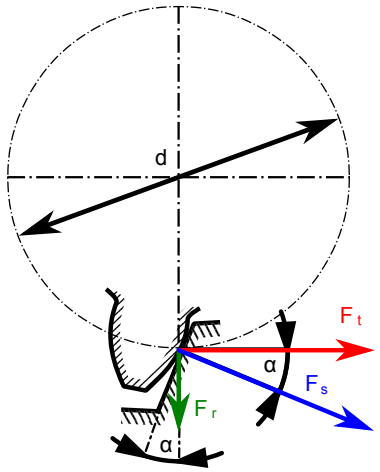
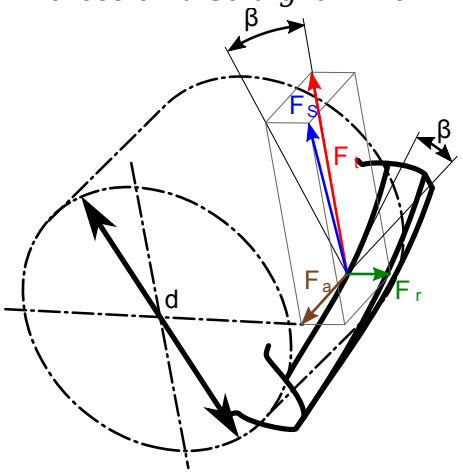
Forces on Pinions



Forces on a Straight Pinion



Forces on an Helical Pinion

Constants

Pi $\pi \simeq 3.141592654$

Inputs

Torque on Pinion $T \ [N \cdot m]$

Pinion Pitch Diameter $d \ [mm]$

Pinion Pressure Angle $\alpha \ [degrees]$

Pinion Helix Angle $\beta = \beta_d + \frac{\beta_m}{60} + \frac{\beta_s}{3600}$

$\beta \ [degrees]$

$\beta_d \ [degrees]$

$\beta_m \ [arcmin]$

$\beta_s \ [arcsec]$

Disclaimer

This tool has been created to assist engineers with the sizing of the different parts of the system. Calculations might not cover all corner cases. and results should always be checked by a qualified engineer. Under no circumstances shall we beheld responsible to any damages to persons or property due to correct or incorrect use of this tool, or to errors in it.

Tangential Force on Pinion

$$F_t = 2000 \cdot \frac{T}{d} \ [N]$$

Radial Force on Pinion (Straight Pinion)

$$F_r = F_t \cdot \tan\left(\frac{\alpha \cdot \pi}{180}\right) \ [N]$$

Radial Force on Pinion (Helical Pinion)

$$F_r = \frac{F_t \cdot \tan\left(\frac{\alpha \cdot \pi}{180}\right)}{\cos\left(\frac{\beta \cdot \pi}{180}\right)} \ [N]$$

Axial Force on Pinion (Helical Pinion)

$$F_r = F_t \cdot \tan\left(\frac{\beta \cdot \pi}{180}\right) \ [N]$$

Pinion Pitch Circumference

$$L_c = \pi \cdot d \ [mm]$$