International Journal of Recent Advances in Multidisciplinary Topics
Volume 4, Issue 3, March 2023
https://www.ijramt.com | ISSN (Online): 2582-7839

Comparative Analysis of Properties of Yarn Made from Vortex Blended, Ringspun Blended and OE Blended

M. Parthiban[1*], R. Sridhar[2], S. D. Vedhabhashini[3], S. Sudhan[4], S. Rajesh Kumar[5]
[1,2,3,4]*Student, Department of Textile Technology, Bannari Amman Institute of Technology, Erode, India*
[5]*Assistant Professor, Department of Textile Technology, Bannari Amman Institute of Technology, Erode, India*

***Abstract*: The structures and properties of the yarn made from the ring, Rotor and Vortex spinning systems are totally different. Each spinning system has its own advantages and disadvantages in terms of its technical and commercial viability. 24s count, 60:40 cotton polyester blend is get produced in Ring spinning, Vortex spinning, Rotor spinning with the industry provided processing parameter (i.e., Break draft, Main draft, cradle length setting, RH value, hank from carding to speed frame, Tension, TPI, Tapper angle, Doffing length, with below 2% coefficient of variation. The yarn produced in the vortex spinning have low strength, water absorption, resistance to pilling, wash resistance, fine printing where the ring spun have more strength. The vortex yarn being porous has a higher diameter compared to ring and OE yarn. Adding more strength to vortex yarn result in applying in various application. The primary goal of the project is to examine and contrast the yarn characteristics of the ring, rotor, and vortex (Um%, CSP, Elongation, Breaking point, etc.). We studied in the way of yarn with a change in procedure, qualities alter. we used a graphical representation to assess the different yarn qualities. Finally, in this project we are identifying the different properties of produced yarn and its application.**

***Keywords*: Textile, Spinning, Ring spun yarn, Rotor yarn, Vortex yarn, Yarn properties.**

1. Introduction

The majority of the yarn used in the clothing industry is produced using conventional ring spinning methods. Cotton fibre can be spun using any one of three different methods: classic ring spinning, open-end spinning, or Murata Vortex spinning. The characteristics of a yarn depend on its constituent fibre and how it spreads across a body cross-section. Different spinning techniques, as well as the yarn's structure, have an impact on the delicate interaction between the formation of fibre and yarn. The yarn produced by the conventional ring spinning technique has tightly coiled fibres.

The air vortex spinning technology has drawn more interest from the textile industry due to some unique qualities and better production rates. Moreover, air vortex yarn-knitted fabrics have excellent resilience, superior resistance to pilling and abrasion, and moisture content absorption. So far, modern spinning techniques like rotor, air-jet, and friction produce yarn that resembles a tangle of fibres more. That occurred due to a geometrical inconsistency in the yarn's manufacture. There is proof that the draughts produced by the ring, rotor, and air-jet machines have an effect on the tensile properties of yarn. Process variables have a considerable impact on the yarn's physical properties. Understanding the structure of yarn and how it impacts its physical features is crucial since every spinning machine creates yarn with different physical properties. There have been continuing efforts for several decades to change the way that ring spinning is now done in order to enhance technology, including automation and process capability expansion. Every spinning method produces yarns with different structural characteristics. Because the fibres are organized in a helix, ring spun yarns have a homogeneous fibre core. In open-end rotor spun yarns, the core fibres that make up the inner portion twist as they are produced. Yet, the wrapping of a portion of the fibres around already spun yarn is what makes open-end rotor spun yarns distinctive.

Due to the multiple doubling or back doubling of the fibres in the rotor groove and the fact that the ultimate thickness of rotor spun yarn is formed of numerous tiny layers of fibres, rotor yarns are less uneven than ring spun yarn. Moreover, rotor spun yarns are less affected by roller drafting wave than ring yarns since they are made of silver and have opening roller drafting.

Rotor spun yarns are more consistent, a little weaker, and have a rougher feel than ring spun yarns. Rotor spinning can yield counts ranging from medium (30 Ne, 20 tex) to coarse (10 Ne, 60 tex). The use of this system has two key advantages. Because it is fed by a sliver rather than roving like the ring frame is, it eliminates the speed frame from the production line. In order to improve the quality of the yarn, it can also be altered to remove any remaining trash.

Because it has superior evenness, less pilling and static electricity, and better processing performance, cotton and polyester mixed yarn is used more commonly to make garments. The more traditional Murata Jet Spinners (MJS), which used 100% synthetic spinning technology and principally a cotton blend, were replaced by the more contemporary Murata Vortex Spinner (MVS). MVS yarn is renowned for its fabrics'

---

*Corresponding author: parthiban.tx19@bitsathy.ac.in

exceptional abrasion and pill resistance. They also provide a very smooth fabric handle in contrast to yarns spun using other types of technologies. The short staple fibres employed in the vortex spinning technique have a length of up to 38 mm and are distributed outward from the centre of the skeins. Vortex yarns' tensile strength and elongation are tightly controlled since they are limited in how many twists they can have compared to ring spun yarns. Vortex yarns typically have a 20% less breaking force and elongation at break than yarns.

There are very few studies comparing the properties of vortex spun yarn with those of traditional ring and open-end rotor spun yarns. In order to clarify the intended usage of a particular mix with a 24s count, we researched the structure and characteristics of 60:40 cotton Polyester Vortex spun yarns and compared them with ring and open-end rotor spun yarns

2. Material and Methods

A. *Fiber Pre-Testings*

24's Ne Cotton/Polyester blended yarns in proportion of 60:40 were produced on vortex, ring and rotor spinning systems were produced from these yarns for comparison. S6 cotton was used for this purpose. And the Reliance polyester is choose as the blend.

Table 1
Fiber tests

Fiber Property name	Shankar - 6	Reliance Polyester
SCI	148	
Density (g/cm^3)	1.52	1.35
Fiber finess (dtex)	1.70	1.2
Moisture regain %	7.5	
Maturity ratio (-)	0.82	
Staple length (mm)	27	38
Tenacity (g/tex)	26.7	7.14
Elongation (%)	6.6	

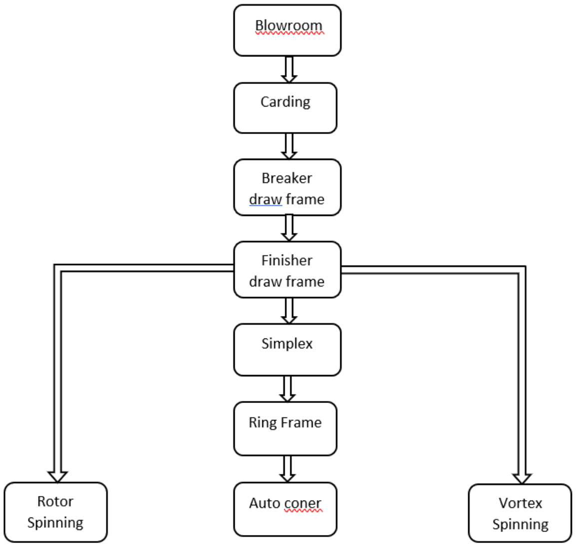


Fig. 1. Yarn production methodology

B. *Blow Room Process of Shankar 6*

1) *Bale plucker*

The first shankar 6 cotton is processed through the blowroom for opening and cleaning process. The S6 cotton in form of bale upto 158Kg in order of 130 bales are keep in the single bale line LA23s Bale plucker. The Wobbling disc pick the cotton by the strong air force and it passes through the next machine. Here, by It eliminates awfully small tufts and micro-tufts from bales. These micro-tufts are de-dusted and the impurities in them are removed much more proficiently in the later processes.

2) *Vetal metal detector*

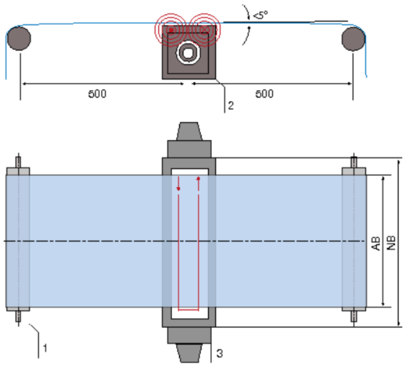


Fig. 2. Metal detector

An alternating magnetic field at a frequency of 200 kHz is produced in the scanning region by a transmitter coil driven by an oscillator. If any conductive metallic particles enter the magnetic field, an induction current is generated and received in a coil, which separates the metal particles.

3) *Spark detectors*

Fig. 3. Spark detector

Cotton is processed in the blow room before spinning begins, where sparks might happen in any area. Spark detectors in certain locations detect the threat right away, long before a fire may start. And the valve to the tiny dust splitter closes when there is a spark. and suddenly it's are sucked out of the factory and dipped in the water

4) *Uniclean LB9/2*

The cotton is then sent through LMW's Varioclean where it is made to travel across the grid five times, each time exposing it to a new surface area. In addition to the grid, the tufts pass through a specially arranged perforated sheet five times.

The cleaning in the drum is started by the angle that has been selected in the grid. The speed of the rollers also increases the cleaning's intensity. Then the cotton is feed into the mixer.

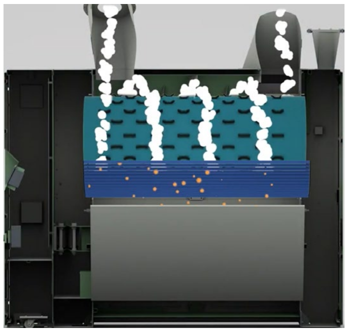


Fig. 4. Uniclean LB9/2

Table 2
Machine specifications

Machine	Varioclean
Made by	LMW
Model	LB9/2
Beater speed	420RPM

5) *Unimix LB7/6*

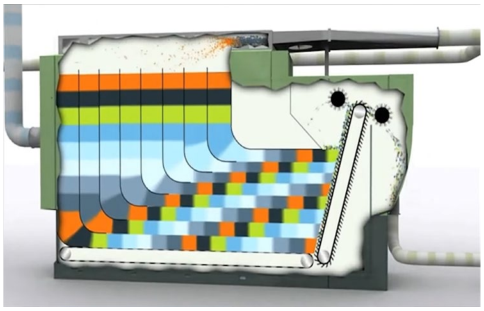


Fig. 5. Unimis mixing principle

Fig. 6. Unimix in the factory

1) The tufts are deflected by 90 degrees, which causes the layers to briefly alter. As a result, it produces good mixing.
2) The spike lattice simultaneously eliminates every tuft from every one of the eight compartments. Here, there is a slight opening that leads to proper tuft mixing.
3) The tufts undergo a third rigorous mixing in the mixing roller zone. It enhances the blending of the fibre.

So, the unique 3- point mixing principle with 8 mixing chambers produces a good, permanently homogeneous fiber mix. This is the precondition consistently high yarn quality. The cotton is mixed well and the cotton is feed into the flexiclean for course cleaning via a foreign particle detector Vetal Scan.

6) *Vetal Scan (Foreign particle separator)*

Fig. 7. Vetal Scan (FPS)

The scanner looks for and eliminates foreign objects like feathers, coloured fabric parts with discoloured threads, and yellow fabric fragments line by line. Use sonic acoustic or ultrasonic sensing to examine cameras and high-density contaminants such as white or transparent polypropylene, plastic, and pieces of coloured polythene bags. A strong pneumatic air pressure separates the identified particles. The cotton comes as the 70% cleaned cotton and the waste is sucked into VXL. The cotton is feed into the fine cleaning machine flexiclean.

7) *Flexiclean (Fine cleaning)*

Fig. 8. Flexiclean

- The tufts from the previous machine unflex due to the strong air force. The tufts are gathered as they drop into the filling chute. The slots in the aluminium lamellae that make up the back wall of the chute allow air to escape.
- At the first stage of dedusting, the uniform, homogeneous batt is produced in a length and across direction. The material is transferred to a perforated drum and a plain drum (second dedusting process).
- The distance between the feed trough and the opening cylinder is predetermined depending on how the material is treated. Depending on the requirements of the material, a broad range of options are available for the opening cylinder. The opening cylinder's speed can be altered based on the raw material and the desired result.

- The seed and micromaterial are removed here. After that, the cotton enters the mixing chamber. The cleaning surface and impurities are formed by a grid made of carding segments and knives. By adjusting the knives' settings, the level of cleaning and the number of openings can be changed. The cotton that was accidentally spilled into the chamber has been gathered and is ready to be mixed with the polyester.

8) *Manual hand mixing*

Fig. 9. Cotton/Polyester Hand mixing

The fibers are blended manually by hand according to the ratio of fiber blend. For the Cotton/Polyester 60:40, the cotton from the flexiclean is layered on the floor (6 kgs) and next the polyester from the bale is finely opened by the bale mixer and layered on above the cotton, again the layering process is carried for 2 sets, totally 18kgs cotton and 12kgs polyester are cutted well and blend well by hand mixing. The blending is done for 3 times, so the fibers will looks in good blend.

The material is ready to get into the (BO-E Mixing bale opener).

9) *Mixing bale opener (Trutzschler)*

The blended material is transported to the BO-E mixing bale opener. From the stripping roller, the material flocks are thrown into the trunk where they are directed into two spring-loaded feed rollers.

Fig. 10. BO-E Bale opener

The compressed cotton sheet that is supplied by the feed roller is vigorously battered by the saw-toothed cylinder. The material is divided into smaller flocks by this pounding action. A saw-toothed cylinder that is used to extract heavy rubbish and sand projects the flocks throughout the grid. The cotton falls down.

An exhaust fan at the top of the machine will suction the dust, air, and short fibres from within the machine through perforated sheet in addition to the cleaning through grid bar system. This pepper trash is taken by pneumatic pipe to the cellar (dust chamber).

10) *Multimixer – Trutzschler*

Fig. 11. Multimier process

The tufts are deflected by 90 degrees, which causes the layers to change momentarily and in a new way. As a result, it produces good mixing. The eight compartments' eight tufts are simultaneously removed by the spike lattice. There is a tiny gap here that allows for correct tuft blending. The mixing roller zone performs a third thorough mixing on the tufts. It improves how the fibres mix. As a result, a good, dependably homogeneous fibre mix is produced by the 8 mixing chambers and unique 3-point mixing mechanism. This is a requirement for consistently high yarn quality. The material is completely mixed after going through the multimixer before being fed straight to the carding machine (chute feed).

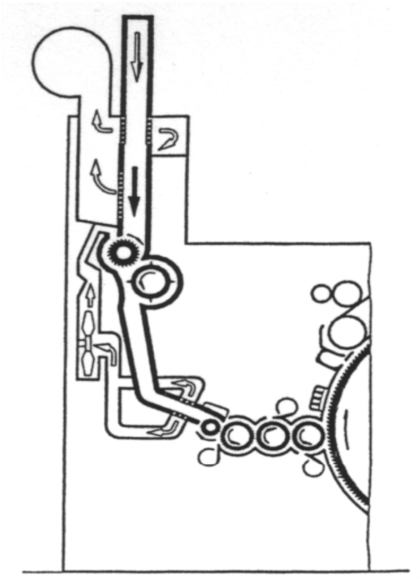
C. *Carding Process*

1) *Parameters*

The tufts are introduced into feed uniformly thanks to the excellent cleaning. The fibre tufts are separated from the transported air, and they subsequently combine to create a homogeneous, uniform batt. The air disappears.

The built-in mote knives swiftly remove the rubbish fragments, and the feed roller, feed trough, and needle cylinder reduce the size of the tufts and supply them to the next step. The tufts are then passed into the lower portion using the increased blowing air. The perforated back wall's additional washing function causes impurities to collect in the down.

Table 3
Carding parameters

Machine model and count	Trutzschler DK903
Trutzschler DK903; KHC coiler	3 Licker in 1st: 1024rpm 2nd: 1589rpm 3rd: 2083rpm
No. of flats	94
No. of working flats	36
Cylinder speed	430rpm
Chute feed Thickness	4mm
Feed Weight	900g/Min
Doffer speed	380rpm
Draft	90
Hank	0.11
Sliver can capacity	10,000m
Delivery speed	110m/min
Sliver hank variation	<2.5%
Feeding System	
Licker in	10 fibers per wire point
Main cylinder	10 wiring points per fiber
Machine model and count	Trutzschler DK903

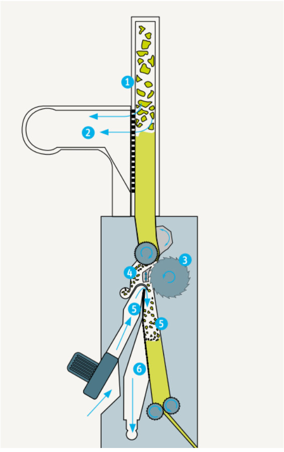


Fig. 12. Feed part in carding

In the chute, a batt of between 500 and 900 ktex is created that is uniformly compressed. This batt is transported to the feed arrangement by a transport roller. This is made up of a feed roller and a feeder plate that work together to slowly push the fibre sheet into the licker-operating in's range.

These tufts are transported over grid equipment and transferred to the main cylinder. As travelling past mote knives, grids, carding segments etc., the material loses most of its impurities

The waste is taken care of via suction ducts. The tufts are transported along with the main cylinder and separated into individual fibres between the cylinder and the flats during the actual carding process. The flats are constructed of 80–100 distinct carding bars that are joined to create a belt that moves endlessly. Currently, 25 to 35 flats are arranged with respect to the main cylinder in the carding position.

Fig. 13. Caring process

- The tufts are introduced into feed uniformly thanks to the excellent cleaning. The fibre tufts are separated from the transported air, and they subsequently combine to create a homogeneous, uniform batt. The air disappears.
- The feed roller, feed trough, and needle cylinder reduce the size of the tufts and deliver them to the next stage while the built-in mote knives quickly remove the trash fragments. Then, utilising the stronger blowing air, the tufts are passed into the lower part. Impurities gather in the down as a result of the increased washing action of the perforated back wall.
- A consistently compressed batt of between 500 and 900 ktex is produced in the chute. A transport roller moves this batt to the feed arrangement. This is composed of a feed roller and a feeder plate that cooperate to gradually move the fibre sheet into the range of the licker-operating device. These tufts are supplied to the grid using grid equipment and foremost cylinder. As travelling past mote knives, grids, carding segments etc., the material loses most of its impurities.
- Suction ducts are used to handle the waste. The real carding procedure involves splitting the tufts into individual fibres between the cylinder and the flats while they are being transported with the main cylinder. The flats are built from 80–100 different carding bars that are connected to form a belt that moves constantly. In the carding position, 25 to 35 flats are currently

positioned in relation to the main cylinder.

D. Breaker Draw Frame Process

1) Parameters

Table 4
Breaker draw frame parameters

Model	TD7
Roller setting	4 over 3 rollers
Break draft	1.6
Main draft	3.4
Total draft	5.45
Speed	350RPM
No. of Doubling	6
Delivery Hank	0.1
Max delivery speed	310m/min
Loading type	Spring
Delivery can size	20” X 45”/48”

- The pressure bar and front roller settings are always combined. if the depth of the pressure bar is great. The creel height is kept as low as possible with high depth pressure bars, particularly while processing combed cotton.
- The configuration of the silver monitor is exact. In the event of a linear density variation in the silver, the open-loop auto leveller instantly stops the machine. When there is a problem with the silver weight, the machine will halt. The auto leveller needs to be calibrated on a regular basis to ensure efficient performance

Fig. 14. Breaker draw frame process

- A draw frame with an automatic leveller chooses the mechanical draught in the right way. The draw frame is in an off position with the auto leveller active for calculating mechanical draught. The mechanical draught is accurate if the linear density of the sliver is investigated and found to be accurate. If the linear density of the silver changes without an auto leveller, gears must be adjusted to meet the needed weight per unit length of silver. The speed of correction and levelling intensity are two essential attributes of auto levellers.
- An unequal percentage of the delivered sliver occurs from improper timing of the auto leveller's adjustment. The auto leveller of today can adjust the sliver's total 25% feed fluctuation. In other words, it is capable of adjusting the variation of 12% on both the plus and minus side.

E. Finisher Draw Frame

1) Parameters

Table 5
Finisher drawframe parameters

Machine	RSB-D45
Break Draft	1.6
Main draft	3.4
Total draft	5.45
No. of Doubling	6
Front spacer	36mm
Back spacer	42mm
Drafting system	3 over 4 rollers
Top pressure	20kg
Delivery Hank	0.10
U%	1.8 – 2.1
A%	2.7%
CV%	3.5%
Monitoring system	Open loop Auto leveller
Sliver can capacity	6,000m
Delivery Speed	500m/Min

- Sliver uniformity will decrease with higher draught in the drawframe, although fibre parallelization will increase. Occasionally the negative consequences of sliver irregularity can be outweighed by the improvement in fibre parallelization.
- Improved fibre parallelization typically leads in more uniform yarns and a reduced end breakage rate in spinning.

Fig. 15. Finisher draw frame

- The majority of the improvement in fibre parallelization and decrease in hooks takes place at first drawframe passage rather than at second passage. In ring spinning, heavier sliver fed to the draw frame results in weaker, less-even yarn, higher levels of defects, and more end breaks. The acceleration point becomes unstable over time, which leads to irregularities.
- Individual fibre control is not achieved, but the aprons and rollers are used in the drafting zone to maintain the fibre at the rear roller velocity until the leading end is firmly grasped by the front roller. Drafting wave is

- primarily caused by periodic, uncontrolled fibre movement that results from mechanical faults rather than the defects themselves.
- Since the draught rises as the fiber-accelerating point gets closer to the front rollers (and vice versa), a periodic change in linear density is unavoidably the result. The drafting irregularity will be considerable with a variable fiber-length distribution (with a higher concentration of short fibre).
- The number of doublings increases with decreasing irregularity brought on by random fluctuations. Periodic flaws are typically not eliminated by doublings. But it reduces the consequences of random pulses. The Index of Irregularity is unaffected by doubling since the square root of the number of doublings reduces both irregularities.

F. Simplex Machine

1) Parameters

Table 6
Simplex machine parameters

Drafting system	4 over 4 rollers
Twist per inch	1.04
Break draft	1.07
Total draft	9.3
Top arm pressure	25
Bobbin dia	150mm
Doffing lenght	3600m
Traverse angle	26 degrees
Speed	812rpm
Delivery speed	17.6m/min

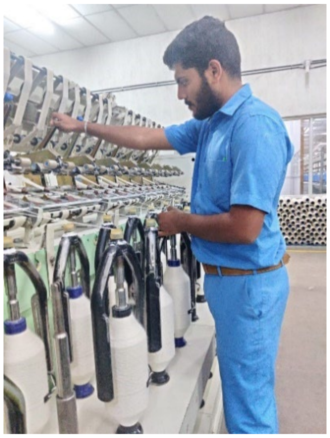


Fig. 16. Simplex machine

Creeling: Big cans of draw frame slivers are fed to the roving frame. The slivers are moved over the tension and guiding rollers after passing through separators. The slivers then pass through the drafting rollers.

Drafting: Drafting a piece of metal to lessen its weight per unit of length. In the drafting zone, pneumatic pressure is supplied over the drafting rollers, and the sliver is drafted to the required hank by the speed differential between the drafting rollers.

Twisting is necessary to reinforce the roving in order to prevent breakage during the following processing because the delivered drafted slivers are too thin to hold themselves together. The flyers receive the drafted fibre strands from the drafting zone and twist them.

Winding: The flyers give the fibre strands twist, enabling the roving to be coiled on a bobbin and used in Ring Frame Construction processing. The bobbin is built up by the bobbin rail's up-and-down movement, giving it a conical or tapper shape.

Doffing: When the roving bobbins are full, the machine stops, and doffing is done to remove the full bobbins and fix the empty bobbins with the necessary length of roving manually wound on the empty bobbins through Flyers for continued operation.

G. Ring Spinning

1) Parameters

Table 7
Ring spinning parameters

Machine	LMW LR6/S
Roller type	3 over 3 drafting system
Speed for 40s/60s	17,200 RPM
TPI	19.51
TPM	775.3
Front roller speed	230.19
Space between front roller and middle roller	42.3mm
Space between middle roller and back roller	60mm
Doffer length for	5400m
Spacer	4mm
Ring Dia	38mm
Delivery Count	24s Ne

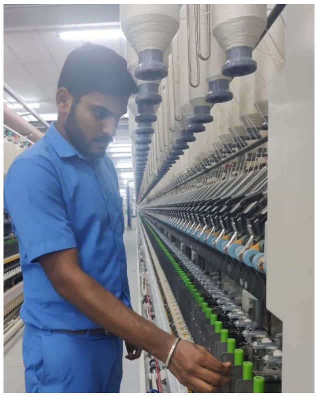


Fig. 17. Ring spinning process

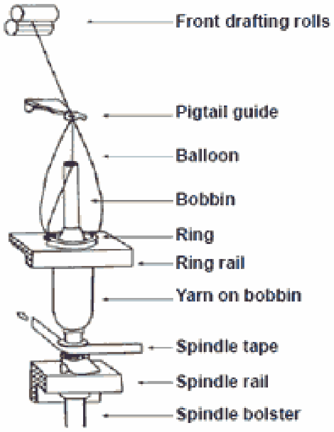


Fig. 18. Ring frame flow diagram

Ring spinning is the process of turning roving into yarn. The roving is first hung on a creel, then it is funneled through compressed rollers and onto a drafting system with three rollers above three. The wandering change in length per unit mass is brought on by the differential speed in the drafting. In order to keep the balloon formed on the front roller delivery, the ABC (balloon controlling) is employed. If the ABC is not utilized, the yarn will move to the nearest spindle and run the risk of breaking easily. The fibre is given twist by the traveller in the spinning ring, which rotates anticlockwise to the spindle.

H. Vortex System (MVS)

1) Parameters

Table 8

Vortex machine parameters

Machine	MVS 840 EX
Yarn count	24s
Package length	48772m
Package weight	1200g
Yarn speed	480m/min
T.D.R	185
M.D.R	26
B.D.R	3.0
Fixed Ratio	0.995
Take up ratio	1.000
TRV angle	15.0deg
BR start up ratio %	100%
Spindle inner diameter	1.4mm
Space between front roller and spindle	19.5
Nozzle air pressure	5.0 kg/cm^2

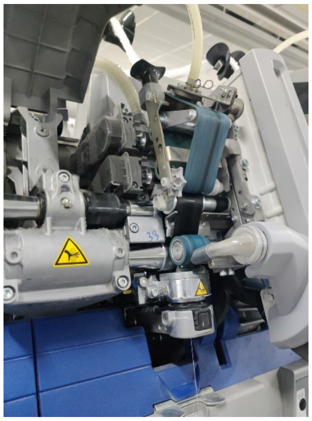


Fig. 19. Vortex gauge

Fig. 20. MVS machine

A four-roller apron drafting system used in vortex spinning draughts pulled cotton sliver to the required yarn count (fineness). The drafted fibres are then drawn into a nozzle, where they are swirled at high speed around the outside of a stationary spindle that is hollow (see below image). The free fibre ends are truly twisted around the bridge fibres by a revolving air vortex, creating a ring yarn-like structure. This enables the processing of carded yarns as well. The twist is introduced as the fibres wind around the spindle's peak and are then drawn down a shaft that passes through the spindle's centre.

The finished yarn is cleaned and coiled right into a packaging that the mill can easily sell. Once the yarn's flaws have been fixed, it is wound onto a packaging. The majority of the fibres do not acquire the erroneous twist during yarn creation because the guide component prevents twist propagation. Moreover, the bundle's entire outer periphery experiences fibre detachment from the bundle. As a result, there are more wrapper fibres in the yarn. Because of this, vortex spun yarns have a structure that is more akin to ring yarns than air jet spun yarns and have a greater proportion of wrapper fibres.

I. Rotor Yarn Production

1) Parameters

Table 9

Rotor machine parameters

Machine	Schlafhorst bd 380
Feed hank	0.11
Total draft	166
TPI	18
Delivery Speed	90m/Min

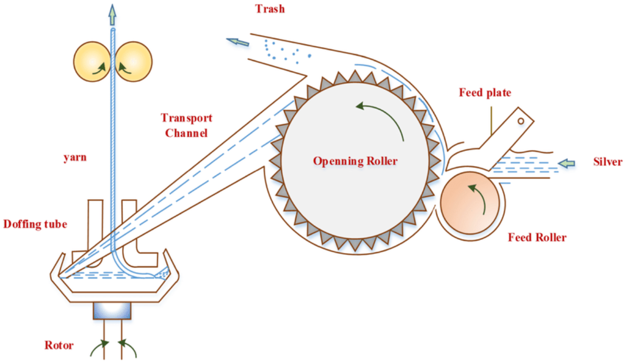


Fig. 21. Rotor machine operational diagram

This process involves separating the draw frame supply's fibres from one another on an opening roller, allowing air to enter, guiding the fibres through a fibre guide channel, and feeding the rotor. The fibres arrange themselves into a ring inside the housing for the rotating rotor. The fibres are removed from this spinning ring in a plane that is roughly perpendicular to the fibre ring. When the fibres exit the fibre ring plane, the rotation of the rotor causes twists in the fibres. The fibres are consolidated as a result, coming together to create a yarn. To construct the fabric, this yarn is turned away from the open-end portion and wound on a cylindrical bobbin. an encircled packet. The idealised helicoid shape found in a ring yarn is not present in the fibres due to the fiber-yarn geometry during twist insertion. Furthermore, fibres will occasionally coil across the yarn's longitudinal axis on the thread. Wrappers are the names for these areas.

3. Results and Discussion

Evaluation of the yarn's attributes According to the ISO 139 standard, all of the yarns were condition for 24 hours in a lab setting. In the Uster Test fast, single yarn tenacity was evaluated. The environment for the test was 21 °C and 60% relative humidity. The test length of the specimen of 500 mm is maintained during the testing. The fibres are tested

Table 10
Fiber properties from HVI

Fiber Property name	Shankar - 6	Reliance Polyester
SCI	148	
Density (g/cm^3)	1.52	1.35
Fiber finess (dtex)	1.70	1.2
Moisture regain %	7.5	
Maturity ratio (-)	0.82	
Staple length (mm)	27	38
Tenacity (g/tex)	26.7	7.14
Elongation (%)	6.6	

For this study, 24 Ne (60:40) Polyester cotton blended yarns were from three different spinning systems namely ring, rotor and air vortex (MVS). These techniques offer yarn with various structural and physical characteristics. Regarding technical viability and financial feasibility, each system has its own pros and disadvantages.

1) *Single yarn strength*

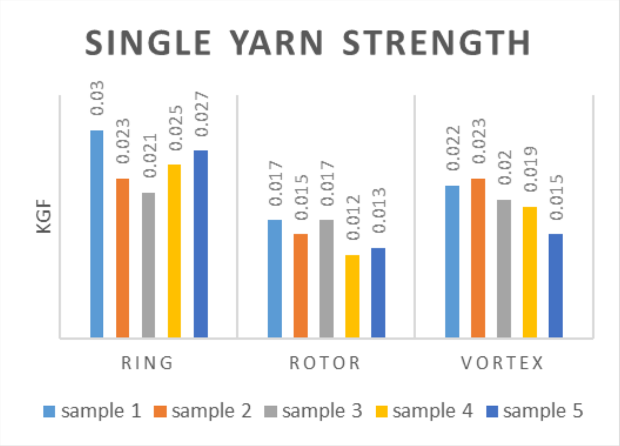


Fig. 22. Single yarn strength representation

The serviceability of the final product must take yarn strength into account. The strength of a single yarn is represented. Considering the outcomes When compared to vortex and rotor yarn, the ring spun yarn's tensile strength is much stronger (0.027 kgf). Rotor yarn has a high degree of elongation (53 mm)

Ring-spun yarn features envelope twist, which twists in the fibres from the outside to the inside, as opposed to rotor-spun yarn's core twist, which twists in the fibres from the inside out. Hence, rotor spun yarn is heavier, rougher, and more open than ring spun yarn. It is possible for some fibres in the envelope layer of a rotor-spun yarn to partially evade twisting action during spinning and therefore take on turns of twist.

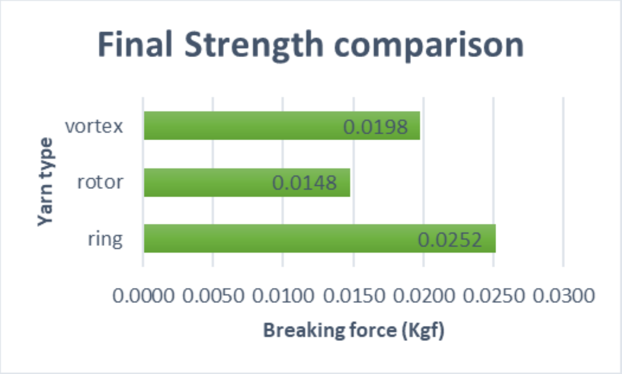


Fig. 23. Yarn strength comparison

B. *Yarn Elongation*

The ultimate product and further processing are both impacted by yarn elongation. Figure 24 displays the three yarns' elongation percentages.

Rotor-spun yarn performs better than ring-spun yarn in terms of elongation at break (%) in contrast to yarn strength. Rotor-spun yarns have a greater elongation at break than normal yarns, according to Uster Data. comparable ring-spun yarns

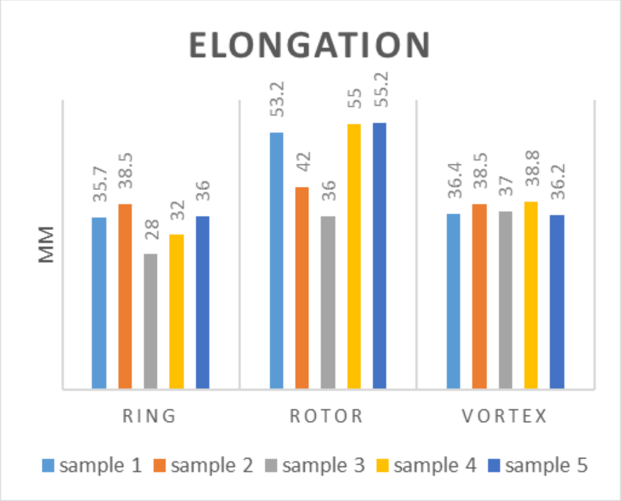


Fig. 24. Yarn elongation representation

C. *RKM Value*

The RKM value is high in vortex yarn compared to other two yarns due to the wrapping of all fibres which giver more. binding points.

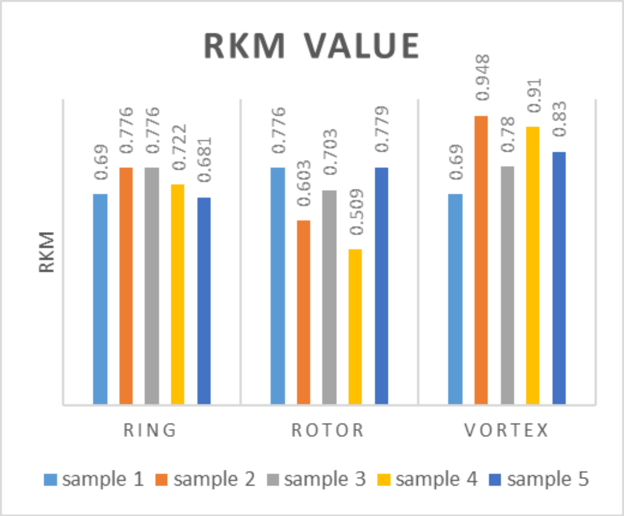


Fig. 25. RKM representation

4. Conclusion

In this study, the yarn properties of the vortex yarn spinning system were contrasted with those of conventional ring spinning. Results reveal that the tenacity of the ring yarns expresses greater value than rotor spun yarn and the elongation% of the ring yarns has a much lower value than that of rotor yarn, as well as to look at how the yarn's qualities represent.

The vortex spinning system appears to have a suitably wide range of yarn counts and the ability to spin finer yarns when compared to open-end rotor spinning technology.

The ring yarns are appropriate for all tough application textiles, such as shirts and pants. Vortex methods have been widely employed in leggings, innerwear, and soft applications for high water absorption.

References

[1] Kostajnšek, Klara and Krste Dimitrovski. "Comparative Study on the Properties of Vortex and Ring Spun Yarn and the Properties of Woven Fabrics Containing Those Yarns in Weft." Fibres & Textiles in Eastern Europe 24 (2016): 59-65.