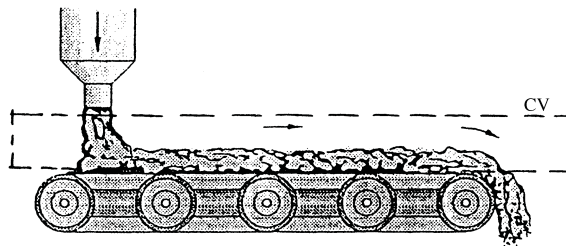


$$\text{Solve for } \mathbf{P} = 500 + 9790(0.6 \text{ m}^3) + 998 \left( \frac{300}{3600} \right) (29.5) \approx \mathbf{8800 \text{ N}} \quad \textit{Ans.}$$

**3.67** Gravel is dumped from a hopper, at a rate of 650 N/s, onto a moving belt, as in Fig. P3.67. The gravel then passes off the end of the belt. The drive wheels are 80 cm in diameter and rotate clockwise at 150 r/min. Neglecting system friction and air drag, estimate the power required to drive this belt.



**Fig. P3.67**

**Solution:** The CV goes under the gravel on the belt and cuts through the inlet and outlet gravel streams, as shown. The no-slip belt velocity must be

$$V_{\text{belt}} = V_{\text{outlet}} = \Omega R_{\text{wheel}} = \left[ 150 \frac{\text{rev}}{\text{min}} 2\pi \frac{\text{rad}}{\text{rev}} \frac{1 \text{ min}}{60 \text{ s}} \right] (0.4 \text{ m}) \approx 6.28 \frac{\text{m}}{\text{s}}$$