

Should the number of gear teeth be used instead of the pitch diameters for rotational speed calculations? Explain

The gear ratio of a gear train is the ratio of the angular velocity of the input gear to the angular velocity of the output gear. The gear ratio can be calculated directly from the numbers of teeth on the gears in the gear train. The number of teeth on a gear is proportional to the radius of its pitch circle, which means that the ratios of the gears' angular velocities, radii, and number of teeth are equal. Where  $N_A$  is the number of teeth on the input gear and  $N_B$  is the number of teeth on the output gear, the following equation is formed:

$$\frac{d_A}{d_B} = \frac{N_A}{N_B}$$

Therefore, the number of gear teeth should be used instead of the pitch diameters.