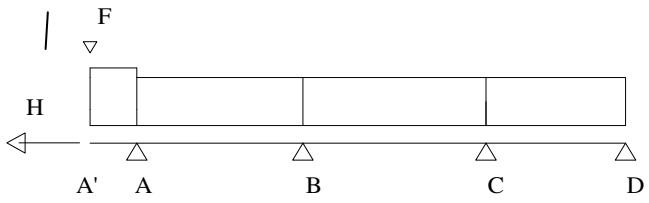
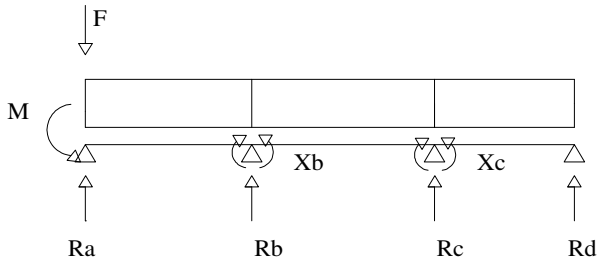
Diagrammi di taglio e momento





Reazioni vincolari

$$R_A = \frac{M}{L_1} + \frac{p_1 L_1}{2} - \frac{X_B}{L_1} + F$$

$$R_B = -\frac{M}{L_1} + \frac{p_1 L_1}{2} + \frac{X_B}{L_1} + \frac{X_B}{L_2} + \frac{p_2 L_2}{2} - \frac{X_C}{L_2}$$

$$R_C = -\frac{X_B}{L_2} + \frac{p_2 L_2}{2} + \frac{X_C}{L_2} + \frac{X_C}{L_3} + \frac{p_3 L_3}{2}$$

$$R_D = -\frac{X_C}{L_3} + \frac{p_3 L_3}{2}$$

Sollecitazione a taglio

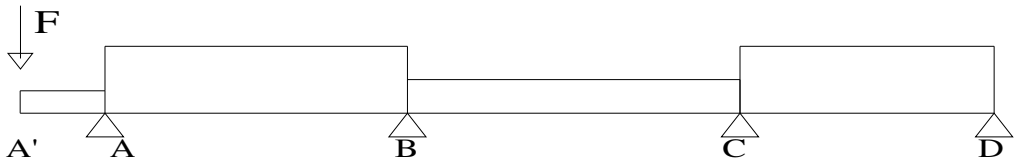
TA(S) = - F
TA(D) = TA(S) + RA
TB(S) = TA(D) - p2 L2
TB(D) = TB(S) + RB
TC(S) = TB(D) -p2L2
TC(D) = TC(S) + RC
TC(D) = TC(D) - p3L3 = - RB

Sollecitazioni a momento

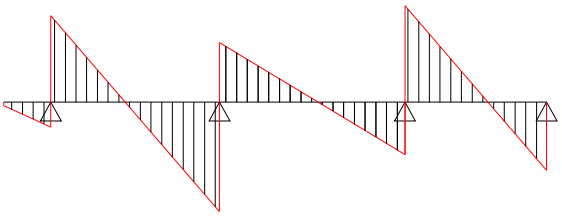
MA' = - H x 1,00m
MA = - M
MB = - XB
MC = - XC
MD = 0

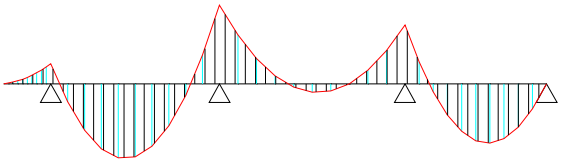
Combinazione 1 S.L.U.

qd,bc =	5.75 kN/m	M = 5,66 kN		L1 = 5 m
qd,cd =	11.05 kN/m	Fd = 1,04 kN		L2 = 5,5 m
qd,ba =	11.05 kN/m	XB = 22,12 kNm		L3 = 4,2 m
qd,sb =	4.29 kN/m	XC = 16,61 kNm		Lsb = 1,4 m



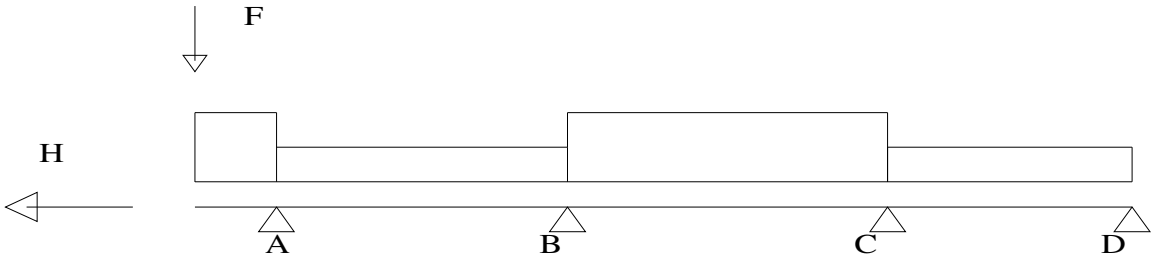
R_A =	31.379 kN	$T_A^{(S)}$ = -1,04 kN		M_A' = 0
R_B =	47.7313 kN	$T_A^{(D)}$ = 24,33304 kN		M_A = 5,6602 kNm
R_C =	41.9704 kN	$T_B^{(S)}$ = 30,91696 kN		M_B = 22,12 kNm
R_D =	19.2502 kN	$T_B^{(D)}$ = 16,81432 kN		M_C = 16,61 kNm
		$T_C^{(S)}$ = 14,81608 kN		M_D = 0
		$T_C^{(D)}$ = 27,15976 kN		
		$T_C^{(D)}$ = 19,25024 kN		



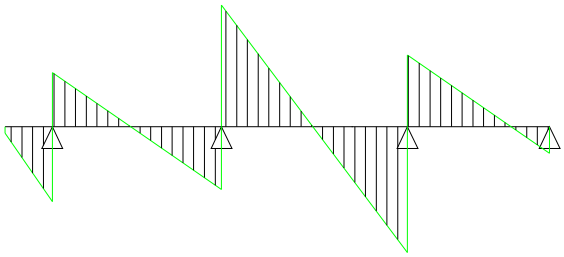


Combinazione 2 S.L.U.

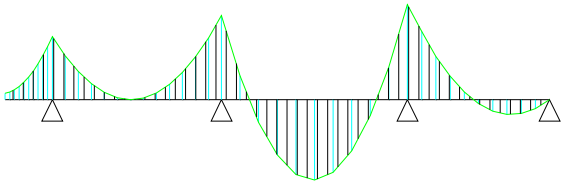
qd,bc =	11.05 kN/m	M =	15,454 kN	L1 =	5 m
qd,cd =	5.75 kN/m	Fd =	1,56 kN	L2 =	5,5 m
qd,ba =	5.75 kN/m	XB =	20,62 kNm	L3 =	4,2 m
qd,sb =	12.01 kN/m	XC =	23,33 kNm	Lsb =	1,4 m
		Hd =	1,5 kN		



R_A =	31.7128 kN	$T_A^{(S)}$ =	-1,56 kN	M_A' =	-1,5 kNm
R_B =	45.303 kN	$T_A^{(D)}$ =	13,34176 kN	M_A =	- 15,4538 kNm
R_C =	48.51 kN	$T_B^{(S)}$ =	15,40824 kN	M_B =	20,62 kNm
R_D =	6.52024 kN	$T_B^{(D)}$ =	29,89477 kN	M_C =	- 23,33 kNm
		$T_C^{(S)}$ =	30,88023 kN	M_D =	0
		$T_C^{(D)}$ =	17,62976 kN		
		$T_C^{(D)}$ =	6,520238 kN		



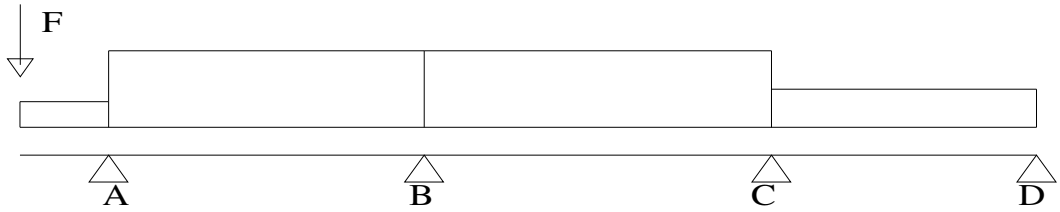
T



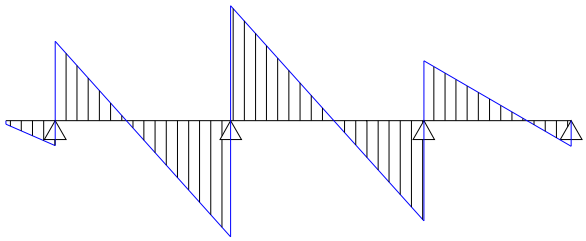
M

Combinazione 3 S.L.U.

qd,bc =	11.05 kN/m	M =	5,6602 kN	L1 =	5 m
qd,cd =	5.75 kN/m	Fd =	1,04 kN	L2 =	5,5 m
qd,ba =	11.05 kN/m	XB =	31,69 kNm	L3 =	4,2 m
qd,sb =	4.29 kN/m	XC =	20,18 kNm	Lsb =	1,4 m
		Hd =	0 kN		



R_A =	29.465 kN	$T_A^{(S)}$ =	-1,04 kN	M_A' =	0 kNm
R_B =	65.3112 kN	$T_A^{(D)}$ =	22,41904 kN	M_A =	- 5,6602 kNm
R_C =	45.1745 kN	$T_B^{(S)}$ =	32,83096 kN	M_B =	-31,69 kNm
R_D =	7.27024 kN	$T_B^{(D)}$ =	32,48023 kN	M_C =	- 20,18 kNm
		$T_C^{(S)}$ =	28,29477 kN	M_D =	0
		$T_C^{(D)}$ =	16,87976 kN		
		$T_C^{(D)}$ =	7,270238 kN		



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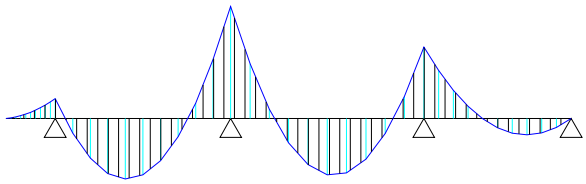
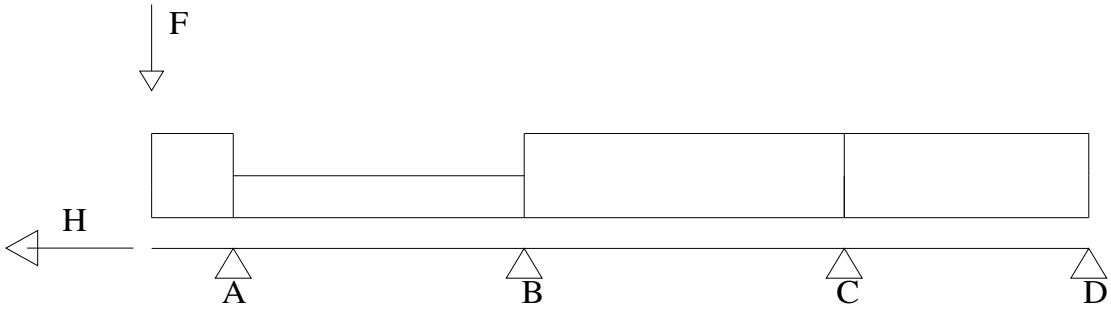


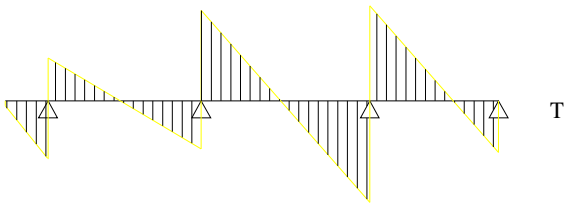
M

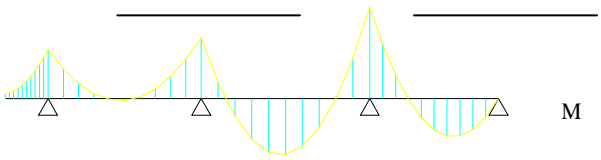
Combinazione 4 S.L.U.

qd,bc =	11.05 kN/m	M =	15,4538 kN	L1 =	5 m
qd,cd =	11.05 kN/m	Fd =	1,56 kN	L2 =	5,5 m
qd,ba =	5.75 kN/m	XB =	19,23 kNm	L3 =	4,2 m
qd,sb =	12.01 kN/m	XC =	28,79 kNm	Lsb =	1,4 m
		Hd =	1,5 kN		



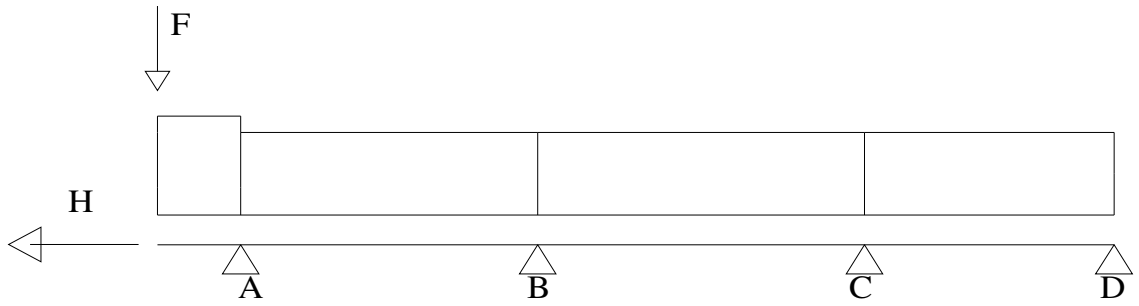
R_A =	31.9936 kN	$T_A^{(S)}$ =	-18,374 kN	M_A' =	-1,5 kNm
R_B =	43.7796 kN	$T_A^{(D)}$ =	13,61976 kN	M_A =	-1 5,4538 kNm
R_C =	62.1854 kN	$T_B^{(S)}$ =	15,13024 kN	M_B =	-19,23 kNm
R_D =	16.3602 kN	$T_B^{(S)}$ =	28,64932 kN	M_C =	- 28,79 kNm
		$T_C^{(D)}$ =	32,12568 kN	M_D =	0
		$T_C^{(D)}$ =	30,05976 kN		
		$T_C^{(D)}$ =	16,35024 kN		



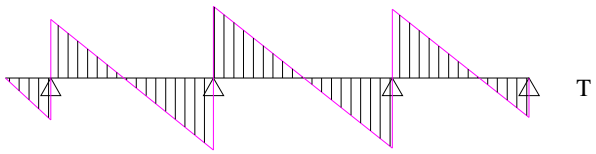


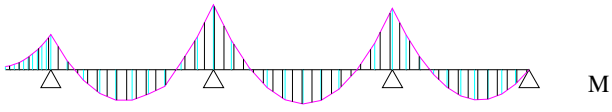
Combinazione 1 S.L.S.

qd,bc =	7.75 kN/m	M =	10,5802 kN	L1 =	5 m
qd,cd =	7.75 kN/m	Fd =	1,04 kN	L2 =	5,5 m
qd,ba =	7.75 kN/m	XB =	19,53 kNm	L3 =	4,2 m
qd,sb =	8.29 kN/m	XC =	18,48 kNm	Lsb =	1,4 m
		Hd =	1 kN		



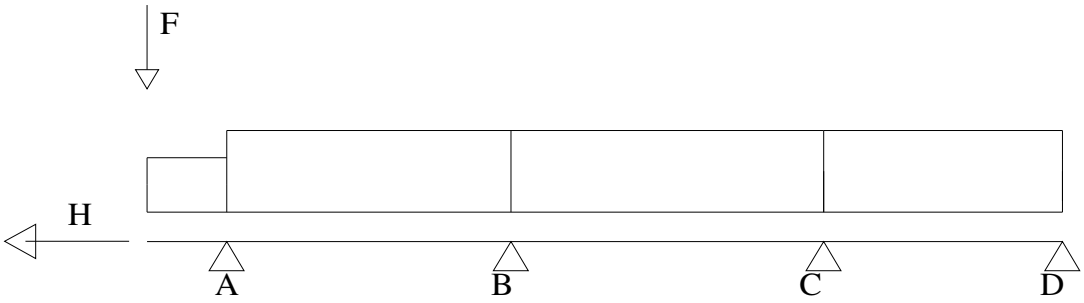
R_A =	30.231 kN	$T_A^{(S)}$ =	-12,646 kN	M_A' =	-1,0 kNm
R_B =	42.6684 kN	$T_A^{(D)}$ =	17,58504 kN	M_A =	-1 0,5802 kNm
R_C =	41.7966 kN	$T_B^{(S)}$ =	21,16496 kN	M_B =	-19,53 kNm
R_D =	11.875 kN	$T_B^{(D)}$ =	21,50341 kN	M_C =	- 18,48 kNm
		$T_C^{(S)}$ =	21,12159 kN	M_D =	0
		$T_C^{(D)}$ =	20,675 kN		
		$T_C^{(D)}$ =	11,875 kN		



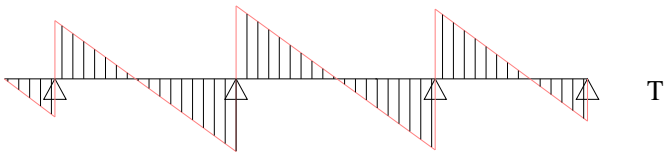


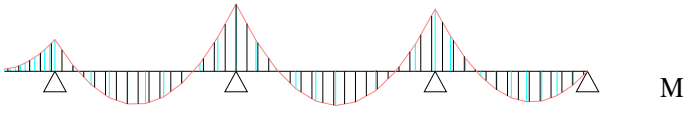
Combinazione 2 S.L.S.

qd,bc =	6.75 kN/m	M =	8,1202 kN	L1 =	5 m
qd,cd =	6.75 kN/m	Fd =	1,04 kN	L2 =	5,5 m
qd,ba =	6.75 kN/m	XB =	17,29 kNm	L3 =	4,2 m
qd,sb =	6.29 kN/m	XC =	15,98 kNm	Lsb =	1,4 m
		Hd =	0,5 kN		



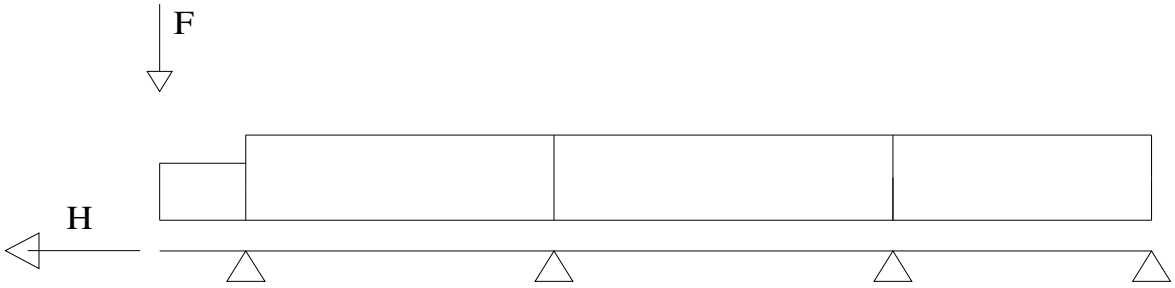
R_A =	24.887 kN	$T_A^{(S)}$ =	- 9,846 kN	M_A' =	-0,5 kNm
R_B =	37.5096 kN	$T_A^{(D)}$ =	15,04104 kN	M_A =	-8,1202 kNm
R_C =	36.3041 kN	$T_B^{(S)}$ =	18,70896 kN	M_B =	-17,29 kNm
R_D =	10.3702 kN	$T_B^{(D)}$ =	18,80068 kN	M_C =	- 15,98 kNm
		$T_C^{(S)}$ =	18,32432 kN	M_D =	0
		$T_C^{(D)}$ =	17,97976 kN		
		$T_C^{(D)}$ =	10,37024 kN		



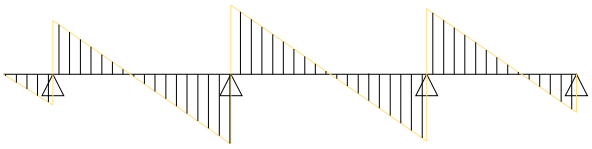


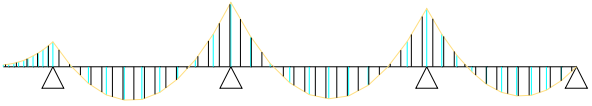
Combinazione 3 S.L.S.

qd,bc =	6.15 kN/m	M =	6,2162 kN	L1 =	5 m
qd,cd =	6.15 kN/m	Fd =	0,52 kN	L2 =	5,5 m
qd,ba =	6.15 kN/m	XB =	16,05 kNm	L3 =	4,2 m
qd,sb =	5.09 kN/m	XC =	14,50 kNm	Lsb =	1,4 m
		Hd =	0,5 kN		

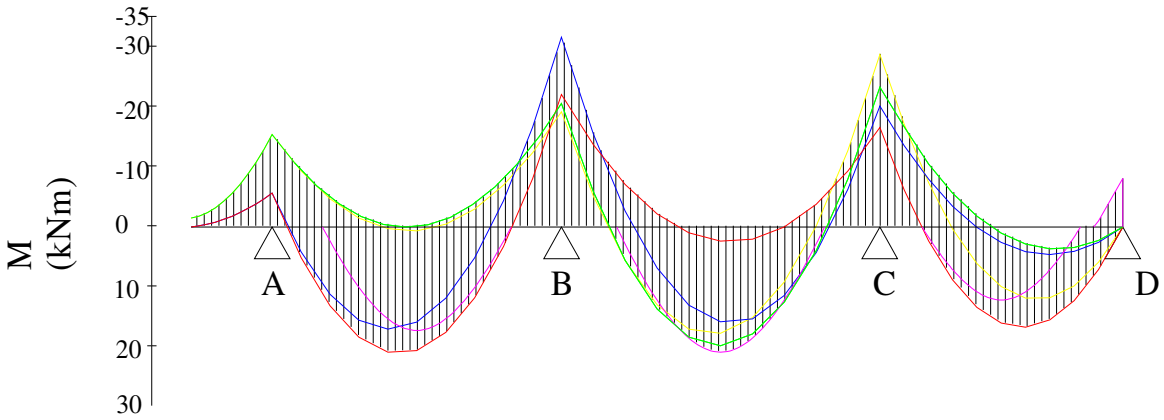


R_A =	21.0542 kN	$T_A^{(S)}$ =	- 7,646 kN	M_A' =	-0,5 kNm
R_B =	34.5361 kN	$T_A^{(D)}$ =	13,40824 kN	M_A =	-6,2162 kNm
R_C =	32.9981 kN	$T_B^{(S)}$ =	17,34176 kN	M_B =	-16,05 kNm
R_D =	9.46262 kN	$T_B^{(D)}$ =	17,19432 kN	M_C =	- 14,50 kNm
		$T_C^{(S)}$ =	16,63068 kN	M_D =	0
		$T_C^{(D)}$ =	16,36738 kN		
		$T_C^{(D)}$ =	9,462619 kN		





Inviluppo delle sollecitazioni allo stato limite ultimo



Momenti massimi agli appoggi

MA(max) = - MA(4) = -15,4538 kNm

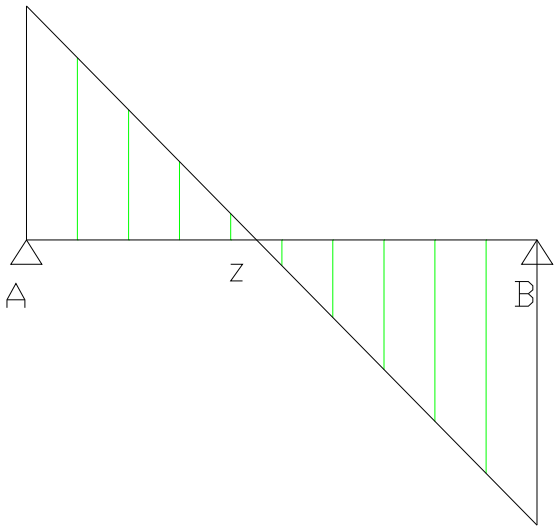
MB(max) = - XB(3) = -31,69 kNm

MC(max) = - XC(4) = -28,79 kNm

MD(max) = $-\frac{p3L32}{24}$ = -8,1 kNm

Momenti massimi in campata:

MAB(max) è data lalla soluzione SLU1 in corrispondanza del punto in cui il taglio è nullo

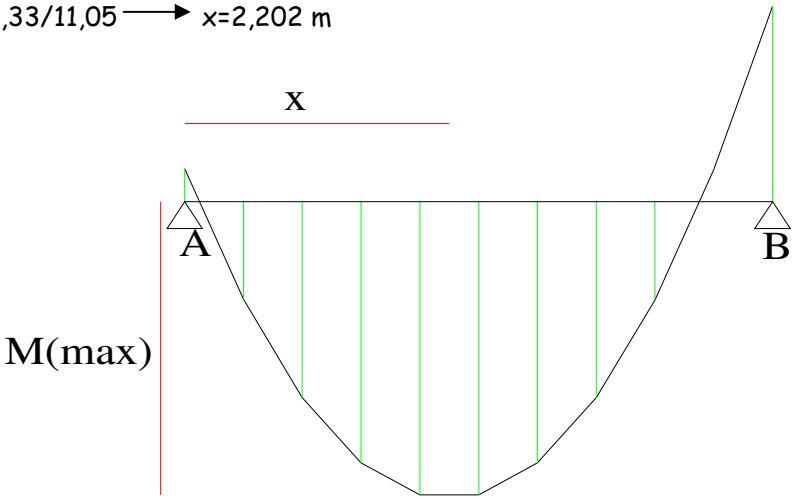


$T_A^{(D)}$=24,33 KN $T_B^{(S)}$= -30,91 kN

T_A - qx=0 q=11,05 KN/m

24,33-11,05x=0

x=24,33/11,05 ⟶ x=2,202 m



M_A= -5,66 KNm

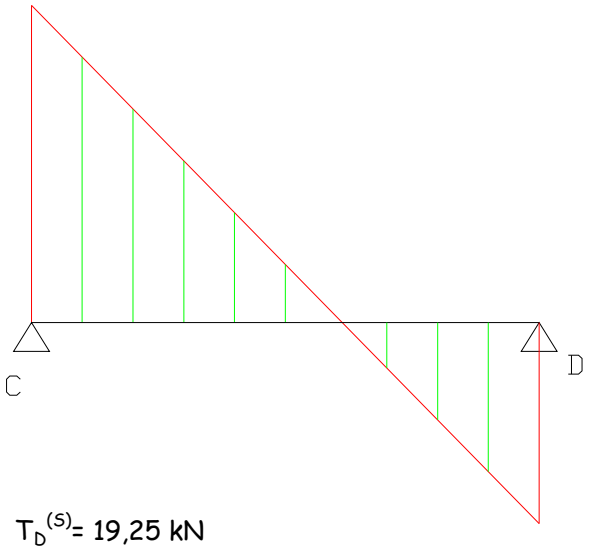
M_B= -22,12 KNm

$M(x)=qx^2/2+T_Ax$

M_{AB}(max)=11,05*2,202/2+24,33*2,202 ~~26~~,785KNm

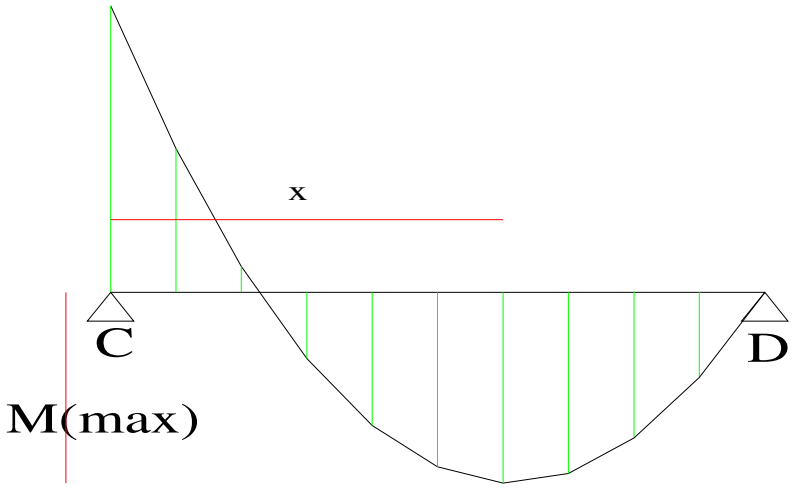
MBC(max) e il momento in campata dovuto al semincastro:
MBC(max)=p(max)2L22/16 =20,89 KNm

MBC(max) è data lalla soluzione SLU1 in corrispondanza del punto oin cui il taglio è nullo

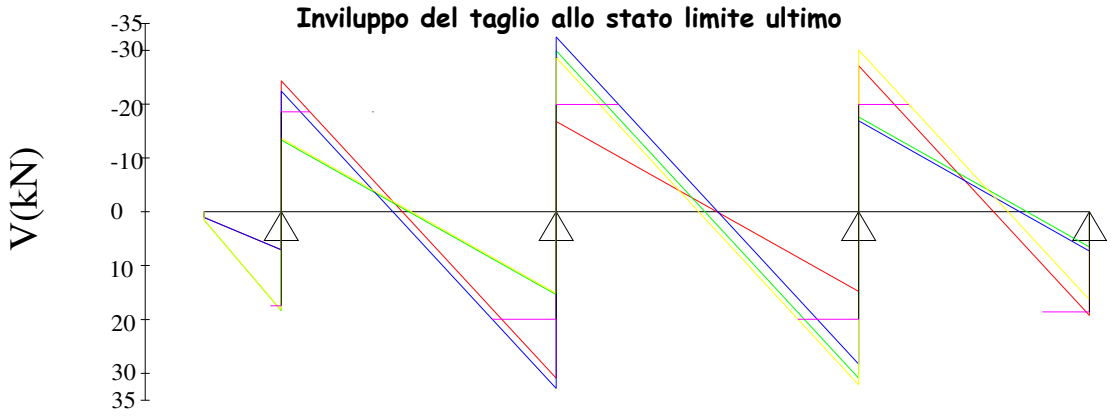


$T_C^{(D)}$=30,059 KN $T_D^{(S)}$= 19,25 kN

T_A - qx=0 q=11,05 KN/m
30,059-11,05x=0
x=30,059/11,05 → x=2,72 m



Mc= -28,79 KNm
MB= 0 KNm
M(x)=qx2/2+TAx
MAB(max)=11,05*2,722/2-30,059*2,72 → 49,884KNm



T_A= T_A^-=-18,374 KN; T_A^+=24,33KN

T_B= T_B^-=-32,83 KN; T_B^+=32,48KN

Tc= Tc^-=-32,12 KN; Tc^+= 30,059 KN

T_D= 19,25 KN