

## FAQ

### Module-8: Transmission shaft and drafting rollers

- 1) Does the factor of safety given to a shaft is to avoid its fracture during operation?

No. The shaft is designed to undergo elastic deflection during operation with stress much below the static tensile yield strength. The shaft is subjected to shear stresses; and it is weaker by 50% compared to that under static tensile load.

- 2) Why do we reduce the allowable shear stress if the shaft has keyway?

Material on the shaft is removed to pass the key to secure the gear/pulley. This reduces the effective diameter of shaft; hence the allowable stress is reduced by suitably increasing the shaft diameter.

- 3) The shaft carrying shock loads are heavy. Why?

Shafts undergo fatigue under shock load. Hence their diameters are larger compared with the ones subjected to gradual loads.

- 4) Why the permissible lateral deflection on bottom drafting roller is very low compared with transmission shafts mounted with gears?

The maximum permissible radial deflection ( $\delta$ ) at any gear is limited to 1 mm. In the case of drafting rollers, the maximum permissible lateral deflection is 0.05 to 0.075mm. Deflection above this may result in roller nip movement and periodic irregularity on drafted fibre assembly.

5) In long ring spinning machine how do we contain torsional deformation of bottom drafting rollers (roller twist) within permissible limit?

Short roller segments are screwed together to make long roller. Recently, in very long machines, the drafting rollers are made into two halves (left and right as two machines); both are independently driven by separate motors. This reduces the length of shaft by 50% that helps in reducing the angle twist of shaft.

6) How does the eccentricity in mounting the bottom drafting roller in the bearing affect the product quality and machine condition?

The eccentricity must be kept below 0.075 mm to avoid roller bowing and nip movement. Eccentricity also induces vibration forces on the bearing supports. Prolonged operation will subject the bearings to fatigue crack, which will not keep the roller in place. Over a period of time, the roller oscillates (nip movement), introduces periodic fault on fibre assemblies.