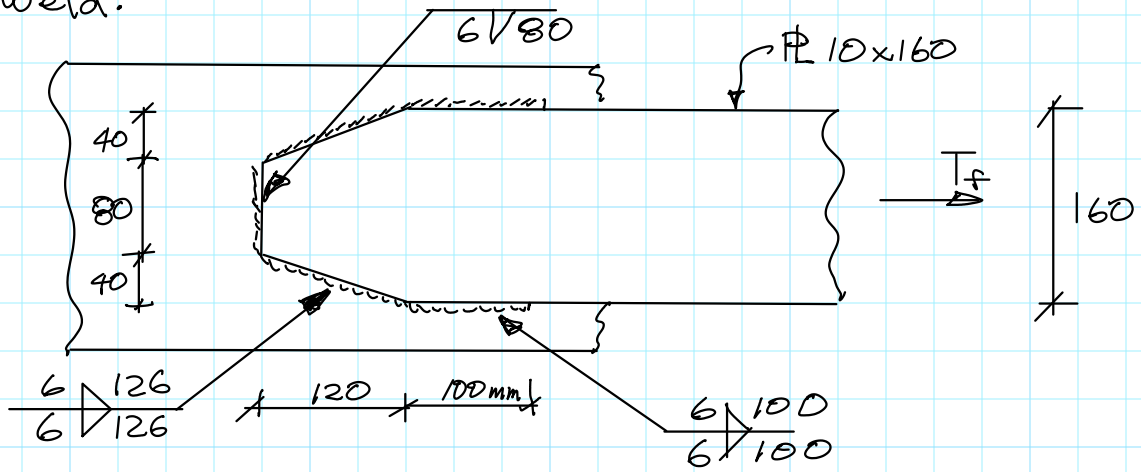
Example Weld-1

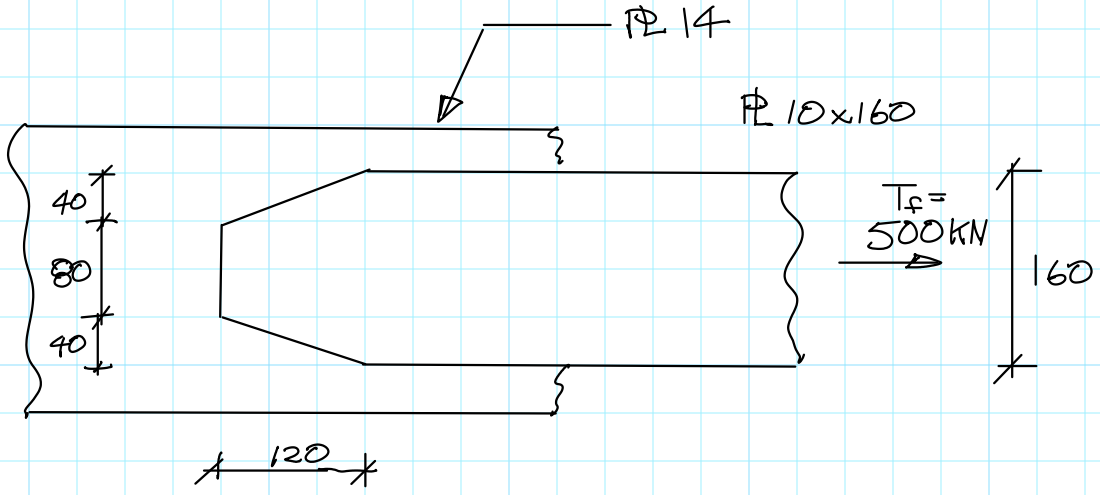
March 11, 2012

A) Determine the tensile capacity based only on the weld.



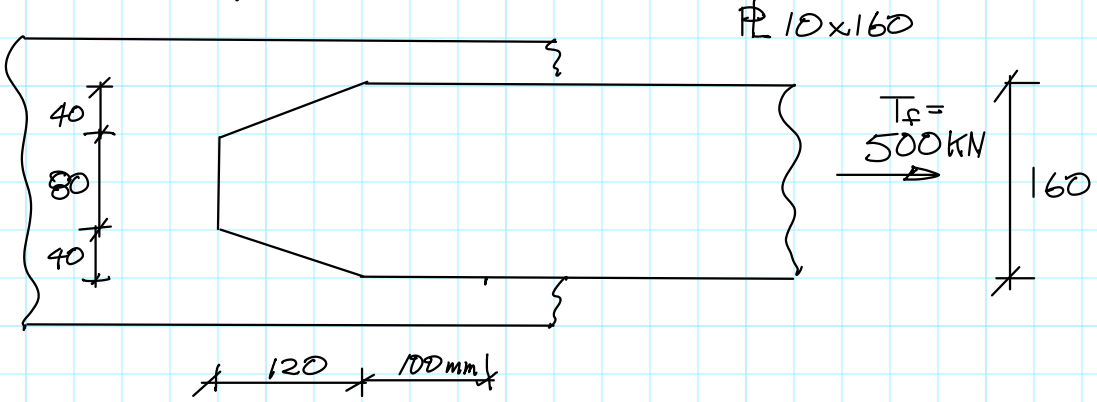
350W steel E49XX electrodes

B) Weld only along angled and parallel sides. Determine size & length of weld req'd.



350W steel E49XX electrodes

A) - Capacity



80mm side: $\theta = 90°$ $M_w = 1.0$

$$V_r = 0.67 \phi_w A_w X_u \left(1 + 0.5 \sin^{1.5}\theta\right) M_w$$

$$= 0.67 \times 0.67 \times 0.707 \times 6 \times 80 \times 490 \times \left(1 + 0.5 \times 1^{1.5}\right) \times 1.0 \times 10^{-3}$$

$$= 111 \text{ kN}$$

angled sides: $\theta = \tan^{-1}\frac{40}{120} = 18.4°$

$$M_w = \frac{.85 + 18.4/600}{.85 + 90/600} = 0.881$$

$$L = 2\sqrt{40^2 + 120^2} = 253 \text{ mm}$$

$$V_r = .67 \times .67 \times .707 \times 6 \times 253 \times 490 \times \left(1 + 0.5 \times (\sin 18.4)^{1.5}\right) \times .88 \times 10^{-3}$$

$$= 226 \text{ kN}$$

parallel sides: $\theta = 0°$

$M_w = 0.85$

$L = 2 \times 100 = 200 \text{ mm}$

$$V_r = .67 \times .67 \times .707 \times 6 \times 200 \times 490 \times 1 \times .85 \times 10^{-3}$$

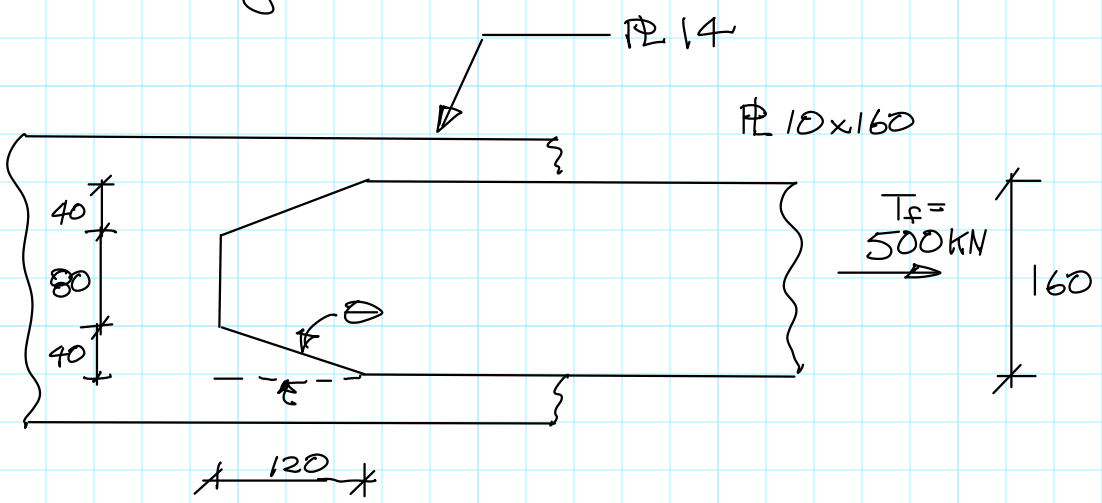
$$= 159 \text{ kN}$$

total: $T_r = 111 + 226 + 159$

$$T_r = 496 \text{ kN}$$ ←

matching electrodes - no need to check base metal

B) Design weld:



350W steel E49XX electrodes

matching electrode - no need to check base metal.

min weld size = 6mm
max weld size = 10-2 = 8mm } (p 6-172)

Try 6 mm weld

Angled sides:

$\theta = \tan^{-1}\frac{40}{120} = 18.4°$

$M_w = 1$

$L = 2\sqrt{40^2+120^2} = 253$ mm

$V_r = .67\,\phi_w A_w X_u (1 + .5\sin^{1.5}\theta) M_w$

$= .67 \times .67 \times .707 \times 6 \times 253 \times 490 \times (1 + .5(\sin 18.4)^{1.5}) \times 1 \times 10^{-3}$

$= 257$ kN

Parallel sides:

$\theta = 0°$

$M_w = \frac{0.85 + 0/600}{0.85 + 18.4/600} = 0.965$

for 1 mm length of 6mm weld @ 0°

$$V_r = 0.67 \times 0.67 \times .707 \times 6 \times 1 \times 490 \left(1 + 0.5 \sin^{1.5} 0\right) \times .965 \times 10^{-3}$$

$$= 0.900 \text{ kN}$$

length required, ea side

$$= \frac{(500 - 257)}{0.900} \times \frac{1}{2}$$

$$= 135 \text{ mm}$$

Summary