MECH 325

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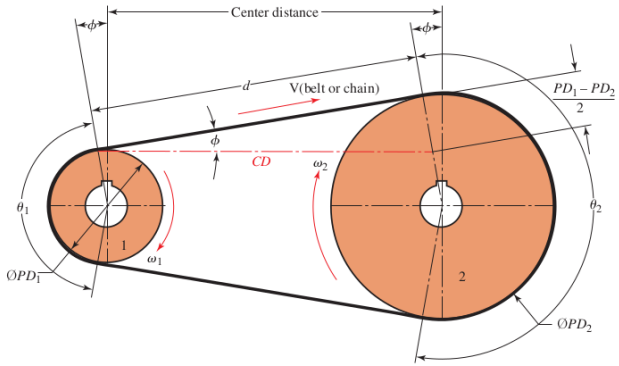
Belt and chain drive systems

Chain drive for high rotational power transmitted at slow speeds/lifting heavy loads

Belt drives for higher speed, accurate registration of shafts between drive and driven machine

Linear velocity of point a point A on a rotating disk:

$$v_A = r_A \omega_A$$



Velocity ratio

Is the ratio of the input and output angular velocity (N is the number teeth of the driving and driven sprocket):

$$\text{VR} = \frac{\omega_{in}}{\omega_{out}} = \frac{\text{PD}_{out}}{\text{PD}_{in}} = \frac{N_{out}}{N_{in}}$$

Angle of wrap

Shown as ϕ in the figure:

$$\sin(\theta) = \frac{1}{\text{CD}} \frac{\text{PD}_2 - \text{PD}_1}{2}$$

Angle of wrap for sprocket 1:

$$\theta_1 = \pi - 2\phi$$

Angle of wrap for sprocket 2:

$$\theta_2 = \pi + 2\phi$$

Belt perimeter

Length of chain or belt wrap:

$$s = \frac{\text{PD}}{2}\theta$$

Perimeter, where $d = \text{CD}\cos(\phi)$:

$$L_p = 2d + s_1 + s_2$$