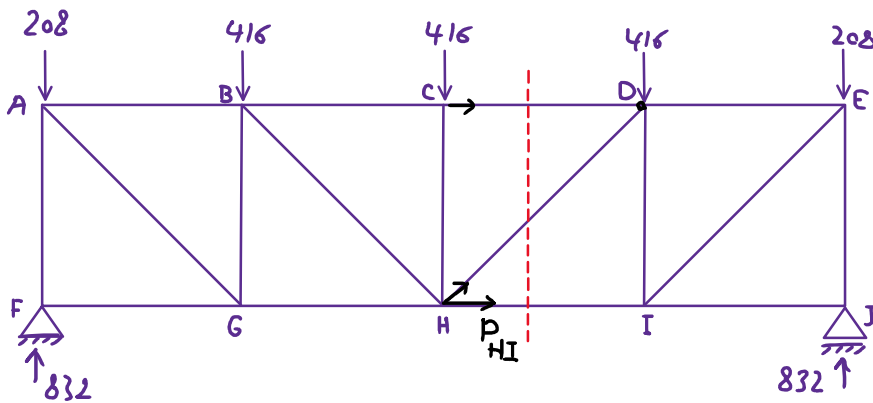
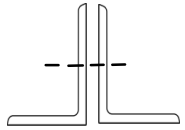
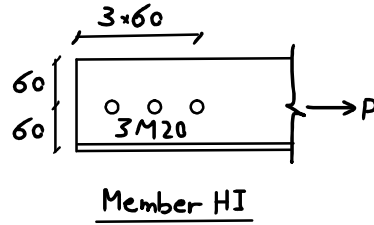
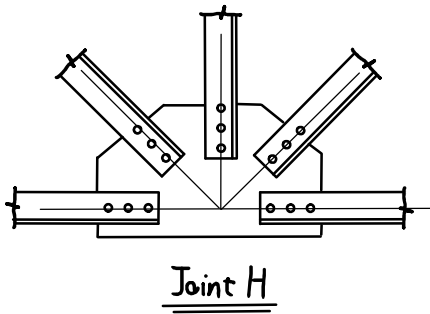
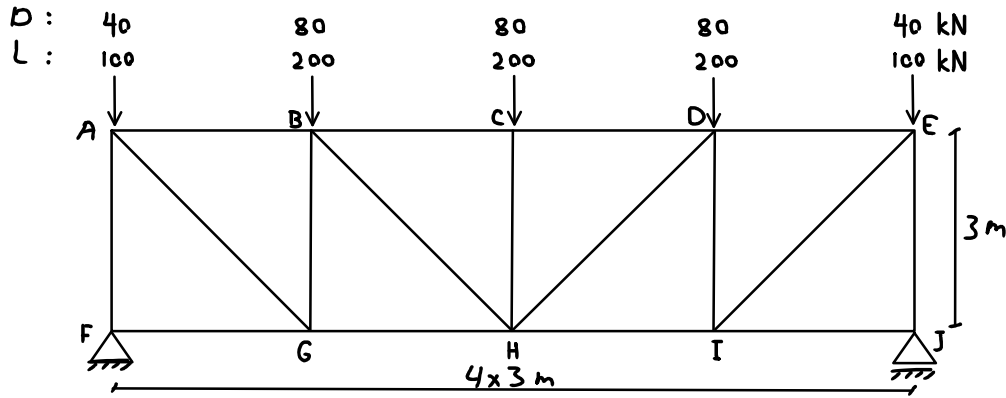


مثال: عضو HI از خرابی شکل زیر را طراحی کنید. هر اعضا از دوپل نبش مستدک در محل اتصال به دو طرف یک ورق اتصال با ضخامت 20 mm وصل شده اند.



$$1.2 \times 40 + 1.6 \times 100 = 208 \text{ kN}$$

$$\sum M_D = 0 \rightarrow 416 \times 3 + 416 \times 6 + 208 \times 9 - 832 \times 9 + P_{HI} \times 3 = 0 \rightarrow$$

$$P_{HI} = 624 \text{ kN}$$

Design for one angle :  $P_u = \frac{624}{2} = 312 \text{ kN}$

① Yield of Gross Section

$$\phi P_n = 0.9 F_y A_g \geq P_u \rightarrow 0.9 \times 235 A_g \geq 312 \times 10^3 \rightarrow A_g \geq 14.75 \times 10^2 \text{ mm}^2$$

Try L120x80x8  
 $A_g = 15.5 \times 10^2$

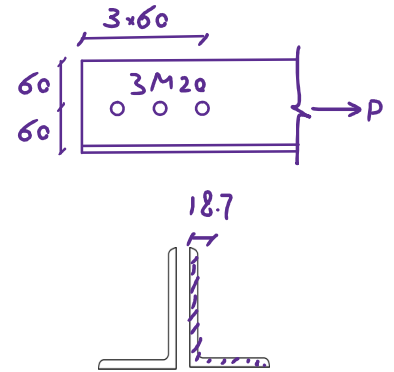
## ② Fracture of Net Section

$$A_n = 15.5 \times 10^2 - (24 \times 8) = 13.58 \times 10^2 \text{ mm}^2$$

$$U = 1 - \frac{\bar{x}}{L} = 1 - \frac{18.7}{120} = 0.844 \geq \frac{A_i}{A_g}$$

$$A_e = U A_n = 0.844 \times 13.58 \times 10^2 = 11.46 \times 10^2$$

$$\phi P_n = 0.75 F_u A_e = 0.75 \times 360 \times 11.46 \times 10^2 = 309 \text{ kN} \cong P_u = 312 \text{ kN} \checkmark$$



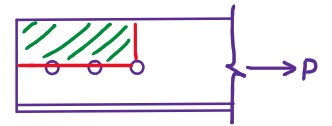
## ③ Block Shear Fracture

$$A_{gv} = 180 \times 8 = 14.4 \times 10^2 \rightarrow 0.6 F_y A_{gv} = 203 \text{ kN}$$

$$A_{nv} = (180 - 2.5 \times 24) \times 8 = 9.6 \times 10^2 \rightarrow 0.6 F_u A_{nv} = 207 \text{ kN}$$

$$A_{nt} = (60 - 0.5 \times 24) \times 8 = 3.84 \times 10^2 \rightarrow F_u A_{nt} = 138 \text{ kN}$$

$$\phi P_n = 0.75 (203 + 138) = 256 \text{ kN} < P_u = 312 \text{ kN} \quad \text{N.G}$$



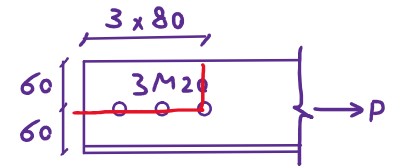
بار آند برش قالبی جواب بدهد باید طول مسیر برش یا ضمت ورق بال را از این لحیم.

$$A_{gv} = 240 \times 8 = 19.2 \times 10^2 \rightarrow 0.6 F_y A_{gv} = 271 \text{ kN}$$

$$A_{nv} = (240 - 2.5 \times 24) \times 8 = 14.4 \times 10^2 \rightarrow 0.6 F_u A_{nv} = 311 \text{ kN}$$

$$A_{nt} = 3.84 \times 10^2 \rightarrow F_u A_{nt} = 138 \text{ kN}$$

$$\phi P_n = 0.75 (271 + 138) = 307 \text{ kN} \cong P_u = 312 \text{ kN} \checkmark$$



$$r_x = \sqrt{\frac{I_x}{A}} = \sqrt{\frac{2I}{2A}} = 38.3 \text{ mm}$$

① لافز عضو (دوبن)

$$I_y = 2 \times [80.8 \times 10^4 + 15.5 \times 10^2 \times 28.7^2] = 2 \times 208.5 \times 10^4$$

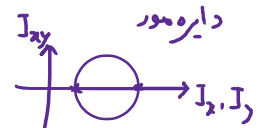
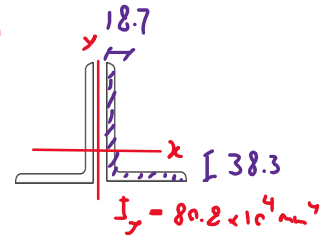
$$r_y = \sqrt{\frac{I_y}{A}} = \sqrt{\frac{2 \times 208.5 \times 10^4}{2 \times 15.5 \times 10^2}} = 36.7 \text{ mm}$$

$$r_{min} = 36.7 \text{ mm} \rightarrow \frac{3000}{36.7} = 82 < 300 \checkmark$$

$$\frac{L_1}{r_1} \leq 300 \rightarrow L_1 \leq 300 \times 17.4 = 5220 \text{ mm} > 3000 \text{ mm}$$

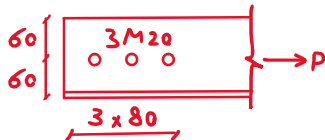
② لافز تک برف (بتن)

لغامیان لازم ندارد.



USE JL 120x80x8 long leg back to back

S235 steel



3x80