11/08/2019
Monday

MODULE - 3

GEARS

Advantages of gear drive

- High power transmission
- No slip
- Exact velocity ratio
- Reliable
- high efficiency
- shorter centre to centre distance

Disadvantages of gear drive

- High cost
- Difficult to manufacture
- normal centre to centre distance not applicable

classification of gear drive

Based on position of shaft

I. Gear drive for parallel or non-intersecting shaft

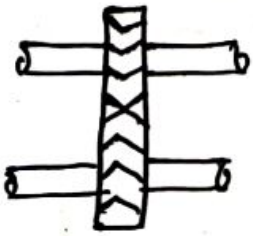
1. spur gear

In spur gear the teeth are || to the axis of shaft

2. Helical gears

In helical gear the teeth are inclined to the axis of the shaft. It is used for high power transmission

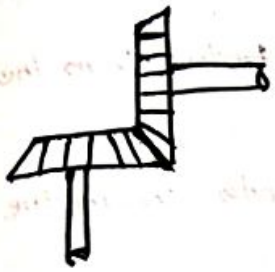
3. Herring bond gears



more power transmission than helical gear it has low axial thrust

I Gear drive for non-parallel intersecting shaft

1. Bevel gear



Teeth are formed on a conical surface used to transfer motion between non-parallel and intersecting shafts.

~~2. Worm gear~~

II Gear drive for non-parallel non-intersecting shaft

1. worm gear

consists of a helical gear and power screw (worm), used to transfer motion between non-parallel and non-intersecting shafts.

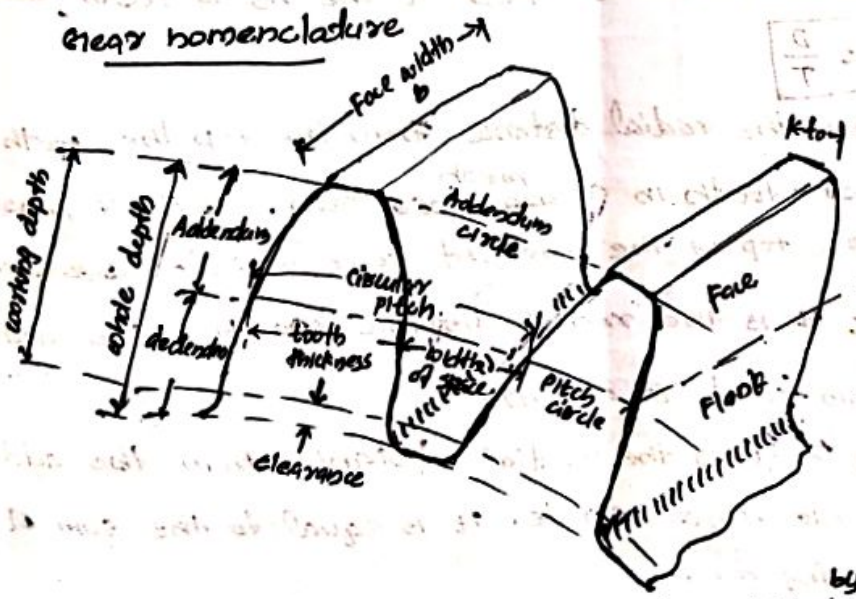
Gear ratio

It is the ratio of speed of driver shaft (input shaft) to that of the driven shaft (output shaft)

$$G_r = \frac{N_1}{N_2} = \frac{Z_2}{Z_1}$$

where, N_1 – speed of driver shaft
N_2 – speed of driven shaft
Z_1 – no of teeth on driver shaft
Z_2 – no of teeth on driven shaft.

Gear nomenclature



1) Pitch circle :- It is an imaginary circle which by pure rolling action would give the same motion as the actual gear.

2) Pitch circle diameter (PCD) : It is the diameter of the pitch circle. The size of gear is usually specified the PCD. It is also called pitch diameter.

9) Pitch point :- It is common point of contact blw two pitch circles

4) Pitch surface :- It is the surface of the rolling disc which the meshing gears have replaced at the pitch circle

5) Addendum :- It is the radial distance of a tooth from the pitch circle to the top of the tooth

6) Dedendum :- It is the radial distance of a tooth from the pitch circle to the bottom of the tooth.

7) Addendum circle :- It is the circle drawn through the top of the teeth and is concentric with the pitch circle.

8) Dedendum circle :- It is the circle drawn through the bottom of teeth It is also called root circle

9) circular pitch :- It is the distance measured on the circumference of the pitch circle from a point of one tooth to the corresponding point on the next tooth. It is usually denoted by P_c.

$$P_c = \frac{\pi D}{T}$$

D - dia of pitch circle
T - no of teeth on wheel.

10) Diametral pitch :- It is the ratio of no of teeth to the PCD in millimeters denoted by P_D, $P_D = \frac{T}{D}$

(11) Module :- It is the ratio of PCD to the no of teeth, denoted by m, $m = \frac{D}{T}$

12) clearance :- It is the radial distance from the top the tooth to the bottom of tooth in a meshed gear. A circle passing through the top of the meshed gear is called clearance gear.

13) Total depth :- It is the radial distance blw the addendum and dedendum circle of a gear.

14) working depth :- It is the radial distance from the addendum circle to the clearance circle. It is equal to the sum of addendum of 2 meshing gear.

15) Tooth thickness :- It is the width of tooth measured along the pitch circle

16) Tooth space :- It is the width space blw the two adjacent teeth measured along the pitch circle.

17) **Backlash**:- It is the difference tooth space and tooth thickness.

18) **Face of tooth**:- It is the surface of the tooth above the pitch surface

19) **Top land** :- It is the surface of the top of the tooth

20) **Flank** :- It is the surface of the tooth below pitch surface

21) **Face coldth** :- It is the coldth of the gear tooth measured parallel to its axis

22) **Pressure angle** (α) : Angle blw common normal to two gear teeth and tangent to the pitch point.

12/08/2019 Tuesday

Type of profile used for gear teeth

cycloidal	involute
Advantages -no interference -teeths are stronger Disadvantages -Difficult to manufacture - Pressure angle is maximum at starting and end of engagement and is zero at middle. -It requires exact centre to centre distance	Advantages - It is a single curve, so it is easy to manufacture - Pressure angle is constant throughout the encagement -centre distance of shaft can vary slightly without changing velocity ratio. Disadvantages -Interference may occur - teeth aren't stronger