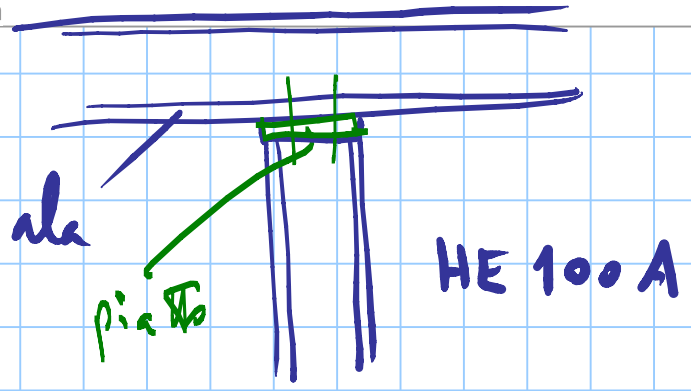
S275

Titolo nota 15/01/2013

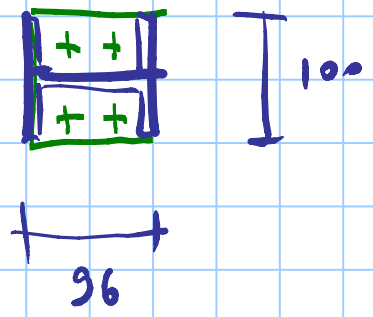


$$N_{Ed} = 500\ kN$$

$$F_{t,Ed} = \frac{500}{4} = 125\ kN$$

$$A \geq \frac{N_{Ed}\,\gamma_{M0}}{f_y}$$

$$= \frac{500 \times 10^3 \times 1.05}{275} = 19.09 \times 10^2\ mm^2$$



$$F_{t,Rd} = 0.9 \, A_{res} \, \frac{f_{ub}}{\gamma_{M2}}$$

M18 ⟶ 10.2

bulloni M16 $\quad A_{res} = 157 \text{ mm}^2$

$$f_{ub} \geq \frac{F_{t,Ed} \, \gamma_{M2}}{0.9 \, A_{res}} = \frac{125 \times 10^3 \times 1.25}{0.9 \times 157} = 1106 \text{ MPa}$$

9 o 4

4 bulloni M18 classe 10.9

verifica a punzonamento

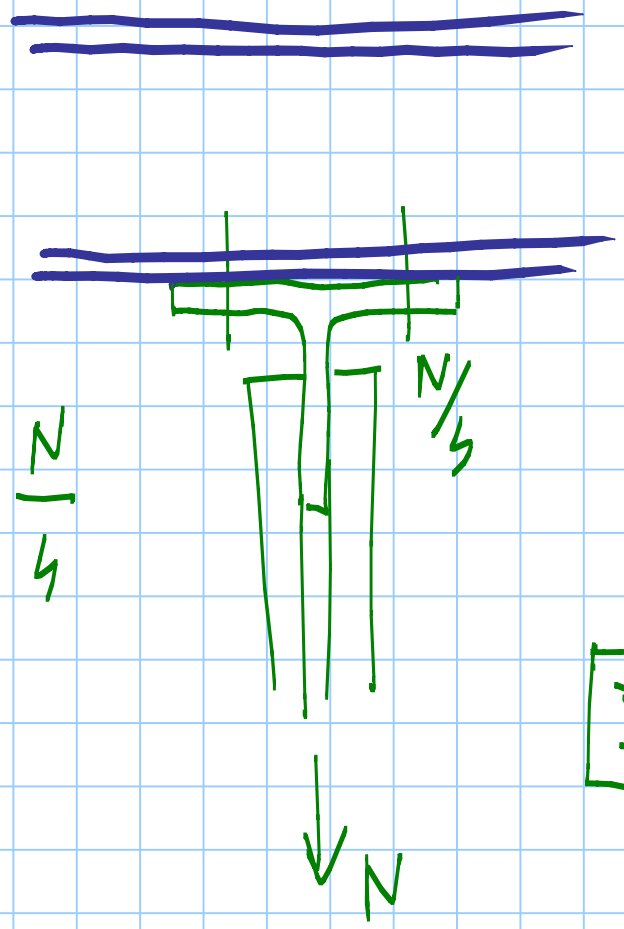
- ala del profilo superiore
- piatto di saldatura

$$F_{T,Ed} \leq B_{p,Rd} = 0.6\,\pi\, d_m\, t\, \frac{f_u}{\gamma_{M2}} \geq 125\ kN$$

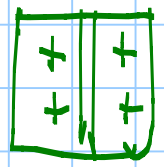
$$d_m \simeq 1.6\, d = 1.6 \times 18 = 28.8\ mm$$

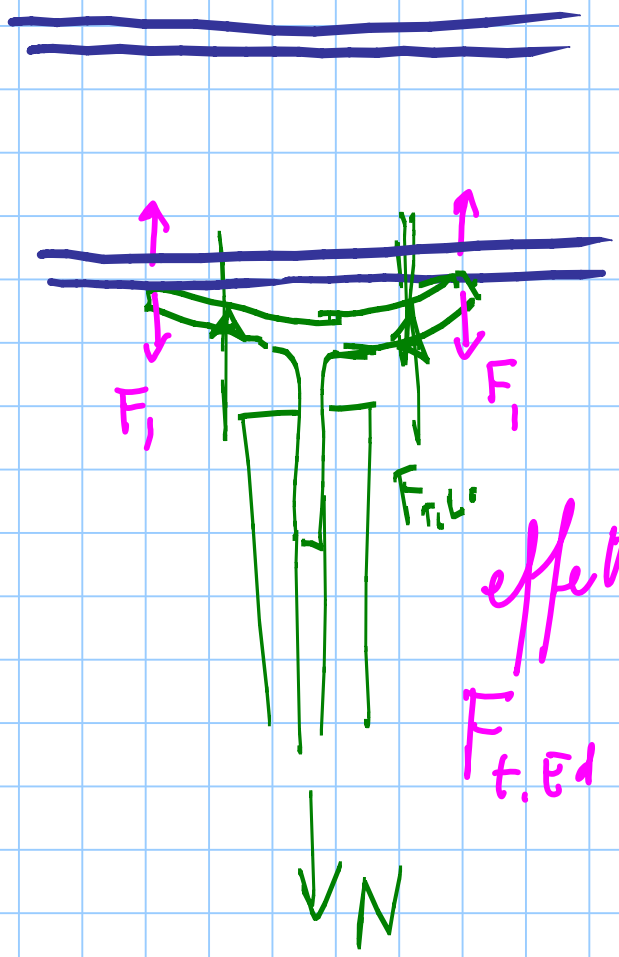
$$t \geq \frac{F_{t,Ed}\ \gamma_{M2}}{0.6\,\pi\, d_m\, f_u} = \frac{125 \times 10^3 \times 1.25}{0.6 \times 3.14 \times 28.8 \times 430} = 6.7\ mm$$

ATTENZIONE quando abbiamo bulloni tesi



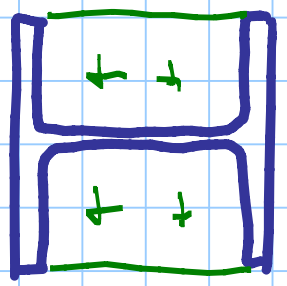
$F_{t,Ed} = \frac{N}{5}$

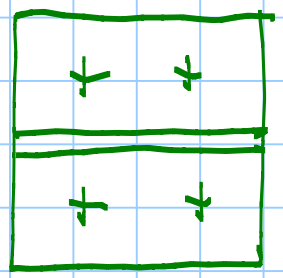


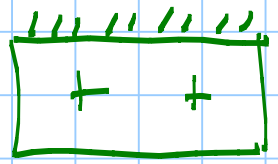


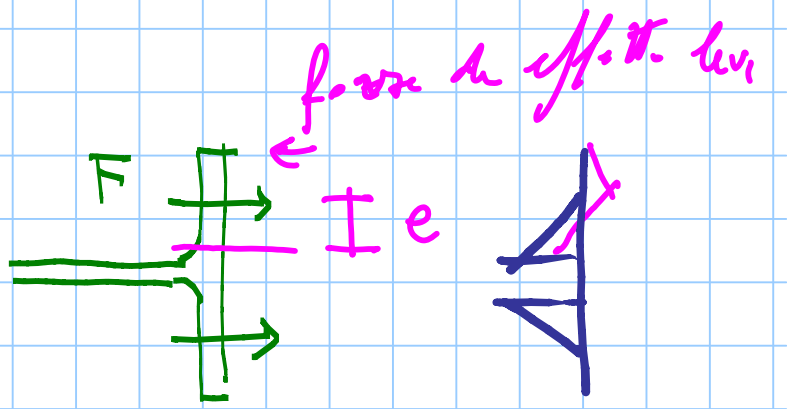
effett. leva

$F_{t,Ed} > \frac{N}{5}$





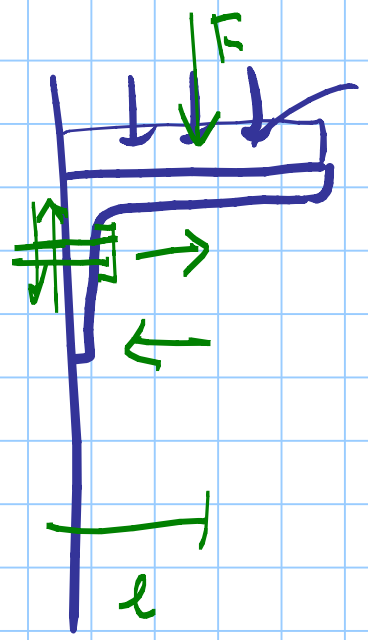




l'effetto leva

- aumenta sollecitaz. a trazione nel bullone (e rischio di punzonamento)
- riduce la flessione nel piatto

BULLONI A TAGLIO + TRAZIONE

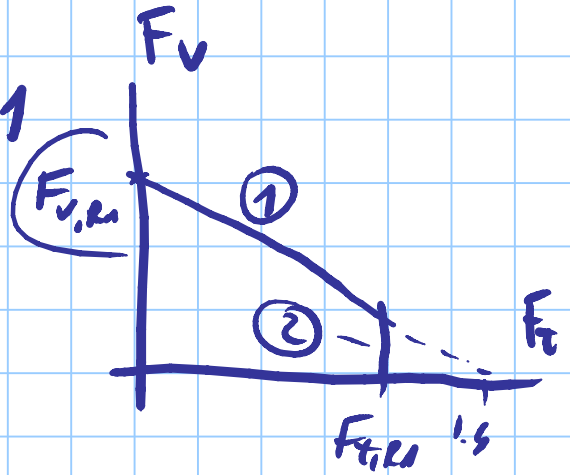


il bullone lavora
sia a Trazione (per M)
che a Taglio (per V)

$M = F\,l$

① $\dfrac{F_{v,Ed}}{F_{v,Rd}} + \dfrac{F_{t,Ed}}{1.4\,F_{t,Rd}} \leq 1$

② $F_{t,Ed} \leq F_{t,Rd}$



COLLEGAMENTI AD ATTRITO

come per Taglio, ma tale da non superare la res. ad attrito

serraggio dei bulloni → compressione tra i piatti

forza di serraggio:

$$F_{p,c} = 0.7 \frac{A_{res} f_{ub}}{\gamma_{M7}}$$

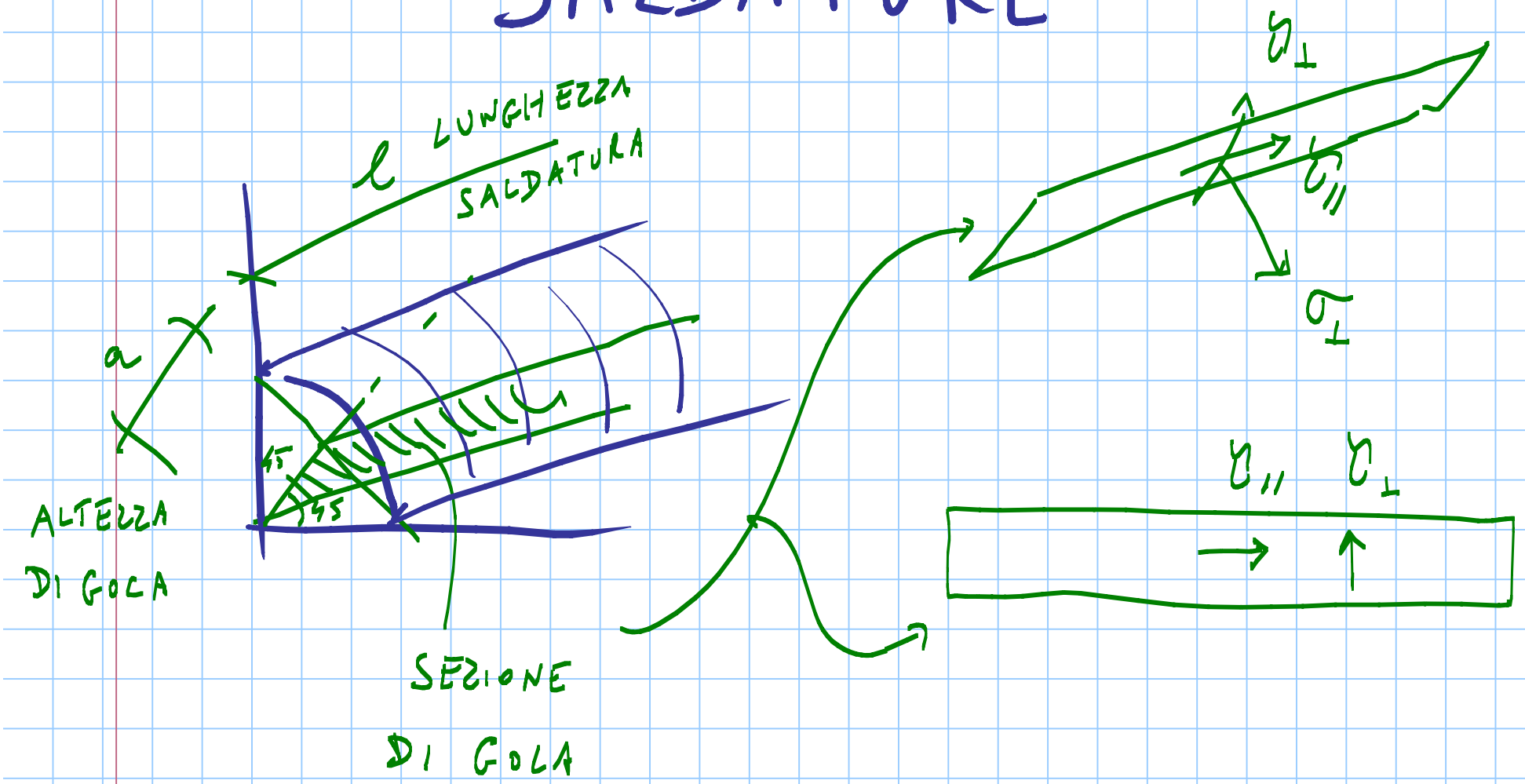
ma $\gamma_{M7} = 1.0$ per serraggio controllato

$$F_{s,Rd} = \sqrt[n]{\mu} \frac{F_{p,c}}{\gamma_{M3}}$$

n = numero di superfici

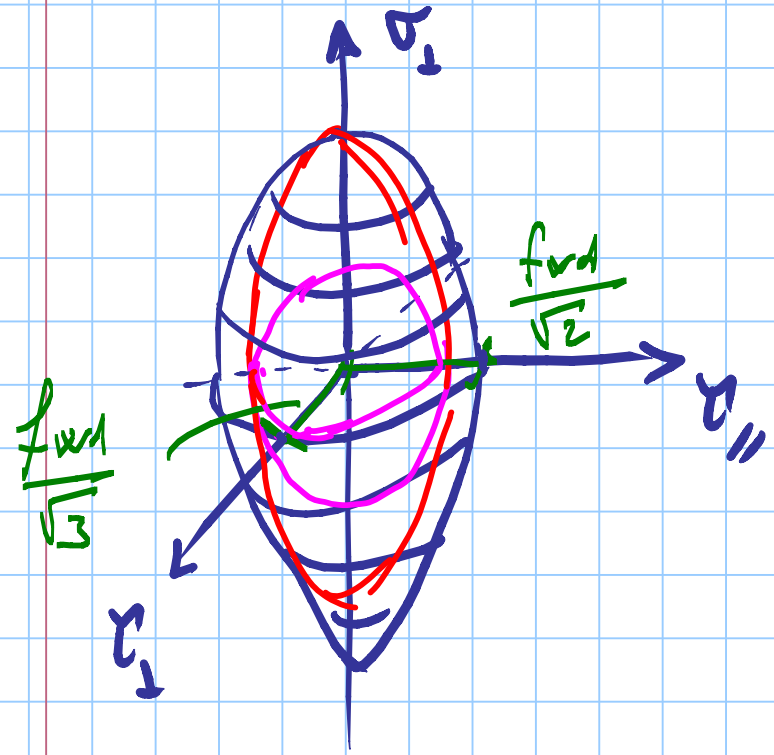
$\mu = 0.2 \div 0.5$

SALDATURE

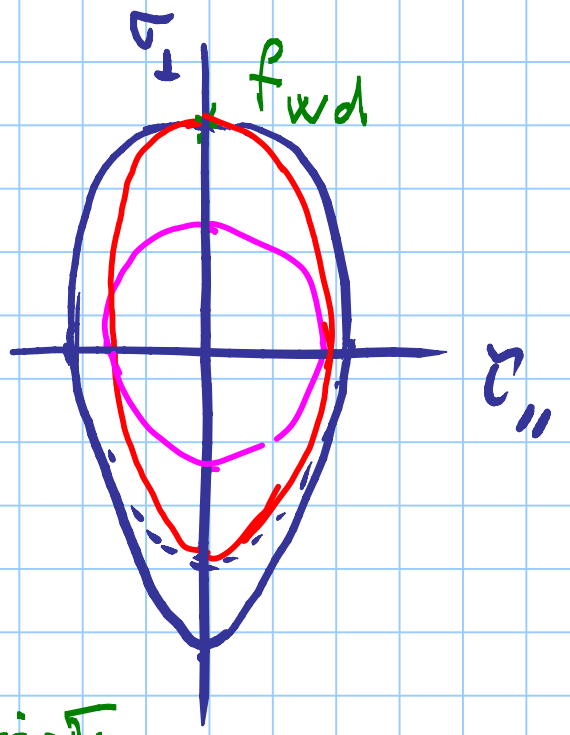

l
LUNGHEZZA
SALDATURA
a
ALTEZZA
DI GOLA
45°
45°
SEZIONE
DI GOLA
τ⊥
τ∥
σ⊥
τ∥
τ⊥

DOMINIO DI RESISTENZA

$\sigma_\perp$ $\tau_\perp$ $\tau_{//}$



PEROIDE



f_{wd} = resistenza a trazione della saldatura

paraboloide $\rightarrow$ ellissoide di rotazione

$$\left(\frac{\sigma_\perp}{f_{wd}}\right)^2 + \left(\frac{\tau_{//}}{f_{wd}/\sqrt{2}}\right)^2 + \left(\frac{\tau_\perp}{f_{wd}/\sqrt{3}}\right)^2 \leq 1$$

$$\sigma_\perp^2 + 2\,\tau_{//}^2 + 3\,\tau_\perp^2 \leq f_{wd}^2$$

$$\Downarrow$$

$$\sigma_\perp^2 + 3\left(\tau_{//}^2 + \tau_\perp^2\right) \leq f_{wd}^2 \qquad (1)$$

$$\Downarrow$$

$$\text{ma} \quad 3\left(\sigma_\perp^2 + \tau_{//}^2 + \tau_\perp^2\right) \le f_{vd}^2$$

$$\sigma_\perp^2 + \tau_{//}^2 + \tau_\perp^2 \le \left(\frac{f_{vd}}{\sqrt{3}}\right)^2 \qquad (2)$$