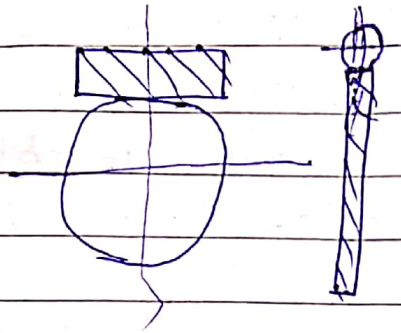
Section-5

1. Schematic diagram of



Force acting upon 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

$$W_T = \frac{2 \times \text{Torque on worm}}{\text{Pitch circle dia of worm } (D_o)}$$

= Axial force or thrust on the worm gear.

(b) Axial force or thrust on the worm: The axial force on worm,

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

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

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Radial or separating force on the worm:

The radial or separating force tends to force the 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.

efficiency of worm gear:

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

ϕ = Normal pressure angle
μ = Coefficient of friction.
λ = Lead angle

Maximum efficiency when:

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

Normal Pitch: it is distance measured along the normal to the threads between two corresponding points on two adjacent threads of worm normal Pitch.

$$\boxed{P_N = P_a \cos\lambda}$$

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Helix angle :- It is measured in a plane containing the axis of the worm and is equal to one-half thread profile angle.

it is angle between the tangent to the thread helix on the pitch cylinder and the axis of the worm. It is denoted by α_w

The worm helix angle is the complement of worm lead angle.

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

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