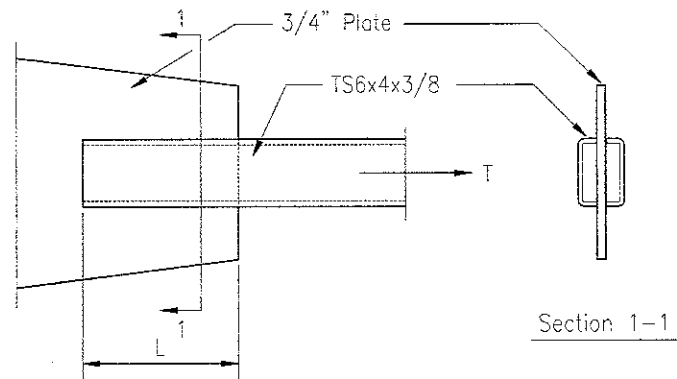


**Example Problem 5.1**

**Given:** The connection shown has a gusset plate fitted into a slot in an HSS section.

The gusset plate is A992 steel.  
 The HSS is A500 Gr B steel.  
 The electrode is F7.

T consists of 50 k Dead load and 150 k Seismic Load. Use ASD.



**Wanted:** Determine the size and required lengths of the fillet welds so as to minimize the lap of the connection. Draw the appropriate fillet weld on your summary detail drawing.

**Solution:** (4) FILLET WELDS CAN BE MADE, EACH OF LENGTH "L", ONE @ EACH HSS/PLATE INTERSECTION.

TO MINIMIZE "L" WE WANT TO USE THE LARGEST EFFECTIVE WELD SIZE SO THAT THE STRENGTH IS CONTROLLED BY SHEAR RUPTURE OF THE BASE METAL.

MATERIAL PROPERTIES

	HSS	PL	WELD	
$F_y$	46	50	—	ksi
$F_u$	58	65	70	ksi

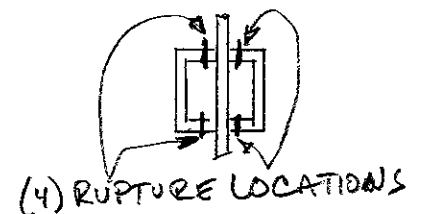
DESIGN LOAD (ASD LC5)

$$T_d = 50k + 0.7(150k) = 155k$$

SHEAR RUPTURE STRENGTH OF HSS:

$$R_u/\Omega = \frac{\overbrace{(4) [0.6 (58 \text{ ksi})]}^{F_u m} (3/8") L}{2.0}$$

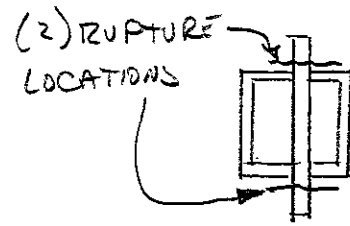
$$R_u/\Omega = (26.1 \text{ k/in}) L$$



SHEAR RUPTURE OF  $\Phi$

$$R_n/\phi = \frac{(2)[.6(65\text{ksi})](3/4")L}{2.0}$$

$$R_n/\phi = (29.3 \text{ k/in})L \geq (26.1 \text{ k/in})L \therefore \text{HSS CONTROLS}$$



FIND FILLET WELD SIZE:

$$R_n/\phi = \frac{(4 \text{ WELDS}) \left[ \overbrace{.6(70\text{ksi})}^{F_{EXX}} \right] \left( \overbrace{707a}^{t_e} \right) L}{2.0} \geq (26.1 \text{ k/in})L$$

$$R_n/\phi = 59.4a \text{ k/in} \geq 26.1 \text{ k/in}$$

$$a \geq .439" = \frac{7.03}{16} \Rightarrow \text{USE } \underline{\underline{a = 1/2"}}$$

COMPUTE REQ'D L

$$T_a \leq (26.1 \text{ k/in})L$$

$$L \geq 155\text{k} / 26.1 \text{ k/in} = 5.94"$$

SCM J2.2b REQUIRES "IF LONGITUDINAL WELDS ARE USED IN END CONNECTIONS OF FLAT BAR TENSION MEMBERS" (OUR GUSSET  $\Phi$  FITS THIS DESCRIPTION) "THE LENGTH OF EACH FILLET WELD SHALL NOT BE LESS THAN THE DISTANCE BETWEEN THEM."

IN OUR CASE,  $L \geq 6"$

LET'S USE 6" AND SEE IF A SMALLER WELD WILL DO SINCE  $6" \geq 5.94"$

PROB 5.1 (CONTINUED)

JBQ 3/3

$$\text{REQ'D } R_N / L = \frac{155 \text{ k}}{6"} = 25.8 \text{ k/in}$$

COMPUTE CORRESPONDING WELD SIZE!

$$25.8 \text{ k/in} \leq \frac{(4 \text{ WELDS}) [0.6 (70 \text{ ksi})] (0.707a)}{2.0}$$

$$a \geq \frac{6.96}{16} \Rightarrow \text{USE } 7/16" \text{ FILLET WELD}$$

SOLUTION SUMMARY

