A New Concept to Increase Ring Spinning Productivity (15-25 %) By "FOR" Twisting Device

By:
Piyush Chandarana

A New Concept to Increase Ring Spinning Productivity (15-25 %) By "FOR" Twisting Device

By: Piyush Chandarana

The ring spinning machine was invented by an American named Thorp in 1828, and Jenk-another American-added the traveler rotating around the ring in 1830. In the intervening period of more than 170 years the ring spinning machine has undergone considerable modification in detail, but the basic concept has remained the same. For many years any noteworthy further development hardly seemed possible, yet a significant process of evolution took place during this time. The productivity of the ring spinning machine has increased by 40% since the late nineteen-seventies

Spinning machine is a major cost factor in a spinning mill, as the graph.

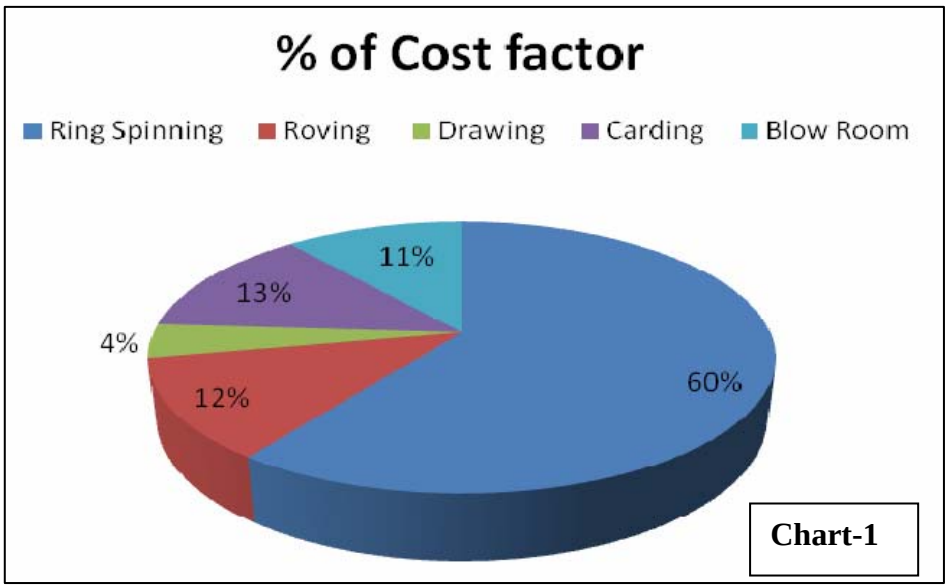


Chart-1

If we improve in spinning machine process, we can save substantial amount. Following is the improvement achieved primarily by

- Development in rings and travelers
- Online take off device (Doffer)
- Reducing the ring diameter.
- Reducing ends down frequency.
- Combining the ring spinning machine and the automatic winder into a production unit
- **Developing new concept "FOR" twist device.**

There is number of improvements which we can list out but we have to check possibility of further improvement in such particular area. There is new concept "FOR" Twist device and development of rings and travelers which have more scope of development compare to other area. Such concept will directly impact on productivity of spinning mill drastically. Before understanding this concept, let us understand first basic working of ring spinning machine.

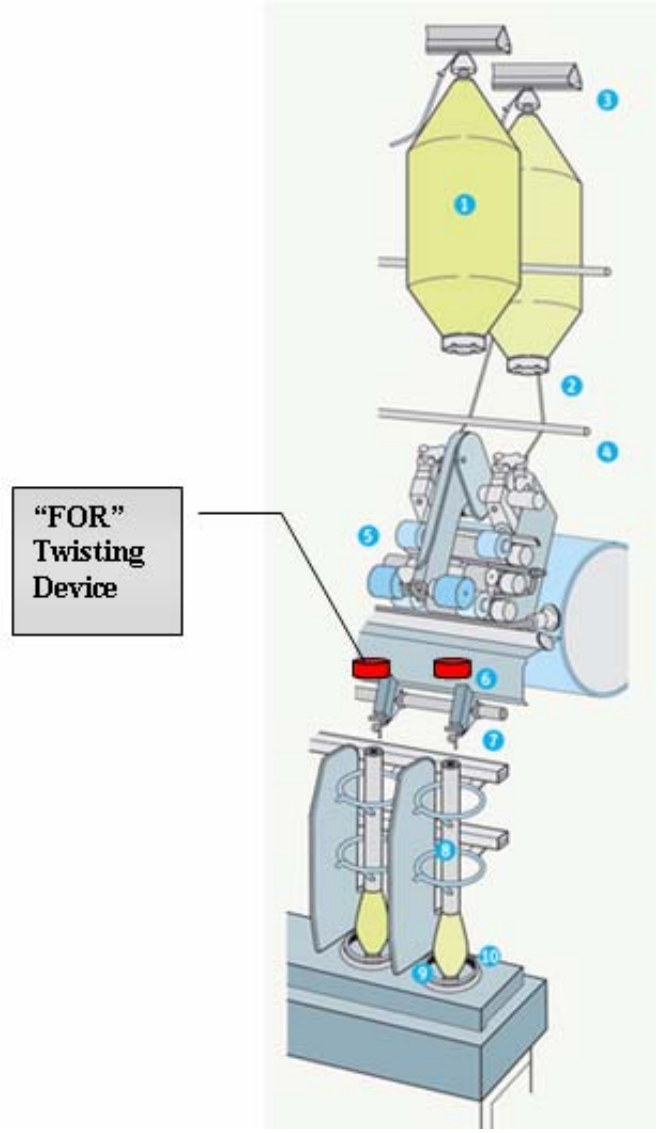


Fig-1

The roving bobbins (**1**) are inserted in holders (**3**) on the creel. Guide bars (**4**) guide the rovings (**2**) into the drafting system (**5**), where they are drawn to their final count. The drafting system is at an angle of 45-60° and is one of the most important units on the machine, since it exerts a very considerable influence on the uniformity of the yarn in particular.

After the resulting thin ribbon of fibers (**6**) leaves the delivery roller, the twist necessary for imparting strength is provided by spindle (**8**) rotating at high speed. In the process each rotation of the traveler on the spinning ring (**10**) produces a twist in the yarn. Ring traveler (**9**) is also necessary for taking up this yarn onto a tube mounted on the spindle. This traveler-a remnant of the flyer on the roving frame- moves on a guide rail around the spindle, the so-called ring (**10**). The ring traveler has no drive of its own, it is dragged with spindle (**8**) via the yarn attached to it. The rotation of the ring traveler lags somewhat behind that of the spindle due to the relatively high friction of the ring traveler on the ring and the atmospheric resistance of the traveler and the thread balloon between yarn guide eyelet (**7**) and traveler (**9**).

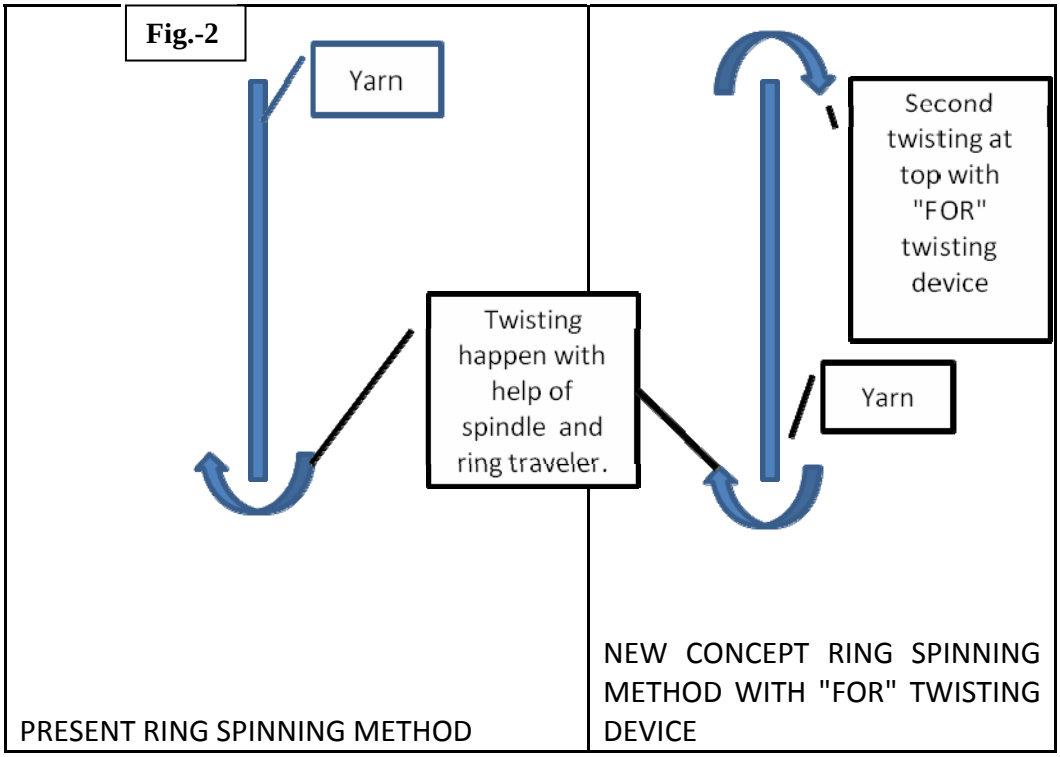
This difference in speed between the spindle and the traveler results in the thread being wound onto the tube. In contrast to the roving frame, the ring spinning machine spindle operates with at higher

speed than the traveller (**9**). The yarn is wound up into a cylindrical cop form by raising and lowering of the rings, which are mounted on a continuous ring rail. The layer traverse of the ring rail is also less than the full winding height of the tube. The ring rail therefore has to be raised slightly (shift traverse) after each layer has been wound. For a time, machines were also built featuring shift traverse produced by lowering the spindle bearing plate rather than raising the ring rail.

Let us understand concept of "FOR" twist device.

1. **What is working principle of "FOR" twist works?**

   Presently, yarn twisting takes place with help of spindle and ring traveler. As per below fig-2,



twisting happened at the end of yarn. With new concept of ring spinning with "FOR" twist device, one more twist given in between front roller and yarn guide eyelet.

2. **Where to fit the "FOR" twist device? How it will help to increase speed of spindle?**

   As per fig-1, this device will be fitted in between front roller and yarn guide eyelet. We can adjust the device position by moving the same up and down. Even, we can adjust the angle also for the positioning.

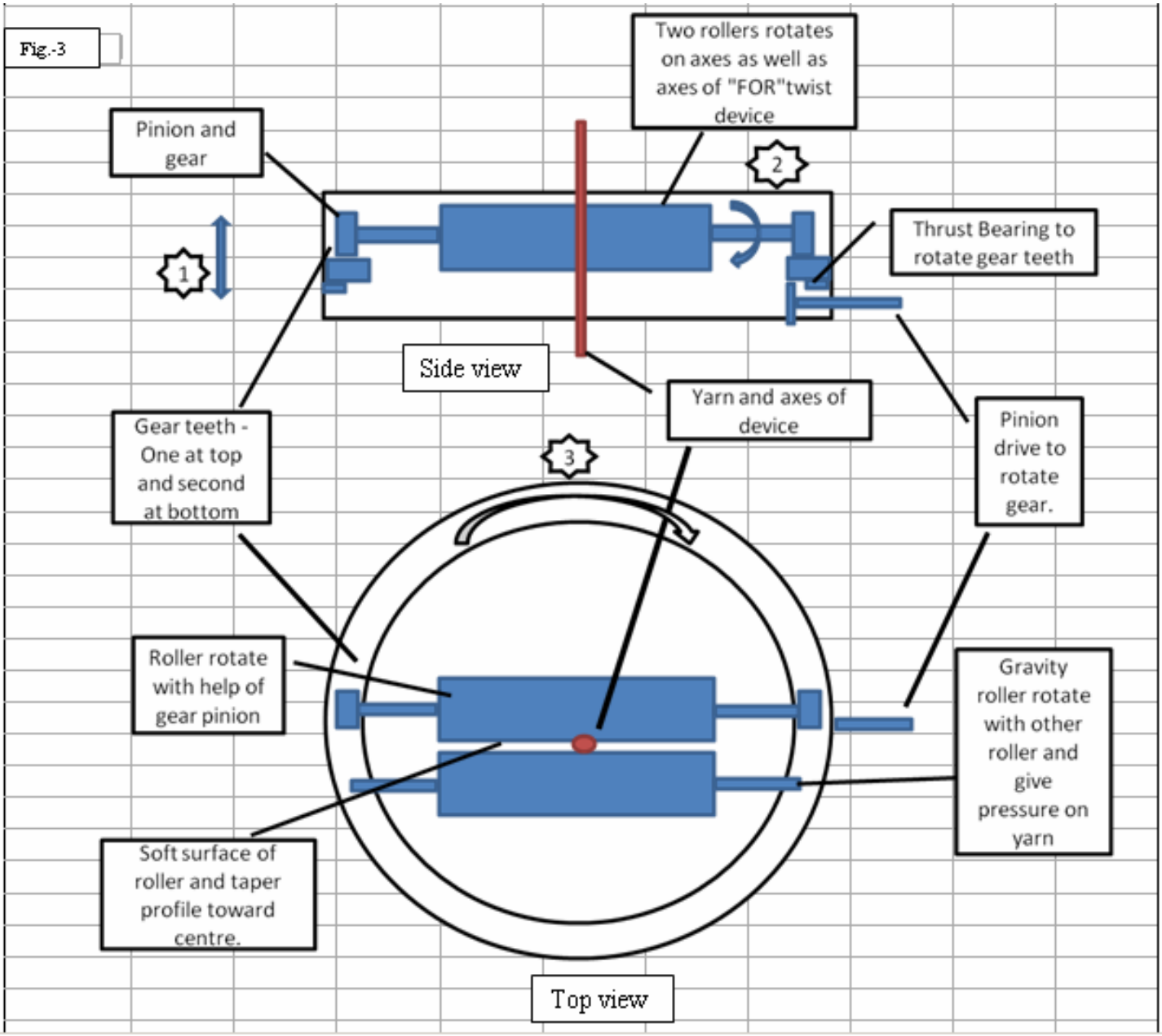
   The problem lies in the fact that the speed of the spindle is restricted to a about 25,000 rpm. The speed of the spindle is restricted by the ring and traveler. The friction between the ring and traveler restricts the speed of the traveler on the ring-spinning machine. If the speed is increased more than 25,000 rpm the heat generated due to friction burns the traveler and the system collapses.

The system has to be improved to get higher spindle speeds there by having higher production. “FOR” twisting device gives twist to the yarn from top. This will also cause resistant to the ring speed on ring traveler as well as gives more twist due to such resistant. With “FOR” twist device, we can reduce the speed of ring with reference to present spindle speed without losing twist on yarn. It means, we can increase 15-25% speed of spindle with this device to reach ring optimum speed.

3. What is “FOR” twisting device and how it will give twist at top of yarn?

“FOR” twisting device will give twist as well as help to feed the yarn without disturbing much to spinning geometry. As per given fig.-3, there is two rollers which rotate (Movement no:-3) around axes of device which provide the twist to the yarn. One of the roller will rotate its own axes (Movement no:-2) by outside drive. There is also up and down movement (Movement no:-1) to the device as per yarn count requirements.

When yarn passes in-between the rollers, it will be rotate yarn along with it so yarn gets twist. This roller’s material is very soft so it will not disturb the yarn structure. Rotation of roller will be controlled by outside drive which also control up and down movement of device. Second roller will give only pressure on yarn by gravity. Twist of yarn will be given by anti-direction rotation of rollers.



4. **What is impact on spinning geometry after fitting of "FOR" twist device?**

Dimensions and guide angles of spinning process, known collectively as spinning geometry, have a significant influence on the spinning process and final yarn quality, and especially on: 1.Tension conditions 2.Ends down frequencies, 3.Irregularity, 4.fiber integration, 5.Yarn hairiness, 6.Incidence of fly etc.

Spinning geometry is therefore a very important optimization criterion for machinery manufacturers. However, it has to be borne in mind here that changing a spinning geometry parameter inevitably entails a change in all other geometry parameters.

Three most important factors from among the numerous spinning geometry parameters are dealt with this device. These parameters are:

- spinning triangle (W/WS)
- spinning length (L_1/L_2)
- spinning angle (γ)

As "FOR" twist device will be rotate anti- direction of twist, spinning triangle and length will increase. This will in fact improve the yarn quality like yarn hairiness, fiber integration etc. Due to increase in this parameter will increase end down time in normal spinning but with such device, there will be less tension on yarn. This device will help yarn to guide and reduce the tension so there will be fewer ends down time. This device will be fitted same path of yarn so there will be no spinning angle changes.

5. **What will be the development cost of "FOR" twist device? What is payback time against benefit?**

This device will be made with light weight metal like plastic so cost of such device will not be more. Rotation of all twist devices per spindle will be given by common shaft. With such cost, there will be increase of productivity by 15-25 % minimum. Therefore, payback cost will be hardly one month.

6. **Is it practical concept to implement?**

The productivity of the ring spinning machine has increased by 40% since the late nineteen-seventies**.** Such productivity increased by implementing such concept only. There is no other reason left to resist implementation of this concept. Even pilot trial already taken and it is observed that there will be 30-35% improvement in productivity.

Let us implement this concept and improve productivity of spinning area. Such implementation will improve our Indian nation productivity. Therefore, we can proudly say to the world that we can also invent new things which improve our productivity.

About the Author

Piyush Chandarana, an engineering graduate and post graduate in business and material management, using his experience and knowledge gained during his long stint with the textile industry has developed a new concept whereby the productivity can be increased while working on a loom.

He is currently working as General Manager-Supply Chain Management with reputed company M/s. Parixit Industries Ltd located Ahmedabad.

Beginning his career as Maintenance Engineer with Orient Abrasive Ltd, he soon joined Mardia Chemicals as Senior Engineer and later as Assistant Manager-Purchase with Anil Products Ltd; as General Manager-Purchase & Stores with Soma Textiles; as HOD-SCM with Birla Century, Bharuch and then Jobanputra Group, Uganda as Group Head of Plant, Commercial Purchase & Planning. He has also worked with RSWM ltd as General Manager-Material

Views presented in this article are from the practical experiences of the author

Image Courtesy: http://www.runjintex.com