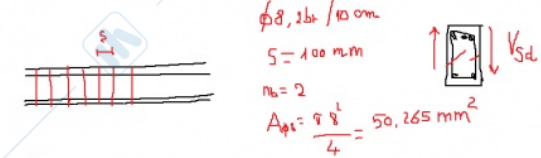


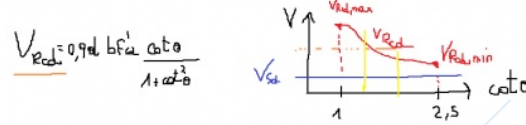
$b = 300 \text{ mm}$   
 $h = 500 \text{ mm}$   
 $d' = 40 \text{ mm} \rightarrow d = h - d' = 460 \text{ mm}$   
 $M_{sd} = 220 \text{ kNm} = 220'000'000 \text{ Nmm}$   
 $A_s = \frac{M_{sd}}{0.9 d f_{yd}} = \frac{220'000'000}{0.9 \cdot 460 \cdot 391.3} = 1358 \text{ mm}^2$   
 $A_{\phi 18} = \frac{\pi \cdot 18^2}{4} = 254.469 \text{ mm}^2$   
 $n = \frac{A_s}{A_{\phi 18}} = 5.33 \rightarrow n = 6 \quad A_s = 6 \cdot A_{\phi 18} = 1526.814 \text{ mm}^2$   
 $A'_s = 3 \cdot A_{\phi 18} = 763.407 \text{ mm}^2$   
 $C + F_s = F_s; \quad 0.8 f_{cd} b x + A'_s f_{yd} = A_s f_{yd} \Rightarrow x = \frac{(A_s - A'_s) f_{yd}}{0.8 f_{cd} b} = \frac{763.407 \cdot 391.3}{0.8 \cdot 15,867 \cdot 300} = 78.44 \text{ mm}$

$\xi = \frac{x}{d} = 0.17 \quad \text{ok! CAMPO 3'}$

$M_{red} = C(d - 0.4x) + F'_s(d - d') = 0.8 f_{cd} b x (d - 0.4x) + A'_s f_{yd} (d - d') =$   
 $= 0.8 \cdot 15,867 \cdot 300 \cdot 78.44 (460 - 0.4 \cdot 78.44) + 763.407 \cdot 391.3 (460 - 40) =$   
 $= 128'032'473 + 125'462'887 = 253'495'360 \text{ Nmm} = 253.5 \text{ kNm}$



$V_{sd} = 300 \text{ kN} = 300'000 \text{ N}$   
 $V_{sd} \leq V_{Rd} ? \quad V_{Rd} = \min(V_{Rd1}, V_{Rd2}) \quad \alpha = 90^\circ$



$1 \leq \cot \theta \leq 2.5$

1)  $V_{sd} < V_{Rd}$

$V_{Rd,min} = V_{Rd}(\cot \theta = 2.5) = 0.9 \cdot 460 \cdot 300 \cdot 0.5 \cdot 15,867 \cdot \frac{2.5}{1 + 2.5^2} = 339765.5 \text{ N}$

$300'000 < 339765.5 \Rightarrow$  la verifica della pila  
 è soddisfacente  $\forall 1 \leq \cot \theta \leq 2.5$   
 $\Downarrow$   
 sc elgo  $\cot \theta = 2.5$

$V_{Rd1} = 0.9 d f_{td} \frac{A_{sw}}{s} \cot \theta = 0.9 \cdot 460 \cdot 391.3 \cdot \frac{2 \cdot 50.265}{100} \cdot 2.5 =$   
 $= 407150.4 \text{ N}$

$A_{sw} = n A_s$   
 $V_{Rd} = \min(V_{Rd1}, V_{Rd2}) = 339765.5 \text{ N} > V_{sd} \quad \text{VERIFICATA OK!}$