

**FORMULA SHEET****1. BELT DRIVES**

$$1.1 \quad \text{Belt speed} = \frac{\pi DN}{60}$$

$$1.2 \quad \text{Belt speed} = \frac{\pi (D+t) \times N}{60} \quad (t = \text{belt thickness})$$

$$1.3 \quad \text{Belt mass} = \text{Area} \times \text{length} \times \text{density}$$

$$1.4 \quad \text{Speed ratio} = \frac{\text{Diameter of driven pulley}}{\text{Diameter of drive pulley}}$$

$$1.5 \quad N_1 D_1 = N_2 D_2$$

$$1.6 \quad \text{Open-belt length} = \frac{\pi (D+d)}{2} + \frac{(D-d)^2}{4c} + 2c$$

$$1.7 \quad \text{Crossed-belt length} = \frac{\pi (D+d)}{2} + \frac{(D+d)^2}{4c} + 2c$$

$$1.8 \quad \text{Power (P)} = \frac{2\pi NT}{60}$$

$$1.9 \quad \text{Ratio of tight side to slack side} = \frac{T_1}{T_2}$$

$$1.10 \quad \text{Power} = \frac{(T_1 - T_2) \pi DN}{60} \quad \text{where } T_1 = \text{force in the tight side}$$

$$1.11 \quad \text{Width} = \frac{T_1}{\text{Permissible tensile force}}$$

**2. FRICTION CLUTCHES**

$$2.1 \quad \text{Torque (T)} = \mu W n R$$

$\mu$  = coefficient of friction

$W$  = total force

$n$  = number of friction surfaces

$R$  = effective radius

$$2.2 \quad \text{Power (P)} = \frac{2\pi NT}{60}$$

### 3. GEAR DRIVES

$$3.1 \quad \text{Power (P)} = \frac{2\pi NT}{60}$$

$$3.2 \quad \text{Gear ratio} = \frac{\text{Product of the number of teeth on driven gears}}{\text{Product of the number of teeth on driving gears}}$$

$$3.3 \quad \frac{N_{\text{input}}}{N_{\text{output}}} = \frac{\text{Product of the number of teeth on driven gears}}{\text{Product of the number of teeth on driving gears}}$$

$$3.4 \quad \text{Torque} = \text{force} \times \text{radius}$$

$$3.5 \quad \text{Torque transmitted} = \text{gear ratio} \times \text{input torque}$$

$$3.6 \quad \text{Module (m)} = \frac{\text{Pitch-circle diameter (PCD)}}{\text{Number of teeth (T)}}$$

$$3.7 \quad N_1 T_1 = N_2 T_2$$

$$3.8 \quad \text{Pitch-circle diameter (PCD)} = \frac{\text{circular pitch (CP)} \times \text{number of teeth (T)}}{\pi}$$

$$3.9 \quad \text{Outside diameter (OD)} = \text{PCD} + 2 \text{ module}$$

$$3.10 \quad \text{Addendum (a)} = \text{module (m)}$$

$$3.11 \quad \text{Dedendum (b)} = 1, 157 m \quad \text{OR} \quad \text{Dedendum (b)} = 1, 25 m$$

$$3.12 \quad \text{Cutting depth (h)} = 2, 15 \quad \text{OR} \quad \text{Cutting depth (h)} = 2, 157 m$$

$$3.13 \quad \text{Clearance (c)} = 0, 157 m \quad \text{OR} \quad \text{Clearance (c)} = 0, 157 m$$

$$3.14 \quad \text{Circular pitch (CP)} = m \times \pi$$

### 4. CALCULATIONS OF FEED

$$4.1 \quad \text{Feed (f)} = f_1 \times T \times N$$

Where:  $f$  = feed in millimetres per minute

$f_1$  = feed per tooth in millimetres

$T$  = number of teeth on cutter

$N$  = number of revolutions of cutter per minute

$$4.2 \quad \text{Cutting speed (V)} = \pi \times D \times N$$

Where;  $D$  = diameter of the cutter in meters