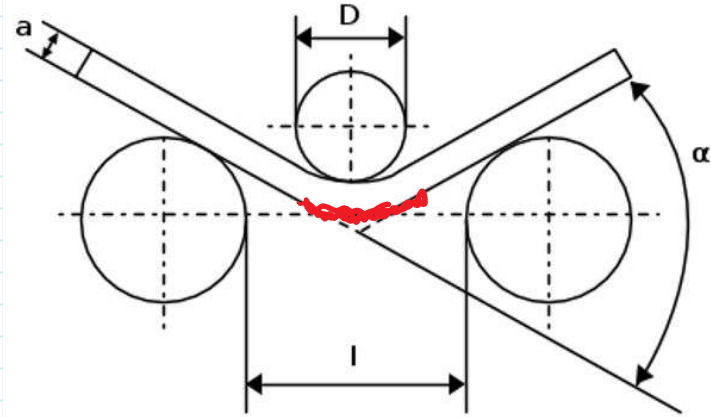
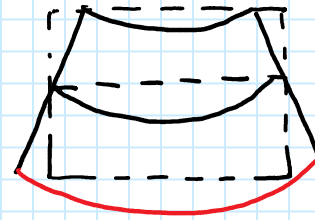


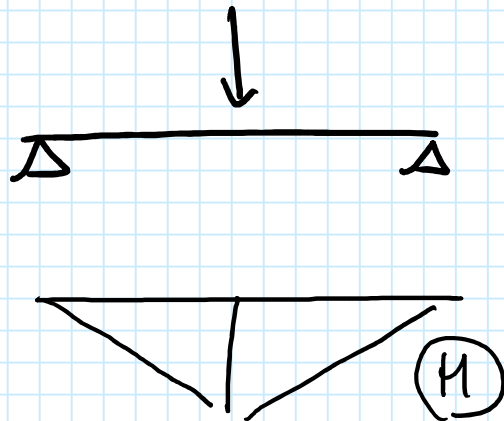
Prove di piegamento



Se ci sono crepe l'acciaio non è duttile



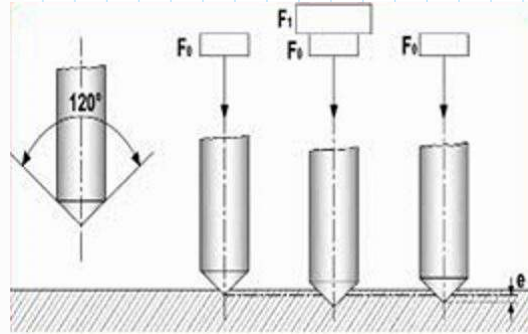
Allungamento delle fibre



Prove di durezza



Durometro



Misurare la durezza del materiale...
... indirettamente anche la resistenza

Classificazioni degli acciai per carpenterie metalliche

Tab. 4.2.I – Laminati a caldo con profili a sezione aperta piani e lunghi

Norme e qualità degli acciai	Spessore nominale "t" dell'elemento			
	t ≤ 40 mm		40 mm < t ≤ 80 mm	
	f _{yk} [N/mm ²]	f _{tk} [N/mm ²]	f _{yk} [N/mm ²]	f _{tk} [N/mm ²]
UNI EN 10025-2				
S 235	235	360	215	360
S 275	275	430	255	410
S 355	355	510	335	470
S 450	440	550	420	550
UNI EN 10025-3				
S 275 N/NL	275	390	255	370
S 355 N/NL	355	490	335	470
S 420 N/NL	420	520	390	520
S 460 N/NL	460	540	430	540
UNI EN 10025-4				
S 275 M/ML	275	370	255	360
S 355 M/ML	355	470	335	450
S 420 M/ML	420	520	390	500
S 460 M/ML	460	540	430	530
S460 Q/QL/QL1	460	570	440	580
UNI EN 10025-5				
S 235 W	235	360	215	340
S 355 W	355	510	335	490

Normative italiana

Legge 1086/71: è una legge quadro, le prescrizioni tecniche vengono fornite attraverso D.M. e circolari



D.M. 14/01/2018 NTC18

Circolare n. 7 del 21/01/2019

Normativa europea: Eurocodici

EN 1990

EN 1991 Eurocodice 1 Axiomi sulle strutture

EN 1992 Eurocodice 2 Strutture in c.a.

EN 1993 Eurocodice 3 Strutture in acciaio

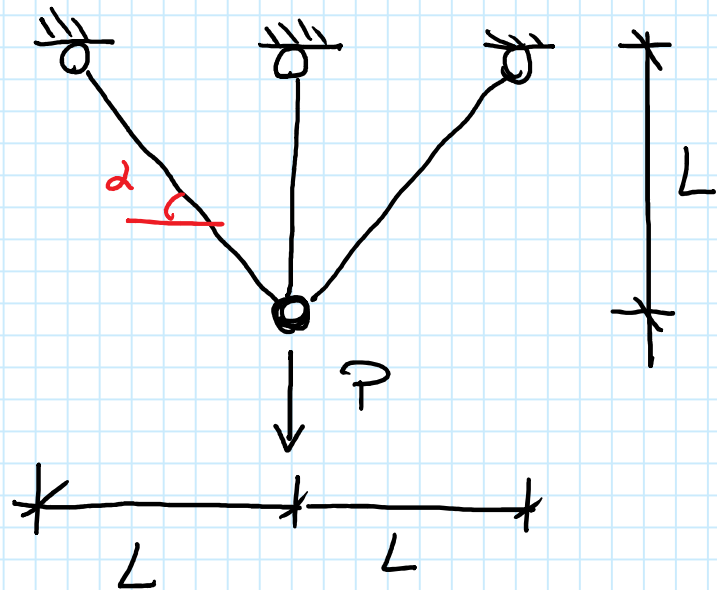
⋮

Appendici nazionali (per l'applicazioni degli Eurocodici
in Italia)

Criteri di verifica

1. Metodo delle funzioni ammissibili
2. Metodo del calcolo a rotture
3. Metodo probabilistico
4. Metodo semi-probabilistico

Metodo delle tensioni ammissibili



$$P = 350 \text{ kN}$$

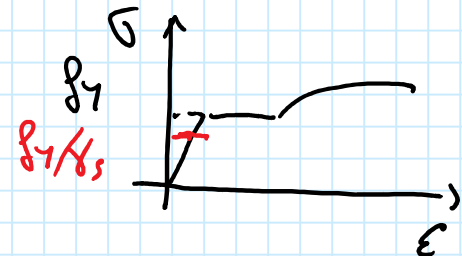
$$S 275 \quad \bar{\sigma}_s = \frac{275}{1,5} = 183,34 \text{ Pa}$$

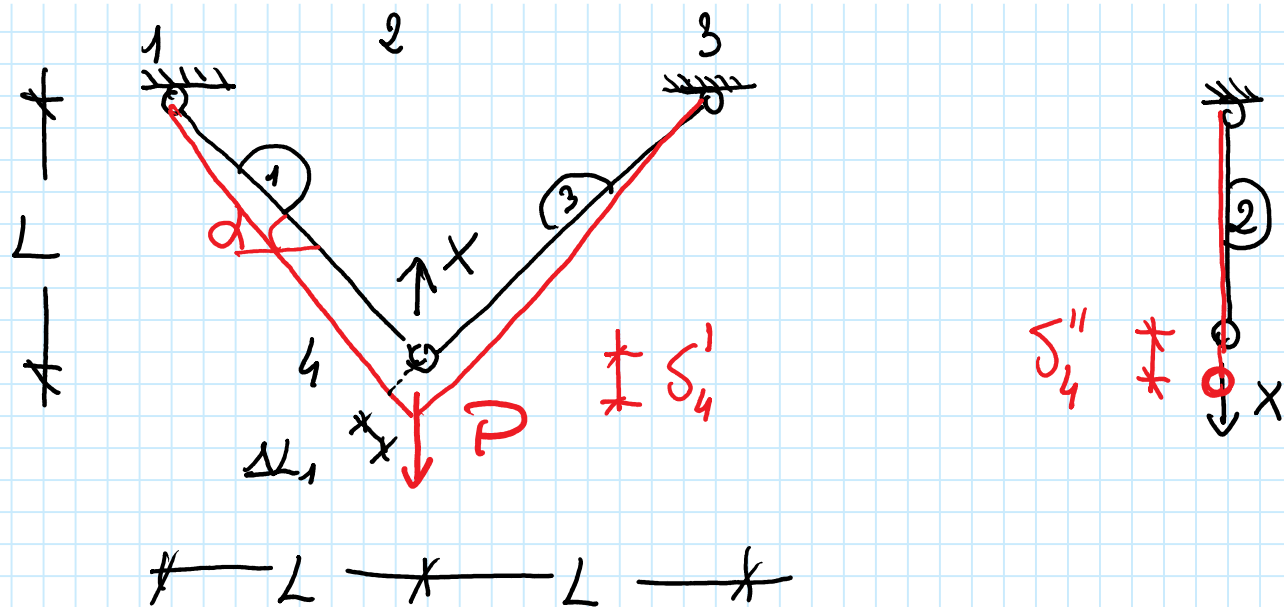
$$\text{⊗} \quad A = 10 \text{ cm}^2$$

$$\alpha = 45^\circ$$

$$P \rightarrow \begin{matrix} N, M \\ \cancel{V}, \cancel{T} \end{matrix} \rightarrow \sigma_{\max} \leq \frac{f_y}{\gamma_s} = \bar{\sigma}_s \quad \text{tensione ammissibile}$$

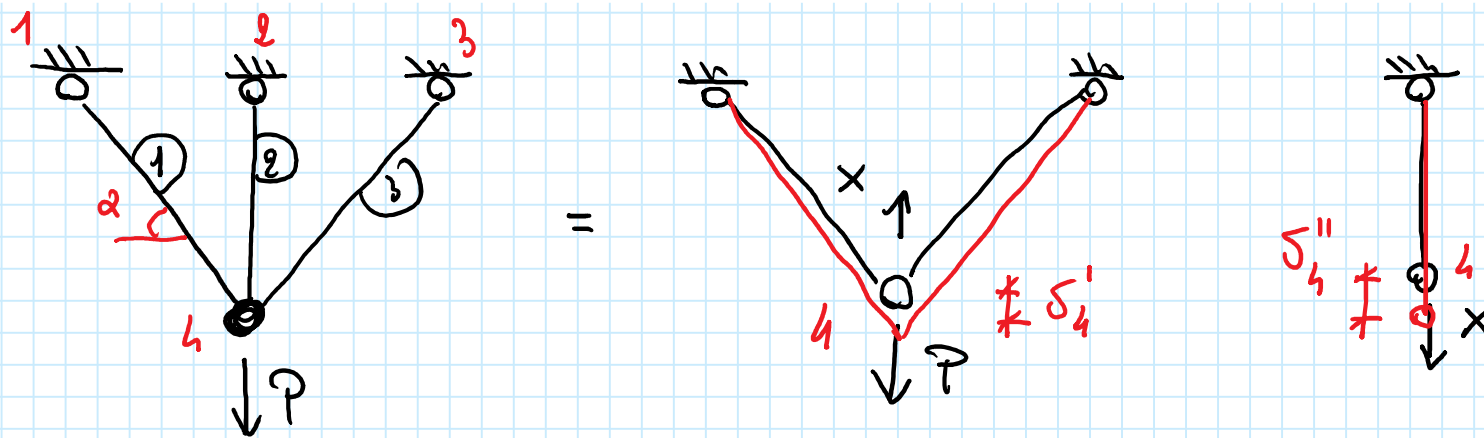
$$\gamma_s \geq 1 \quad \gamma_s = 1,5$$



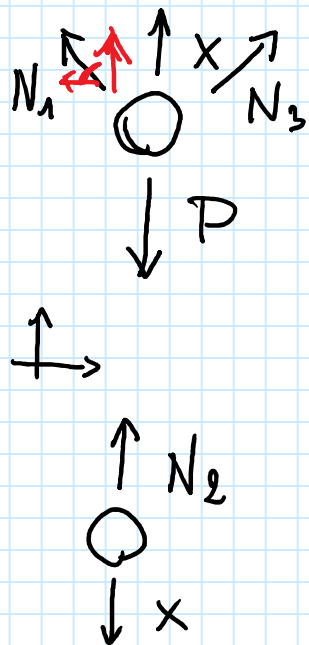


2 eq. di equilibrio del nodo

1 cond. di congruenza \rightarrow 1 eq.



Equazioni di equilibrio del nodo



$$-N_1 \cos \alpha + N_3 \cos \alpha = 0 \Rightarrow N_1 = N_3$$

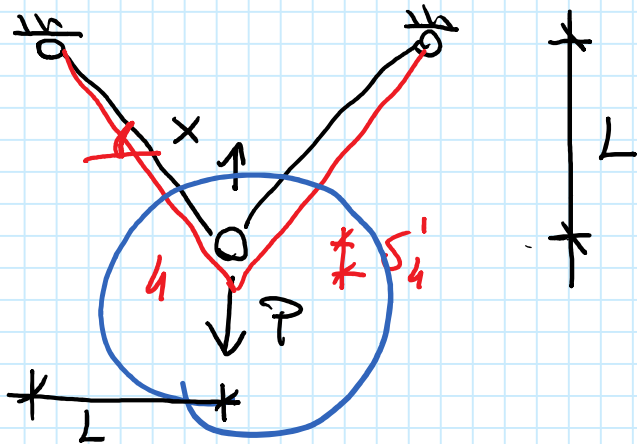
$$-P + X + N_1 \sin \alpha + N_3 \sin \alpha = 0$$

$$2 N_1 \sin \alpha = P - X \Rightarrow N_1 = N_3 = \frac{P - X}{2 \sin \alpha}$$

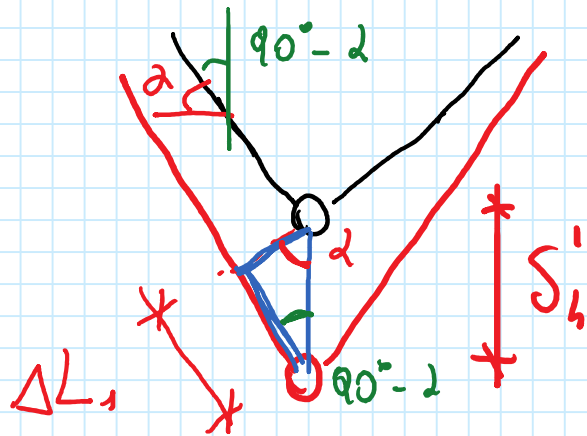
$$N_2 = X$$

$$\delta'_4 = \delta''_4 \Rightarrow X$$

Condizione di congruenza



$$L_1 = \frac{L}{\sin \alpha}$$



$$\Delta L_1 = \frac{N_1 L_1}{E_s A} = \frac{N_1 L}{E_s A \sin \alpha}$$

$$\boxed{\delta'_4 = \frac{\Delta L_1}{\sin \alpha} = \frac{N_1 L}{E_s A \sin^2 \alpha}}$$



$$\delta_4'' = \Delta L_2$$

$$\delta_4'' = \Delta L_2 = \frac{N_2 L_2}{E_s A} = \frac{N_2 L}{E_s A}$$

$$\frac{N_1 L}{E_s A 2m^2 2} = \frac{N_2 L}{E_s A} \Rightarrow \frac{P - X}{2 m^3 2} = X$$

$$P - X = 2 m^3 2 X \Rightarrow P = (1 + 2 m^3 2) X \Rightarrow X = \frac{P}{1 + 2 m^3 2}$$

$$N_2 = \frac{P}{1 + 2 m^3 2}$$

$$N_1 = \frac{1}{2 m 2} \left(P - \frac{P}{1 + 2 m^3 2} \right) = \frac{P}{2 m 2} \left(\frac{1 + 2 m^3 2 - 1}{1 + 2 m^3 2} \right) = \frac{m^2 2}{1 + 2 m^3 2} P$$

$$\sigma_{max} = \frac{N_{max}}{A} = \frac{N_2}{A}$$

$$N_2 = \frac{P}{1 + 2 \mu^3 \alpha} = \frac{350}{1 + 2 \times \left(\frac{\sqrt{2}}{2}\right)^3} = 205,03 \text{ kN}$$

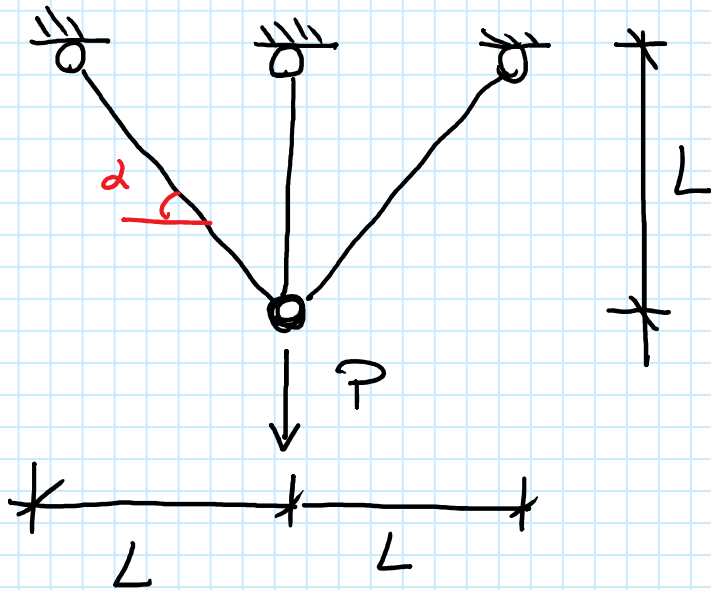
$$\sigma_{max} = \frac{N_2}{A} = \frac{205,03}{10} \times \frac{10^3}{10^2} = 205,03 \text{ MPa}$$

$$\sigma_{max} = 205,0 \text{ MPa} \leq \underbrace{\frac{f_y}{\gamma_s}}_{\sigma_{s}} = \frac{275}{1,5} = 183,3 \text{ MPa}$$

NO

∴

Método del cálculo a rotura



$$P = 350 \text{ kN}$$

S 275

$$\text{⊗ } A = 10 \text{ cm}^2$$

$$\alpha = 45^\circ$$

$$\gamma_F P \leq P_m$$

$$\gamma_F = 1,5$$

