ENDS 231. Assignment #9

Date: 6/27/06, due 6/30/06  
Worth 25 pts.

Problems: all but 9A & 9B from Onouye, Chapter 10.
Note: Problems marked with a * have been altered with respect to the problem stated in the text.

*Use A992 steel, and increase the load to 46 kips. Also select the column using LRFD design method and the column chart knowing the load is a dead load, and there is an additional live load of 70 k.

\[ F_y = 50 \text{ ksi}, \ E = 30,000 \text{ ksi}, \gamma_D = 1.2, \gamma_L = 1.6 \]

10.3.9 What is the most economical W8 (W200) column for Problem 10.3.8 to support a load of 50 k and a length of \( L = 20 \text{ ft} \). Assume \( F_y = 30 \text{ ksi} \) and \( K = 1.0 \).

Partial answers to check with:
- ASD: \( A_{req,d} \geq 9.3 \text{ in.}^2 \) with \( F_a = 10.72 \),
- LRFD: \( P_u = 167 \text{ k}, \phi_{P_n} = \ldots k \)

10.4.3 Determine the axial load capacity of a \( 6\frac{3}{4}'' \times 10\frac{1}{2}'' \) glulam column with an area \( A = 70.88 \text{ in.}^2 \), assuming lateral bracing about the weak axis at the midheight level. Assume pin connections top and bottom in both directions of buckling. (\( F_c = 1650 \text{ psi}, E = 1.8 \times 10^6 \text{ psi} \))

Partial answers to check with:
- \( (C_D = 1) F'_c = 1021 \text{ psi}, P_a = 72.4 \text{ k} \)

9A) Determine the capacity of this butt splice based on shear, bearing, and net tension. The plates are made of A36 steel and the four bolts on each side of the splice are A325-SC with standard round holes.

Partial answers to check with:
- \( P = 60 \text{ k} \) (shear governs with \( P_b = 104.4 \text{ k} \) and \( P_{tgross} = 86.4 \text{ k}, P_{t-net} = 92.5 \text{ k} \))

MORE NEXT PAGE
9B) Determine the capacity of the welded connection shown. The weld size is 3/16 in.. Assume the base metal is A36 steel and electrodes are E70XX in each problem. Use $L = 4.5\"$.

Partial answers to check with:

$P_v = 38.9 \text{ k}, \ P_t = 33.75 \text{ k}$