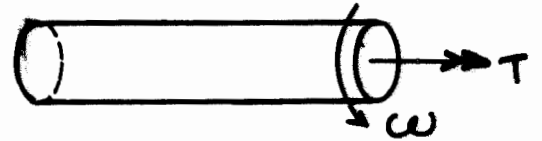


# Torsion: Power Transmission

Power Transmission (HP)

Angular Speed (Hz = cycle/sec or rpm)  
rev./min



T is needed to design the shaft.

From Physics:

$$P = T\omega$$

\*SI Units

$$\omega = 2\pi f$$

P = Power (Watt)

ω = angular velocity (rad/sec)

f = frequency of the rotating shaft (Hz = /sec)

T = Torque (N.m)

$$\Rightarrow P = 2\pi f T \quad (\text{N.m/s} = \text{Watt})$$

$$1 \text{ Hp} = 745.7 \quad (\text{N.m/s})$$

$$\Rightarrow \text{Hp} = \frac{2\pi f T}{745.7} \Rightarrow$$

$$\boxed{\text{Hp} = \frac{fT}{119}}$$

\*U.S./English Units

$$\omega = 2\pi n$$

n (rpm = rev/min)

T (in-lb)

$$\Rightarrow P = 2\pi n T \quad (\text{in-lb/min})$$

$$1 \text{ Hp} = 550 \quad (\text{ft-lb/sec})$$

$$\Rightarrow \text{Hp} = \frac{2\pi n T}{550 (12) (60)} \Rightarrow$$

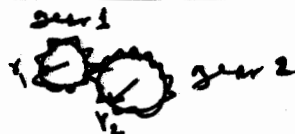
$$\boxed{\text{Hp} = \frac{nT}{63000}}$$

Do NOT

Forget

the units

Gears:  $\frac{T_1}{T_2} = \frac{r_1}{r_2}$



See the Example.