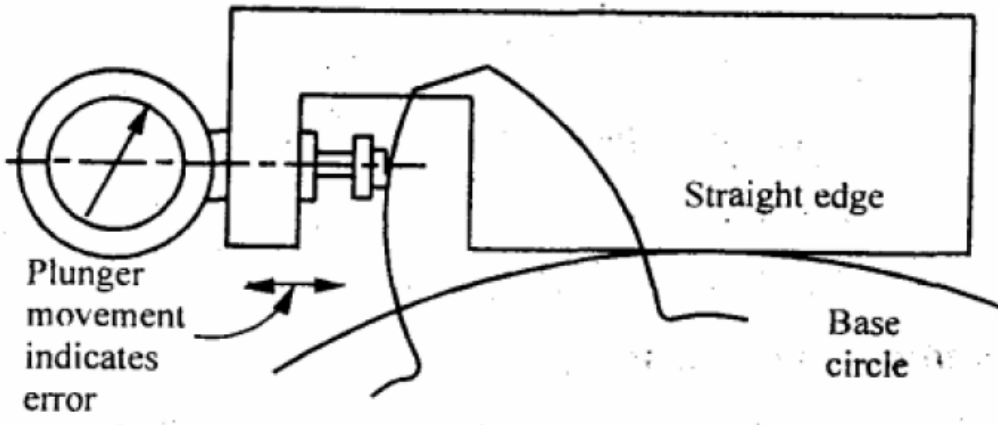
Gear Measurement

3. Gear profile checking

2. Involute measuring machine

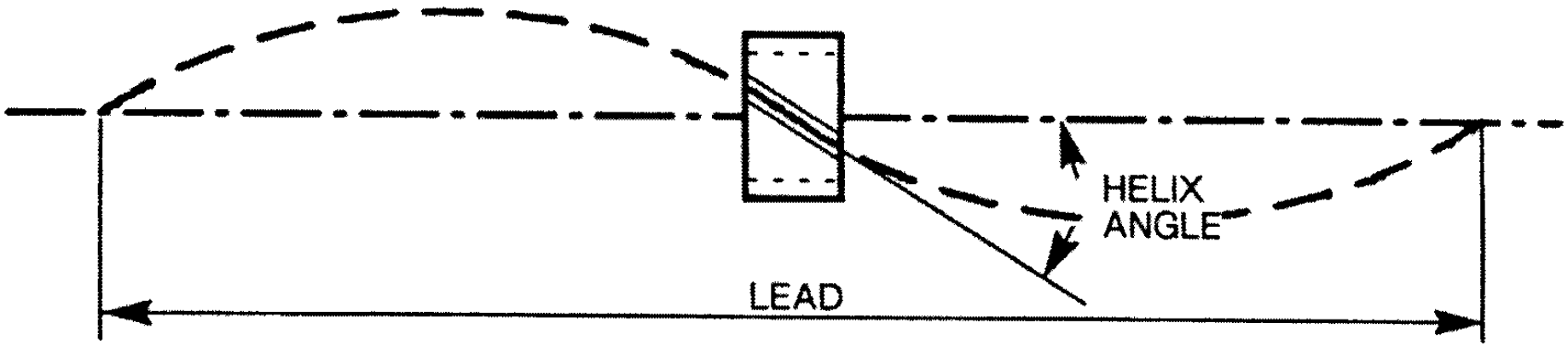
- In this method the gear is held on a mandrel and circular disc of same diameter as the base circle of gear for the measurement is fixed on the mandrel.
- After fixing the gear in the mandrel, the straight edge of the instrument is brought in contact with the base circle of the disc. Now, the gear and disc are rotated and the edge moves over the disc without sleep.
- The stylus moves over the tooth profile and the error is indicated on the dial gauge.



Gear Measurement

4. Gear lead checking

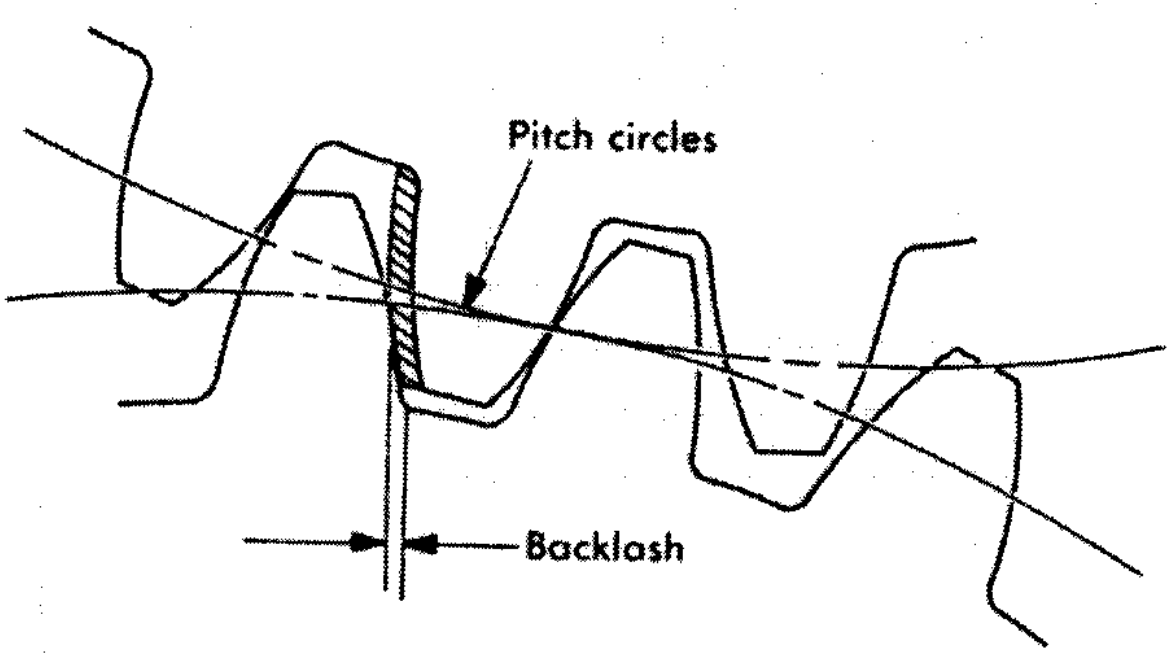
It is checked by lead checking instruments. Actually lead is the axial advance of a helix for one complete turn. The lead checking instruments are advances a probe along a tooth surface, parallel to the axis when the gear rotates.



Gear Measurement

5. Backlash checking

Backlash is the distance through which a gear can be rotated to bring its nonworking flank in contact with the teeth of mating gear. Numerical values of backlash are measured at the tightest point of mesh on the pitch circle.



Gear Measurement

There are two types of backlash

1. *Circumferential backlash*

2. *Normal backlash*

The determination of backlash is, first one of the two gears of the pair is locked, while other is rotated forward and backward and by the comparator the maximum displacement is measured. The stylus of comparator is locked near the reference cylinder and a tangent to this is called circular backlash.

Gear Measurement

6. Gear Tooth thickness measurement

Tooth thickness is generally measured at pitch circle and also in most cases the chordal thickness measurement is carried out i.e. the chord joining the intersection of the tooth profile with the pitch circle. The methods which are used for measuring the gear tooth thickness is

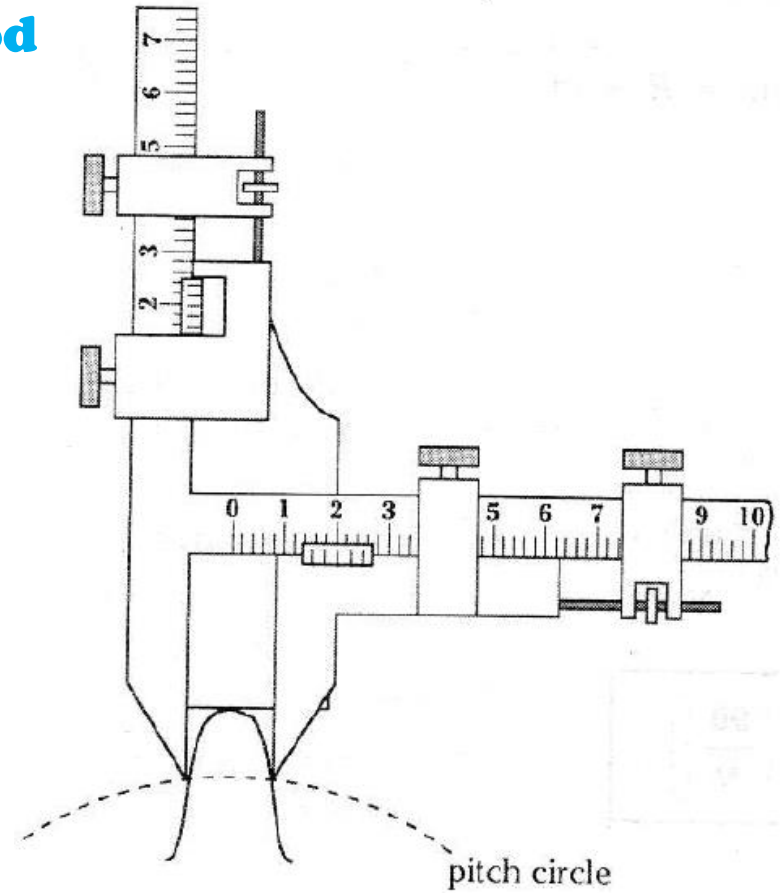
1) Gear tooth vernier caliper method (Chordal thickness method)
2) Base tangent method.
3) Constant chord method.
4) Measurement over pins or balls.

Gear Measurement

6. Gear Tooth thickness measurement

1. Gear tooth vernier caliper method

- In gear tooth vernier method the thickness is measured at the pitch line.
- Gear tooth thickness varies from the tip of the base circle of the tooth, and the instrument is capable of measuring the thickness at a specified position on the tooth.
- The tooth vernier caliper consists of vernier scale and two perpendicular arms.
- In the two perpendicular arms one arm is used to measure the thickness and other arm is used to measure the depth. Horizontal vernier scale reading gives chordal thickness and vertical vernier scale gives the chordal addendum.
- Finally the two values compared.



Gear Measurement

7. Measurement of concentricity

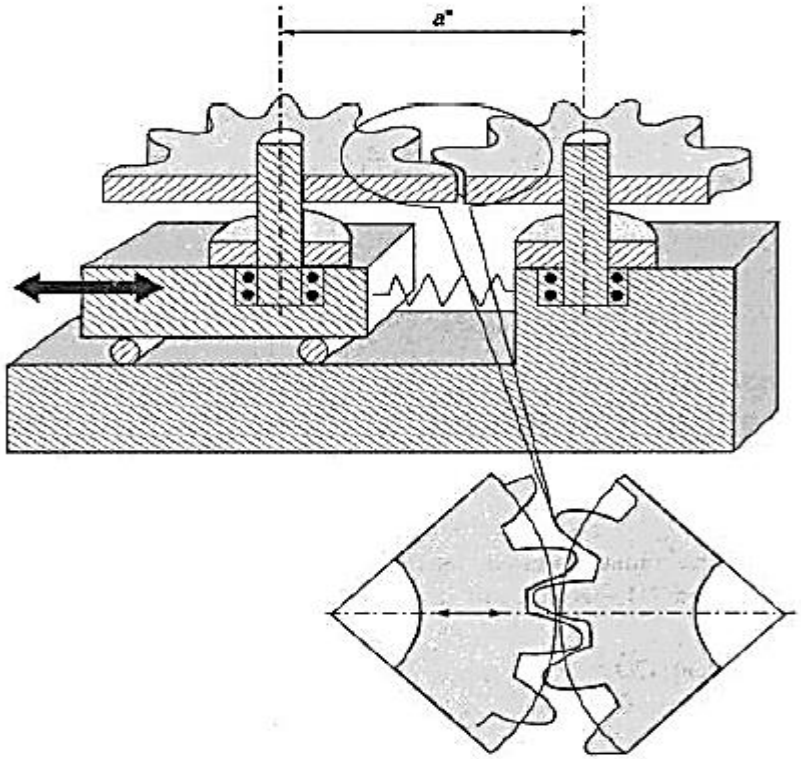
In setting of gears the centre about which the gear is mounded should be coincident with the centre from which the gear is generated. It is easy to check the concentricity of the gear by mounting the gear between centers and measuring the variation in height of a roller placed between the successive teeth. Finally the variation in reading will be a function of the eccentricity present.

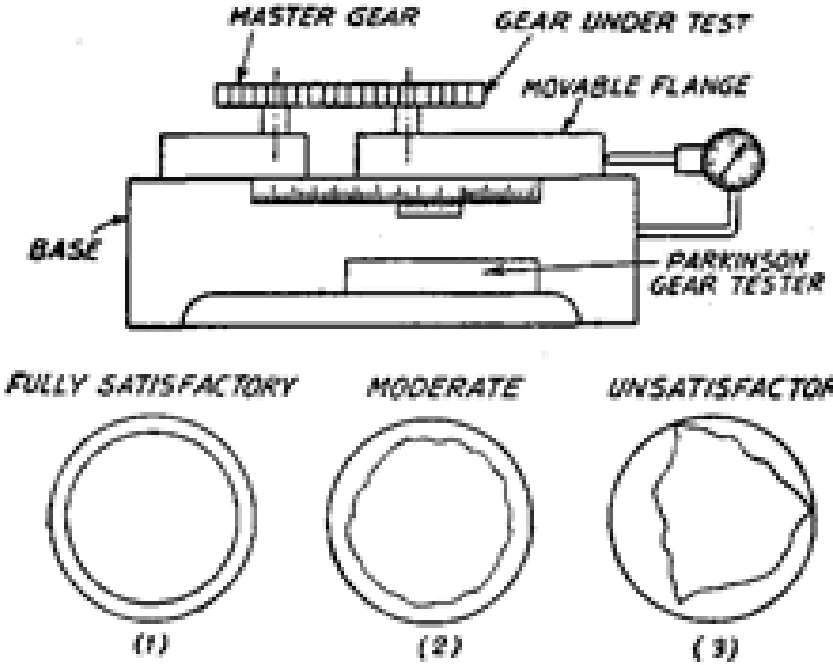
8. Alignment checking

It is done by placing a parallel bar between the gear teeth and the gear being mounted between centers. Finally the readings are taken at the two ends of the bar and difference in reading is the misalignment.

Gear Measurement

Parkinson Gear Tester





Gear Measurement

Parkinson Gear Tester

Features

1. Involutes profile accuracy testing.
2. Lead checking for helical gears.
3. Gear run out checking.
4. Backlash of theoretical center distance.
5. Actual center distance.
6. Over all run out.
7. Involutes teeth projector.

Gear Measurement

Parkinson Gear Tester

Working principle

The master gear is fixed on vertical spindle and the gear to be tested is fixed on similar spindle which is mounted on a carriage. The carriage which can slide either side of these gears are maintained in mesh by spring pressure. When the gears are rotated, the movement of sliding carriage is indicated by a dial indicator and these variations arc is measure of any irregularities. The variation is recorded in a recorder which is fitted in the form of a waxed circular chart. In the gears are fitted on the mandrels and are free to rotate without clearance and the left mandrel move along the table and the right mandrel move along the spring-loaded carriage. The two spindles can be adjusted so that the axial distance is equal and a scale is attached to one side and vernier to the other, this enables center distance to be measured to within 0.025mm.

Gear Measurement

Parkinson Gear Tester

Working principle (continued)

If any errors in the tooth form when gears are in close mesh, pitch concentricity of pitch line will cause a variation in center distance from this movement of carriage as indicated to the dial gauge will show the errors in the gear test. The recorder also fitted in the form of circular or rectangular chart and the errors are recorded.

Limitations of Parkinson gear tester:

1. Accuracy ±0.001mm
2. Maximum gear diameter is 300mm
3. Errors are not clearly identified.
4. Measurement dependent upon the master gear.
5. Low friction in the movement of the floating carriage.


Thank
You