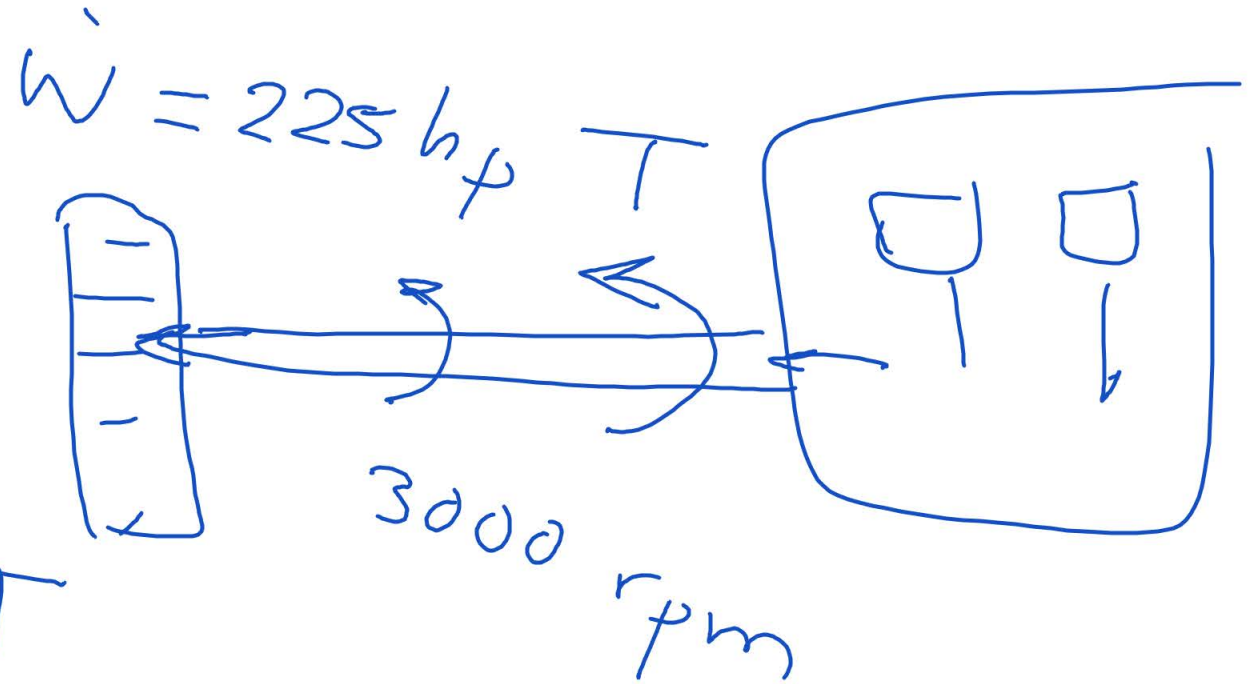


2-29E Determine the torque applied to the shaft of a car that transmits 225 hp and rotates at a rate of 3000 rpm.

$T = ?$
Torque = ?



$$W_{\text{shaft}} = 2 \pi n T$$

$$\dot{W}_{\text{shaft}} = 2 \pi \dot{n} T \rightarrow T = \frac{\dot{W}_{\text{shaft}}}{2 \pi \dot{n}}$$

$$1 \text{ hp} = 746 \text{ W}$$

$$\dot{W}_{\text{shaft}} = 225 \text{ hp} = 225 \times (746 \text{ W})$$

$$= 225 \times (0.746 \text{ kW}) = 167.9 \text{ kW}$$

$$\dot{n} = 3000 \text{ rpm} = \frac{3000}{60} = 50 \text{ rps}$$

$$T = \frac{167.9}{2\pi \times 50} = 0.53 \text{ kN}\cdot\text{m}$$