

The diagram shows an L-shaped weld group with a horizontal leg of length 100 and a vertical leg of length 150. The centroid G is located at a distance \bar{x} from the vertical leg and \bar{y} from the horizontal leg. The distance from the corner to the centroid along the horizontal leg is d_2 , and along the vertical leg is d_1 . The centroid is located 20 mm from the vertical leg and 45 mm from the horizontal leg.

$$\bar{x} = \bar{x} = \frac{\sum x_i A_i}{\sum A_i} = \frac{(100t)(50) + (150t)(0)}{(250t)} = 20 \text{ mm}$$

$$\bar{y} = \frac{\sum y_i A_i}{\sum A_i} = \frac{(100t)(0) + (150t)(75)}{250t} = 45 \text{ mm}$$

Need to know J for weld group.

$$J = I_x + I_y$$

look @ each arm of weld separately.

longer

$$J_L = [I_x] + [I_y] + d_1^2$$

$$= \left[\frac{L^3 t}{12} + Lt (75-45)^2 \right] + [Lt (20)^2]$$

$$J = 476250 t$$

shorter

$$J = I_x + I_y + d_2^2$$

$$= [(100t)(45)^2] + \left[\frac{100^3 t}{12} + (100t)(50-20)^2 \right]$$

$$J_s = 375833 t$$

$$J_{\text{TOTAL}} = (375833 + 476250) t$$

$$= \underline{852083 t}$$