Engineering Formulas

VALUE	*FORMULA*	*DEFINITION*
Torque (in Pound-Inches)	$= \frac{hp \times 63\,025}{RPM}$ = Force (lbs) x Lever Arm Length (inches)	hp = Horsepower Force = Working Load RPM = Revolutions per Minute Lever Arm = Distance from the Force to the center of the rotation in inches or feet
Torque (in Pound-Feet)	$= \frac{hp \times 5\,252}{RPM}$ = Force (lbs) x Lever Arm Length (feet)	
Torque (Newton-metres)	= Force (Newtons) x Lever Arm (metres) $= \frac{hp \times 7\,121}{RPM}$	hp = Horsepower RPM = Revolutions per Minute
Power	1 hp = 33 000 lb-ft/minute = 0.7457 Kilowatts	
Circumference	$= \pi \times D$	D = Diameter π = Pi (3.1416)
Velocity (V) (in feet per minute) (in metres/second)	= (0.2618) x D(in inches) x RPM $= \frac{\pi \times D(\text{in millimetres}) \times RPM}{60\,000}$	D = Diameter RPM = Revolutions per Minute π = Pi (3.1416)
DN - Values	1 ft/min = 80 DN 1 metre/second = 16 000 DN	DN = Product of Diameter in millimetres and Speed in RPM
Force at Circumference (pounds) (Newtons)	$= \frac{126\,000 \times hp}{D(\text{inches}) \times RPM}$ $= \frac{hp \times 1.91 \times 10^7}{D(\text{millimetres}) \times RPM}$	D = Diameter RPM = Revolutions per Minute hp = Horsepower
O.H.L. - Overhung Loads (pounds) (Newtons)	$= \frac{126\,000 \times hp \times F}{RPM \times PD}$ $= \frac{hp \times F \times 1.91 \times 10^7}{PD(\text{millimetres}) \times RPM}$ (NOTE: Assuming the load is applied at a point equal to one shaft diameter from bearing face.)	hp = Transmitted hp x service factor PD = Pitch Diameter - sprocket, pulley, etc. F = Factor of: 1.00 for Single Chain 1.10 for Timing Belts 1.25 for Double Chain 1.50 for V-Belts 2.50 for Flat Belts
Belt Length (L) (inches)	$= (2 \times C) + (1.57 \times (D + d)) + \frac{(D-d)^2}{4 \times C}$	C = Center Distance D = Larger Sheave Diameter d = Smaller Sheave Diameter
V-Belt Pull (Approximate in pounds)	$= \frac{hp \times 126\,000 \times 1.5}{RPM \times PD}$	PD = Pitch Diameter of Sheave
Roller Chain Length (Approximate)	$= (2 \times C) + (1.65 \times (D + d))$	C = Center Distance D = Larger Sprocket Diameter d = Smaller Sprocket Diameter
Chain Pull Calculation	$= \frac{126\,000 \times hp}{RPM \times D}$	hp = Horsepower D = Diameter of Sprocket RPM = Revolutions per Minute

INSERT P1

Engineering Formulas

	FORMULA	DEFINITION
Horspower (hp) (Using torque in Pound-Inches)	$= \frac{T \times RPM}{63025}$	T = Torque in Pound-Inches RPM = Revolutions Per Minute
(Using torque in Pound-Feet)	$= \frac{T \times RPM}{5252}$	T = Torque in Pound-Feet RPM = Revolutions Per Minute
(Using torque in Newton-Metres)	$= \frac{T \times RPM}{7121}$	T = Torque in Newton-Metres RPM = Revolutions Per Minute
Revolutions Per Minute (RPM)	$= \frac{FPM \times 12}{\pi \times D}$	FPM = Feet Per Minute D = Sprocket or Pulley Diameter (in inches) π = Pi = 3.14159
Horsepower for Level Conveyor (hpLC)	$= \frac{TL \times FPM}{33000}$ Where $TL = f(L+C)$	TL = Total Load L = Total Weight of Material (pounds) C = Total Weight of Moving Conveyor Parts (pounds) f = Coefficient of Friction .12 - Belt on Bearing Idler
Horsepower for Inclined Conveyor (hpIC)	$= \frac{TL \times FPM}{33000}$ Where $TL = \frac{(L+C)}{Z}(fX+Y)$	.20 - Rollers on Steel .25 - Chain of Plastic .40 - Chain of Steel Y = Conveyor Height (feet) Z = Conveyor Length (feet) X = Horizontal Distance Between Sprocket Centres (feet)
Horsepower for Pumps (hpP) (Using U.S. Gallons Per Minute) (Using Imperial Gallons Per Minute)	$= \frac{PSI \times SG \times Q^{U.S.}}{1714 \times E}$ $= \frac{H \times SG \times Q^{U.S.}}{3960 \times E}$ $= \frac{PSI \times SG \times Q^{Imp.}}{1428 \times E}$ $= \frac{H \times SG \times Q^{Imp.}}{3300 \times E}$	$Q^{U.S.}$ = U.S. Gallons Per Minute $Q^{Imp.}$ = Imperial Gallons Per Minute PSI = Net Pressure Change (lb/ sq. in.) SG = Specific Gravity 1.00 - Water .85 - Hydraulic Oil .70 - Gasoline E = Pump Efficiency .85 - Piston .80 - Vane/Centrifugal .75 - Gear H = Net Change in Head (ft. of Water)
Approximate Fan Horsepower (hpF)	$= \frac{CFM \times P}{6350 \times E}$	CFM = Cubic Feet Per Minute P = Net Pressure Change (in. of Water) E = Fan Efficiency (Typically .70)
Approximate Air Compressor Horsepower (hpC) (For 100 psi discharge pressure)	$= \frac{CFM}{4}$	CFM = Cubic Feet Per Minute