

Spun Yarn Production Technology

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Abstract

A large number of works have already been done on the development of spun yarn technology. The following article especially evaluates the latest inventions in its production, like the twisting system built on the technology of superconduction in a ring spinning system and the idea of manufacturing cluster-spun composite yarn. These mentioned technologies are of very high potential and have not yet been used in the industrial sector.

Introduction

Product qualities and processes in spun yarn have various modifications of existing techniques and have significant latest creations. During the spinning process, twist maneuvers play an active role in transmitting strength in tensile during the process of spinning. The resistance between the ring and the traveler is the major flaw in this technology. It generates heat at a very high speed, which results in limiting productivity. This resistance between the traveler and the ring is remarkably reduced through the execution of a system bearing the magnet based on superconduction technology. It totally exchanges the present ring and traveler system of this machine. Thus this yarn is the new concept of producing composite yarn. In this concept, the slotted roller is utilized by the polyester multifilament, which is a mixture of cotton fiber. The slipperiness of staple fibers is reduced by this yarn relative to the core spun composite yarns' filaments.

Twisting Mechanism

A. Background

The usage of the spinning process is, to a high degree, in short, a staple spinning process. The superiority of this process is still over improper technologies of spinning, for example, air jet and rotor rotating, etc. The ring and the traveler compound for injecting twist and rambling them on steels. However, the main drawback of the old system is the resistance between both. An excellent amount of heat is generated at a greater speed which results in decreasing the production. This drawback is reduced through a system bearing the magnet based on superconducting technology by replacing the present loop and traveler system. It consists of a superconductor, which is circular, and a magnet ring, which is permanent.

B. The Functionality Of Superconducting Magnet Bearing

The superconducting magnet bearing is a joined connection between a mediator system, e.g., an enduring magnet and High-temperature superconductor (HTSC) components (Mahmud Hossain, 2014).

These bearings self-stabilize themselves as they stay entirely inactive devices without any essential importance for location sensing and regulators. This is the reason for them being wear-free, the repetitiveness of the sensor and control elements, having very high reliability and having no EMC (electromagnetic compatibility) (Mahmud Hossain, 2014).

Below is the normal temperature; when the superconductor is cooled down, the permanent magnet ring elevates and freely rotates up the superconductor ring following the rules of the superconducting phenomenon and spike. Hence, the SMB assures an operation that is free of friction during spinning and ensures a more considerable amount of speed and the rate of production increased drastically. The features of yarn are similar to those of conventional rings after the investigation of the SMB system.

C. Conclusion

In the year 150, many twisting mechanisms have been developed to achieve a very high rate of production. Spindle development, a subordinate revolving ring breadth, automating etc., were the most indispensable creations of this time. Most importantly, this bearing system has a straightforward construction, unlike other systems such as active magnet bearing. Also, this superconducting magnet bearing system, which is free of friction, has a very high latent to replace the present traveler system. However, a little more optimization is required in the size and weight of PM. An establishment of the theoretical method is required for the prediction of tension in yarn, formation of the balloon, PM weight, etc., by keeping in mind the superconductor magnetic bearing system. Because of no friction, there is a possibility that the yarn can spin dual the speed of loop loop-rotating machine. Many researchers have previously established counterfeits of mathematics for the spinning process of a ring. Thus, this system, i.e., SMB, is the revolution in the twisting rule of yarn, which eliminates the resistance of the loop and rover system in the present machine of spinning of ring.

Cluster-Spun Yarn – An Innovation In Composite Yarn Spinning

A. Background

Researchers have given a complete stress on the improvements of Complex yarn spinning

procedures. In this method, a unique structure is formed with the combination of continuous filaments yarn. Various spinning methods produce composite yarns, for example, ring, air jet, resistance and spinning of the rotor, among which the most conventional one is the modified ring spinning method. It has two mechanisms, i.e., fibers that are stapled and the filament. They form the affiliation of the center and sheath of the yarn.

The major problem with composite yarns is the decline of the staple fibers compared to the filament. A high level of twist is applied to build consistency between the core component and the sheath. But this will increase the cost of production and reduce the speed of production as well. To decide this issue, a fresh idea of cluster-spun anecdote is born. It consists of a multifilament of polyester, which is haggard by a scheduled roller, and fibers of strands, which play the principal part. Some physical features of cluster-spun and spun-core were calculated through SEM, i.e., scanning electron microscopy as well (Mahmud Hossain, 2014). Image processing and microscopic methods are secondhand to revise the dispensation of threads in the crosswise of model yarns to interrogate the purpose and longest at interruption (Mahmud Hossain, 2014).

B. Cluster Spun-Yarn Properties

Core-spun yarns have a lower purpose and long-ness than yarns cluster-spun, which technically means that clustering influences yarn properties and structure for the following reasons;

1. The mixture of cotton fiber and polyester filament provides a greater force of friction and cohesion in fiber.
2. It decreases the tendency of slippage of the fibers that are stapled, which is compared to the filament, resulting in increased migration of fiber in the yarn.
3. Cluster-spun yarns are clearer in view than yarns of core-spun as well as the spun yarn of cluster structure packed more tightly than spun of core.

C. Conclusions

Innovative ways of manufacturing complex yarn, which is named the cluster-spun, is a twisted yarn consisting of threads of cotton and multifilament made of polyester scattered by using a scheduled roller.

A positioned roller has good imprints dividing the multi-filaments into two or more sub-strands which produce clustered-spun yarns.

The difference in internal structures and cluster yarn's mechanical structure has more exceptional outcomes in the properties of the yarn. Eventually, this resulted in the upgradation of yarn properties, thus reducing the tendency of the decline of staple fibers compared to the filament. Also, a more significant increase in the force of friction and connectedness produces an evenly and toughly

blended mixture of filaments made of polyester and strands of thread in spun yarn of the cluster. Additionally, the subordinate rotation is compulsory for the production of quality yarn. As a whole, the spun of spun has a high latent to play a vital part in the profitable presentation of complex yarn revolving in the close prospect.

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