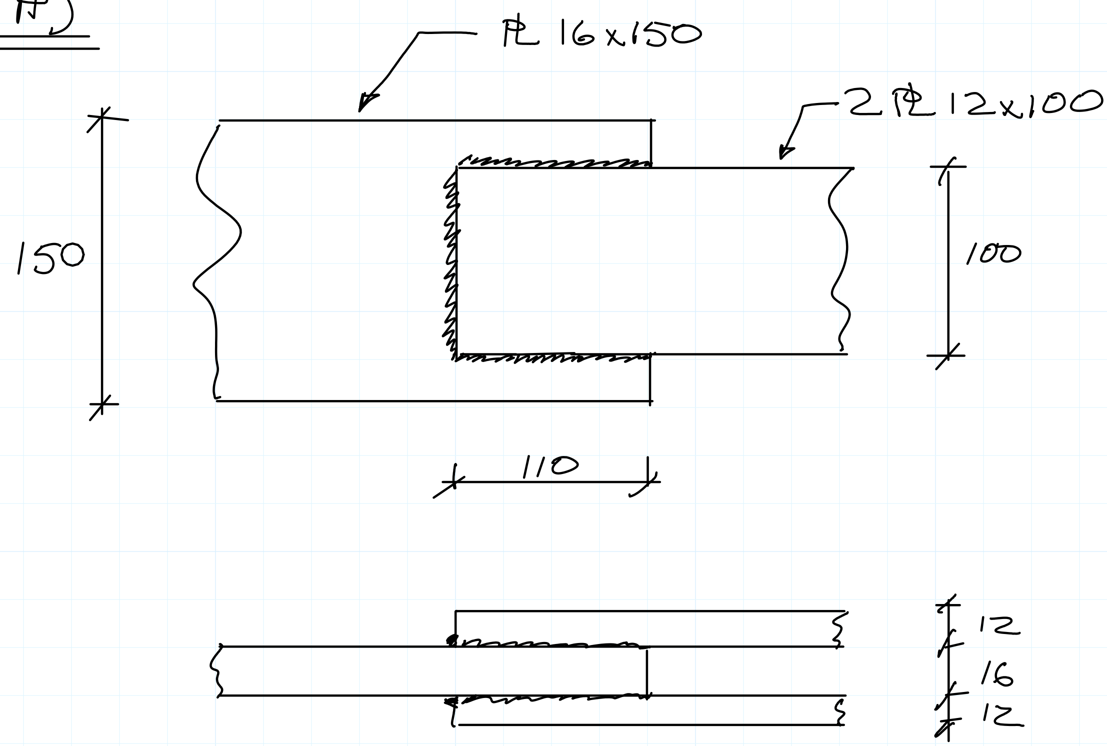
Part A)



Compute factored tension capacity, T_r of the plates. CSA G40.21 350A steel. Fillet welds around 3 sides of each 12mm plate.

350A Steel: $F_y = 350$ MPa (Table 6-3)
$F_u = 480$ MPa

12mm plates:

$$A_g = 12\text{mm} \times 100\text{mm} \times 2 = 2400\ \text{mm}^2$$

$$A_{n1} = 12\text{mm} \times 100\text{mm} \times 2 = 2400\ \text{mm}^2$$

$$A_{ne} = A_{n1} = 2400\ \text{mm}^2$$

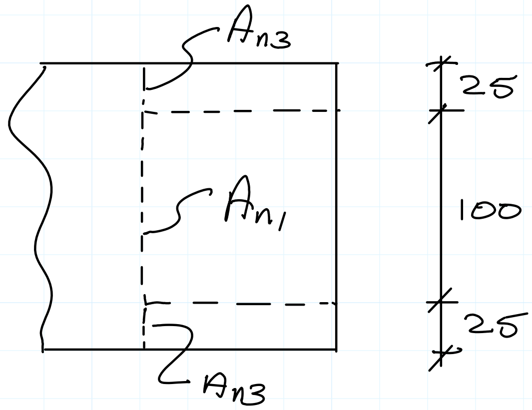
yield: $T_r = \phi A_g F_y$

$$= 0.9 \times 2400\ \text{mm}^2 \times .350\ \frac{\text{kN}}{\text{mm}^2} = 756\ \text{kN}$$

fract: $T_r = \phi_u A_{ne} F_u$

$$= 0.75 \times 2400\ \text{mm}^2 \times 0.480\ \frac{\text{kN}}{\text{mm}^2} = 864\ \text{kN}$$

<u>16 mm plate:</u>



$$A_g = 16\,mm \times 150\,mm = 2400\,mm^2$$

$$A_{n1} = 16\,mm \times 100\,mm = 1600\,mm^2$$

A_{n3}: $\quad L = 110\,mm \quad w = 25\,mm \quad \bar{x} = 12.5\,mm$

$$L > w$$

$$\therefore A_{n3} = \left(1 - \frac{12.5}{110}\right) \times 25 \times 16 \times 2$$

$$A_{n3} = 709\,mm^2$$

$$A_{ne} = 1600 + 709 = 2309\,mm^2$$

yield: $\quad T_r = \phi A_g F_y$

$$= 0.9 \times 2400\,mm^2 \times .350\,\frac{kN}{mm^2}$$

$$= 756\,kN \longleftarrow \text{governs}$$

fracture: $\quad T_r = \phi_u A_{ne} F_u$

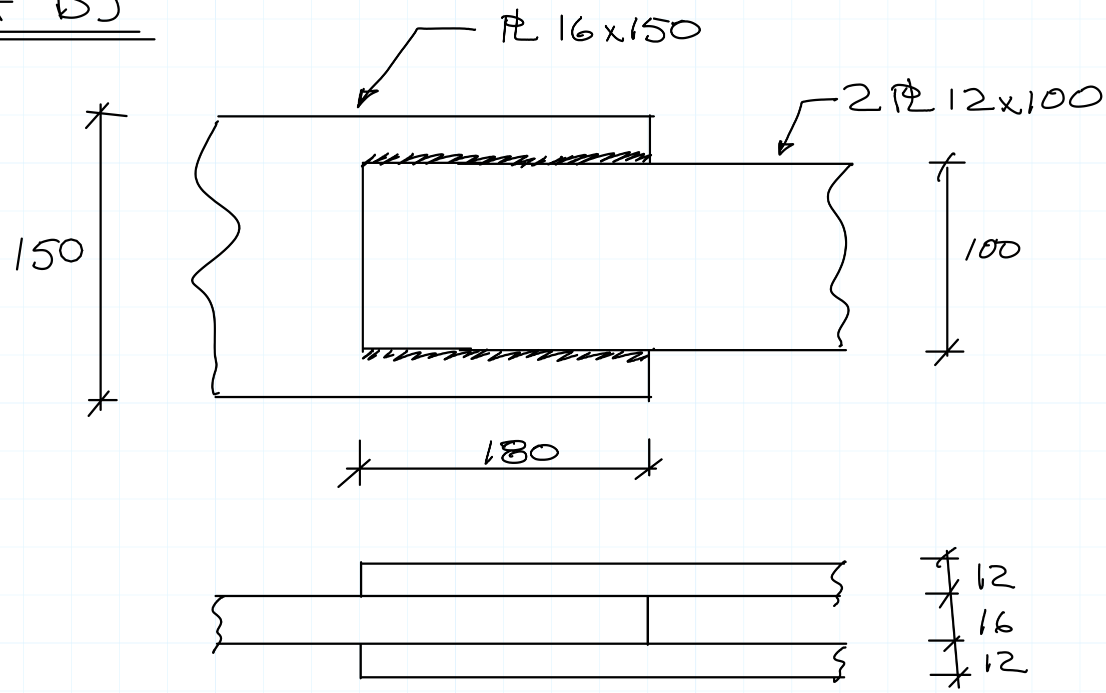
$$= 0.75 \times 2309\,mm^2 \times 0.480\,\frac{kN}{mm^2}$$

$$= 831\,kN$$

Capacity of plates

$$T_r = \underline{\underline{756\,kN}} \longleftarrow$$

Part B)



Compute the factored tension capacity, T_r, of the plates. CSA G40.21 350A steel. Fillet welds on 2 sides of each 12 mm plate.

350A Steel: $F_y = 350$ MPa (Table 6-3)
$F_u = 480$ MPa

12 mm plates:

$A_g = 12\text{ mm} \times 100\text{ mm} \times 2 = 2400\text{ mm}^2$

A_{n2}: $L = 180$ mm
$w = 100$ mm

$2w > L > w$

$\therefore A_{n2} = (0.5 \times 100 \times 12 + .25 \times 180 \times 12) \times 2$

$= 2280\text{ mm}^2$

$A_{ne} = 2280\text{ mm}^2$

yield: $T_r = 0.9 \times 2400 \times 0.35 = 756$ kN ← gov.
fracture: $T_r = 0.75 \times 2280 \times 0.48 = 821$ kN

16 mm plate:

$A_g = 2400 \text{ mm}^2$

A_{n2}: $L = 180$ $\quad w = 100$

$A_{n2} = 0.5 \times 100 \times 16 + .25 \times 180 \times 16$

$= 1520 \text{ mm}^2$

A_{n3}: $L = 180$ $\quad w = 25$ $\quad \bar{x} = 12.5$

$$A_{n3} = \left(1 - \frac{12.5}{180}\right) \times 25 \times 16 \times 2$$

$= 744 \text{ mm}^2$

$A_{ne} = 1520 + 744$
$= 2264 \text{ mm}^2$

yield: $T_r = 0.9 \times 2400 \times 0.35 = 756 \text{ kN}$ ← gov.

fract: $T_r = 0.75 \times 2264 \times .48 = 815 \text{ kN}$

Plate Capacity:

$$\underline{\underline{T_r = 756 \text{ kN}}}$$ ←