Section-5

1 force acting on worm gear:

a Tangential force on the worm:

The tangential force (W_T) on the worm produces a twisting moment of magnitude ($W_T \times D_W/2$) and bends the worm in the horizontal plane

$$W_T = \frac{2 \times \text{torque on worm}}{\text{Pitch circle diameter of worm } (D_W)}$$

= Axial force or thrust on the worm gear.

b. Axial force or thrust: The axial force on the worm tends to move the worm axially, induce an axial load on the bearing and bends the worm in a vertical plane with bending moment of magnitude ($W_A \times D_W/2$)

$W_A = W_T/\tan\lambda$ = Tangential force on the worm gear

$$= \frac{2 \times \text{torque on worm gear}}{\text{Pitch circle diameter of worm gear } (D_G)}$$

Shiva
Date
Page

c. Radial or separating Force On the worm!

The radial or separating force tends to force the worm and worm gear out of mesh. This force also bends the worm in the vertical plane.

$W_R = W_A \tan\phi$ = Radial or Separating force on the worm gear

Normal pitch of worm gear!

1. It is distance measured along the normal to the threads between two corresponding point on two adjacent threads of the worm.

Normal pitch = $P_N = P_a \cos\lambda$

(iii) Helix Angle!

1. It is the angle between the tangent to the thread helix on the pitch cylinder and the axis of the worm. It is denoted by α_w.
2. The worm helix angle is the complement of worm lead angle i.e

$$\alpha_w + \gamma = 90^\circ$$

efficiency!

1. The efficiency of worm gearing may be defined as the ratio of work done by the worm gear to the work done by the worm.

2. mathematically, the efficiency of worm gearing is given by

$$\eta = \frac{\tan\lambda(\cos\phi - \mu\tan\lambda)}{\cos\phi\tan\lambda + \mu}$$

(4) The efficiency is maximum when

$$\tan\lambda = \sqrt{1+\mu^2} - \mu$$

8: third part

The heat dissipation in worm gearing.

1. In the worm gearing the heat generated due to the work lost in friction must be dissipated in order to avoid over heating of the drive and lubricating oil

2. The quantity of heat generated (Q_g) is

$$Q_g = P(1-\eta)$$

3. The heat generated must be dissipated through the lubricating oil to the gear box housing and then to the atmosphere.

Shiva

Date

Page

mathematically the heat dissipating capacity

$$Q_d = A(t_2 - t_1) K.$$