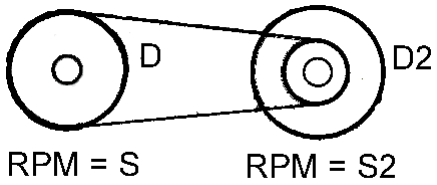
Calculating Diameters and Speeds of Pulleys.



If D = diameter of driving pulley, D2 = diameter of driven pulley, S = speed of driving pulley and S2 = speed of driven pulley.

$$D = \frac{D2 \times S2}{S} \qquad D2 = \frac{D \times S}{S2} \qquad S = \frac{D2 \times S2}{D} \qquad S2 = \frac{D \times S}{D2}$$

Example 1: If the diameter of the driving pulley D is 24 inches, its speed is 100 rpm, and the driven pulley is to run at 600 rpm, the diameter of the driven pulley, D2 = 24 x 100 / 600 = 4 inches.

Example 2: If the diameter of the driven pulley D2 is 36 inches, its required speed is to be 150 rpm, and the speed of the driving pulley D is to be 600 rpm, the diameter of the driving pulley D = 36 x 150 / 600 = 9 inches.

Example 3: If the diameter of the driven pulley D2 is 4 inches, its required speed is 800 rpm, and the diameter of the driving pulley D is 26 inches, the speed of the driving pulley = 4 x 800 / 26 = 123 rpm.

Example 4: If the diameter of the driving pulley D is 15 inches, and its speed is 180 rpm, and the diameter of the driven pulley D2 is 9 inches, then the speed of the driven pulley = 15 x 180 / 9 = 300 rpm.

Pulley Diameter in Compound Drive.

If speeds of driving and driven pulleys, A, B, C, and D are known, the first step

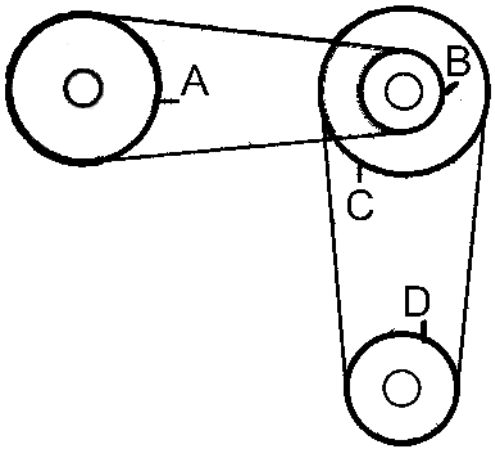
in finding their diameters is to form a fraction with the driving pulley speed as the numerator and the driven pulley speed as the denominator, and then reduce this fraction to its lowest terms. Resolve the numerator and the denominator into two pairs of factors (a pair being one factor in the numerator and one in the denominator) and, if necessary, multiply each pair by a trial number that will give pulleys of suitable diamters.

Example: If the speed of pulley A is 260 rpm and the required speed of pulley D is 720 rpm, find the diameters of the four pulleys. Reduced to its lowest terms, the fraction 260 / 720 = 13 / 36, which represents the required speed ratio. Resolve this ratio 13 / 36 into two factors:

$$\frac{13}{36} = \frac{1 \times 13}{2 \times 18}$$

Multiply by trial numbers 12 and 1 to get:

$$\frac{(1 \times 12) \times (13 \times 1)}{(2 \times 12) \times (18 \times 1)} = \frac{12 \times 13}{24 \times 18}$$



Compound Drive with Four Pulleys.

The values 12 and 13 in the numerator represent the diameters of the driven pulleys, B and D, and the values 24 and 18 in the denominator represent the diameters of the driving pulleys, A and C, as shown above.

Speed of Driven Pulley in Compound Drive.

If diameters of pulleys A, B, C, and D *(See Above Illustration)*, and speed of pulley A are known, the speed of the driven pulley D is found from:

$$\frac{\text{driving pulley diameter}}{\text{driven pulley diameter}} = \frac{\text{driving pulley diameter}}{\text{driven pulley diameter}} \times \text{speed of first driving pulley.}$$

Example: If the diameter of driving pulleys A and C are 18 and 24 inches, diameters of driven pulleys B and D are 12 and 13 inches, and the speed of driving pulley A is 260 rpm, speed of driven pulley

$$D = \frac{18 \times 24}{12 \times 13} \times 260 = 720 \text{ rpm.}$$