



Class Example - T2

Design Example - partially done in class
2017-01-19
- revised slightly here.

Design double-lap (plate) tension member
for $T_f = 400 \text{ kN}$.

Use 300W Steel (see top of page 3-4 HB)

Assume $t < 65 \text{ mm}$

$$\therefore F_y = 300 \text{ kN}$$

$$F_u = 440 \text{ kN}$$

(Table 6-3, HB)

Bolted connection:

Try M16 bolts (A325M) ($= 5/8"$ Imperial)

Not yet
covered
in class.

$$\text{Shear resistance per bolt} = 54.9 \times 2 = 109.8 \text{ kN} \quad (\text{HB Table 3-4})$$

$$\# \text{ bolts req'd} = \frac{400}{109.8} = 3.6$$

use 4 bolts

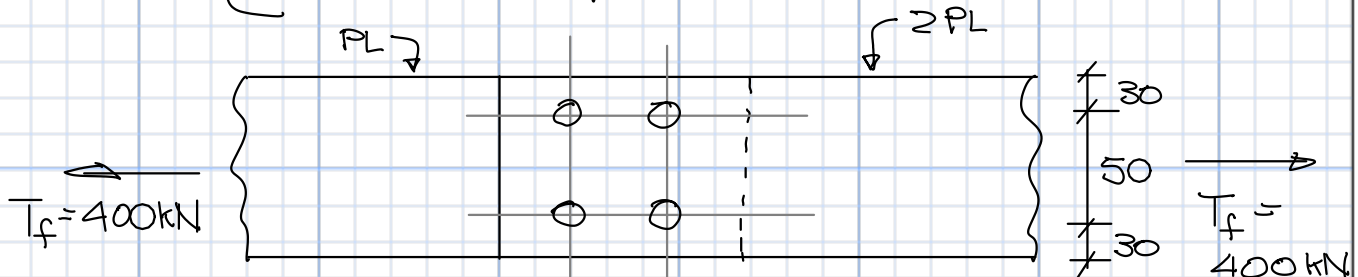
$$\text{Min spacing} = 2.7 \times 16 = 43 \text{ mm}$$

use 50 mm

$$\text{Min edge dist (Table 6)} = 28 \text{ mm}$$

$$\text{Min plate width} = 28 + 50 + 28 = 106 \text{ mm}$$

use 110 mm





Req'd plate thickness: (inner plate)

Gross Area Yield:

$$A_g = 110t \text{ mm}$$

$$T_r = \phi A_g F_y$$

$$= 0.9 \times 110t \text{ mm} \times 0.300 \frac{\text{kN}}{\text{mm}^2} \geq 400 \text{ kN}$$

$$t \geq 13.5 \text{ mm}$$

Net Area Fracture:

$$w_n = 110 - 2 \times (16 + 2 + 2) \text{ mm}$$

$$= 70 \text{ mm}$$

$$A_n = 70t \text{ mm}$$

$$T_r = \phi A_n F_u$$

$$= 0.75 \times 70t \text{ mm} \times 0.44 \frac{\text{kN}}{\text{mm}^2} \geq 400 \text{ kN}$$

$$\underline{t \geq 17.3 \text{ mm}} \quad \leftarrow \text{governs}$$

Use $t = 20 \text{ mm}$, inner

$t = 10 \text{ mm}$, outer

(see p. 6-154 HB)