Presentation

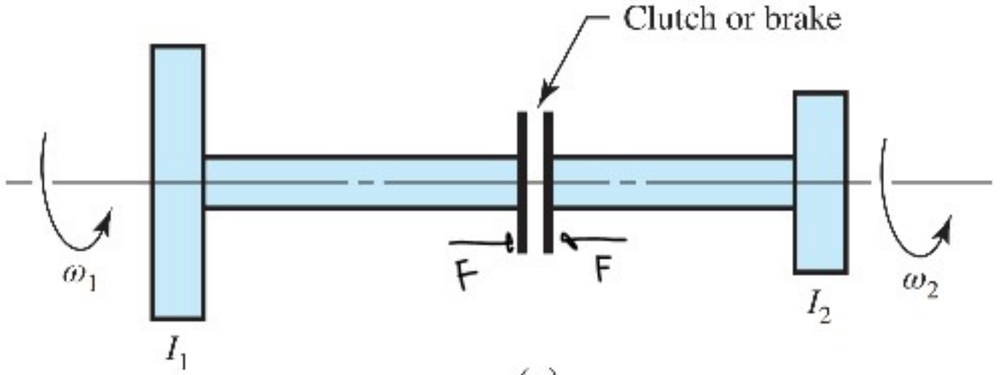
Introduction

~ 2 slides

Part design

~ 3 slides per part

Clutches and Brakes



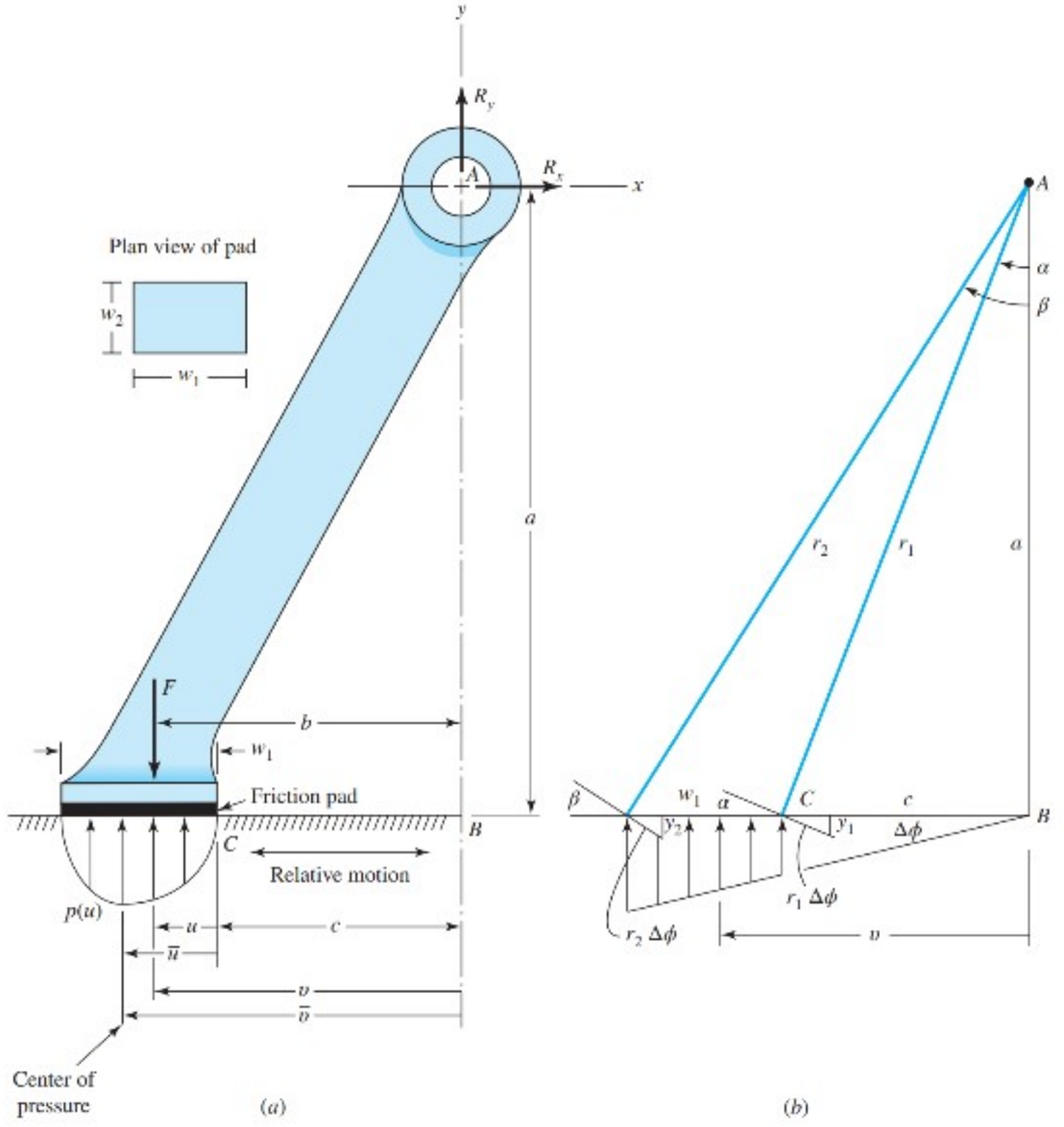
(a)

Actuating Force

Torque Transmitted

Temperature Rise

Energy loss



$$N = w_2 \int_0^{w_1} p(u)\,du = p_{av}\, w_1 w_2$$

$$R_x = \pm w_2 \int_0^{w} f\, p(u)\,du = \pm f\, w_1 w_2\, p_{av}$$

$$R_y = F - p_{av}\, w_1 w_2$$

$$\Sigma M_A = F b - w_2 \int_0^{w_1} p(u)\,(c+u)\,du \mp a f w_2 \int_0^{w_1} p(u)\,du = 0$$

$$F = \frac{w_2}{b}\left(\int_0^{w_1} p(u)(c+u)\,du \pm a f \int_0^{w_1} p(u)\,du\right)$$

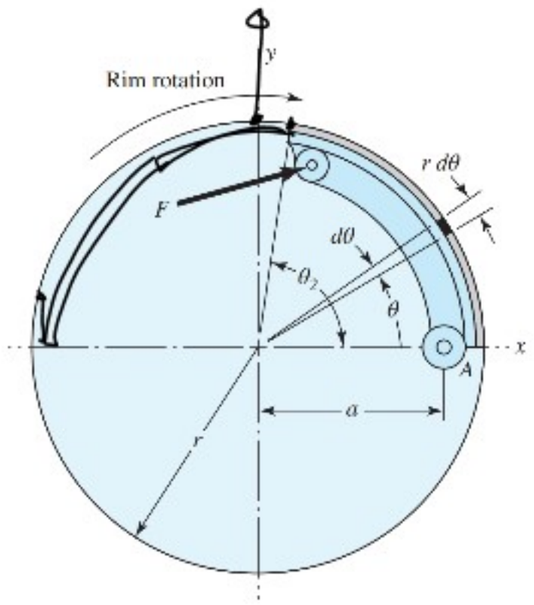
$$\int_0^{w_1} p(u)(c+u)\,du - a f \int_0^{w_1} p(u)\,du \le 0$$

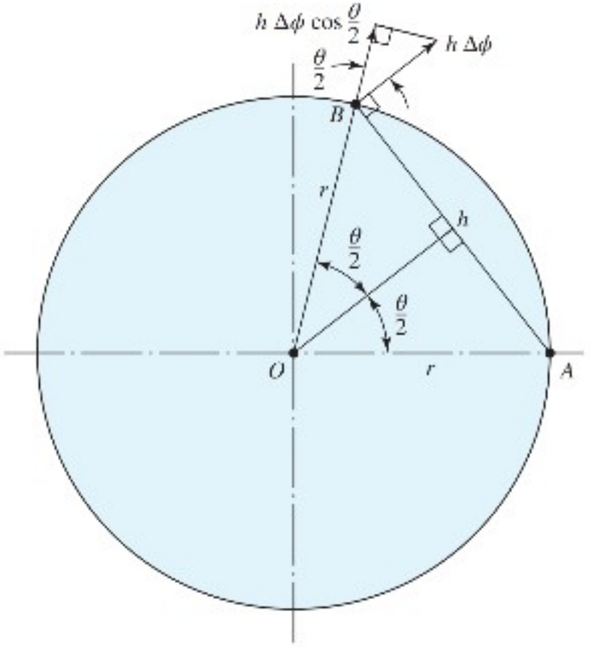
Self acting
Self locking

$$f_{cr} \ge \frac{1}{a}\,\frac{\int_0^{w_1} p(u)(c+u)\,du}{\int_0^{w_1} p(u)\,du}$$

$$f_{cr} \ge \frac{c+\bar{u}}{a}$$

Internal Expanding Ring Clutches





Centrifugal
magnetic
hydraulic
pneumatic

$$dN = p b r \, d\theta$$

$$= \frac{P_a b r \sin\theta \, d\theta}{\sin\theta_a}$$

$$p = \frac{P_a}{\sin\theta_a} \sin\theta$$

P_a max pressure

θ_a location of max pressure

if short max pressure at end

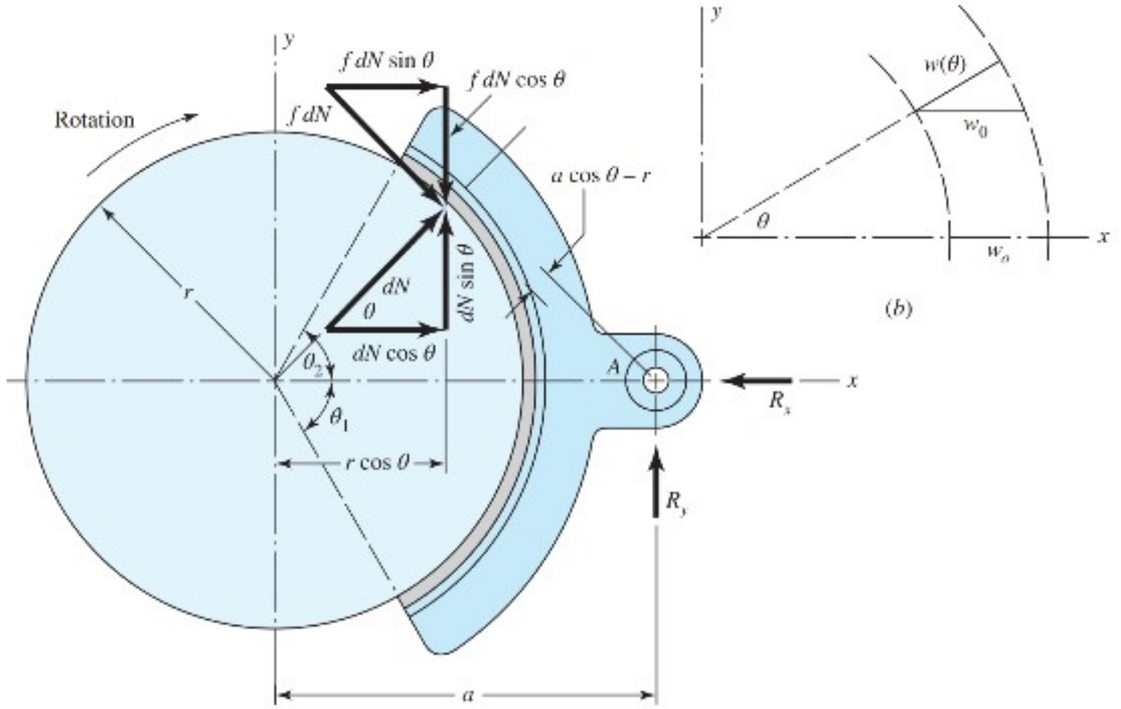
if long max pressure at 90° from A

$$\Sigma M_A = 0$$

$$F = \frac{M_N - M_f}{c}$$

External Contacting Rim Clutches

$$dN = p_a\, b\, r \cos\theta\, d\theta$$



(b)