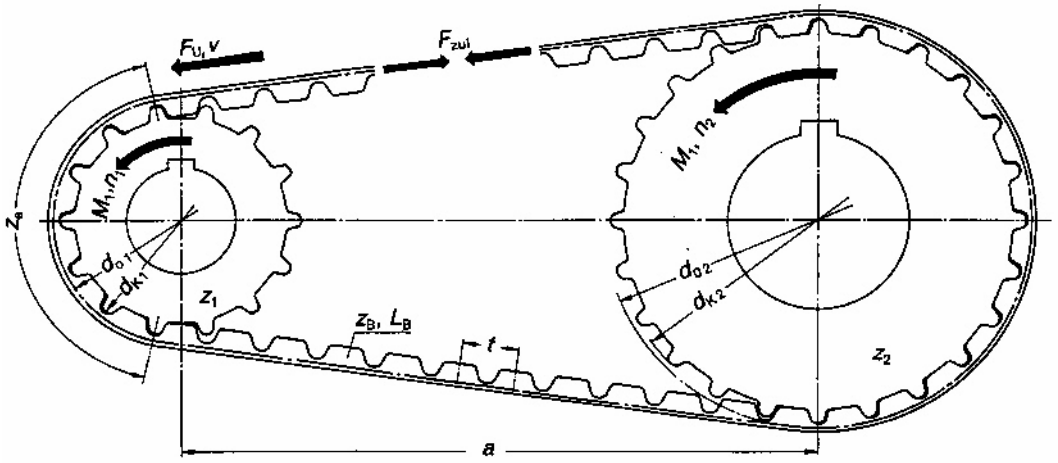
FORMULAE Terms and Definitions



Center distance	a	(mm)
Acceleration torque	M_B	(Nm)
Acceleration time	t_B	(s)
Bore	d	(mm)
Density	ρ	(kg/dm^3)
Torque	M	(Nm)
RPM	n	(min^{-1})
Outside diameter	d_K	(mm)
Power	P	(kW)
Moment of inertia	J	(kgm^2)
Belt length	L_B	(mm)
Ratio	i	

Allowable tensile strength of tension member	F_{zul}	(N)
Pulley width	B	(mm)
Pitch	t	(mm)
Velocity	v	(m/s)
Peripheral force	F_U	(N)
Angular velocity	ω	(s^{-1})
Pitch circle diameter	d_0	(mm)
No. of teeth when i = 1	z	
No. of teeth of small pulley	z_1	
No. of teeth of large pulley	z_2	
No. of teeth on the belt	z_B	
No. of teeth in mesh	z_e	

Belt length when i ≠ 1

$$L_B \approx \frac{t}{2}(z_2 + z_1) + 2a + \frac{1}{4a}\left[\frac{(z_2 - z_1)t}{\pi}\right]^2$$

Belt length when i = 1

$$L_B = 2a + \pi \cdot d_0 = 2a + z \cdot t$$

Peripheral Force

$$F_U = \frac{2 \cdot 10^3 \cdot M}{d_0} = \frac{19.1 \cdot 10^6 \cdot P}{n \cdot d_0} = \frac{10^3 \cdot P}{v}$$

Torque

$$M = \frac{d_0 \cdot F_U}{2 \cdot 10^3} = \frac{9.55 \cdot 10^3 \cdot P}{n} = \frac{d_0 \cdot P}{2 \cdot v}$$

Power

$$P = \frac{M \cdot n}{9.55 \cdot 10^3} = \frac{F_U \cdot d_0 \cdot n}{19.1 \cdot 10^6} = \frac{F_U \cdot v}{1000}$$

Angular velocity

$$\omega = \frac{\pi \cdot n}{30}$$

RPM

$$n = \frac{19.1 \cdot 10^3 \cdot v}{d_0}$$

Velocity

$$v = \frac{d_0 \cdot n}{19.1 \cdot 10^3}$$

Mass moment of inertia

$$J = 98.2 \cdot 10^{-15} \cdot B \cdot \rho \cdot (d_K^4 - d^4)$$

Acceleration torque

$$M_B = \frac{J \cdot \Delta n}{9.55 \cdot t_B}$$

Only the units listed above should be used in the formulae as they are the approved SI units. The unit of force, the Newton, is very important: 1N is the force required to accelerate a body with a mass of 1kg to 1m/s^2. ⇨ 1 kg·m/s^2

Conversion of non-standard units:

Force	1 kp = 1 kg · 9.81m/s^2 = 9.81 N ≈ 1 daN
Torque	1 kpm = 9.81 kgm^2/s^2 = 9.81 Nm ≈ 1 daNm
Power	1 PS = 75 kpm/s = 0.736 kW
Centrifugal force	1 [GD^2] = 4 [J] when GD^2 in kpm^2 and J in kgm^2