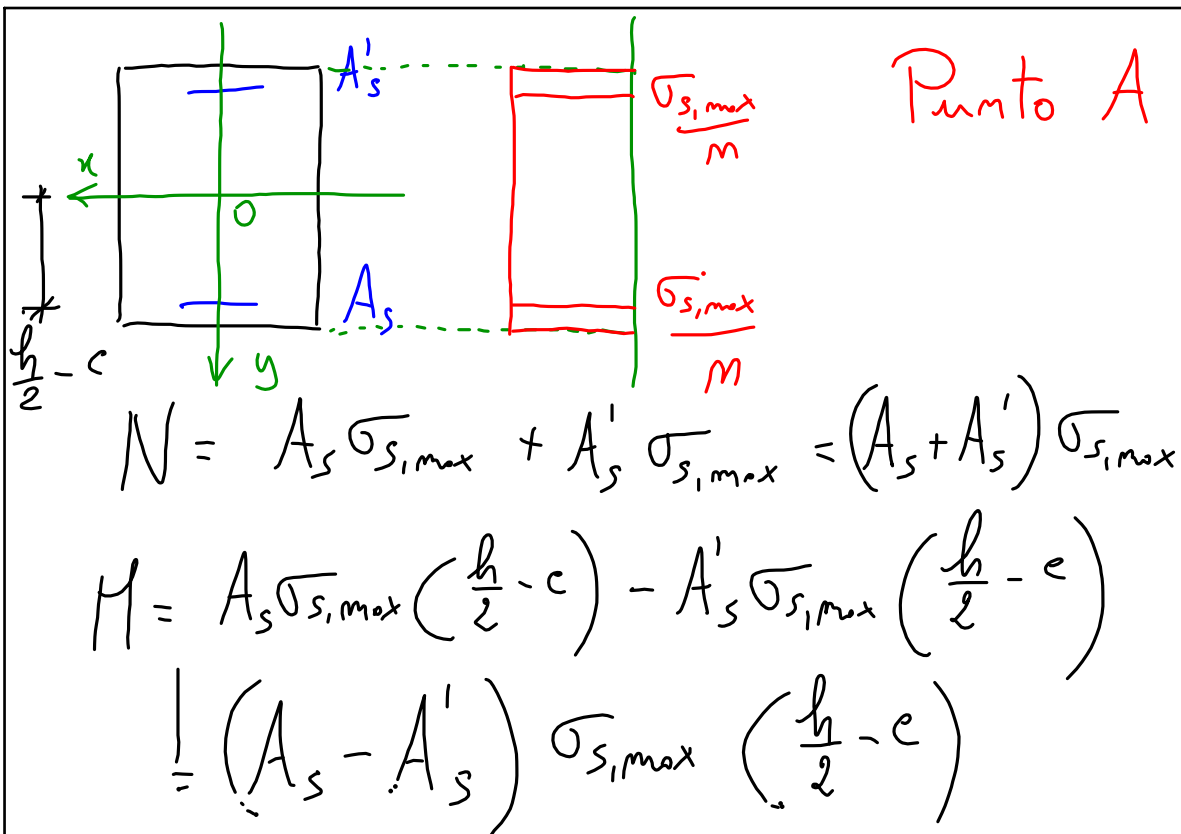
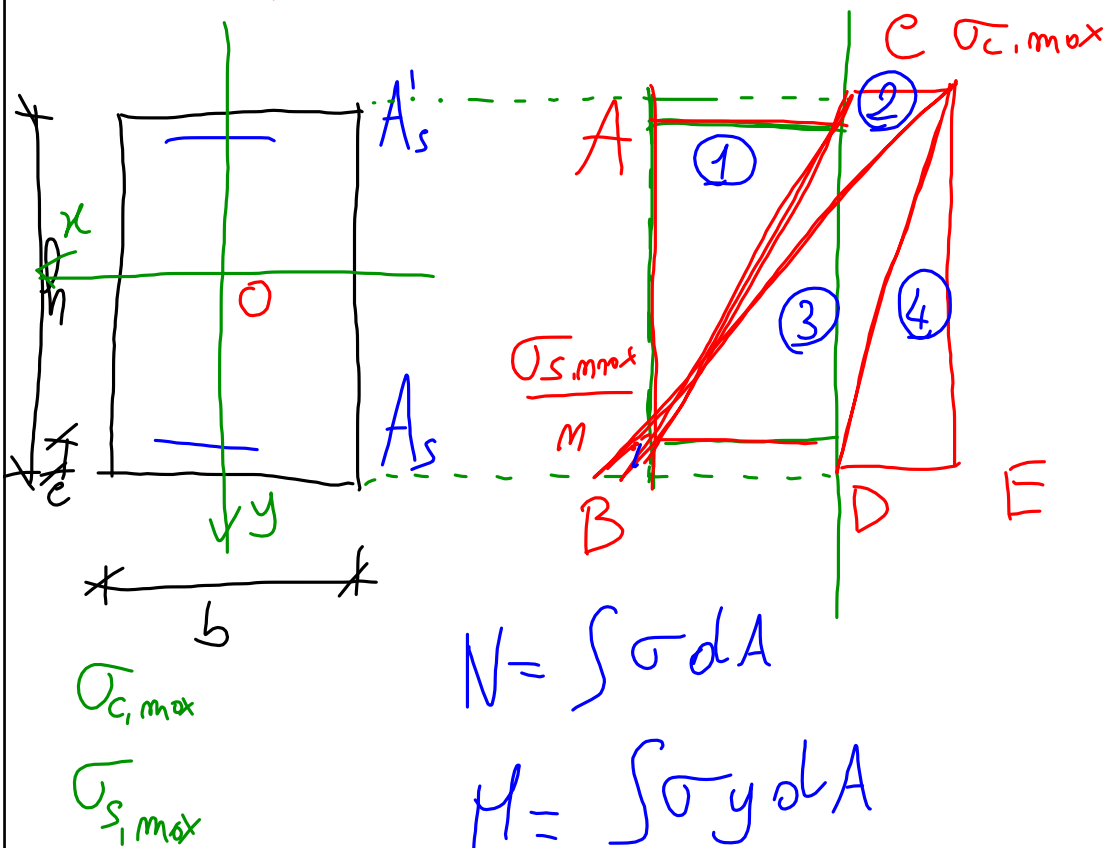
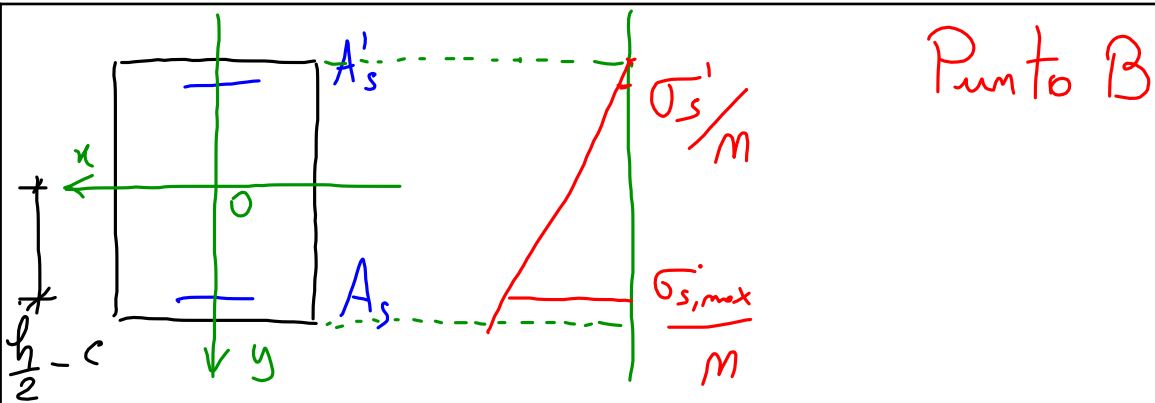


DOMINI M-N: II STADIO

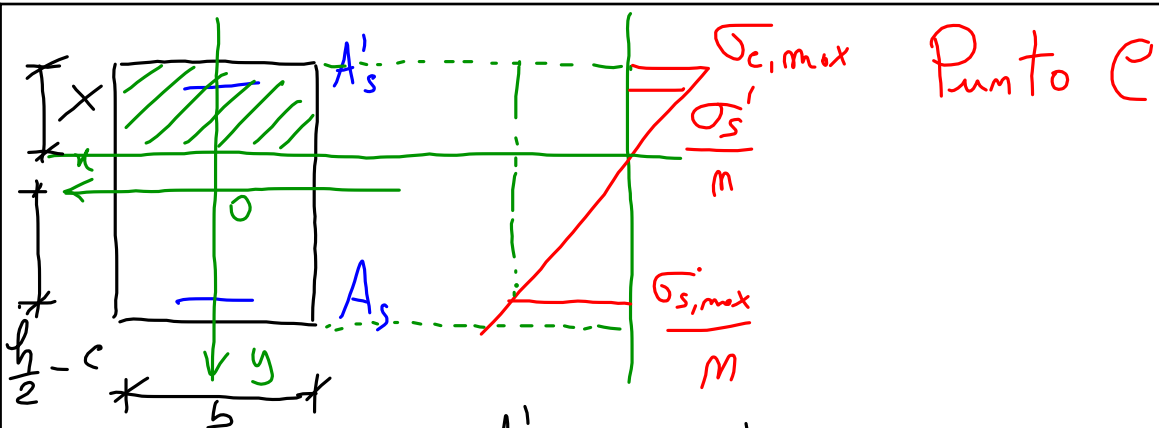




$$N = A_s \sigma_{s,max} + A'_s \sigma'_s$$

$$\frac{\sigma'_s/m}{c} = \frac{\sigma_{s,max}/m}{d} \Rightarrow \sigma'_s = \frac{c}{d} \sigma_{s,max}$$

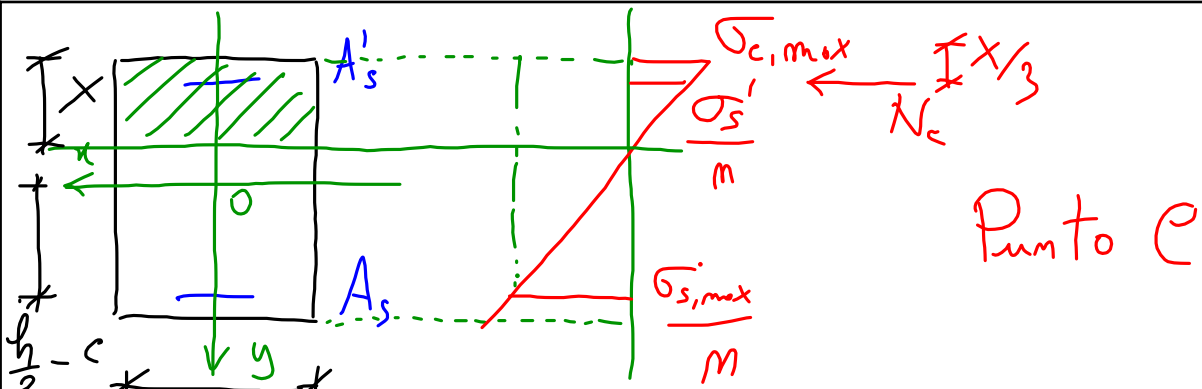
$$M = (A_s \sigma_{s,max} - A'_s \sigma'_s) \left(\frac{h}{2} - c \right)$$



$$N = A_s \sigma_{s,max} + A'_s \sigma'_s - \frac{bX}{2} \sigma_{c,max}$$

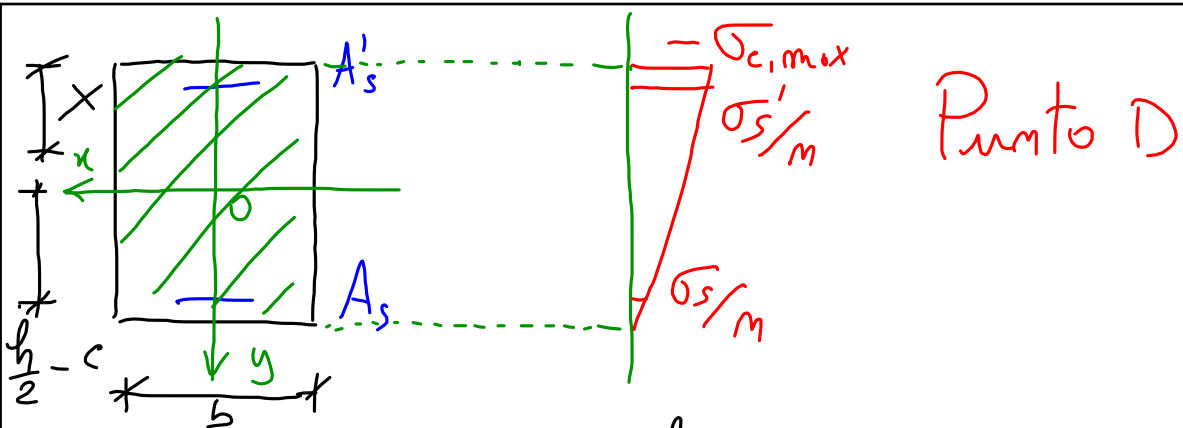
$$\frac{X}{\sigma_{c,max}} = \frac{d}{\sigma_{c,max} + \frac{\sigma_{s,max}}{m}} \Rightarrow X = \frac{\sigma_{c,max}}{\sigma_{c,max} + \frac{\sigma_{s,max}}{m}} d$$

$$-\frac{\sigma'_s/m}{X-c} = \frac{\sigma_{s,max}/m}{d-X} \Rightarrow \sigma'_s = -\frac{X-c}{d-X} \sigma_{s,max}$$



$$N = A_s \sigma_{s,max} + A'_s \sigma'_s - \frac{bX}{2} \sigma_{c,max}$$

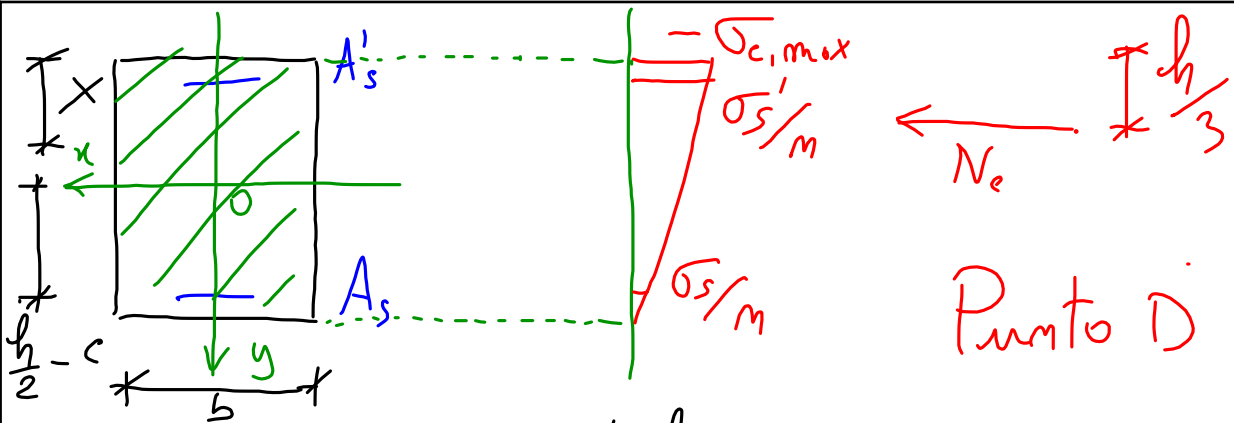
$$M = (A_s \sigma_{s,max} - A'_s \sigma'_s) \left(\frac{h}{2} - e \right) + \frac{bX}{2} \sigma_{c,max} \left(\frac{h}{2} - \frac{X}{3} \right)$$



$$N = A_s \sigma_s + A'_s \sigma'_s - \frac{b h}{2} \sigma_{c,max}$$

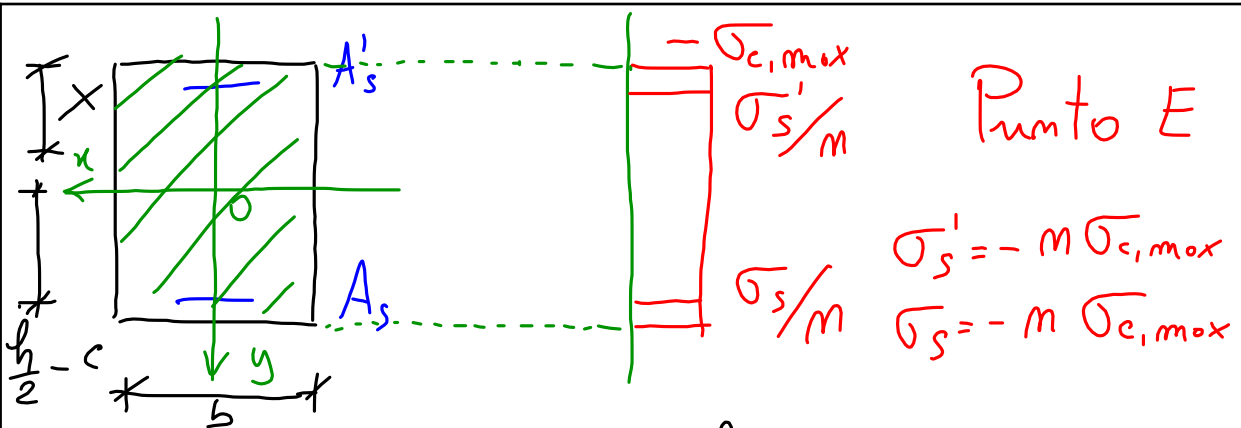
$$\frac{\sigma'_s/m}{d} = - \frac{\sigma_{c,max}}{h} \Rightarrow \sigma'_s = - m \frac{d}{h} \sigma_{c,max}$$

$$\sigma_s = - m \frac{e}{h} \sigma_{c,max}$$



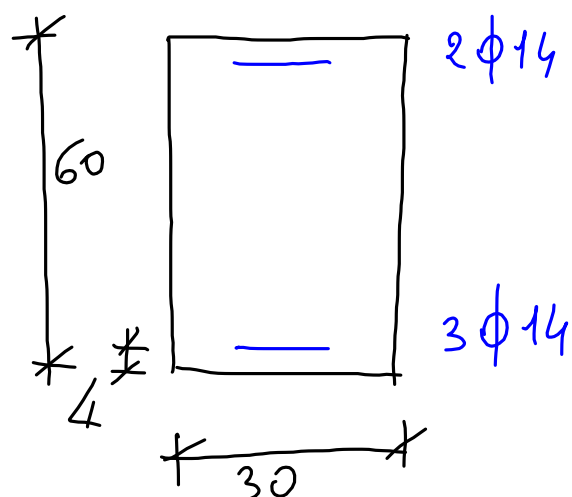
$$N = A_s \sigma_s + A'_s \sigma'_s - \frac{b h}{2} \sigma_{c,max}$$

$$M = (A_s \sigma_s - A'_s \sigma'_s) \left(\frac{h}{2} - e \right) + \frac{b h}{2} \sigma_{c,max} \frac{h}{6}$$



$$N = A_s \sigma_s + A'_s \sigma'_s - b h \sigma_{c,max}$$

$$M = (A_s \sigma_s - A'_s \sigma'_s) \left(\frac{h}{2} - e \right)$$



C25/30

B450C

$$\sigma_{c,max} = 0,6 f_{ck} = 15 \text{ MPa}$$

$$\sigma_{s,max} = 0,8 f_{yk} = 360 \text{ MPa}$$

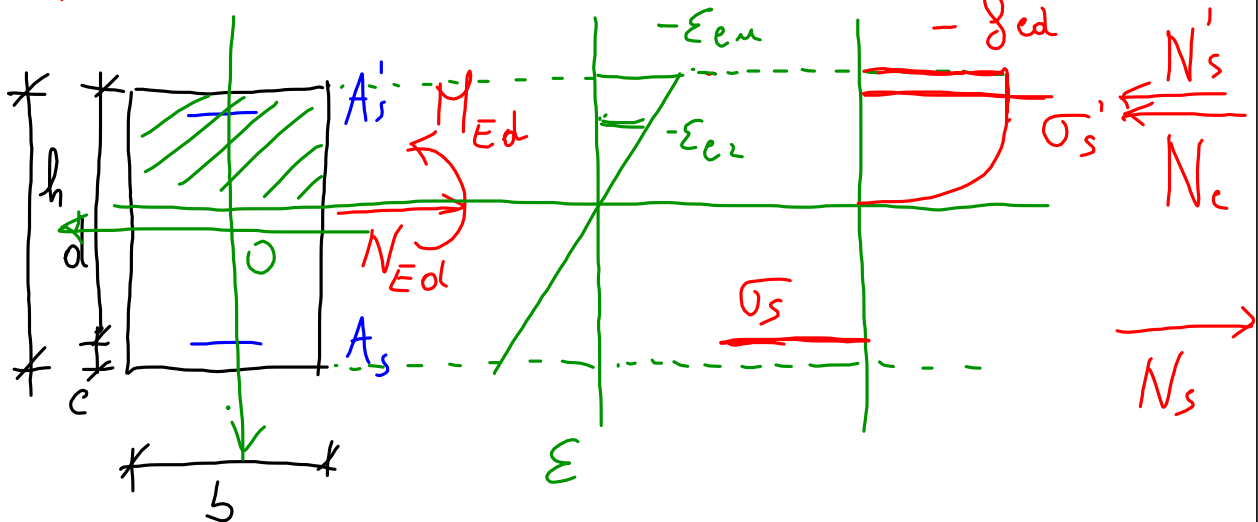
Costruzione dominio con Excel

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	b	30	cm		SigCmax	15	Mpa		Punto A							
2	h	60	cm		SigSmax	360	MPa		N	277.2	kN		M		14.4	kNm
3	c	4	cm		n	15										
4	d	56	cm						Punto B							
5	Asp	3.08	cm ²						N	174.2	kN		M		41.2	kNm
6	As	4.62	cm ²						SigSp	25.7	Mpa					
7																
8									Punto C							
9	Punti dominio								N	-374.7	kN		M		168.5	kNm
10									SigSp	-183.2	Mpa					
11		N	M						X	21.5	cm					
12	A	277.2	14.4													
13	B	174.2	41.2						Punto D							
14	C	-374.7	168.5						N	-1421.6	kN		M		150.0	kNm
15	D	-1421.6	150.0						SigSp	-210.0	Mpa					
16	E	-2873.3	-9.0						SigS	-15.0	MPa					
17																
18									Punto E							
19									N	-2873.3	kN		M		-9.0	kNm
20									SigSp	-225.0	Mpa					
21									SigS	-225.0	MPa					

Costruzione dominio con Excel

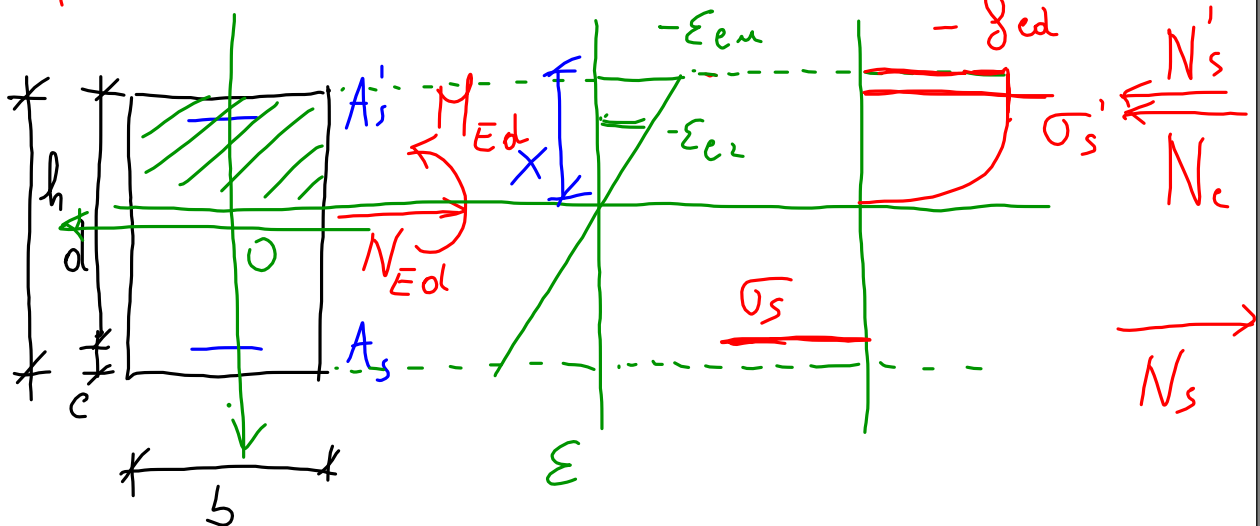


FLESSIONE COMPOSTA-III STADIO



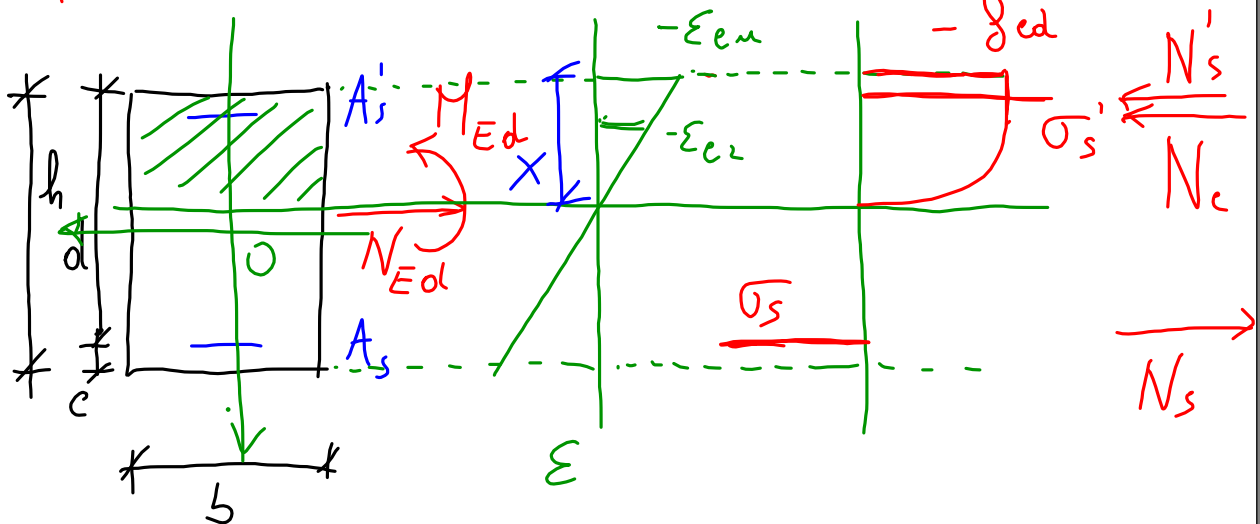
$$M_{Ed} \leq M_{Rd}(N_{Ed})$$

FLESSIONE COMPOSTA-III STADIO



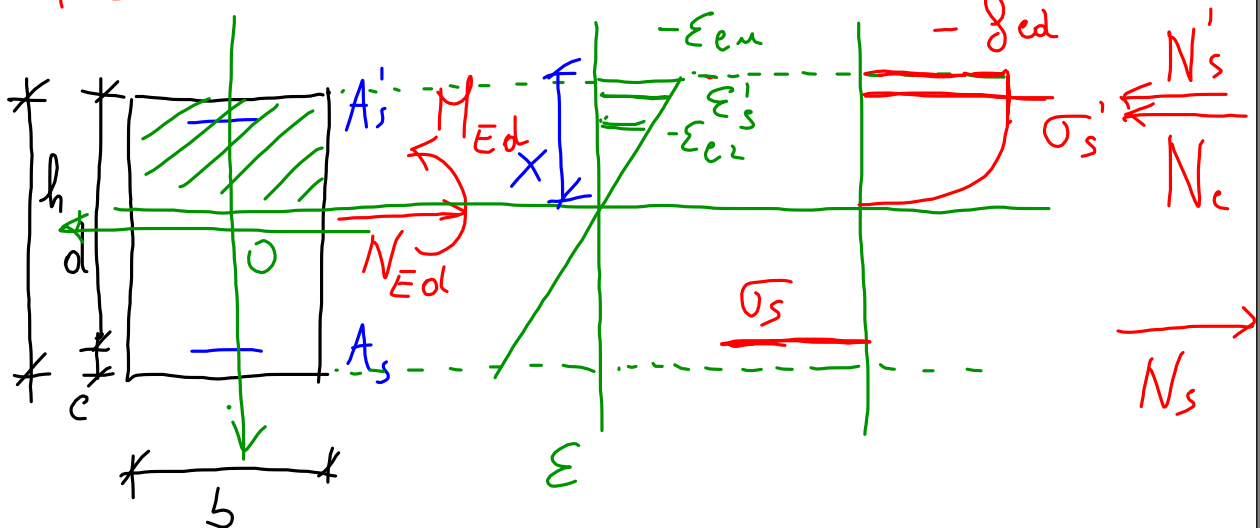
$$N_s + N'_s + N_c = N_{Ed}$$

FLESSIONE COMPOSTA-III STADIO



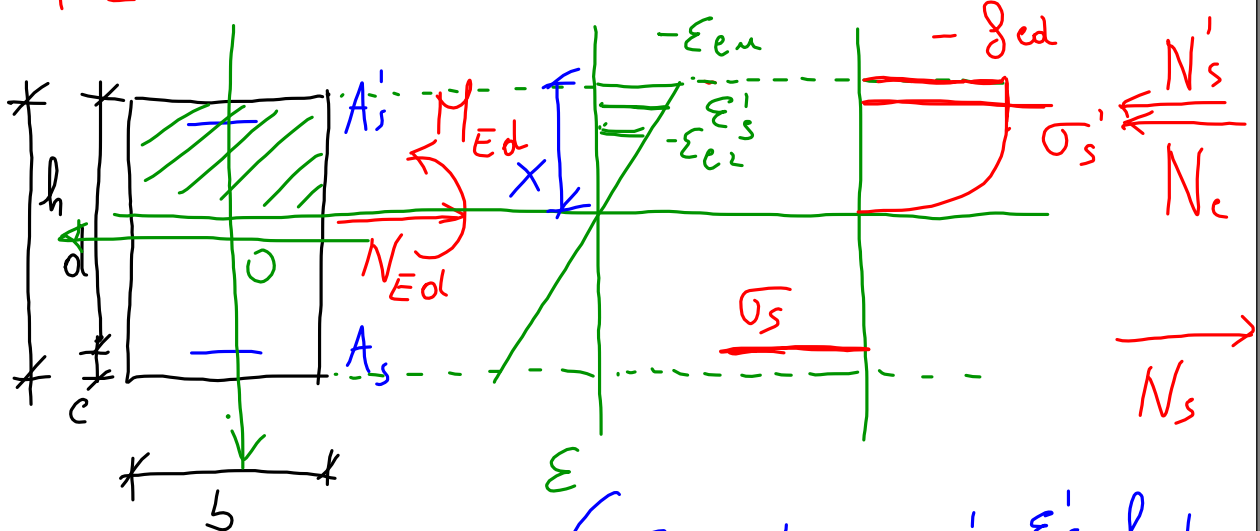
$$N_c = -\beta b x f_{cd} \quad \beta = 0,81$$

FLESSIONE COMPOSTA-III STADIO



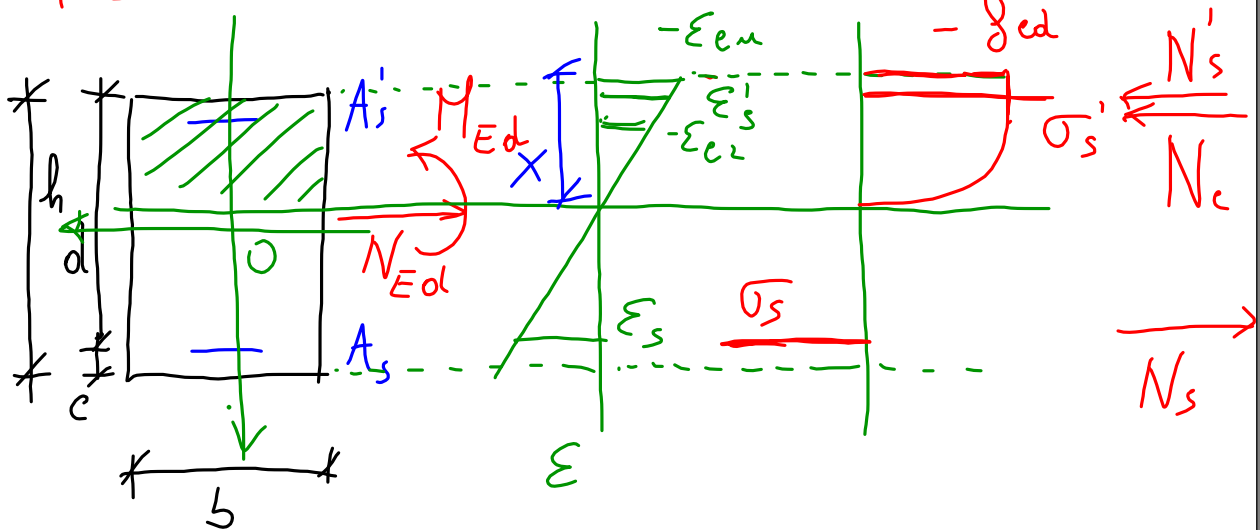
$$N'_s = A'_s \sigma'_s \quad \epsilon'_s = - \frac{X-c}{X} \epsilon_{cm} \Rightarrow \sigma'_s$$

FLESSIONE COMPOSTA-III STADIO



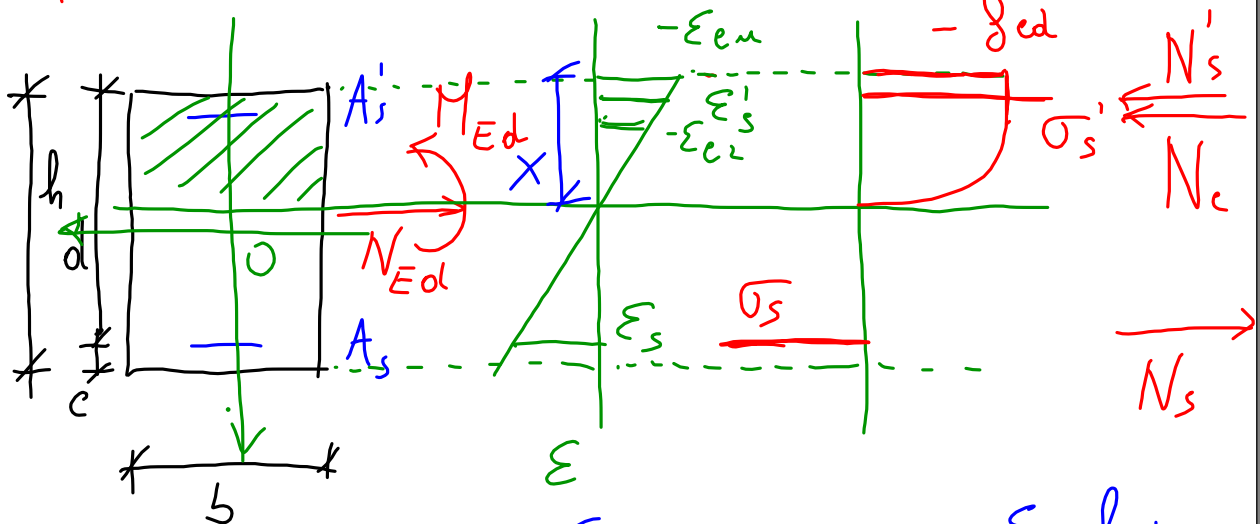
$$N'_s = A'_s \sigma'_s \quad \begin{cases} -\epsilon_{yd} \leq \epsilon'_s & \sigma'_s = \frac{\epsilon'_s}{\epsilon_{yd}} f_{yd} \\ \epsilon'_s > -\epsilon_{yd} & \sigma'_s = -f_{yd} \end{cases}$$

FLESSIONE COMPOSTA-III STADIO



$$N_s = A_s \sigma_s \quad \varepsilon_s = \frac{d-X}{X} \varepsilon_{en}$$

FLESSIONE COMPOSTA-III STADIO



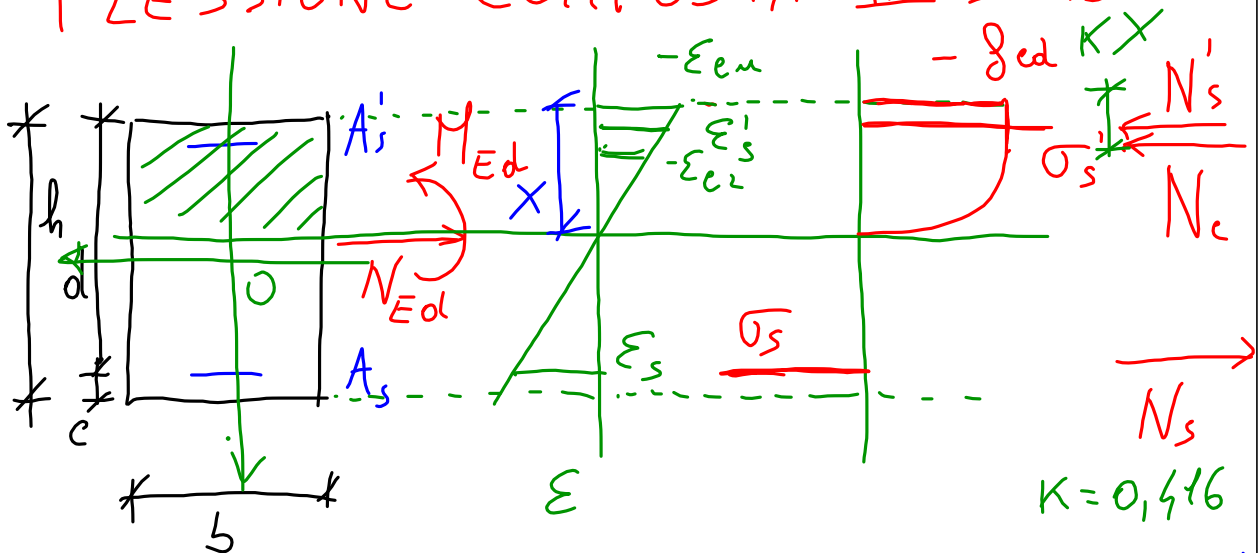
$$N_s = A_s \sigma_s \quad \begin{cases} \varepsilon_s \leq \varepsilon_{yd} & \sigma_s = \frac{\varepsilon_s}{\varepsilon_{yd}} f_{yd} \\ \varepsilon_s > \varepsilon_{yd} & \sigma_s = f_{yd} \end{cases}$$

$$N_c + N'_s + N_s = N_{Ed} \quad \text{Armeture simmetrica}$$

$$- \beta b x f_{cd} - A'_s f_{yd} + A_s f_{yd} = N_{Ed}$$

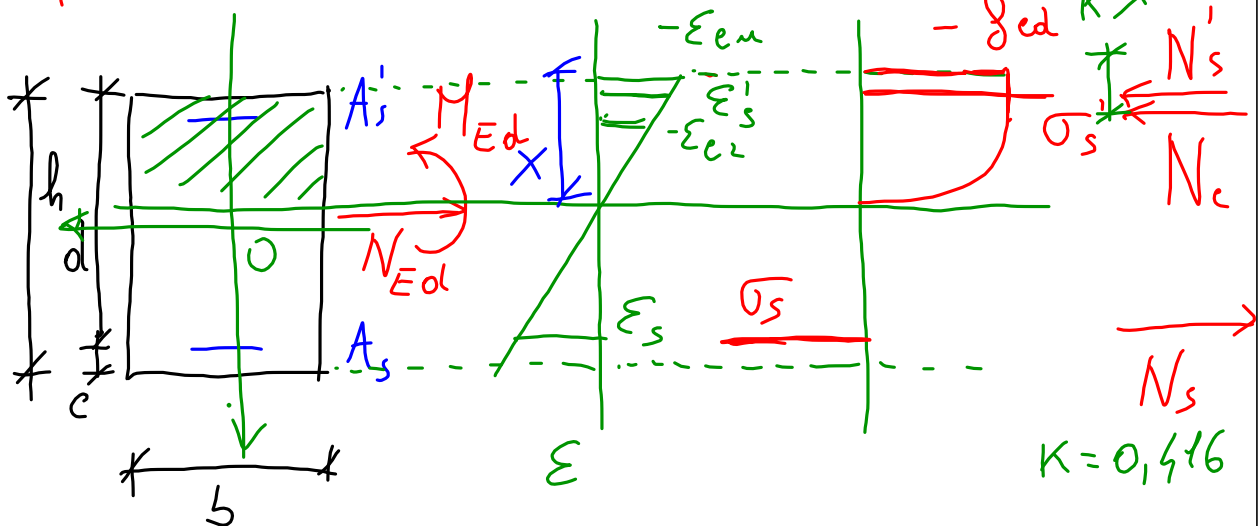
$$x = \frac{(A_s - A'_s) f_{yd} - N_{Ed}}{\beta b f_{cd}}$$

FLESSIONE COMPOSTA-III STADIO

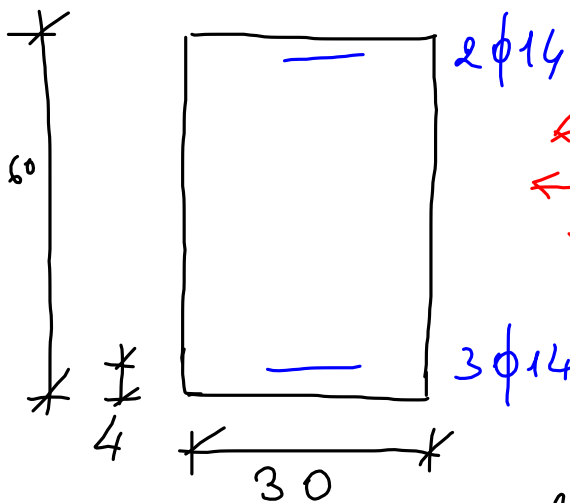


$$M_{Rd}(N_{Ed}) = N_s \left(\frac{h}{2} - c \right) - N'_s \left(\frac{h}{2} - c \right) - N_c \left(\frac{h}{2} - Kx \right)$$

FLESSIONE COMPOSTA-III STADIO



$$M_{Rd}(N_{Ed}) = (N_s - N_s') \left(\frac{h}{2} - e \right) - N_c \left(\frac{h}{2} - Kx \right)$$



$$N_{Ed} = -300 \times 1,4 = -420 \text{ kN}$$

$$M_{Ed} = 100 \times 1,4 = 140 \text{ kNm}$$

C25/30

B450C

$$f_{cd} = 14,17 \text{ MPa}$$

$$f_{yd} = 391,3 \text{ MPa}$$

Verifica a flessione composta SLU: sezione parzializzata

	A	B	C	D	E	F	G	H	I	J	K
3	c	4 cm				EpsCu	0.0035				
4	d	56 cm				EpsC2	0.002				
5	Asp	3.08 cm ²				EpsYd	0.001957				
6	As	4.62 cm ²				Beta	0.81				
7						K	0.416				
8	X	13.9 cm									
9											
10	EpsSp	-0.0025		SigSp	-391.3 MPa			NsP	-120.5 kN		
11	EpsS	0.010553		SigS	391.3 MPa			Ns	180.8 kN		
12								Nc	-480.3 kN		
13								Somma	-420.0 kN		
14											
15	NEd	-420 kN					MRd(NEd)	194.6 kNm			
16	Med	140 kNm									
17											
18											