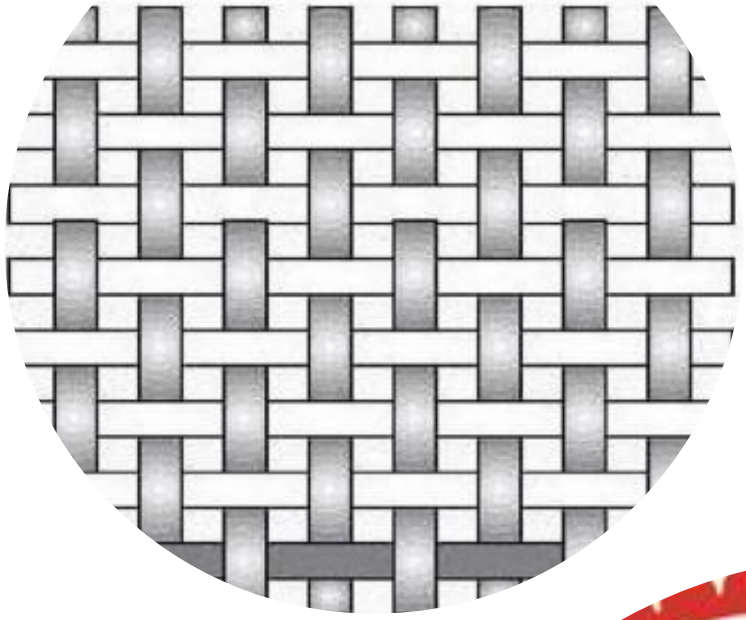
Fabric Manufacturing I (TXL231)



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Winding- The Objectives

- To wrap the forming yarn on a package in a systematic manner or to transfer yarn from one supply package to another in such a way that the latter is adequately compact and usable for the subsequent operations.
- To remove the objectionable faults, present in original yarns.

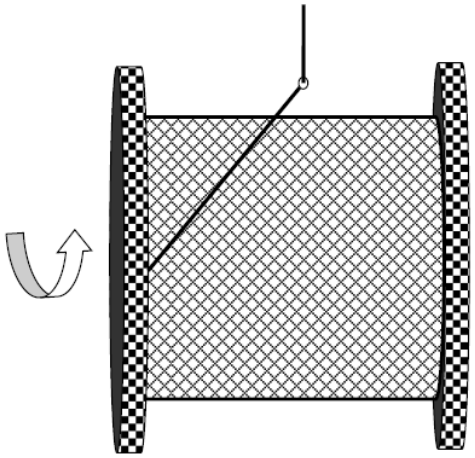
One ringframe bobbin (cop) typically contains around 100 grams of yarn. If the yarn count is 20 tex, then the length of yarn in the package will be around 5 km. As the warping speed in modern machines is around 1000 m/min, direct use of ringframe bobbins in warping will necessitate package change after every 5 minutes.

This is not a feasible solution..

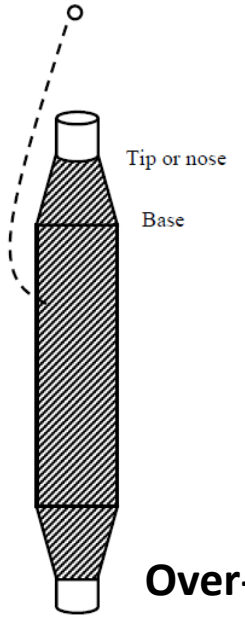
Winding- Basic Motions

- First, the rotational motion of the package, on which the yarn is being wound, is required. This rotational motion pulls out the yarn from the supply package.
- Second, the traverse motion is requited so that the entire width of the package is used for winding the yarn

The process of withdrawing yarn from supply package during winding



Side withdrawal

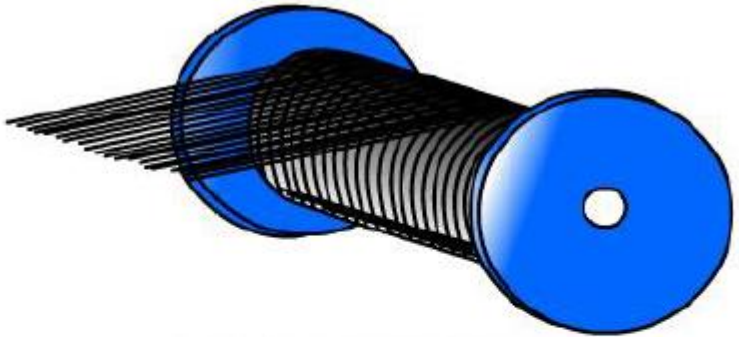


Over- end withdrawal

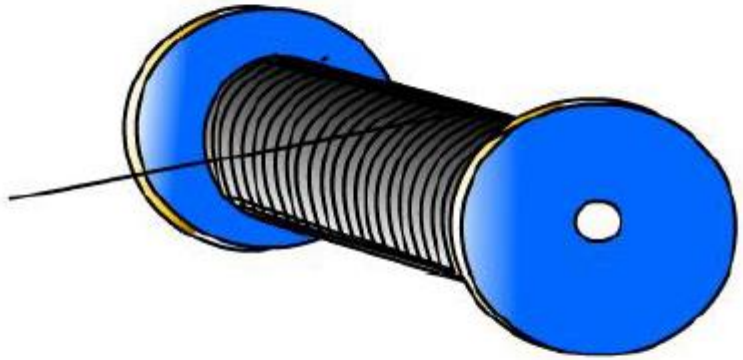
For flanged packages- Side withdrawal
For ringframe bobbin- over-end withdrawal

Types of Wound Packages

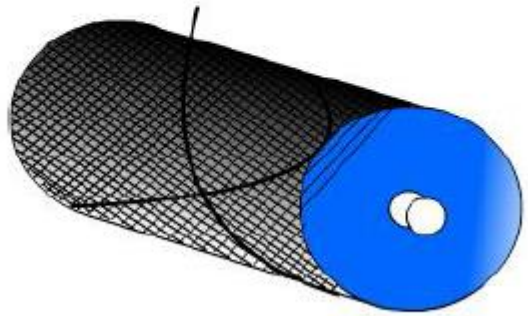
- In parallel wound package, yarns are laid parallel to each o
- In nearly parallel wound package, successive coils of yarn a laid with a very nominal angle. The rate of traverse is very in this case.
- In cross wound package, yarns are laid on the package at considerable angle.



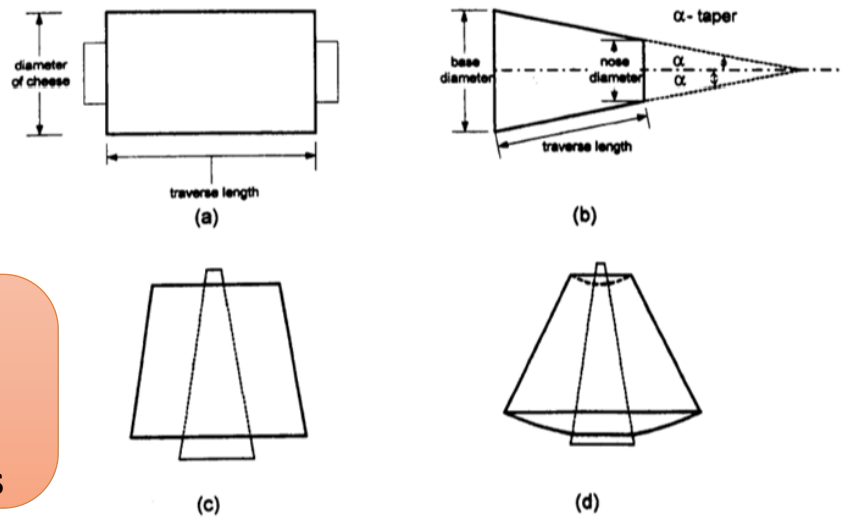
Parallel Wound Packages



Nearly Parallel Wound Packages



Cross Wound Packages

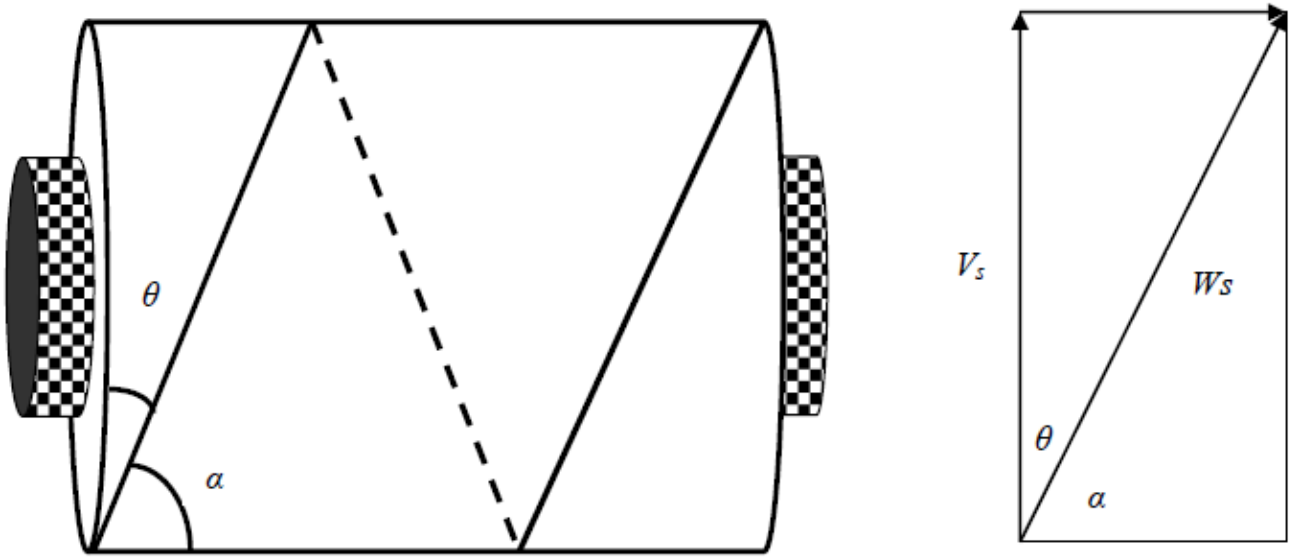


Types of cross wound- (a) Cheese (b) Cone (c) Tapered cone and (d) Accelerated-tapered cones

Some Definitions in Winding

- **Wind:** It is the number of revolutions made by the package (i.e. number of coils wound on the package) during the time taken by the yarn guide to make a traverse in one direction (say from left to right) across the package
- **Angle of wind (θ):** It is the angle made by the yarn with the sides of the package
- **Coil angle (α):** It is the angle made by the yarn with the axis of the package. The coil angle and angle of wind are complementary angles as they add up to 90^0

$$\tan\theta = \frac{V_t}{V_s}$$



$$\text{Winding speed} = W = \sqrt{\text{Surface speed}^2 + \text{Traverse speed}^2}$$

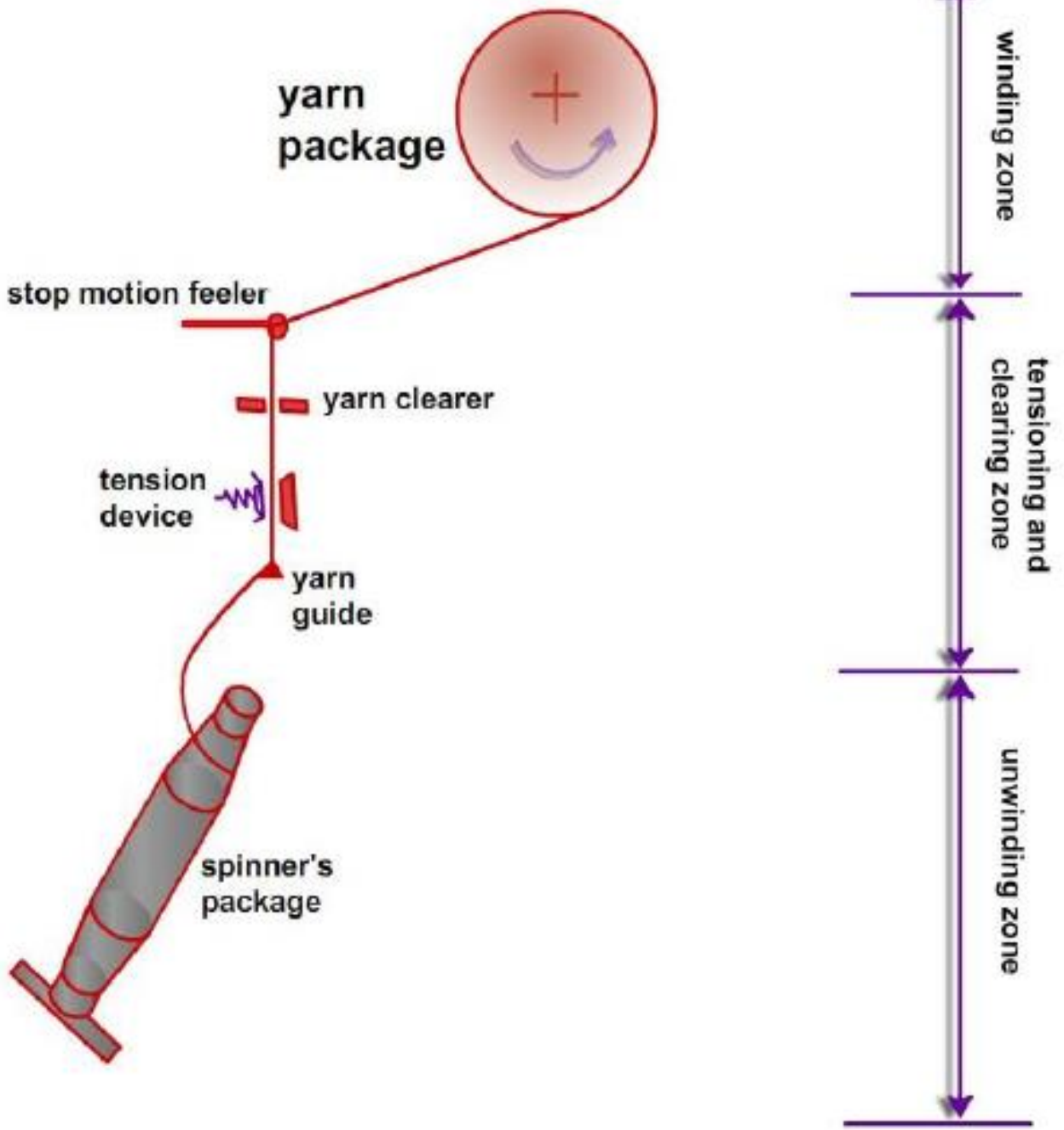
$$= \sqrt{V_s^2 + V_t^2}$$

Winding Machine

Yarns are wound on the package by means of rotational motion of the package and traverse motion of the yarn guide

Tensions are applied on the yarns by using tensioners so that yarns are wound on the package with proper compactness

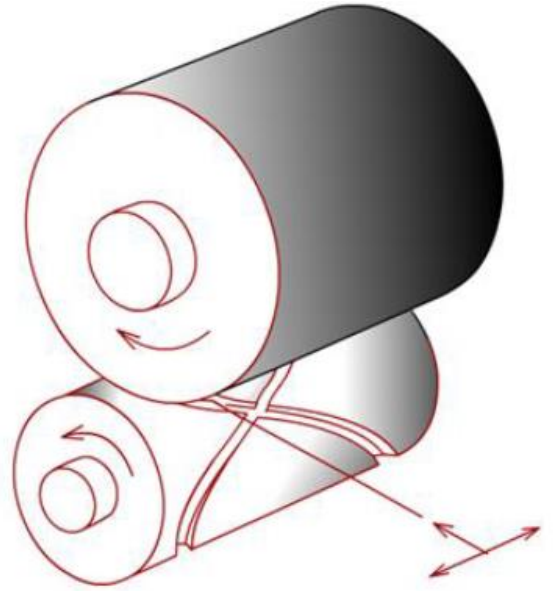
Yarns are unwound from the supply package which is ringframe bobbin in most of the cases. Yarn balloon is formed due to the high-speed unwinding of yarn from the supply package.

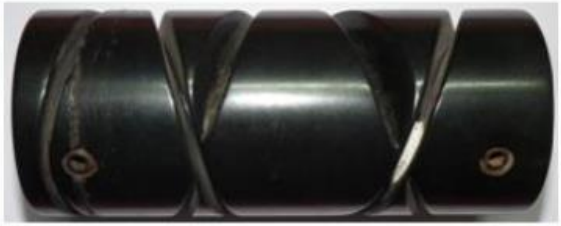


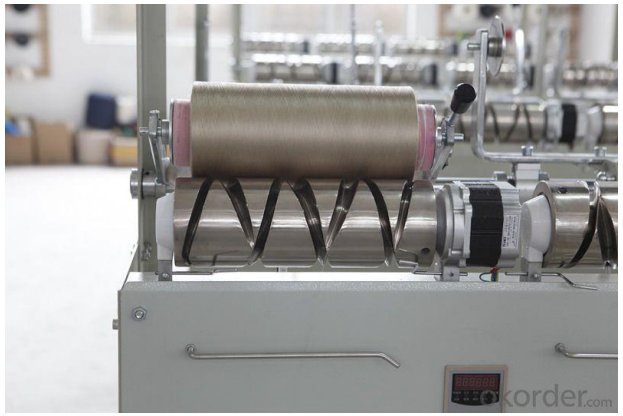
Winding Principles- Drum-driven

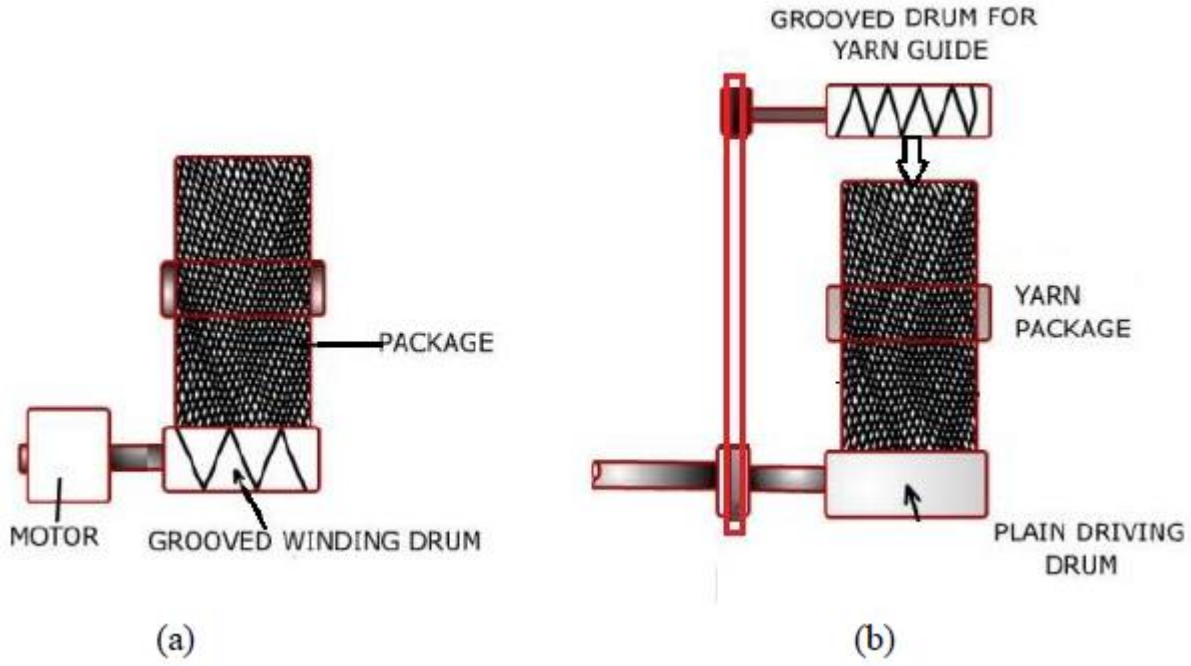
In drum-driven winder, the package is driven by a cylinder by surface or frictional contact

Traverse of yarn is given either by the grooves cut on the or by a reciprocating guide







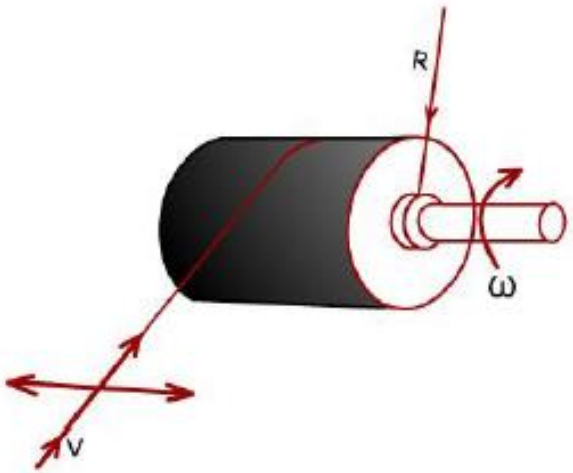


Winding Principles- Spindle-driven

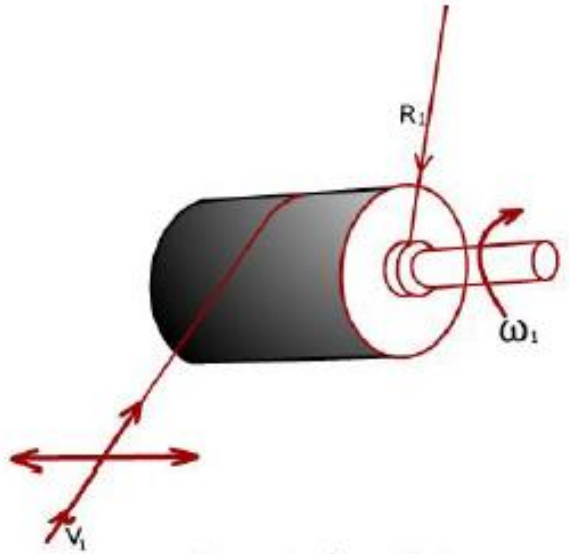
In spindle-driven winder, the package is mounted on a spindle which is driven positively by a gear system

Constant r.p.m. spindle winders **Variable r.p.m. spindle winders**

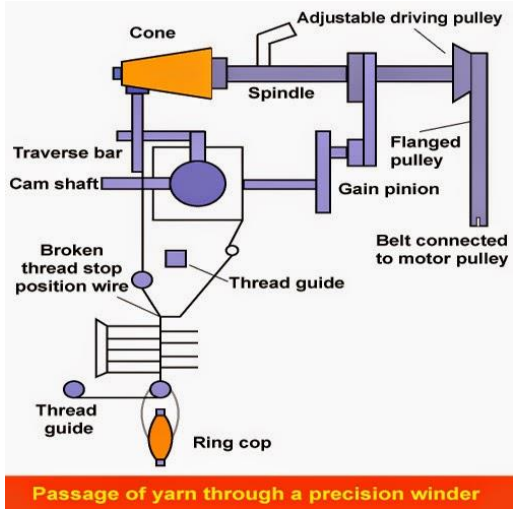
Spindle-driven winders are also known as precision winders as a precise ratio is maintained between the r.p.m. of spindle and r.p.m. of traversing mechanism



ω is constant
v increase as R increases



ω1 is varied as R1 increase so as to keep V1 constant



Passage of yarn through a precision winder

Precision winders are preferred for winding delicate yarns as the package is not rotated by the surface contact and therefore the possibility of yarn damage due to abrasion is lower as compacted to that of surface driven winders.