1951

Calculation of yielding penetration zone of 8 wf 40, October 1951

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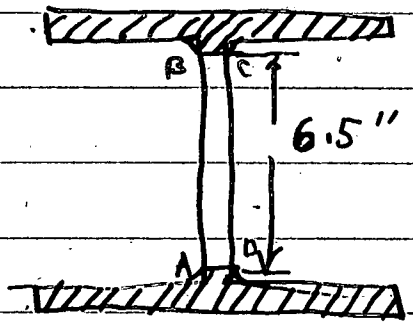


$Z_x = 41.05 \text{ in}^3$

$t_w = 0.371"$

$\sigma_{o\,flange} = 37.6 \text{ kip/in}^2$

$\sigma_{o\,web} = 38.7$ "

$M_{ABCD} = \left(\frac{6.5}{2}\right)^2 \times .371 = 3.91$

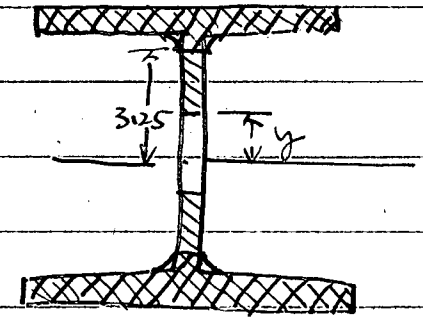
$$M_o = (41.05 - 3.91)37.6 + \frac{2}{3}\left(\frac{6.5}{2}\right)^2 \times 0.371 \times 38.7$$

$$M_o = 37.14 * 37.6 + \frac{2}{3}(3.25)^2 \times 0.371 \times 38.7$$

$$= 1395 + 101 = 1495$$

$W = 21.6$ (last load) kips

$l = 1495 / 21.6 = 69.3"$



$$M = 1395 + \frac{2}{3}(y)^2 \times 0.371 \times 38.7$$

$$+ (3.25 - y)(3.25 + y) \times 38.7$$

$$= 1395 + \frac{2}{3}y^2 \times 0.371 \times 38.7$$

$$+ \left[(3.25)^2 - y^2\right] \cdot 371 \times 38.7$$

$$= 1395 + \frac{1}{6} \cdot 371 \times 38.7 + \frac{}{2}$$

$$= 1395 - \frac{1}{3}\,0.371 \times 38.7\, y^2 + (3.25)^2 [.371 \times 38.7]$$

$$= 1395 - \frac{1}{3} \times 14.35\, y^2 + 3.25^2 \times 14.35$$

$$= 1395 + 151 - 4.78\, y^2$$

$$= 1546 - 4.78\, y^2 \qquad \text{previous calculated } 1540$$

$y = 0 \qquad x = 1546/21.6 = 71.6''$

$y = 3.25'' \qquad x = 69.3'' \qquad 71.6 - 69.3 = 2.3''$

The Curve

$21.6\, x = 1546 - 4.78\, y^2$ between $x = 71.6''$ & $x = 69.3''$

Calculation of yield & zones #4 W=31 to be continued.

1. Simple tension test with white wash to see the yielding lines developing as a comparision of measured strain.
2. More strain gages on cantilever to study yielding mechanism in bending.

$T \cap T = T \cap [X \cap T']'$

$6 \,|\, 185 = 31$

31

$T \cap X'$

$T =$

$(1.25) \; 310$

250

$T \cap X''$