

**EJERCICIO N°2****Prof. A. Verdugo / Aux. P.Correa**

1.- La figura muestra una viga enrejada de 12m de longitud, soportada en sus extremos.

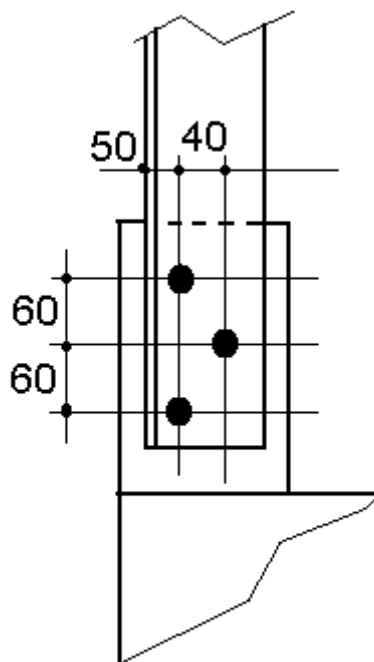
Se pide determinar la carga máxima que admiten los elementos traccionados del sistema, verificando resistencia de acuerdo al Método ASD (tensiones admisibles) de la norma AISC 2005. Se deberá comprobar cumplimiento de esbeltez y altura mínima.

En particular deberá evaluar:

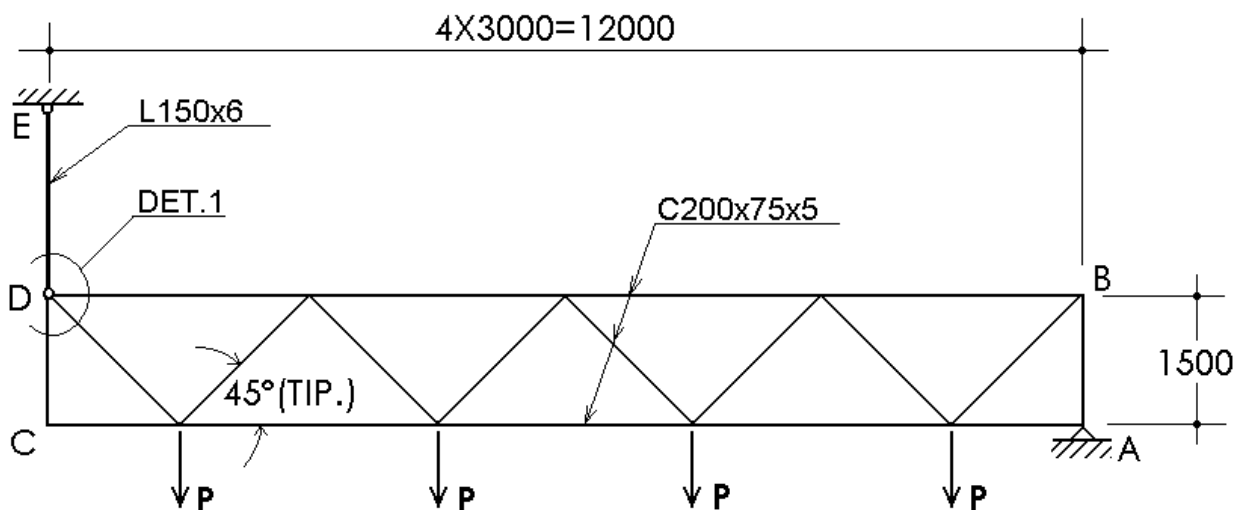
- Cordon superior
- Diagonal traccionada
- Colgador

Considerar:

- Acero ASTM A36  $F_y=2.53 \text{ tonf/cm}^2$
- Los puntos A, B, C, D y E están fijos al movimiento fuera del plano
- Despreciar el peso propio de la estructura
- Pernos de conexión  $\phi 1"$
- Dimensiones en mm



**DETALLE 1**



## **Ejercicio 2 (Pauta)**

$$\text{Ton} := 1000 \cdot \text{kgf}$$

$$P := 6.329 \cdot \text{Ton}$$

### **Análisis Estructural**

$$\text{Colgador} := 2 \cdot P$$

$$\text{Colgador} = 12.658 \text{ Ton}$$

$$\text{Diagonal} := \frac{\text{Colgador}}{\cos(45 \cdot \text{deg})}$$

$$\text{Diagonal} = 2\sqrt{2} \cdot P$$

$$\text{Diagonal} = 17.901 \text{ Ton}$$

$$\text{Cordon} := 4 \cdot P$$

$$\text{Cordon} = 25.316 \text{ Ton}$$

### **Acero**

$$F_y := 2.53 \cdot \frac{\text{Ton}}{\text{cm}^2}$$

$$F_u := 4.0 \cdot \frac{\text{Ton}}{\text{cm}^2}$$

### **Diagonal**

$$\text{C200x75x5}$$

$$A_{\text{diagonal}} := 16.7 \cdot \text{cm}^2$$

$$P_n := \frac{F_y \cdot A_{\text{diagonal}}}{1.67}$$

$$P_n = 25.3 \text{ Ton}$$

$$F_u := \frac{\text{Diagonal}}{P_n}$$

$$F_u = 0.71$$

$$K := 1$$

$$L := 1.5 \cdot \sqrt{2} \cdot \text{m}$$

$$r_{\min} := \frac{K \cdot L}{300}$$

$$r_{\min} = 0.707 \text{ cm}$$

CUMPLE

$$h_{\min} := \frac{1.5 \cdot \text{m}}{90}$$

$$h_{\min} = 1.667 \text{ cm}$$

CUMPLE

### Cordon

C200x75x5

$$A_{\text{cordon}} := 16.7 \cdot \text{cm}^2$$

$$P_n := \frac{F_y \cdot A_{\text{cordon}}}{1.67} \quad P_n = 25.3 \text{ Ton}$$

$$FU := \frac{\text{Cordon}}{P_n} \quad FU = 1.00$$

$$K := 1$$

$$L := 3 \cdot \text{m}$$

$$r_{\min} := \frac{K \cdot L}{300} \quad r_{\min} = 1 \text{ cm} \quad \text{CUMPLE}$$

$$h_{\min} := \frac{L}{90} \quad h_{\min} = 3.333 \text{ cm} \quad \text{CUMPLE}$$

### Colgador

L150x6

$$A_{\text{colgador}} := 17.4 \cdot \text{cm}^2$$

$$P_{n1} := \frac{F_y \cdot A_{\text{colgador}}}{1.67} \quad P_{n1} = 26.36 \text{ Ton}$$

$$K := 1$$

$$L := 2 \cdot \text{m}$$

$$r_{\min} := \frac{K \cdot L}{300} \quad r_{\min} = 0.667 \text{ cm} \quad \text{CUMPLE}$$

área neta

$$A_{n1} := \left[ \frac{A_{\text{colgador}}}{6 \cdot \text{mm}} - 1 \cdot \left( 1 \cdot \text{in} + \frac{1}{16} \cdot \text{in} + \frac{1}{16} \cdot \text{in} \right) \right] \cdot 6 \cdot \text{mm} \quad A_{n1} = 15.685 \text{ cm}^2$$

$$A_{n2} := \left[ \frac{A_{\text{colgador}}}{6 \cdot \text{mm}} - 2 \cdot \left( 1 \cdot \text{in} + \frac{1}{16} \cdot \text{in} + \frac{1}{16} \cdot \text{in} \right) + \frac{(6 \cdot \text{cm})^2}{4 \cdot (4 \cdot \text{cm})} \right] \cdot 6 \cdot \text{mm} \quad A_{n2} = 15.321 \text{ cm}^2$$

$$A_{\text{neta}} := \min(A_{n1}, A_{n2}) \quad A_{\text{neta}} = 15.321 \text{ cm}^2$$

Factor de corrección

$$U_1 := 1 - \frac{4.03}{12} \quad U_1 = 0.664$$

$$U_2 := 0.6$$

$$U := \max(U_1, U_2) \quad U = 0.664$$

$$P_{n2} := \frac{F_u \cdot A_{\text{neta}} \cdot U}{2.00} \quad P_{n2} = 20.351 \text{ Ton}$$

$$P_n := \min(P_{n1}, P_{n2}) \quad P_n = 20.351 \text{ Ton}$$

$$FU := \frac{\text{Colgador}}{P_n} \quad FU = 0.62$$