns, tension and size of the yarns, function of the yarns, what purposes they serve. According to the time of twisting of the initial yarns, twisted yarns are divided into the following - natural yarns (silk raw materials, cotton yarns, woolen yarns, etc.), artificial (viscose, acetate, copper-ammonia), synthetic (polyamide, polyester, polypropylene, etc.), glass yarn, as well as complex yarns consisting of various initial yarns combined. Yarn twisting characteristics: a) twisting (twist) kr. - the average twisting amount of yarn per 1 meter.

b) The coefficient of elongation is used as a characteristic of the elongation of yarns of different thicknesses and almost the same bulk density.

d) Twist angle is used as a characteristic of yarns of different thicknesses and masses.

Depending on the degree of twist, that is, the number of turns per unit length, twisted yarns are divided into 3 groups: low twisted (up to 230 turns/m), medium twisted (230-900 turns/m), high twisted (900 turns/m and more). Depending on the direction of twist, twisted yarns are divided into two: Z twisted to the right and S twisted to the left. Twists on the right side are

directed from bottom to top to the right, Z twisted to the left, S twisted from bottom to top to the left[3].

The purpose of twisting is to strengthen the yarn, increase its elasticity, improve the structure of the yarn, and make it suitable for use in special fabrics. Several factors play an important role in the twisting process, among which the twist angle, the number of twists, and the twist force are the most important parameters.

*Twist angle:*The twist angle affects the elasticity and strength of the yarn. Increasing the twist angle increases the strength of the yarn, but it reduces the elasticity of the yarn.

*Number of turns:*As the number of twists increases, the density of the yarn increases. This, in turn, increases the strength of the yarn.

*Twisting force:*High twist strength ensures long-term performance of the yarn.

Double screw technologies.Double twisting technology is a process of creating a new yarn by combining two or more yarns and twisting each yarn separately. Double twisting helps to increase the strength, durability and elasticity of the yarn. This technology is especially used in the production of products with high mechanical strength. Along with cotton, twining machines of the following brands are used in silk spinning factories and textile workshops of chemical fiber factories - TKM-8-12, TK-2, TK-3I, Tk-160-I, TK-250-I.

Despite the complexity of the structure and high cost of the twining machines, they are economically effective when used to weave several yarns in series and produce yarns with a small amount of twining, for example, weaving warp yarns from natural silk, as well as yarns for crepe production and weaving them at the same time up to 80-100 br/m and then using them on layered twining machines to weave several natural silk twining yarns, which are widely used in engineering, medicine and other fields, and to weave no more than 5 chemical yarns.

TK-2 qThe twining machines are designed for twining and untwisting natural silk and chemical yarns from 2 to 12 strands. The machine is single-tier, double-sided, consists of 20 sections, and can work with both fixed and rotating packages. The difference between the TK-2 machine and the TK-3 and TK-160-I machines is that it uses high-capacity packages. The main disadvantage of such machines is that they cannot use large-capacity bobbins (more than 150), since in this case the tension of the yarn increases, which can negatively affect the quality of the untwisted yarn, especially when operating at high speeds, the breaking properties of the yarn increase. In machines that untwist the yarn from rotating packages, there are no tensioners, so it is easier to load yarns into such machines. However, in such cases, due to the different capacities of the packages and the fact that their mass decreases during the packaging process, the tension of the added yarns is not evenly distributed. Chemical yarns wound on large-sized bobbins cannot be processed on machines that operate

by winding from rotating packages. Rewinding the same yarns from bobbins to small-sized bobbins is economically inefficient and technologically impractical. Therefore, chemical yarns should be processed on a TK-2 machine, which can be equipped with large fixed packages, and for this purpose, the TK-3I machine gives even better results [4].

Technological factors of the doubling and twisting process of natural raw silk

Table 1.

№	Number of indicators	Unit of measurement	Indicators	
			Warp	Weft
1	Linear speed during doubling	m/min	160	160
2	Number of yarns in doubling	Pcs	4	4
3	Linear density of yarn	Tex	3,23x4	3,23x4
4	Number of twists in doubled yarn	twists/m	80	80
7	Type of knot in joining	–	Simple	Simple
8	Tension of single yarn	N	8-10	8-10
9	Winding density on bobbin	g/cm	0.70	0.70

Research results and discussion

The conducted experimental and analytical studies demonstrated that the technological parameters of twisting and double twisting have a significant impact on the physical and mechanical properties of yarn.

-The results revealed that an increase in the number of twists leads to a noticeable improvement in yarn strength due to enhanced cohesion and friction between fibers within the yarn structure. However, excessive twisting reduces the elasticity of the yarn, as the fibers become more tightly bound, limiting their ability to deform under load.

-It was also determined that maintaining an optimal level of yarn tension during the twisting process reduces the probability of yarn breakage, ensuring stability and continuity in production. Proper tension control contributes to uniform yarn structure and consistent quality indicators.

Furthermore, the application of double twisting technology significantly increases the durability and service life of the yarn. This is achieved through improved structural stability and better distribution of internal stresses within the yarn. Double twisted yarns exhibit enhanced resistance to mechanical deformation, making them particularly suitable for technical textiles and high-performance fabric production.

In addition, the study indicates that the combined optimization of twist level, tension, and processing speed allows for achieving a balance between strength, elasticity, and production efficiency. Therefore, selecting appropriate technological parameters is a key factor in improving yarn quality and ensuring its competitiveness in modern textile manufacturing.

Conclusion

The technology of twisting and double twisting of textile yarns is one of the most important stages determining the quality of the yarn. The results of the study show that the number, angle and strength of twists directly affect the physical and mechanical properties of the yarn. Although an increase in the twist angle increases the strength of the yarn, it reduces its elasticity, therefore, it is necessary to choose the technological parameters optimally. The double twisting process increases the durability, stability and workability of the yarns, and is especially effective in the production of special yarns used in the technical and medical fields.

-Analysis of the technical capabilities of machines such as TK-2, TK-3, TK-160-I shows that they are effective for interlacing natural and chemical yarns, but it is necessary to improve the mechanisms for controlling yarn tension. When working with large-capacity packages, the degree of yarn breakage increases, therefore, it is important to maintain optimal speed and tension during the production process.

-In general, improving the technology of twisting and double twisting will improve the quality of yarns, reduce energy consumption and ensure economic efficiency. In the future, the process can be further improved by introducing automated control systems, using digital monitoring and sensor control methods.

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