

COMPLEMENTARY INFORMATION

RATIO

A ratio is a proportional factor between two similar objects of different sizes. In a belt drive system, a ratio is used to determine the speed relation between two pulleys. The speed ratio would be stable if slippage did not occur; however as belt slip is inevitable, the ratio varies and is therefore only theoretical. If the speed ratio is < 1 (ex. 1:4), we refer to a speed up system; if the ratio is > 1 (ex. 4:1), it's a speed reduction system. In both cases, the ratio is obtained using the dimensions of the input drive (driver) pulley and the output (driven) pulley.

In the following ratio, RS is the speed ratio, D1 the diameter of the driver pulley, D2 the diameter of the driven pulley:

$$R_s = \frac{RPM_1}{RPM_2} = \frac{D_2}{D_1}$$

SPEED & VELOCITY

With reference to a belt drive system, the formula to find rim speed, or belt speed, is:

$$\text{Rim Speed [ft/min]} = \frac{\text{Pulley Diameter [in]} \times \pi \times \text{RPM}}{12} \text{ [ft/in]}$$

OR

$$\text{FPM} = \text{Pulley Diameter [in]} \times 0.2618 \times \text{RPM}$$

POWER

In mechanical engineering, power is a measure of performance or capacity and is defined as the amount of work performed in a given time. The most work accomplished in the least amount of time, equals greater power. This formula also shows the relation between torque and HP.

Power in hp (HP) can be calculated using the following formulas:

$$HP = \frac{T [\text{lb}\cdot\text{in}] \text{RPM}}{63025}$$

OR

$$HP = \frac{T [\text{lb}\cdot\text{ft}] \text{RPM}}{5252}$$

HP can be converted to kilowatts as follows:

$$\text{HP} = \text{Kilowatts} \times 1.341$$

DYNAMIC OR TWO-PLANE BALANCING

When considering dynamic balance, it is necessary to determine when dynamic balancing is recommended.

To determine whether dynamic balancing is recommended, perform the following calculation or refer to the nomograph on the previous page.

$$RPM = 15,500 / \sqrt{(DF)}$$

D is diameter in inches

F is Face Width in inches

$$RPM = 25.4 \times 15,500 / \sqrt{(DF)}$$

D is diameter in millimeters

F is Face Width in millimeters

The resultant RPM is maximum recommended operating rpm for a sheave or pulley with a single plane balance.

Note: If the sheave or pulley is to be operated at a higher speed, a two plane balance is recommended.