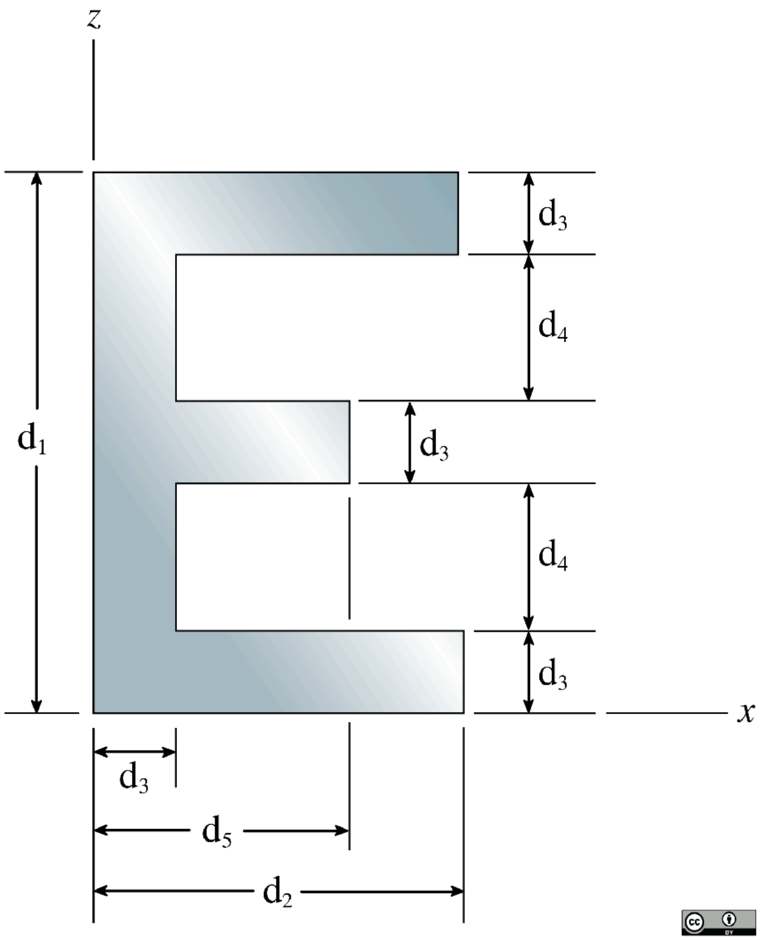
21-S-9.2-RP-01



Determine the area and locate the centroid, $(\bar{x}, \bar{z})$, of the structure above.

$$A = 2 \cdot (d_2 \cdot d_3) + 2 \cdot (d_3 \cdot d_4) + (d_3 \cdot d_5)$$
$$\Rightarrow A = d_3 \cdot (2d_2 + 2d_4 + d_5)$$

Due to symmetry, $\bar{z} = \dfrac{d_1}{2}$

$$\bar{x} = \frac{\Sigma A_i \cdot \widetilde{x}_i}{A}$$

$$\Sigma A_i \cdot \widetilde{x}_i = 2\frac{d_3 \cdot d_2^2}{2} + \frac{d_3 \cdot d_5^2}{2} + 2\frac{d_4 \cdot d_3^2}{2}$$

$$\Rightarrow \bar{x} = \frac{d_2^{\,2} + \frac{d_5^{\,2}}{2} + d_3 \cdot d_4}{2d_2 + 2d_4 + d_5}$$