$e_c := 10.7$

$e_b := 0.875$

$P := 120$

$\theta := \frac{\pi}{2} - \operatorname{atan}\left(\frac{12}{9.125}\right) = 0.65$

$s := 0.75$

$r(\alpha, \beta) := \sqrt{(\alpha + e_c)^2 + (\beta + e_b)^2}$

$\alpha_{bar} := 0$

$\beta_{bar} := 18.375$

$\alpha := \alpha_{bar}$

$\beta := \alpha - \beta \cdot \tan(\theta) = e_b \cdot \tan(\theta) - e_c \text{ solve}, \beta \rightarrow 13.196$

$0 \le \left|(\alpha - \beta \cdot \tan(\theta)) - (e_b \cdot \tan(\theta) - e_c)\right| \le 0.1 = 1$

$r(\alpha, \beta) = 17.677$

$\beta = \beta_{bar} = 0$ so there must be NON-ZERO moment @ gusset-to-column interface

$H_b := P \cdot \frac{\alpha}{r(\alpha, \beta)} = 0$

$V_b := P \cdot \frac{e_b}{r(\alpha, \beta)} = 5.94$

$V_c := P \cdot \frac{\beta}{r(\alpha, \beta)} = 89.58$

$H_c := P \cdot \frac{e_c}{r(\alpha, \beta)} = 72.635$

$M_c := (H_c) \cdot (\beta_{bar} - \beta) = 376.161$

(negative moments add to the shear)

$M_b := (V_b) \cdot (\alpha_{bar} - \alpha) = 0$

$$
\begin{aligned}
V_b &\leftarrow \max\left(\left|\frac{V_b}{2}\right| + \left|\frac{M_b}{\alpha_{bar} - s}\right|, |V_b|\right) \text{ if } \alpha > \alpha_{bar} \\
V_b &\leftarrow \max\left(\left|\frac{V_b}{2}\right| - \left|\frac{M_b}{\alpha_{bar} - s}\right|, |V_b|\right) \text{ if } \alpha < \alpha_{bar} \\
H_c &\leftarrow \max\left(\left|\frac{H_c}{2}\right| + \left|\frac{M_c}{\beta_{bar} - s}\right|, |H_c|\right) \text{ if } \beta > \beta_{bar} \\
H_c &\leftarrow \max\left(\left|\frac{H_c}{2}\right| + \left|\frac{M_c}{\beta_{bar} - s}\right|, |H_c|\right) \text{ if } \beta > \beta_{bar}
\end{aligned}
$$

$V_b = 5.94$

$H_c = 72.635$

CHECKS

$H := P \cdot \sin(\theta) = 72.635$ $\quad H_b + H_c = 72.635$ $\quad 0 \le \left|H - (H_b + H_c)\right| \le 1 = 1$

$V := P \cdot \cos(\theta) = 95.52$ $\quad V_b + V_c = 95.52$ $\quad 0 \le \left|V - (V_b + V_c)\right| \le 1 = 1$

$$H_{bfig} := \frac{P \cdot \cos\left(\operatorname{atan}\left(\frac{12}{9.125}\right)\right) \cdot \left(\beta_{bar} - 6\right) - P \cdot \sin\left(\operatorname{atan}\left(\frac{12}{9.125}\right)\right) \cdot e_c}{\beta_{bar}} = -6.705$$

$$H_{cfig} := \frac{P \cdot \cos\left(\operatorname{atan}\left(\frac{12}{9.125}\right)\right) \cdot 6 + V \cdot e_c}{\beta_{bar}} = 79.34$$

Why is the angle not consistent with the rest of UFM?
Why is e 6, which is not congruent with e.b or e.c?

$$slope := \frac{12}{9.125} = 1.315$$

$$x := 29 \cdot \cos(\text{atan}(slope)) = 17.554$$

$$y := 29 \cdot \sin(\text{atan}(slope)) = 23.084$$

$$x - 10.7 = 6.854$$

$$y + 6 = 29.084$$

column connections, respectively. When the calculated $\alpha > \bar{\alpha}$ or the calculated $\beta > \bar{\beta}$, the additional shear induced in the beam or column due to the moment may add to the shear, V_b, in the beam and H_c in the column. Thus, for the beam:

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When $\alpha > \bar{\alpha}$:

$$\text{Total beam shear} = \max\left\{\left|\frac{V_b}{2}\right| + \left|\frac{M_b}{\bar{\alpha} - s}\right|, |V_b|\right\} + R_b$$

When $\alpha < \bar{\alpha}$:

$$\text{Total beam shear} = \max\left\{\left|\frac{V_b}{2}\right| - \left|\frac{M_b}{\bar{\alpha} - s}\right|, |V_b|\right\} + R_b$$

where

R_b = beam end reaction

s = snip size in the gusset where the top flange o

For the column:

When $\beta > \bar{\beta}$:

$$\text{Total column shear} = \max\left\{\left|\frac{H_c}{2}\right| + \left|\frac{M_c}{\bar{\beta} - s}\right|, |H_c|\right\}$$

When $\beta < \bar{\beta}$:

$$\text{Total column shear} = \max\left\{\left|\frac{H_c}{2}\right| - \left|\frac{M_c}{\bar{\beta} - s}\right|, |H_c|\right\}$$