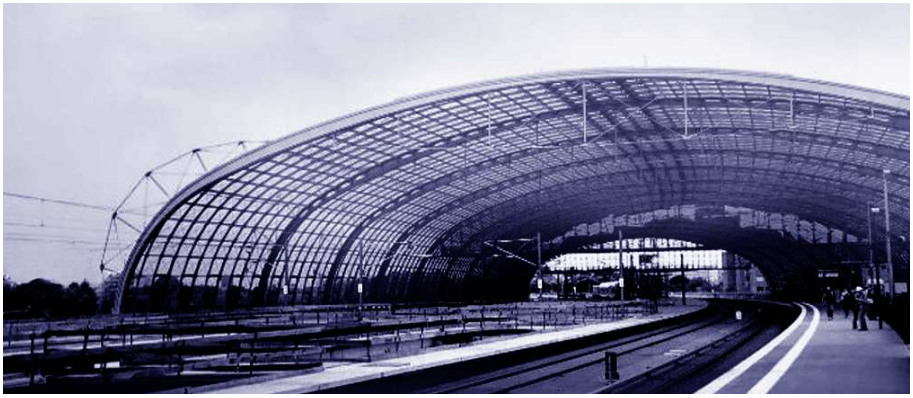
Materialmekanik VSMA10



Formelblad, lastfall och tvärsnittsdata

Formelblad för Materialmekanik

Spännings-töjningssamband för linjärt elastiskt isotropt material

Enaxiell normalspänning:

$$\sigma_x = E\varepsilon_x$$

Fleraxiell normalspänning:

$$\varepsilon_x = \frac{\sigma_x}{E} - \frac{\nu\sigma_y}{E} - \frac{\nu\sigma_z}{E}$$

$$\varepsilon_y = -\frac{\nu\sigma_x}{E} + \frac{\sigma_y}{E} - \frac{\nu\sigma_z}{E}$$

$$\varepsilon_z = -\frac{\nu\sigma_x}{E} - \frac{\nu\sigma_y}{E} + \frac{\sigma_z}{E}$$

Skjuvspänning:

$$\tau = G\gamma \qquad G = \frac{E}{2(1+\nu)}$$

Temperaturtöjning

$$\varepsilon = \alpha(T - T_0)$$

Axiell belastning av stång

$$\sigma = \frac{N}{A} \qquad \varepsilon = \frac{\delta}{L} \qquad \delta = \frac{NL}{AE} \qquad \delta = \int_0^L \frac{N(x)}{A(x)E(x)}dx$$

Böjning av balk

Vid balkens ändar:

- Vid en fast inspänning är momentet i allmänhet skilt från noll.
- Vid ett fixlager eller rullager i balkens ände är momentet noll såvida inte ett punktmoment angriper vid stödet.

Balkdel utan last:

- Tvärkraften är konstant.
- Momentet varierar linjärt.

Balkdel med jämnt utbredd last:

- Tvärkraften varierar linjärt.
- Momentet varierar kvadratiskt.

Vid punktlast:

- Diskontinuitet i tvärkraftsdiagrammet.
- Knyck i momentdiagrammet.

Vid punktmoment:

- Tvärkraften opåverkad.
- Diskontinuitet i momentdiagrammet.

Allmänt:

- Där tvärkraften är noll har momentet ett extremvärde.
- Momentdiagrammet ligger på den dragna sidan, d.v.s. den konvexa sidan av balken om man skissar balkens utböjda form.

Samband mellan last - tvärkraft - böjmoment:

$$q(x) = -\frac{dV}{dx}$$

$$V(x) = -\frac{dM}{dx}$$

Normalspänning:

$$\sigma_x = -\frac{M_z}{I_z} y \qquad \sigma_x = \frac{M_y}{I_y} z$$

$$\sigma_{x,max} = \frac{M_z}{W_z} \qquad W_z = \frac{I_z}{|y_{max}|}$$

$$\sigma_x = \frac{N}{A} - \frac{M_z}{I_z} y + \frac{M_y}{I_y} z$$

$$\sigma_x = \frac{N}{A} - \frac{M_z I_y + M_y I_{yz}}{I_y I_z - I_{yz}^2} y + \frac{M_y I_z + M_z I_{yz}}{I_y I_z - I_{yz}^2} z$$

Yttröghetsmoment:

$$I_z = \int_A y^2 \, dA \qquad I_y = \int_A z^2 \, dA \qquad I_{yz} = \int_A yz \, dA$$

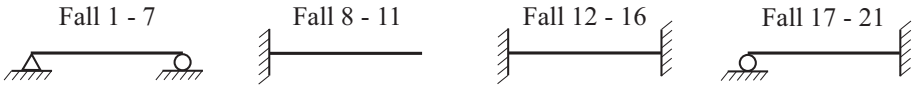
Rektangulärt tvärsnitt: $I_z = \frac{b\,h^3}{12}$ Cirkulärt tvärsnitt: $I_z = \frac{\pi R^4}{4}$

Parallellförflyttningssatsen: $I_{z'} = I_z + \bar{b}^2 A$

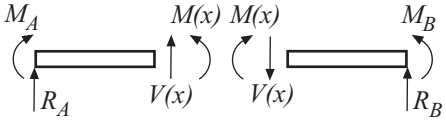
Lastfall

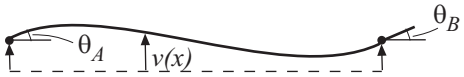
Enfacksbalkar med konstant böjstyvhet.

Randvillkor:

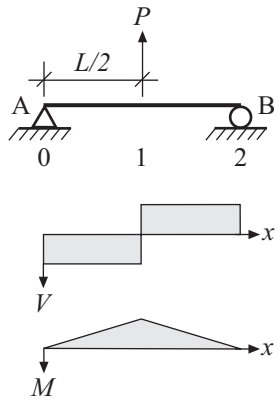


Beteckningar:
L = längd
E = elasticitetsmodul
I = yttröghetsmoment
R = upplagskraft
V = tvärkraft
M = böjmoment
θ = vinkeländring
v = utböjning





1



$$R_A = -\frac{P}{2} \qquad R_B = -\frac{P}{2}$$

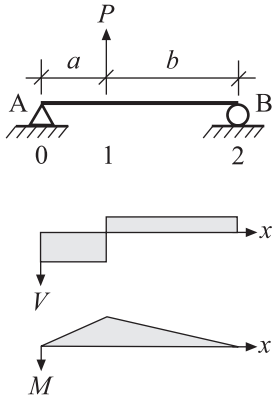
$$V_{0-1} = \frac{P}{2} \qquad V_{1-2} = -\frac{P}{2}$$

$$M_{0-1} = -\frac{Px}{2} \qquad M_{1-2} = -\frac{P(L-x)}{2} \qquad M_{max} = -\frac{PL}{4}$$

$$\theta_A = \frac{PL^2}{16EI} \qquad \theta_B = -\frac{PL^2}{16EI}$$

$$v_{0-1} = \frac{PL^2}{16EI}\left(x - \frac{4x^3}{3L^2}\right) \qquad v_{max} = \frac{PL^3}{48EI}$$

2



$$R_A = -\frac{Pb}{L} \qquad R_B = -\frac{Pa}{L}$$

$$V_{0-1} = \frac{Pb}{L} \qquad V_{1-2} = -\frac{Pa}{L}$$

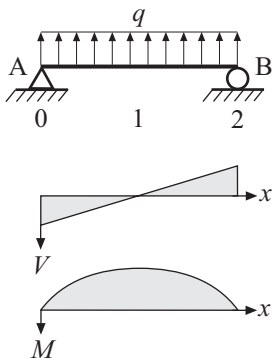
$$M_{0-1} = -\frac{Pbx}{L} \qquad M_{1-2} = -\frac{Pa(L-x)}{L}$$

$$\theta_A = \frac{PbL}{6EI}\left(1 - \frac{b^2}{L^2}\right) \qquad \theta_B = -\frac{PaL}{6EI}\left(1 - \frac{a^2}{L^2}\right)$$

$$v_{0-1} = \frac{PLb}{6EI}\left(\left(1 - \frac{b^2}{L^2}\right)x - \frac{x^3}{L^2}\right) \qquad v_1 = \frac{Pa^2b^2}{3EIL}$$

$$v_{1-2} = \frac{Pa}{6EI}\left(-a^2 + \left(2L + \frac{a^2}{L}\right)x - 3x^2 + \frac{x^3}{L}\right)$$

3



$$R_A = -\frac{qL}{2} \qquad R_B = -\frac{qL}{2}$$

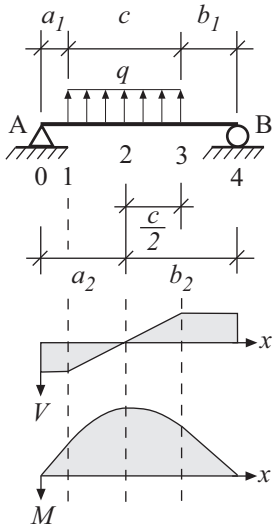
$$V = q\left(\frac{L}{2} - x\right)$$

$$M = \frac{q}{2}\left(-Lx + x^2\right) \qquad M_{max} = -\frac{qL^2}{8}$$

$$\theta_A = \frac{qL^3}{24EI} \qquad \theta_B = -\frac{qL^3}{24EI}$$

$$v = \frac{qL^3}{24EI}\left(x - 2\frac{x^3}{L^2} + \frac{x^4}{L^3}\right) \qquad v_{max} = v(0.5L) = \frac{5qL^4}{384EI}$$

4



$$R_A = -\frac{qcb_2}{L} \qquad R_B = -\frac{qca_2}{L}$$

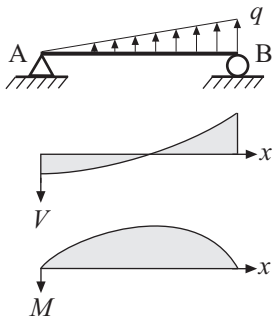
$$V_{1-3} = \frac{qcb_2}{L} - q(x - a_1)$$

$$M_{1-3} = q\left(\frac{a_1^2}{2} - \left(a_1 + \frac{cb_2}{L}\right)x + \frac{x^2}{2}\right) \qquad M_{max} = -\frac{qcb_2}{2L^2}(2a_1L + cb_2)$$

$$\theta_A = \frac{qcb_2L}{6EI}\left(1 - \frac{b_2^2}{L^2} - \frac{c^2}{4L^2}\right)$$

$$\theta_B = -\frac{qca_2L}{6EI}\left(1 - \frac{a_2^2}{L^2} - \frac{c^2}{4L^2}\right)$$

5



$$R_A = -\frac{qL}{6} \qquad R_B = -\frac{qL}{3}$$

$$V = \frac{q}{2}\left(\frac{L}{3} - \frac{x^2}{L}\right)$$

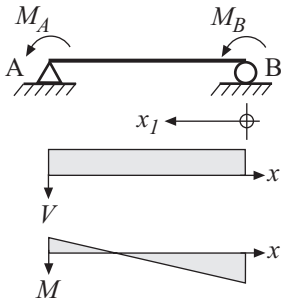
$$M = -\frac{qL}{6}\left(x - \frac{x^3}{L^2}\right) \qquad M_{max} = M(0.577L) = 0.064qL^2$$

$$\theta_A = \frac{7qL^3}{360EI} \qquad \theta_B = -\frac{8qL^3}{360EI}$$

$$v = \frac{qL^3}{360EI}\left(7x - \frac{10x^3}{L^2} + \frac{3x^5}{L^4}\right)$$

$$v_{max} = v(0.519L) = 0.00652\frac{qL^4}{EI}$$

6



$$R_A = \frac{M_A + M_B}{L} \qquad R_B = -\frac{M_A + M_B}{L}$$

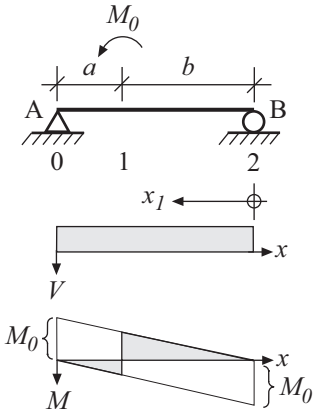
$$V = -\frac{M_A + M_B}{L}$$

$$M = -M_A + (M_B + M_A)\frac{x}{L}$$

$$\theta_A = \frac{L}{6EI}(2M_A - M_B) \qquad \theta_B = \frac{L}{6EI}(2M_B - M_A)$$

$$v = \frac{L}{6EI}\left[M_A\left(x_1 - \frac{x_1^3}{L^2}\right) - M_B\left(x - \frac{x^3}{L^2}\right)\right]$$

7



$$R_A = \frac{M_0}{L} \qquad R_B = -\frac{M_0}{L}$$

$$V = -\frac{M_0}{L}$$

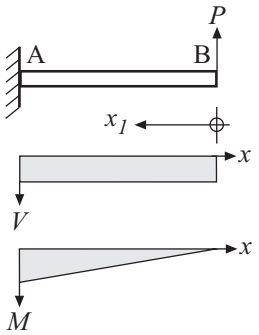
$$M_{0-1} = M_0\frac{x}{L} \qquad M_{1-2} = -M_0\frac{L-x}{L}$$

$$\theta_A = -\frac{M_0 L}{6EI}\left(3\frac{b^2}{L^2} - 1\right) \qquad \theta_B = -\frac{M_0 L}{6EI}\left(3\frac{a^2}{L^2} - 1\right)$$

$$v_{0-1} = -\frac{M_0 L}{6EI}\left(\left(1 - \frac{3b^2}{L^2}\right)x - \frac{x^3}{L^2}\right)$$

$$v_{1-2} = \frac{M_0 L}{6EI}\left(\left(1 - \frac{3a^2}{L^2}\right)x_1 - \frac{x_1^3}{L^2}\right)$$

8



$$R_A = -P$$

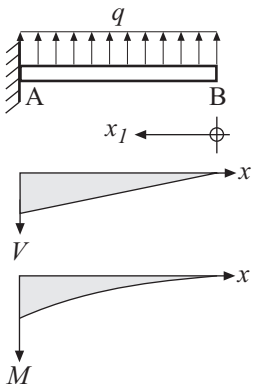
$$V = P$$

$$M = Px_1$$

$$\theta_A = 0 \qquad \theta_B = \frac{PL^2}{2EI}$$

$$v = v_B - \frac{PL^2}{6EI}\left(3x_1 - \frac{x_1^3}{L^2}\right) \qquad v_B = \frac{PL^3}{3EI}$$

9



$$R_A = -qL$$

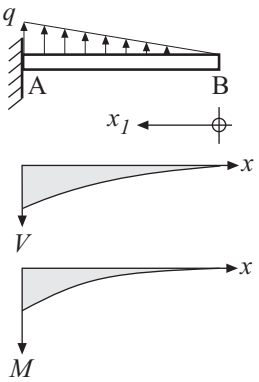
$$V = qx_1$$

$$M = \frac{qx_1^2}{2}$$

$$\theta_A = 0 \qquad \theta_B = \frac{qL^3}{6EI}$$

$$v = v_B - \frac{qL^3}{24EI}\left(4x_1 - \frac{x_1^4}{L^3}\right) \qquad v_B = \frac{qL^4}{8EI}$$

10



$$R_A = -\frac{qL}{2}$$

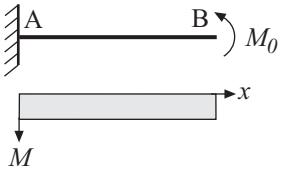
$$V = \frac{qx_1^2}{2L}$$

$$M = \frac{qx_1^3}{6L}$$

$$\theta_A = 0 \qquad \theta_B = \frac{qL^3}{24EI}$$

$$v = v_B - \frac{qL^3}{120EI}\left(5x_1 - \frac{x_1^5}{L^4}\right) \qquad v_B = \frac{qL^4}{30EI}$$

11



$$R_A = 0$$

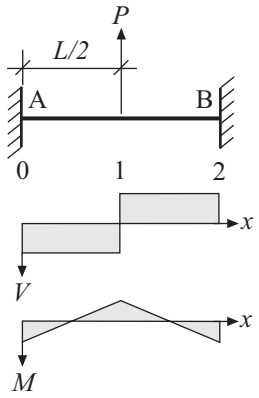
$$V = 0$$

$$M = M_0$$

$$\theta_A = 0 \qquad \theta_B = \frac{M_0 L}{EI}$$

$$v = \frac{M_0 x^2}{2EI} \qquad v_B = \frac{M_0 L^2}{2EI}$$

12



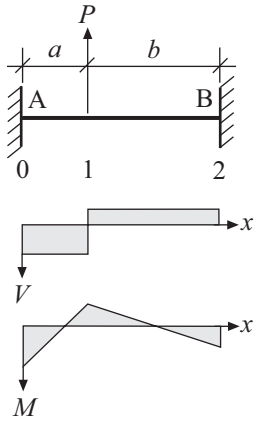
$$R_A = -\frac{P}{2} \qquad R_B = -\frac{P}{2}$$

$$V_{0-1} = \frac{P}{2} \qquad V_{1-2} = -\frac{P}{2}$$

$$M_A = \frac{PL}{8} \qquad M_1 = -\frac{PL}{8} \qquad M_B = \frac{PL}{8}$$

$$v_{0-1} = \frac{PL}{16EI}\left(x^2 - \frac{4x^3}{3L}\right) \qquad v_{max} = \frac{PL^3}{192EI}$$

13



$$R_A = -\frac{Pb^2}{L^2}\left(1 + \frac{2a}{L}\right) \qquad R_B = -\frac{Pa^2}{L^2}\left(1 + \frac{2b}{L}\right)$$

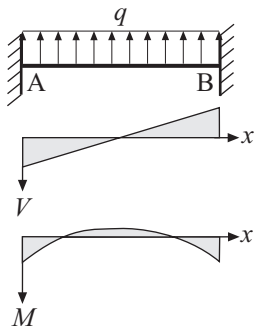
$$V_{0-1} = \frac{Pb^2}{L^2}\left(1 + \frac{2a}{L}\right) \qquad V_{1-2} = -\frac{Pa^2}{L^2}\left(1 + \frac{2b}{L}\right)$$

$$M_A = \frac{Pab^2}{L^2} \qquad M_1 = -\frac{2Pa^2b^2}{L^3} \qquad M_B = \frac{Pba^2}{L^2}$$

$$v_{0-1} = \frac{Pa}{6EI}\left[\left(3 - 6\frac{a}{L} + 3\frac{a^2}{L^2}\right)x^2 - \left(1 - 3\frac{a^2}{L^2} + 2\frac{a^3}{L^3}\right)\frac{x^3}{a}\right]$$

$$v_1 = \frac{Pa^3b^3}{3EIL^3}$$

14



$$R_A = -\frac{qL}{2} \qquad R_B = -\frac{qL}{2}$$

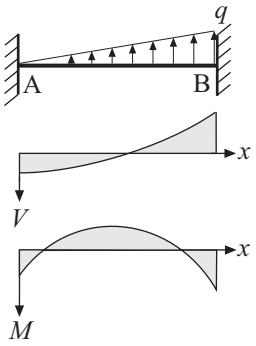
$$V = q\left(\frac{L}{2} - x\right)$$

$$M = \frac{q}{2}\left(\frac{L^2}{6} - Lx + x^2\right)$$

$$M_A = M_B = \frac{qL^2}{12} \qquad M_{mitt} = -\frac{qL^2}{24}$$

$$v = \frac{qL^2}{24EI}\left(x^2 - \frac{2x^3}{L} + \frac{x^4}{L^2}\right) \qquad v_{max} = \frac{qL^4}{384EI}$$

15



$$R_A = -\frac{3qL}{20} \qquad R_B = -\frac{7qL}{20}$$

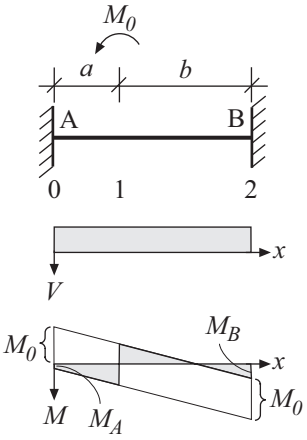
$$V = \frac{qL}{20}\left(3 - 10\frac{x^2}{L^2}\right)$$

$$M = \frac{qL^2}{60}\left(2 - 9\frac{x}{L} + 10\frac{x^3}{L^3}\right)$$

$$M_A = \frac{qL^2}{30} \qquad M_B = \frac{qL^2}{20}$$

$$M_{max} = M(0.548L) = -\frac{qL^2}{46.6}$$

16



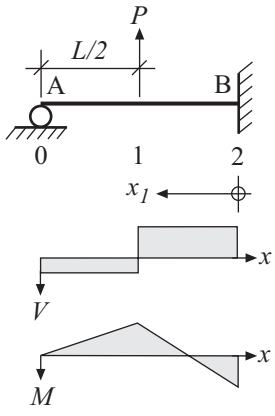
$$R_A = -\frac{3M_0}{L}\left(\frac{a^2}{L^2} + \frac{b^2}{L^2} - 1\right) \qquad R_B = \frac{3M_0}{L}\left(\frac{a^2}{L^2} + \frac{b^2}{L^2} - 1\right)$$

$$V = \frac{3M_0}{L}\left(\frac{a^2}{L^2} + \frac{b^2}{L^2} - 1\right)$$

$$M_{0-1} = R_A x + M_A \qquad M_{1-2} = R_A x + M_A - M_0$$

$$M_A = M_0\left(\frac{a^2}{L^2} + \frac{2b^2}{L^2} - 1\right) \qquad M_B = -M_0\left(\frac{2a^2}{L^2} + \frac{b^2}{L^2} - 1\right)$$

17



$$R_A = -\frac{5P}{16} \qquad R_B = -\frac{11P}{16}$$

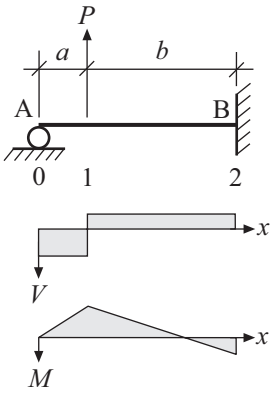
$$V_{0-1} = \frac{5P}{16} \qquad V_{1-2} = -\frac{11P}{16}$$

$$M_1 = -\frac{5PL}{32} \qquad M_B = \frac{3PL}{16}$$

$$v_{0-1} = \frac{PL^2}{32EI}\left(x - \frac{5x^3}{3L^2}\right) \qquad v_{1-2} = \frac{PL}{32EI}\left(3x_1^2 - \frac{11x_1^3}{3L}\right)$$

$$v_1 = \frac{7PL^3}{768EI} \qquad v_{max} = v(0.447L) = \frac{PL^3}{107EI}$$

18



$$R_A = -\frac{Pb^2}{2L^2}\left(3-\frac{b}{L}\right) \qquad R_B = -\frac{Pa}{2L}\left(3-\frac{a^2}{L^2}\right)$$

$$V^{0-1} = \frac{Pb^2}{2L^2}\left(3-\frac{b}{L}\right) \qquad V^{1-2} = -\frac{Pa}{2L}\left(3-\frac{a^2}{L^2}\right)$$

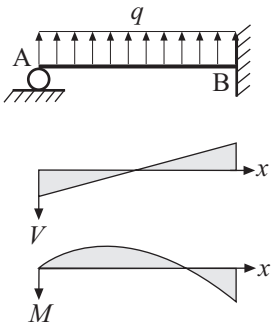
$$M_B = \frac{Pa}{2}\left(1-\frac{a^2}{L^2}\right) \qquad M_1 = -\frac{Pb^2a}{2L^2}\left(2+\frac{a}{L}\right)$$

$$v_{0-1} = \frac{Pb^2}{12EI}\left[3\frac{ax}{L}-\left(2+\frac{a}{L}\right)\frac{x^3}{L^2}\right]$$

$$v_{1-2} = \frac{Pa}{12EI}\left[-2a^2+(3L+\frac{3a^2}{L})x-6x^2+\left(\frac{3}{L}-\frac{a^2}{L^3}\right)x^3\right]$$

$$v_1 = \frac{Pa^2b^3}{12EIL^2}\left(4-\frac{b}{L}\right)$$

19



$$R_A = -\frac{3qL}{8} \qquad R_B = -\frac{5qL}{8}$$

$$V = q\left(\frac{3L}{8}-x\right)$$

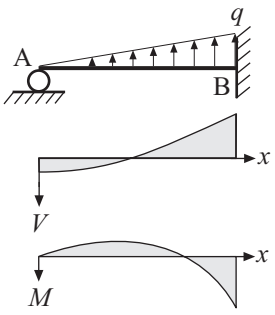
$$M = -\frac{qL}{2}\left(\frac{3x}{4}-\frac{x^2}{L}\right)$$

$$M_B = \frac{qL^2}{8} \qquad M_{max,fält} = M(0.375L) = -\frac{9}{128}qL^2$$

$$v = \frac{qL^3}{48EI}\left(x-3\frac{x^3}{L^2}+2\frac{x^4}{L^3}\right)$$

$$v_{mitt} = \frac{qL^4}{192EI} \qquad v_{max} = v(0.42L) = \frac{qL^4}{185EI}$$

20



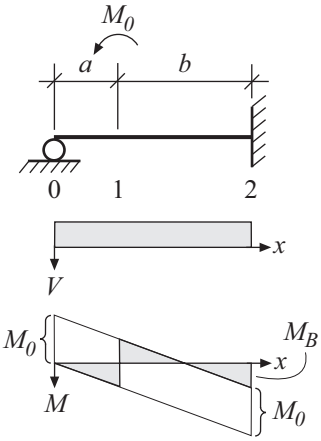
$$R_A = -\frac{qL}{10} \qquad R_B = -\frac{2qL}{5}$$

$$V = \frac{qL}{2}\left(\frac{1}{5}-\frac{x^2}{L^2}\right)$$

$$M = \frac{qL}{2}\left(-\frac{x}{5}+\frac{x^3}{3L^2}\right)$$

$$M_B = \frac{qL^2}{15} \qquad M_{max,fält} = M(0.447L) = 0.0298qL^2$$

21



$$R_A = -\frac{M_0}{2L}\left(\frac{3a^2}{L^2} - 3\right) \qquad R_B = \frac{M_0}{2L}\left(\frac{3a^2}{L^2} - 3\right)$$

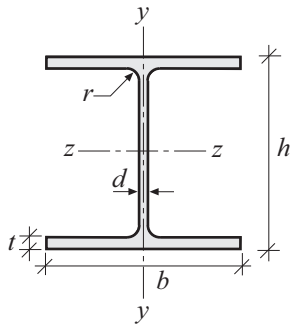
$$V = \frac{M_0}{2L}\left(\frac{3a^2}{L^2} - 3\right)$$

$$M_{0-1} = \frac{M_0 x}{2L}\left(3 - \frac{3a^2}{L^2}\right) \qquad M_{1-2} = \frac{M_0 x}{2L}\left(3 - \frac{3a^2}{L^2}\right) - M_0$$

$$M_B = \frac{M_0}{2}\left(1 - \frac{3a^2}{L^2}\right)$$

Tvärsnittsdata HEA-profil

Beteckningar:



A = Tvärsnittsarea
A_w = Livarea
F = Mantelarea per längdenhet
g = Massa per längdenhet

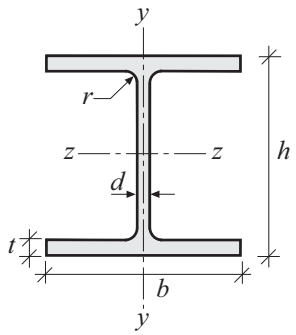
Profil	Tvärsnittsmått					Areor och massa			
	h	b	t	d	r	A	A_w	F	g
	mm	mm	mm	mm	mm	mm^2	mm^2	m^2/m	kg/m
HEA 100	96	100	8.0	5.0	12	2124	400	0.561	16.7
HEA 120	114	120	8.0	5.0	12	2534	490	0.677	19.9
HEA 140	133	140	8.5	5.5	12	3142	638	0.794	24.7
HEA 160	152	160	9.0	6.0	15	3877	804	0.906	30.4
HEA 180	171	180	9.5	6.0	15	4525	912	1.02	35.5
HEA 200	190	200	10.0	6.5	18	5383	1105	1.14	42.3
HEA 220	210	220	11.0	7.0	18	6434	1316	1.26	50.5
HEA 240	230	240	12.0	7.5	21	7684	1545	1.37	60.3
HEA 260	250	260	12.5	7.5	24	8682	1688	1.48	68.2
HEA 280	270	280	13.0	8.0	24	9726	1952	1.60	76.4
HEA 300	290	300	14.0	8.5	27	11250	2227	1.72	88.3
HEA 320	310	300	15.5	9.0	27	12440	2511	1.76	97.6
HEA 340	330	300	16.5	9.5	27	13350	2822	1.79	105
HEA 360	350	300	17.5	10.0	27	14280	3150	1.83	112
HEA 400	390	300	19.0	11.0	27	15900	3872	1.91	125
HEA 450	440	300	21.0	11.5	27	17800	4577	2.01	140
HEA 500	490	300	23.0	12.0	27	19750	5328	2.11	155
HEA 550	540	300	24.0	12.5	27	21180	6150	2.21	166
HEA 600	590	300	25.0	13.0	27	22650	7020	2.31	178
HEA 650	640	300	26.0	13.5	27	24160	7938	2.41	190
HEA 700	690	300	27.0	14.5	27	26050	9222	2.50	204
HEA 800	790	300	28.0	15.0	30	28580	11010	2.70	224
HEA 900	890	300	30.0	16.0	30	32050	13280	2.90	252
HEA 1000	990	300	31.0	16.5	30	34680	15310	3.10	272

I_z, I_y = Yttröghetsmoment
W_z, W_y = Elastiskt böjmotstånd
Z_z, Z_y = Plastiskt böjmotstånd
i_z, i_y = Tröghetsradie

Profil	Böjning kring z-axeln				Böjning kring y-axeln			
	I_z	W_z	Z_z	i_z	I_y	W_y	Z_y	i_y
	$\cdot 10^6$ mm^4	$\cdot 10^3$ mm^3	$\cdot 10^3$ mm^3	mm	$\cdot 10^6$ mm^4	$\cdot 10^3$ mm^3	$\cdot 10^3$ mm^3	mm
HEA 100	3.492	72.8	83.0	40.6	1.338	26.8	41.1	25.1
HEA 120	6.062	106	119	48.9	2.309	38.5	58.9	30.2
HEA 140	10.33	155	173	57.3	3.893	55.6	84.8	35.2
HEA 160	16.73	220	245	65.7	6.156	76.9	118	39.8
HEA 180	25.10	294	325	74.5	9.246	103	156	45.2
HEA 200	36.92	389	429	82.8	13.36	134	204	49.8
HEA 220	54.10	515	568	91.7	19.55	178	271	55.1
HEA 240	77.63	675	745	101	27.69	231	352	60.0
HEA 260	104.5	836	920	110	36.68	282	430	65.0
HEA 280	136.7	1010	1110	119	47.63	340	518	70.0
HEA 300	182.6	1260	1380	127	63.10	421	641	74.9
HEA 320	229.3	1480	1630	136	69.85	466	710	74.9
HEA 340	276.9	1680	1850	144	74.36	496	756	74.6
HEA 360	330.9	1890	2090	152	78.87	526	802	74.3
HEA 400	450.7	2310	2560	168	85.64	571	873	73.4
HEA 450	637.0	2900	3220	189	94.65	631	966	72.9
HEA 500	869.6	3550	3950	210	103.7	691	1060	72.4
HEA 550	1119	4150	4620	230	108.2	721	1110	71.5
HEA 600	1412	4790	5350	250	112.7	751	1160	70.5
HEA 650	1752	5470	6140	269	117.2	782	1200	69.7
HEA 700	2153	6240	7030	288	121.8	812	1260	68.4
HEA 800	3034	7680	8700	326	126.4	843	1310	66.5
HEA 900	4221	9480	10800	363	135.5	903	1410	65.0
HEA 1000	5538	11200	12800	400	140.0	934	1470	63.5

Tvärsnittsdata HEB-profil

Beteckningar:



A = Tvärsnittsarea
A_w = Livarea
F = Mantelarea per längdenhet
g = Massa per längdenhet

Profil	Tvärsnittsmått					Areor och massa			
	h	b	t	d	r	A	A_w	F	g
	mm	mm	mm	mm	mm	mm^2	mm^2	m^2/m	kg/m
HEB 100	100	100	10.0	6.0	12	2604	480	0.567	20.4
HEB 120	120	120	11.0	6.5	12	3401	637	0.686	26.7
HEB 140	140	140	12.0	7.0	12	4296	812	0.805	33.7
HEB 160	160	160	13.0	8.0	15	5425	1072	0.918	42.6
HEB 180	180	180	14.0	8.5	15	6525	1292	1.04	51.2
HEB 200	200	200	15.0	9.0	18	7808	1530	1.15	61.3
HEB 220	220	220	16.0	9.5	18	9104	1786	1.27	71.5
HEB 240	240	240	17.0	10.0	21	10600	2060	1.38	83.2
HEB 260	260	260	17.5	10.0	24	11840	2250	1.50	93.0
HEB 280	280	280	18.0	10.5	24	13140	2562	1.62	103
HEB 300	300	300	19.0	11.0	27	14910	2882	1.73	117
HEB 320	320	300	20.5	11.5	27	16130	3209	1.77	127
HEB 340	340	300	21.5	12.0	27	17090	3564	1.81	134
HEB 360	360	300	22.5	12.5	27	18060	3938	1.85	142
HEB 400	400	300	24.0	13.5	27	19780	4752	1.93	155
HEB 450	450	300	26.0	14.0	27	21800	5572	2.03	171
HEB 500	500	300	28.0	14.5	27	23860	6438	2.12	187
HEB 550	550	300	29.0	15.0	27	25410	7380	2.22	199
HEB 600	600	300	30.0	15.5	27	27000	8370	2.32	212
HEB 650	650	300	31.0	16.0	27	28630	9408	2.42	225
HEB 700	700	300	32.0	17.0	27	30640	10810	2.52	241
HEB 800	800	300	33.0	17.5	30	33420	12850	2.71	262
HEB 900	900	300	35.0	18.5	30	37130	15360	2.91	291
HEB 1000	1000	300	36.0	19.0	30	40000	17630	3.11	314

I_z, I_y = Yttröghetsmoment
W_z, W_y = Elastiskt böjmotstånd
Z_z, Z_y = Plastiskt böjmotstånd
i_z, i_y = Tröghetsradie

Profil	Böjning kring z-axeln				Böjning kring y-axeln			
	I_z	W_z	Z_z	i_z	I_y	W_y	Z_y	i_y
	$\cdot 10^6$ mm^4	$\cdot 10^3$ mm^3	$\cdot 10^3$ mm^3	mm	$\cdot 10^6$ mm^4	$\cdot 10^3$ mm^3	$\cdot 10^3$ mm^3	mm
HEB 100	4.495	89.9	104	41.6	1.673	33.5	51.4	25.3
HEB 120	8.644	144	165	50.4	3.175	52.9	81.0	30.6
HEB 140	15.09	216	245	59.3	5.497	78.5	120	35.8
HEB 160	24.92	311	354	67.8	8.892	111	170	40.5
HEB 180	38.31	426	481	76.6	13.63	151	231	45.7
HEB 200	56.96	570	643	85.4	20.03	200	306	50.7
HEB 220	80.91	736	827	94.3	28.43	258	394	55.9
HEB 240	112.6	938	1050	103	39.23	327	498	60.8
HEB 260	149.2	1150	1280	112	51.35	395	602	65.8
HEB 280	192.7	1380	1530	121	65.95	471	718	70.9
HEB 300	251.7	1680	1870	130	85.63	571	870	75.8
HEB 320	308.2	1930	2150	138	92.39	616	939	75.7
HEB 340	366.6	2160	2410	146	96.90	646	986	75.3
HEB 360	431.9	2400	2680	155	101.4	676	1030	74.9
HEB 400	576.8	2880	3230	171	108.2	721	1100	74.0
HEB 450	798.9	3550	3980	191	117.2	781	1200	73.3
HEB 500	1072	4290	4810	212	126.2	842	1290	72.7
HEB 550	1367	4970	5590	232	130.8	872	1340	71.7
HEB 600	1710	5700	6430	252	135.3	902	1390	70.8
HEB 650	2106	6480	7320	721	139.8	932	1440	69.9
HEB 700	2569	7340	8330	290	144.4	963	1500	68.7
HEB 800	3591	8980	10200	328	149.0	994	1550	66.8
HEB 900	4941	11000	12600	365	158.2	1050	1660	65.3
HEB 1000	6447	12900	14900	401	162.8	1090	1720	63.8