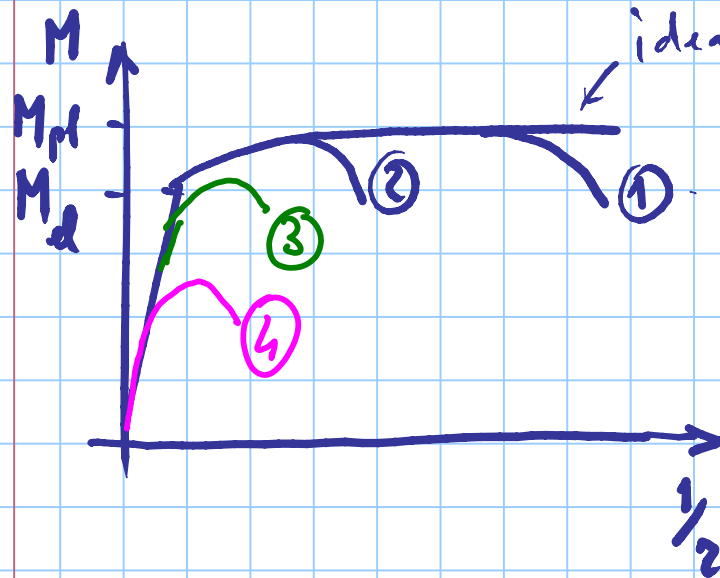
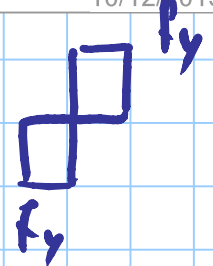
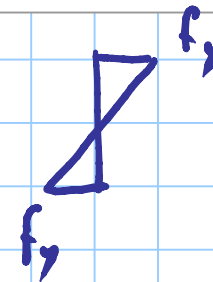
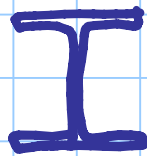
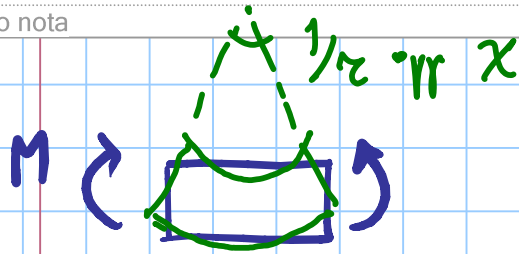


INFLUENZA DELL'INSTABILITA' LOCALE

Titolo nota

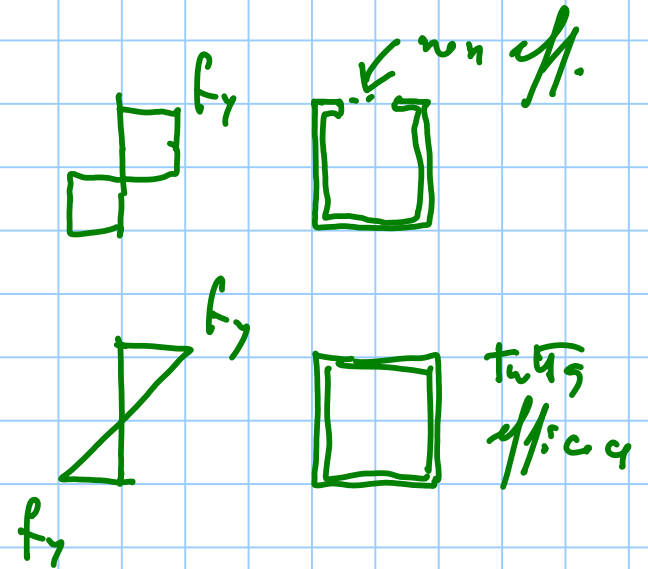
10/12/2013



- ① inst. loc. avviene con sezione pien. plast. e grandi deform.
RESIST. MAX E DUTTILITA'
- ② sez. pien. plast. ma deformazioni più piccole
RESIST. MAX, MENO DUTTILE

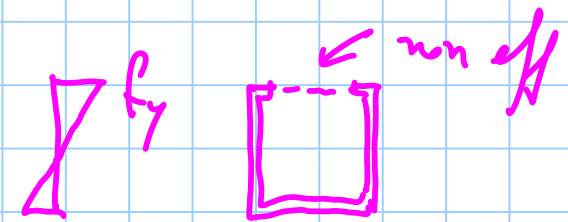
③ inst. loc. avviene prima di M_{el}
 il momento max $\geq M_{el}$

calcolato come



④ inst. loc. per tensione minima
 il momento max $< M_{el}$

$M_{el, eff}$



SEZIONI DI

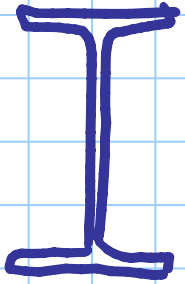
class 1 $M_{pl, RA}$ M.L.T. DUTTIL N_{R1}

class 2 $M_{pl, RA}$ M.E.N. DUTTIL N_{R1}

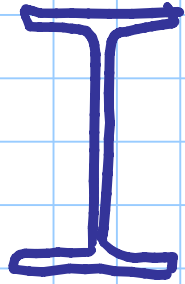
class 3 $M_{el, RA}$ N_{R1}

class 4 $M_{el, eff, RA}$ $A_{eff} \frac{f_y}{\gamma_m}$

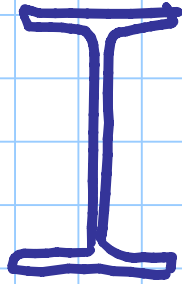
COME SI CLASSIFICANO LE SEZIONI ?



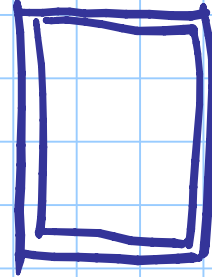
N

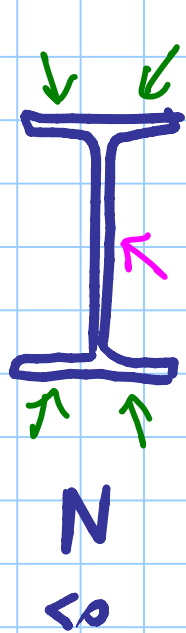


M_y



M_z





elementi lastre
bloccati ai 2 estremi

elementi lastre
bloccati a 1 estremo

$$\bar{\lambda}_p = \frac{b/t}{28.4 \varepsilon \sqrt{f_y}}$$

snellezza normalizzata delle lastre

$$\varepsilon = \sqrt{\frac{235}{f_y}}$$

Parti interne compresse						
Classe	Parte soggetta a flessione	Parte soggetta a compressione	Parte soggetta a flessione e a compressione			
Distribuzione delle tensioni nelle parti (compressione positiva)						
1	$c/t \leq 72\epsilon$	$c/t \leq 33\epsilon$	quando $\alpha > 0,5: c/t \leq \frac{396\epsilon}{13\alpha - 1}$ quando $\alpha \leq 0,5: c/t \leq \frac{36\epsilon}{\alpha}$			
2	$c/t \leq 83\epsilon$	$c/t \leq 38\epsilon$	quando $\alpha > 0,5: c/t \leq \frac{456\epsilon}{13\alpha - 1}$ quando $\alpha \leq 0,5: c/t \leq \frac{41,5\epsilon}{\alpha}$			
Distribuzione delle tensioni nelle parti (compressione positiva)						
3	$c/t \leq 124\epsilon$	$c/t \leq 42\epsilon$	quando $\psi > -1: c/t \leq \frac{42\epsilon}{0,67 + 0,33\psi}$ quando $\psi \leq -1: c/t \leq 62\epsilon(1 - \psi)\sqrt{(-\psi)}$			
$\epsilon = \sqrt{235/f_{yk}}$	f_{yk}	235	275	355	420	460
	ϵ	1,00	0,92	0,81	0,75	0,71

*) $\psi \leq -1$ si applica se la tensione di compressione $\sigma \leq f_{yk}$ o la deformazione a trazione $\epsilon_y > f_{yk}/E$

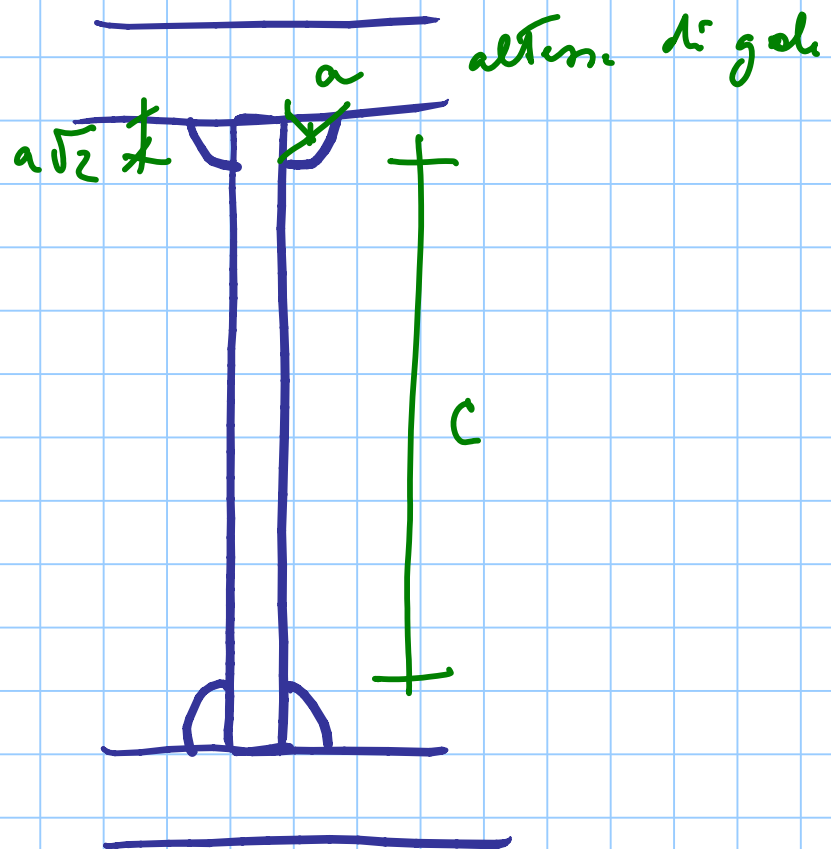
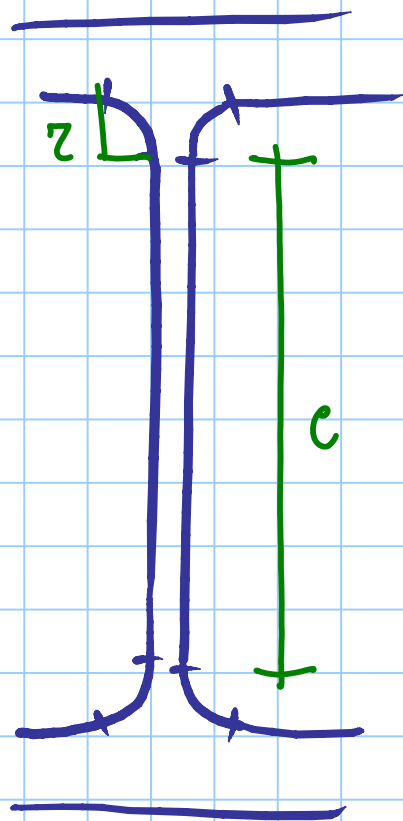
$$c/t \leq 33 \epsilon \quad 1$$

$$c/t \leq 38 \epsilon \quad 2$$

$$c/t \leq 42 \epsilon \quad 3$$

<p style="text-align: right;">Inflexione intorno all'asse</p> <p style="text-align: right;">Inflexione intorno all'asse</p>			
<p style="text-align: center;">Parti interne compresse</p>			
Classe	Parte soggetta a flessione	Parte soggetta a compressione	Parte soggetta a flessione e a compressione
Distribuzione delle tensioni nelle parti (compressione positiva)			
1	$c/t \leq 72\varepsilon$	$c/t \leq 33\varepsilon$	<p>quando $\alpha > 0,5: c/t \leq \frac{396\varepsilon}{13\alpha - 1}$</p> <p>quando $\alpha \leq 0,5: c/t \leq \frac{36\varepsilon}{\alpha}$</p>

vincolo
a 2
estremi



Exmpl.

HE 200 A

S 355

anime

$$h = 190 \text{ mm}$$

$$b = 200 \text{ mm}$$

$$t_f = 10 \text{ mm}$$

$$t_w = 6.5 \text{ mm}$$

$$r = 18 \text{ mm}$$

$$c = h - 2(t_f + r) =$$

$$= 190 - 2(10 + 18) = 134 \text{ mm}$$

$$\frac{c}{t} = \frac{134}{6.5} = 20.62$$

$$\epsilon = \sqrt{\frac{235}{355}} = 0.814$$

$$c/t \leq 33 \text{ } \varepsilon = 33 \times 0.814 = 26.9$$

$$c/t \leq 38 \text{ } \varepsilon$$

30.9


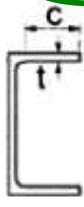

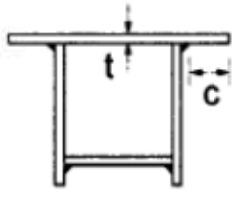
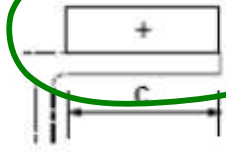
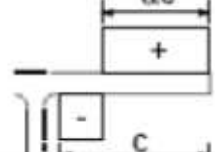
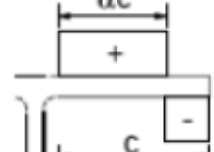
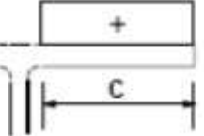
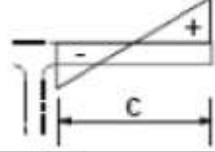
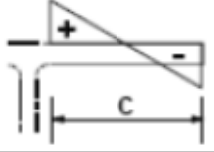
$$\frac{c}{t} < 26.9$$

class 1

$$c/t \leq 42 \text{ } \varepsilon$$

34.2

elemento vincolato = 1
estrem.

<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Profilati laminati a caldo</p> </div> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> <div style="text-align: center;">  <p>Sezioni saldate</p> </div> </div>			
Classe	Piattabande esterne soggette a compressione	Piattabande esterne soggette a flessione e a compressione	
		Con estremità in compressione	Con estremità in trazione
Distribuzione delle tensioni nelle parti (compressione positiva)			
1	$c/t \leq 9\epsilon$	$c/t \leq \frac{9\epsilon}{\alpha}$	$c/t \leq \frac{9\epsilon}{\alpha\sqrt{\alpha}}$
2	$c/t \leq 10\epsilon$	$c/t \leq \frac{10\epsilon}{\alpha}$	$c/t \leq \frac{9\epsilon}{\alpha\sqrt{\alpha}}$
Distribuzione delle tensioni nelle parti (compressione positiva)			
3	$c/t \leq 14\epsilon$	$c/t \leq 21\epsilon\sqrt{k_e}$ Per k_e vedere EN 1993-1-5	

9 ϵ

10 ϵ

14 ϵ

HE 200 A

als

$$c = (b - t_w - 2r) \frac{1}{2} =$$

$$= (200 - 6.5 - 2 \times 18) \frac{1}{2} = 78.75$$

$$\frac{c}{t} = \frac{78.75}{10} = 7.88$$

$$9 \varepsilon = 7.33$$

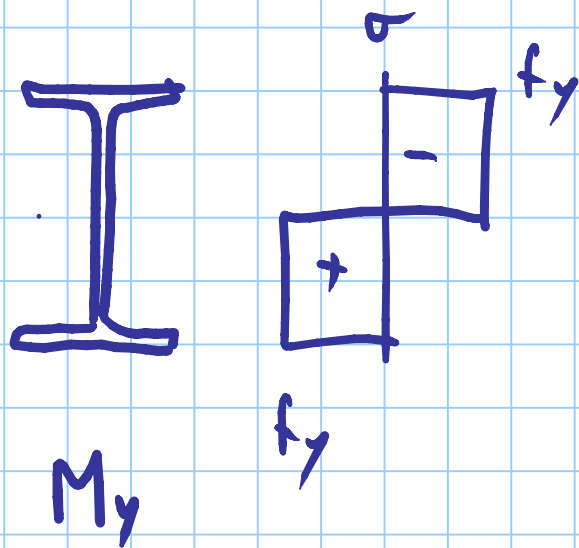
$$10 \varepsilon = 8.14$$

$$14 \varepsilon = 11.4$$

$$7.33 < \frac{c}{t} < 8.14$$

klasse 2

stan. profile

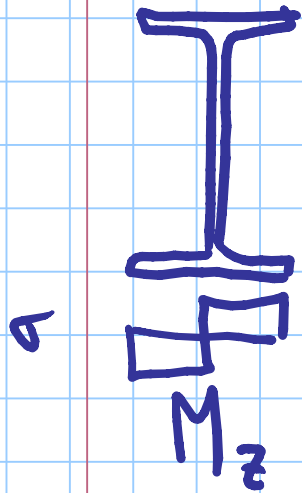


ala ^{sup} unif. compression.
come per N

→ class 2

and me

ste mult. di prima → class 1

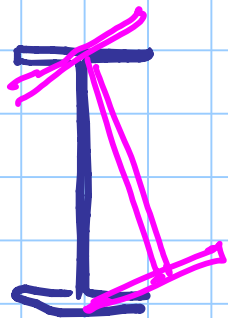
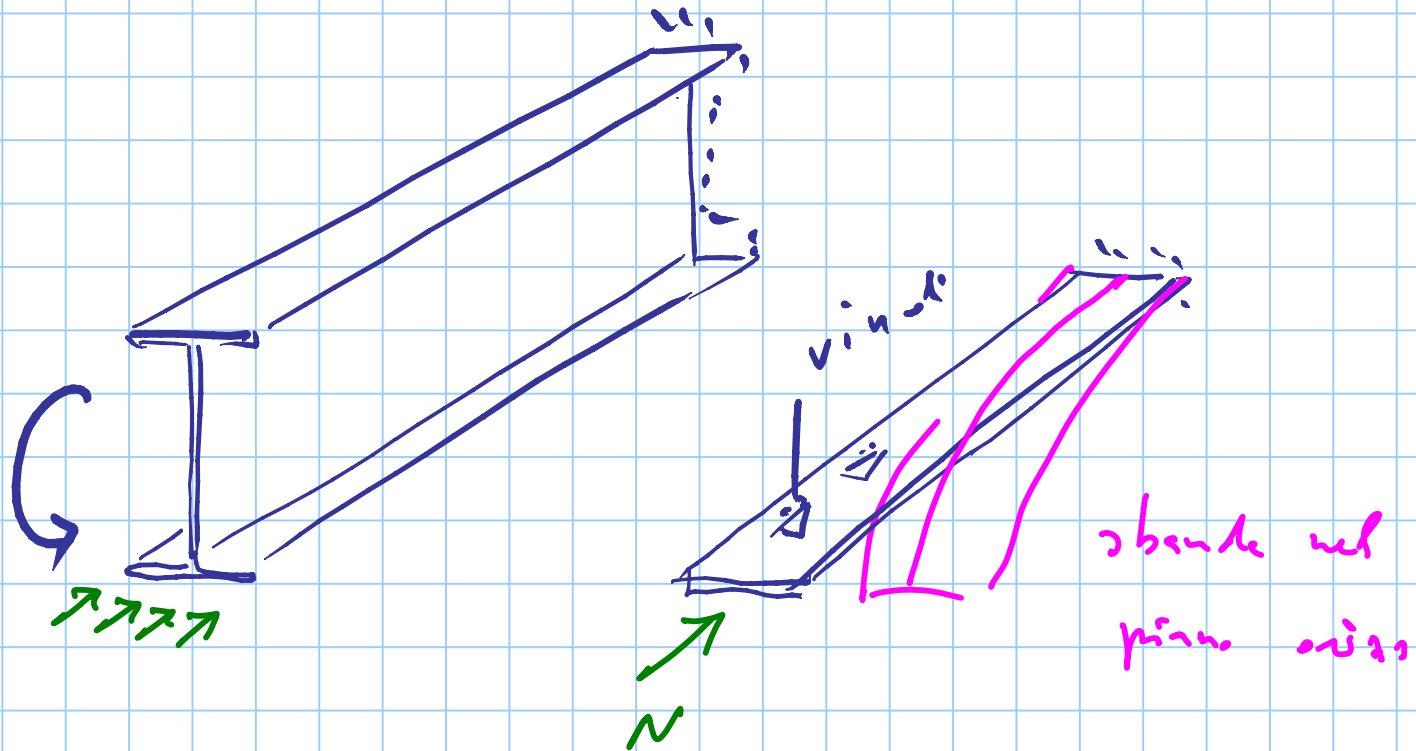


mess'le

unif. compen

shape class 2

3D



INSTABILITA'
FLESSO-TORSIONALE

dell'asse

LATERAL TORSIONAL BUCKLING

