Example 2 of welded eccentric connection in tension and shear

Bracket connection

Determine the size of fillet weld required for the bracket connection shown in Figure 10.28. The web welds are to be taken as one half the leg length of the flange welds. All dimensions and loads are shown in the figure.

Design assuming rotation about XX axis

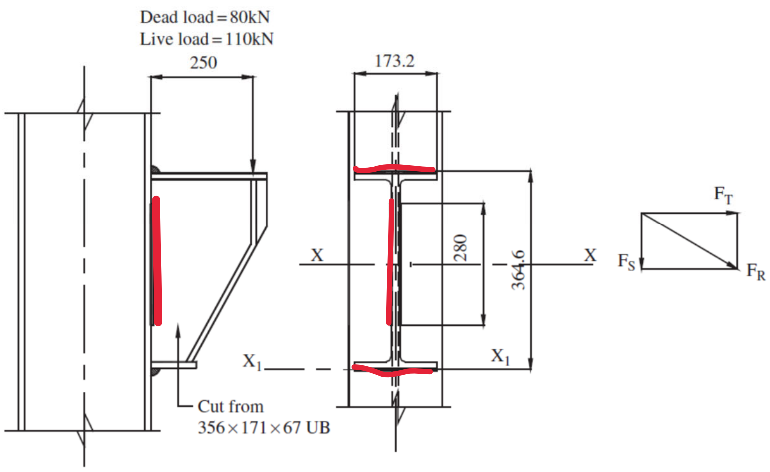
Direct shear	$F_s = P/L$,	Equations used
Load due to moment	$F_T = Ped/2I_x$,	
Resultant load	$F_R = (F_T^2 + F_S^2)^{0.5}$.	

$$\text{Factored load} = (1.4 \times 80) + (1.6 \times 110) = 288\,\text{kN},$$

$$\text{Length } L = (2 \times 173.2) + 280 = 626.4\,\text{mm},$$

$$\text{Inertia } I_x = (2 \times 173.2 \times 182^2) + 280^3/12 = 13.3 \times 10^6\,\text{mm}^3,$$

$$\text{Direct shear } F_s = 288/626.4 = 0.46\,\text{kN/mm},$$



Bracket connection

d/2=364.6/2=182 mm

1-rotation around -X-X

$$\text{Shear from moment } F_T = \frac{288 \times 250 \times 182}{13.3 \times 10^6} = 0.985\,\text{kN/mm},$$

$$\text{Resultant shear } F_R = [0.462 + 0.985^2]^{0.5} = 1.09\,\text{kN/mm}.$$

Provide 8-mm fillet welds for the flanges, strength 1.23 kN/mm. For the web welds provide 6-mm fillets (the minimum size recommended).

how it been calculated for flange use electrode 35 then sterngth =220 kN/mm
leg 8mm then throat =0.7x8 =5.6mm
then sterght of weld =5.6x220/1000=1.23 kN/mm Greater than FT=0.985 kN/mm

2 rotation around X1-X1

Design assuming rotation about X_1X_1 axis

The flange weld resists the moment -288×250

$$F_T = \frac{288 \times 250}{364 \times 173.2} = 1.14\,\text{kN/mm}.$$

Provide 8-mm fillet welds, strength 1.23 kN/mm. The web welds resist the shear:

$$F_s = 288/(2 \times 280) = 0.514\,\text{kN/mm}.$$

Provide 6-mm fillet welds. The methods give the same results.

how it been calculated for the web
leg =6mm then throat =0.7x6 =4.2 mm
strength for of weld in web =4.2x220/1000=0.924kN/mm
greater than Fs=0.46 kN/mm

SECOND METHOD OF ANALYSIS

In a second assumption rotation takes place about the bottom flange X_1X_1. The flange welds resist moment and web welds shear. In this case:

$$F_T = Pe/db$$
$$F_s = P/2a.$$