ROVING FRAME

Roving machine is complicated, liable to faults, causes defects, adds to production costs and delivers a product that is sensitive in both winding and unwinding. This machine is forced to use by the spinner for the following two reasons.

1. Sliver is thick, untwisted strand that tends to be hairy and to create fly. The draft needed to convert this is around 300 to 500. Drafting arrangements of ringframes are not capable of processing this strand in a single drafting operation to create a yarn that meets all the normal demands on such yarns.
2. Drawframe cans represent the worst conceivable mode of transport and presentation of feed material to the ring spinning frame.

- TASKS OF ROVING FRAME:
    1. Attenuation- drafting the sliver into roving
    2. twisting the drafted strand
    3. winding the twisted roving on a bobbin
- Fibre to fibre cohesion is less for combed slivers. Rollers in the creel can easily create false drafts. Care must be taken to ensure that the slivers are passed to the drafting arrangement without disturbance. Therefore, a perfect drive to the creel rollers is very important.
- The drafting arrangement drafts the material with a draft between 5 and 15.The delivered strand is too thin to hold itself together at the exit of the front bottom roller.
- Bobbin and flyer are driven separately, so that winding of the twisted strand is carried out by running the bobbin at a higher peripheral speed than the flyer.
- The bobbin rail is moving up and down continuously, so that the coils must be wound closely and parallel to one another to ensure that as much as material is wound on the bobbin.
- Since the diameter of the packages increases with each layer, the length of the roving per coil also will increase. Therefore the speed of movement of bobbin rail must be reduced by a small amount after each completed layer
- Length delivered by the front roller is always constant. Owing to the increase in the diameter of the package for every up and down movement, the peripheral speed of package should keep on changing , to maintain the same difference in peripheral speeds between package and flyer.
- There are two types of drafting systems.
    1. 3/3 drafting system
    2. 4/4 drafting system

  In general 3/3 drafting system is used, but for higher draft applications 4/4 drafting system is used.

- The draft often has limits not only at the upper limit (15 to 20), but also at lower limit. It is around 5 for cotton and 6 for synthetic fibres. If drafts below these lower limits are attempted, then the fibre masses to be moved are too large, the drafting resistance becomes too high and the drafting operation is difficult to control. It is advisable to keep the break draft (predarft) as low as possible, because lower break draft always improves roving evenness.
- In general two condensers are used in the drafting arrangement. The purpose of this condensers is to bring the fibre strands together. It is difficult to control, Spread fibre masses in the drafting zone and they cause unevenness. In addion, a widely spread strand leaving the drafting arrangement leads to high fly levels and to high hairiness in the roving. The size of condensers should be selected according to the volume of the fibre sliver.
- Flyer inserts twist. Each flyer rotaion creates one turn in the roving. Twist per unit length of roving depends upon the delivery rate.
  Turns per metre = (flyer rpm)/(delivery speed (m/min))
  Higher levels of roving twist, therefore, always represent production losses in Roving frame and possible draft problems in the ring spinning machine. But very low twist levels will cause false drafts and roving breaks in the roving frame.
- Centrifugal tension is created at the bobbin surface as the layers are being wound and is created by the rotation of the package. Each coil of roving can be considered as a high-speed rotating hool of roving on which centrifugal tension increases with increasing diameter of the package. centrifugal tension in the roving is proportional to the square of the winding surface velocity. In this context,

ccentrifugal force acts in such a manner as to lift the top roving strand from the surface of the package so that the radial forces within the strand that hold the fibres together are reduced and the roving can be stressed to the point of rupture. Breaks of this type may occur at the winding-on Point of the presser or in strands that have just been wound on the top surface of the package. This phenomenon is known as "bobbin-bursting". This phenomenon will be prominent if the twist per inch is less or the spindle speed is extremely high when the bobbin is big.

- Apart from inserting twist, the flyer has to lead the very sensitive strand from the flyer top to the package without introducing false drafts. Latest flyers have a very smooth guide tube set into one flyer leg and the other flyer leg serves to balance the flyer. The strand is completely protected against air flows and the roving is no longer pressed with considerable force against the metal of the leg, as it is in the previous designs. Frictional resistance is considerably reduced, so that the strand can be pulled through with much less force.
- False twisters are used on the flyers to add false twist when the roving is being twisted between the front roller and the flyer.Because of this additional twist, the roving is strongly twisted and this reduces the breakage rate. Spinning triangle is also reduced which will reduce the fibre fly and lap formation on the front bottom roller. Because of the false twister, the roving becomes compact which helps to increase the length wound on the bobbin. This compactness helps to increase the flyer speed also.
- Roving strength is a major factor in determining winding limitations. It must be high enough for the fibres to hold together in a cohesive strand and low enough for satisfactory drafting at the spinning machine. The factors affecting roving strength are as follows:
    - the length, fineness, and parallelisation of fibres
    - the amount of twist and compactness of the roving
    - the uniformity of twist and linear density.
- BUILDER MOTION: This device has to perform the following tasks
    0. to shift the belt according to the bobbin diameter increase
    1. to reverse the bobbin rail direction at top and bottom
    2. to shorten the lift after each layer to form tapered ends
- Shifting of the belt is under the control of the ratchet wheel. The ratchet wheel is permitted to rotate by a half tooth. The bobbin diameter increases more or less rapidly depending upon roving hank. The belt must be shifted through corresponding steps. The amount of shifting, which depends upon the thickness of the roving, is modified by replacement of the ratchet wheel or by other gears.If a ratchet wheel with fewer teeth is inserted, then the belt is shifted through larger steps, i.e. it moves more rapidly, and vice versa.
- To form a package, the layer must be laid next to its neighbours. For that the lay-on point must continually be moved. The shift of the winding point is effected by moving the bobbin rail. This raising and lowering is done by rails.Since the package diamter is steadily increasing, the lift speed must be reduced by a small amount after each completed layer.

During winding of a package, the ratchet is rotated at every change-over.Reversal of the bobbin layer occurs little earlier for every reversal.This gives a conitnuous reduction in the lift of the rail . Thus bobbins are built with taper.