

Answer on Question#39162, Physics, Mechanics

A 0.25 m diameter grinding wheel rotates at 2500 rpm. Calculate it's angular velocity in rad/s.

Solution:

Revolutions per minute (abbreviated rpm) are a measure of the frequency of a rotation. It annotates the number of turns completed in one minute around a fixed axis.

Because of the measured physical quantity, the formula sign has to be f for (rotational) frequency and ω for **angular velocity**.

$$1 \text{ rad/s} = 60/2\pi \text{ rpm} = 1/2\pi \text{ Hz.}$$

The conversion between a frequency f measured in hertz and an angular velocity ω measured in radians per second are:

$$\omega = 2 \pi f$$

$$\text{We have } f = 2500 \text{ rpm} = 2500/60 = 41.67 \text{ Hz}$$

$$\omega = 2 \pi f = 2 \cdot 3.14 \cdot 41.67 = 261.7 \text{ rad/s}$$

Answer. 261.7 rad/s.