

Use of Dyed Fiber Yarn for Warp Yarn of Denim Fabrics

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Abstract. This article is devoted to the problem of preparing threads from dyed fibers for denim. It is also about identifying shortcomings in the production of warp threads at the jeans and weaving enterprises of Uzbekistan. There are several disadvantages to dyeing warp threads. Therefore, research is being done on spinning dyed fibers or dyeing soft yarns.

Key words: denim, cotton fiber, deep processing, dyeing, direct warping, ball warping, defect, dyeing, yarn-dyed fiber, drying.

Ensuring the implementation of a number of decisions and decrees adopted by the government of the Republic of Uzbekistan, [1-3] in particular, the issue of deep processing of cotton fiber is urgent. In Uzbekistan, within the framework of the "Cluster" system, a number of enterprises are being launched for the production of ready-made products that fully meet the requirements of the world market. Exportable fabrics such as chit, gray, turban, velvet, denim are produced from cotton yarns in newly established textile enterprises.

In particular, the production of denim fabrics and the preparation of ready-made goods and clothing products from them is being carried out consistently. When you hear the term "jeans", you first think of the timeless, sturdy, crisp blue or black trousers, jackets, sundresses, etc. come to mind. Finished products made of denim are recognized as the most used clothing and items by the world's population.

The preparation of warp thread for weaving in the production of denim is somewhat different from the preparation of warp for other textile fabrics. In the first method, the warp threads are specially (ball) warping, dyeing, separating ball and beam wrapping, sizing, drawing-in or goes through connection processes.

The second method are used in the preparation of warp by the beam warping, warp thread dyeing-sizing, drawing-in or it is put on the looms through the technological processes of connection. There are two different ways of preparation warp for denim cloths in the denim weaving enterprises of Uzbekistan. "Mirzacho'ltex" MCHJ, Jizzakh region by beam warping, through which warp threads are prepared for dyeing-sizing It is located in Okdarya district of Samarkand region "Afrasiab Jeans Textile" specially warping enterprise (Ball warping) dyeing the warp threads through the method thread separation and correct, sizing sent to processes.[4]

A unique advantage of existing methods of preparing warp threat for denim fabrics and there are disadvantages. Disadvantages are a lot of waste of raw materials, warping, dyeing, sizing the complex course of processes and related to the treatment of dyed waste water. In this regard with sources of threat production from dyed fibers were reviewed.

When producing thread from dyed fibers, great importance is evenly to uniform dyeing of the thread. Dyeing of cotton fiber and color throughout the entire size, regardless of the drying method and humidity are not uniform. This is due to the fact that the bundle of fibers entering the dyeing machine does not have the same density, a change in the productivity of the dyeing hardware, changes in the properties of the dye solution and the dyeing mode, grown in different regions and ripening depends on the use of different cotton fibers. In addition, a special feature of the production of dyed threads is the presence of a pneumatic transport system with a long length (up to 1 km). These systems are driven by air flow (air is compressed), absorbent and will be mixed. In the latter system, the fiber passes through a fan, it absorbs the fiber along with the air and drives to the next car. Clean the air from dust in the drive system with the help of air flow and there is also a system that sucks dusty air into a filter to bring it back to the workshop. The diameter of air flow pipes is 250-360mm, the movement speed of cotton air mixture is 13-17 m/s. (1- picture)

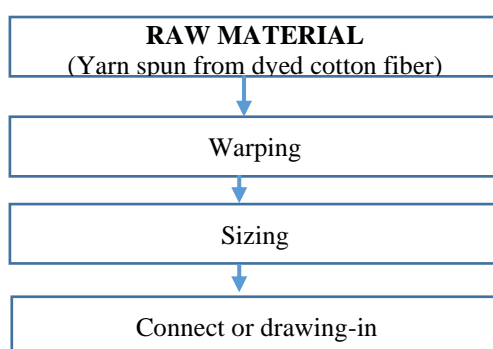
HT type dyeing machines are widely used in industry. HT pressure dyeing machines are naturally under overpressure of no more than 0.45 MPa and chemical fibers (thread, tape threads, threads, fibers in the mass) dyeing, whitening and intended for other liquid processing; 140 ° C works at low temperature and up to 90% vacuum.[5]

Production of denim fabrics, their finishing, making various items, scientific research is being conducted for the purpose of research. It is to ensure high-quality dyeing of warping threads in denim fabrics. The indigo dyeing system is used for dyeing. Indigo dye is an organic compound that has a distinctive blue color. Historically, indigo is a natural dye obtained from the leaves of the *Indigofera tinctoria* plant. Dyeing of the threads of the fabric with "Indigo" dye, raw material and a lot of scientific research on its structure has been conducted. Foreign scientists include Supriya Pal, ZK Tamzed, Yanli Hu, Arjun Dakuri, Belinda Kathryn Crawford, Subramanian Senthilkannan Muthu, Gopalakrishnan Duraisamy, Edith Csanák.

The research conducted by foreign scientists mainly focuses on the gradual development of the history of denim production, dedicated to ensuring the universality of denim, dyeing and washing problems. In the cotton fiber yarn spinning plant, the fiber dyed on the basis of "Indigo" dye is made ringed by appropriate technological processes. or dyed yarn is spun in pneumatic spinning machines, dyed cotton yarn, rewound from the spinning tubes into a conical coil in the rewinding equipment, is sent to the weaving enterprise. Thread picking, adopted according to the appropriate procedure, sizing connect or drawing-in delivered to the weaving loom through technological processes.[2-picture]



Picture 1. Machine for dyeing cotton fibers



Picture 2. The sequence of technological processes of dyed cotton threads for denim fabric preparation.

The linear density of the yarn in the production of dyed fiber cotton yarns delivered to the denim factory and on the basis of structural indicators, the technological processes of preparing yarn for weaving are selected and carried out. and on the basis of structural indicators, the technological processes of warping yarn for weaving are selected and carried out.[6]

Another type of dyed yarn production is made by dyeing cotton yarn on a soft winding bobbin.

Yarn dyeing is a special type of dyeing. The dyeing of the winding is done on the coils. Therefore, during the winding process, while the yarns are being prepared for dyeing, they are wrapped in special iron or plastic cartridges instead of paper cartridges. (Picture 3)



Picture 3. Iron or plastic cartridges used in yarn dyeing.

The wrapping process creates a soft, low-density wrap. A variety of modern winding machines are used to create soft wraps. The process of removing the soft wrapping from the windings is very important for the dyeing industry. Forming a soft roll is the first step in the dyeing process. If the structure or factors in the process of re-winding yarn deviate from the specified norm, it will lead to the violation of the dyeing process. [7]

The main requirements of yarn dyeing process are given below.

1. Forming a low-density, soft roll. Wrap density ($0.3-0.35\text{gr/cm}^3$)
2. Transfer threads from a paper cartridge to an elastic or plastic cartridge.
3. Preparation of the required coil for the required processes.
4. Reduce the packing density.
5. Remove unnecessary items from packaging.
6. Carrying out the painting process.



Picture 4. Winding to form soft rolls.

The following requirements are imposed on the rewinding process for yarn dyeing in coils. Setting different parameters in winding machines makes yarn dyeing process efficient and will try to have a good time. Below are the requirements for making a soft wrap for the winding process. [4-picture]

The winding density should be uniform and low. Because the dye should also reach the inner layers of the yarn.[8]

1. The winding density in the package is $0.3-0.35\text{gr/cm}^3$ or It should be between $300-350\text{ kg/m}^3$.
2. Winding process should be carried out depending on the linear density of the thread.

In the process of winding, the tension of the thread is required to be within the specified norm.

An increase in tension causes the winding to become tighter and a decrease will cause the coil to become too loose. But even a low-density winding does not meet the requirements of the dyeing process.

4. It is winding that the recycling department be neat and clean.

5. It should be possible to set the winding factors within certain limits depending on the linear density of the thread.

6. If the tension is high, the threads will break, and if the tension is low, it will create a soft winding. But the thread tension is required to be within the specified norm.[9]

In summary, the method of warping thread for denim is to re-wind the raw yarn from the spinning mill into a soft winding and its connection with dyeing. In the preparation of warp for denim fabric. We have identified the shortcomings in the technological processes of warp production carried out in existing denim production enterprises in Uzbekistan and development of alternative technology in the production of warp yarns and justification is appropriate. For this, he provided resources on the technology of making dyed yarn.

Recommendations are given for dyeing raw yarns in soft rolls or dyeing on warp spools.

References:

1. Decree of the President of the Republic of Uzbekistan on the development strategy of the New Uzbekistan for 2022-2026, No. PD-60., 28.01.2022 y.
2. Decree of the President of the Republic of Uzbekistan No. PD-5989 of May 5, 2020 "On urgent measures to support the textile and clothing industry."
3. Decree of the President of the Republic of Uzbekistan dated September 16, 2019 No. PP-4453 "On measures to promote the further development of light industry and the production of finished products."
4. Decree of the President of the Republic of Uzbekistan dated February 12, 2019 PQ-4186 "On measures to further deepen the reform of the textile and clothing and knitwear industry and expand its export potential"
5. М.А.Дониёрова, Д.Б.Шамиев, Б.Б.Дониёров, "Жинси газламалар ишлаб чиқариш технологияси"//Монография, ЖизПИ, 2022 й.
6. <https://www.formaktekstilmakina.com/>
7. Боумуратов В.Х. То'қима hosil qilish jarayoni nazariy asoslari, Darslik, Toshkent, 2021 y.
8. <https://dir.indiamart.com/impcat/yarn-dyeing-machine.html>
9. <https://textiletuts.com/types-of-dyeing-machines/>