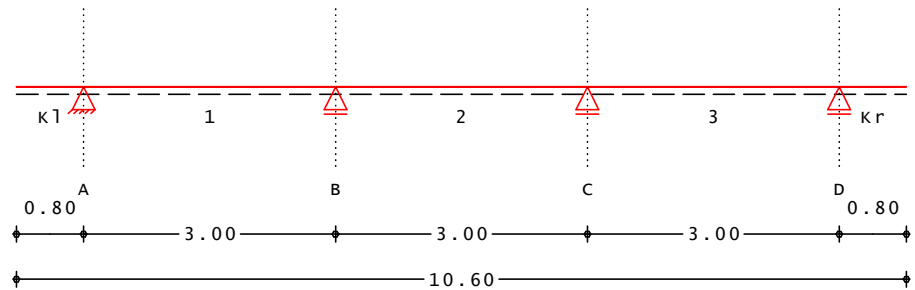


Pos. B166 Holz-Pfette, Doppelbiegung, DIN 1052 (08/04)
System Holz-Dreifeldträger mit Kragarmen

M 1:90



Felder	Feld	l [m]	$l_{ef,cy}$ [m]	$l_{ef,cz}$ [m]	$l_{ef,m}$ [m]	NKL
	K1	0.80	1.60	1.60	1.60	1
	1	3.00	3.00	3.00	3.00	1
	2	3.00	3.00	3.00	3.00	1
	3	3.00	3.00	3.00	3.00	1
	Kr	0.80	1.60	1.60	1.60	1

Auflager	Aufl.	x [m]	b [cm]
	A	0.80	20.00
	B	3.80	20.00
	C	6.80	20.00
	D	9.80	20.00

 Material **Nadelholz c24**
 Querschnitt **b/h = 10/22.0 cm**
Einwirkungen

ständig	ständige Einwirkung	
wind0	windlasten	LG 98
wind90	windlasten	LG 98
SchneeA	Schnee-/Eislast ≤ 1000 m	LG 99

 Lastgruppen **LG Einwirkungen, die nicht gleichzeitig wirken**
 98 wind0 / wind90

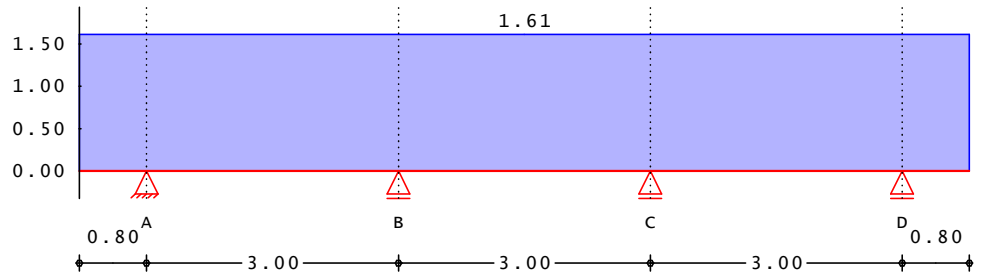
 Erläuterungen Gruppen (LG)
 Einwirkungen, die der gleichen Lastgruppe zugeordnet werden, können nicht gleichzeitig auftreten.

Belastung

Einwirkung ständig
Eigengewicht

	A [cm ²]	γ [kN/m ³]	g [kN/m]
	220.0	5.0	0.11

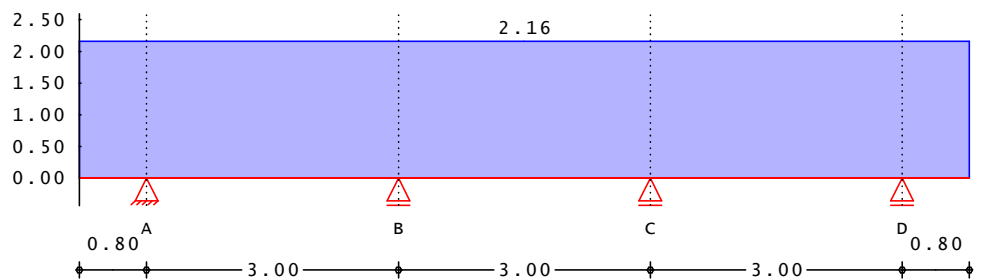
z-Richtung
M 1:90



Gleichlasten

	F_{anf} [k]	a [m]	F_{end} [k]	a [m]	S [m]	q_z [kN/m]
1	1	0.00	3	0.80	10.60	1.50

Einwirkung wind0
z-Richtung
M 1:90



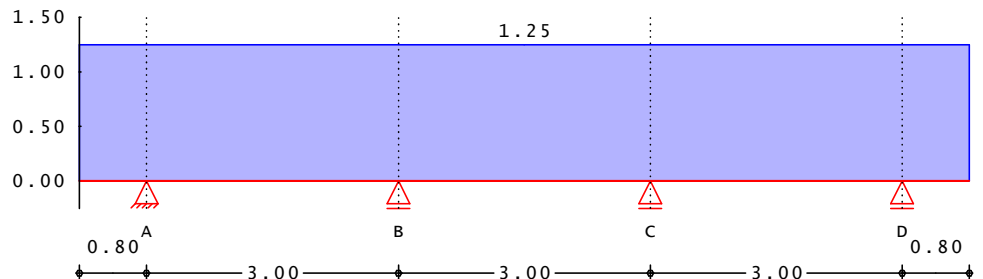
Normalkräfte

	F_{anf}	F_{end}	N_x [kN]
1	1	3	-20.00

Gleichlasten

	F_{anf} [k]	a [m]	F_{end} [k]	a [m]	S [m]	q_z [kN/m]
1	1	0.00	3	0.80	10.60	2.16

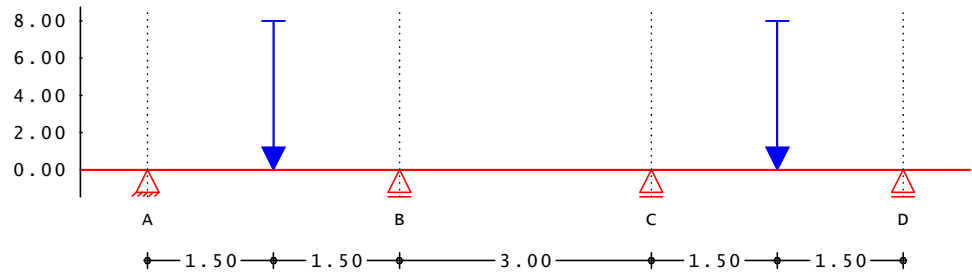
y-Richtung
M 1:90



Gleichlasten

	F_{anf} [k]	a [m]	F_{end} [k]	a [m]	S [m]	q_y [kN/m]
1	1	0.00	3	0.80	10.60	1.25

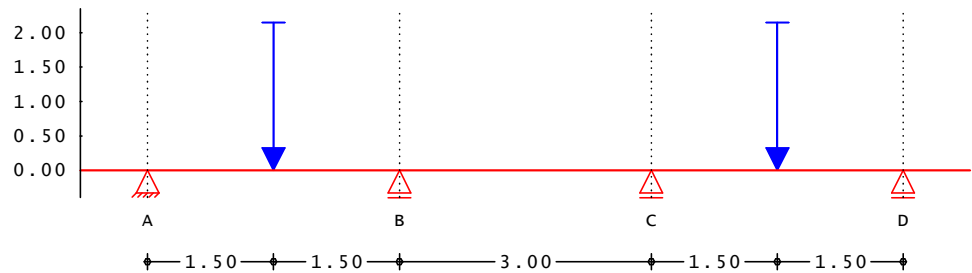
Einwirkung wind90
z-Richtung
M 1:90



Einzellasten

Feld	a [m]	F _z [kN]
1	1.50	8.00
2	3	8.00

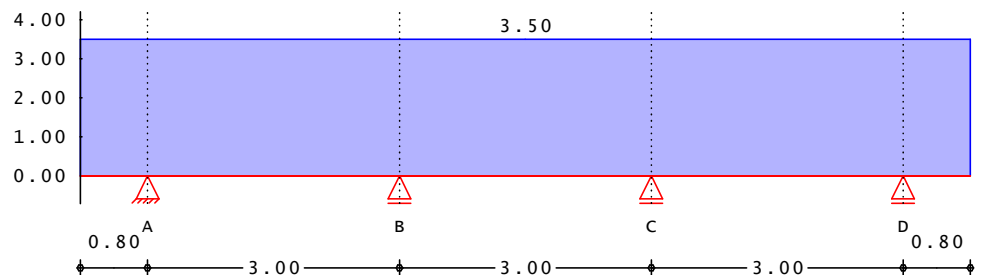
y-Richtung
M 1:90



Einzellasten

Feld	a [m]	F _y [kN]
1	1.50	2.15
2	3	2.15

Einwirkung SchneeA
z-Richtung
M 1:90



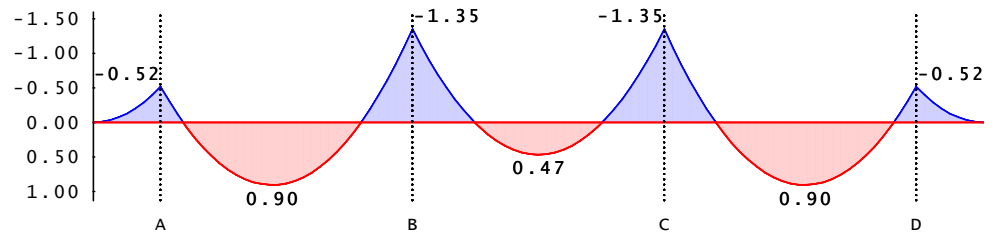
Gleichlasten

F _{anf}	a [m]	F _{end}	a [m]	s [m]	q _z [kN/m]
1	0.00	0.80	10.60		3.50

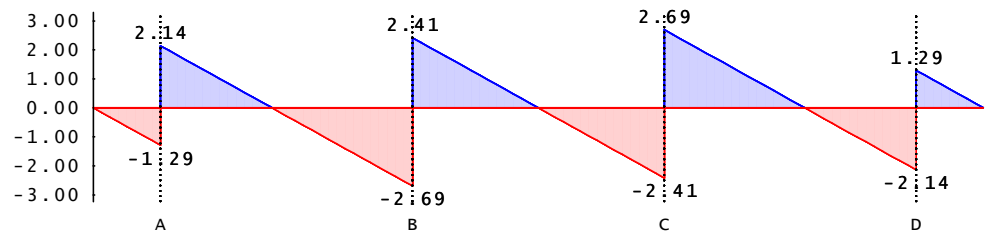
char. Schnittgrößen

Einwirkung ständig

M 1:90

 Moment M_y, k [kNm]


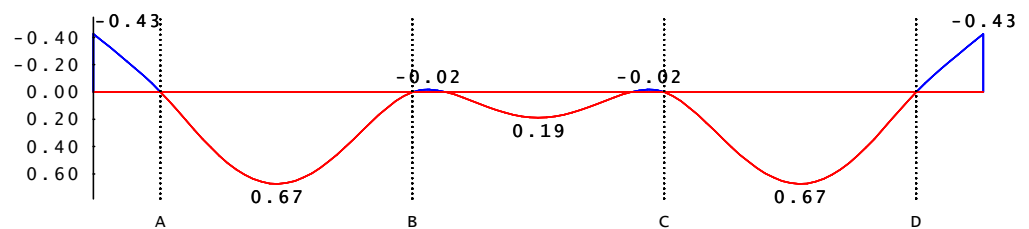
M 1:90

 Querkraft V_z, k [kN]


Schnittgrößen

Feld	x [m]	N_x, k [kN]	M_y, k [kNm]	V_z, k [kN]	M_z, k [kNm]	V_y, k [kN]
Kl	0.00	0.00	0.00*	0.00	0.00*	0.00*
	0.80	0.00	-0.52*	-1.29*	0.00	0.00
1	0.00	0.00	-0.52	2.14	0.00*	0.00*
	1.33	0.00	0.90*	-0.00	0.00	0.00
	3.00	0.00	-1.35	-2.69*	0.00	0.00
2	0.00	0.00	-1.35	2.41	0.00*	0.00*
	1.50	0.00	0.47*	0.00	0.00	0.00
	3.00	0.00	-1.35*	-2.41	0.00	0.00
3	0.00	0.00	-1.35	2.69*	0.00*	0.00*
	1.67	0.00	0.90*	0.00	0.00	0.00
	3.00	0.00	-0.52	-2.14	0.00	0.00
Kr	0.00	0.00	-0.52*	1.29*	0.00*	0.00*
	0.80	0.00	0.00*	0.00	0.00	0.00

M 1:90

 Verformung w_k [mm]


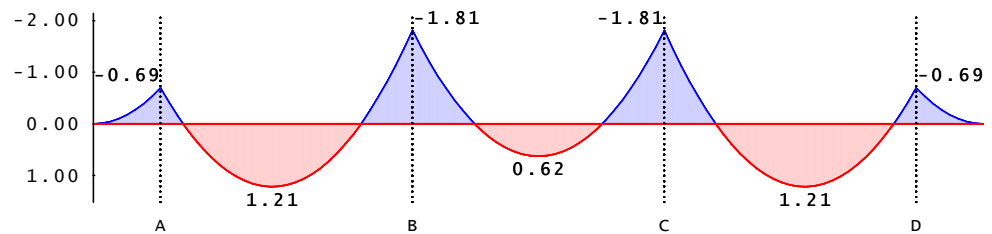
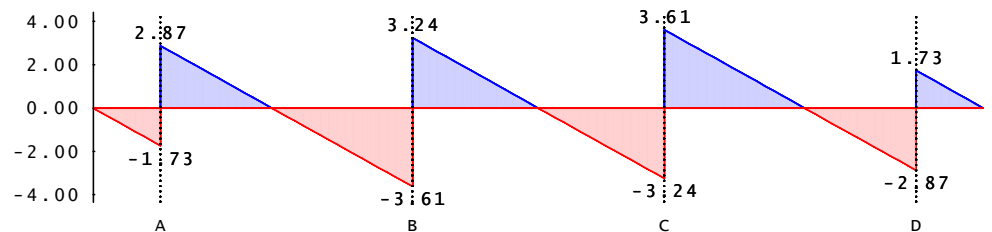
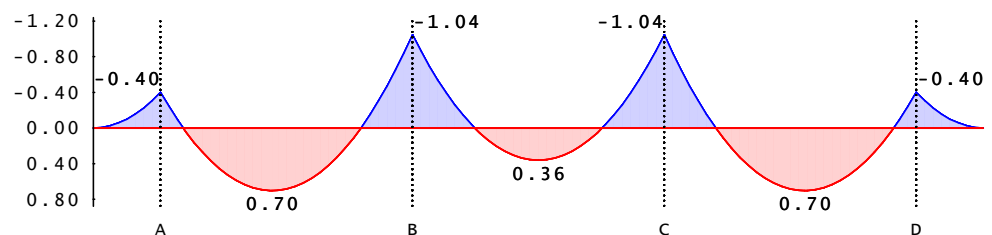
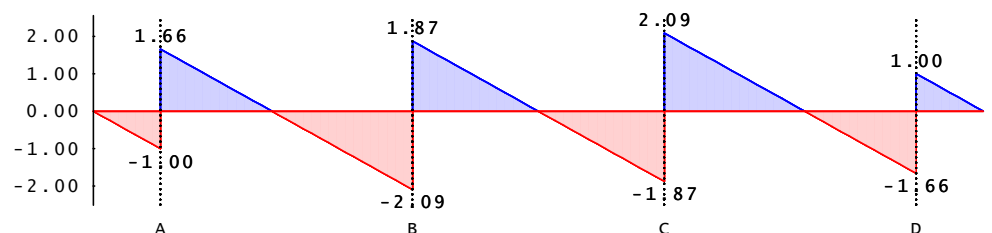
Verformungen

Feld	x [m]	w_k [mm]	V_k [mm]
Kl	0.00	-0.43*	0.00*
	0.80	0.00*	0.00
1	0.00	0.00*	0.00*
	1.38	0.67*	0.00
	3.00	0.00	0.00
2	0.00	0.00	0.00*
	1.50	0.19*	0.00
	2.82	-0.02*	0.00

Feld	x [m]	W _k [mm]	V _k [mm]
3	3.00	0.00	0.00
	0.00	0.00*	0.00*
	1.62	0.67*	0.00
Kr	3.00	0.00	0.00
	0.00	0.00*	0.00*
	0.80	-0.43*	0.00

Auflagerkräfte

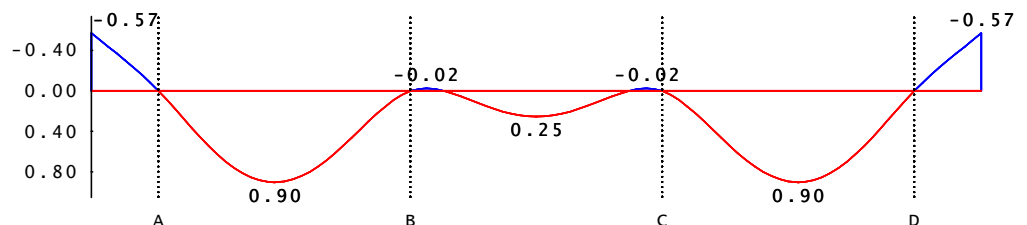
Aufl.	X [m]	F _{z, k} [kN]	F _{y, k} [kN]
A	0.80	3.43	0.00
B	3.80	5.11	0.00
C	6.80	5.11	0.00
D	9.80	3.43	0.00

Einwirkung wind0
M 1:90
Moment M_{y, k} [kNm]

M 1:90
Querkraft v_{z, k} [kN]

M 1:90
Moment M_{z, k} [kNm]

M 1:90
Querkraft v_{y, k} [kN]


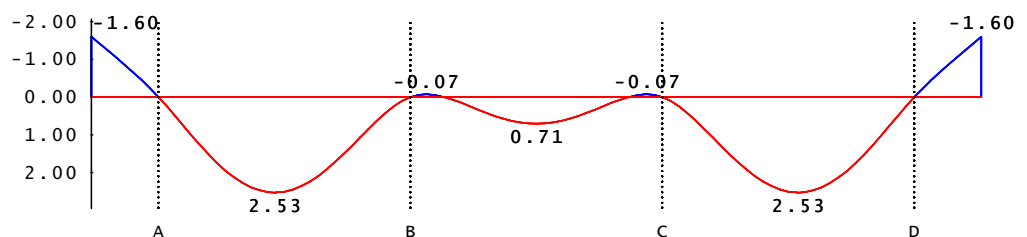
Schnittgrößen

Feld	x [m]	N_x, k [kN]	M_y, k [kNm]	V_z, k [kN]	M_z, k [kNm]	V_y, k [kN]
Kl	0.00	0.00	0.00*	0.00	0.00*	0.00
	0.80	0.00	-0.69*	-1.73*	-0.40*	-1.00*
1	0.00	-20.00	-0.69	2.87	-0.40	1.66
	1.33	-20.00	1.21*	-0.00	0.70*	-0.00
	3.00	-20.00	-1.81	-3.61*	-1.04	-2.09*
2	0.00	-20.00	-1.81	3.24	-1.04	1.87
	1.50	-20.00	0.62*	0.00	0.36*	0.00
	3.00	-20.00	-1.81*	-3.24	-1.04*	-1.87
3	0.00	-20.00	-1.81	3.61*	-1.04	2.09*
	1.67	-20.00	1.21*	0.00	0.70*	0.00
	3.00	-20.00	-0.69	-2.87	-0.40	-1.66
Kr	0.00	0.00	-0.69*	1.73*	-0.40*	1.00*
	0.80	0.00	0.00*	0.00	0.00*	0.00

M 1:90

 Verformung w_k [mm]


M 1:90

 Verformung v_k [mm]

Verformungen

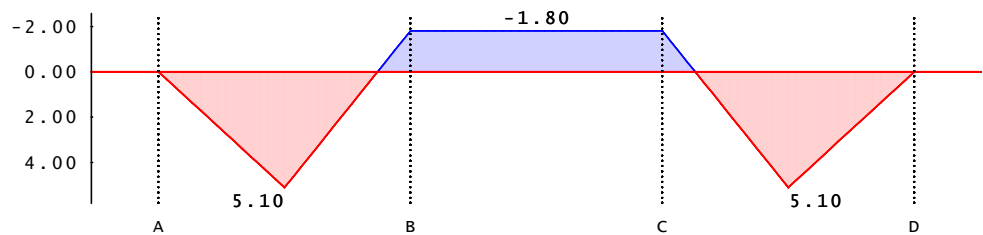
Feld	x [m]	w_k [mm]	v_k [mm]
Kl	0.00	-0.57*	-1.60*
	0.80	0.00*	0.00*
1	0.00	0.00*	0.00*
	1.38	0.90*	2.53*
	3.00	0.00	0.00
2	0.00	0.00	0.00
	1.50	0.25*	0.71*
	2.82	-0.02*	-0.07*
3	0.00	0.00	0.00
	1.62	0.90*	2.53*
	3.00	0.00	0.00
Kr	0.00	0.00*	0.00*
	0.80	-0.57*	-1.60*

Auflagerkräfte

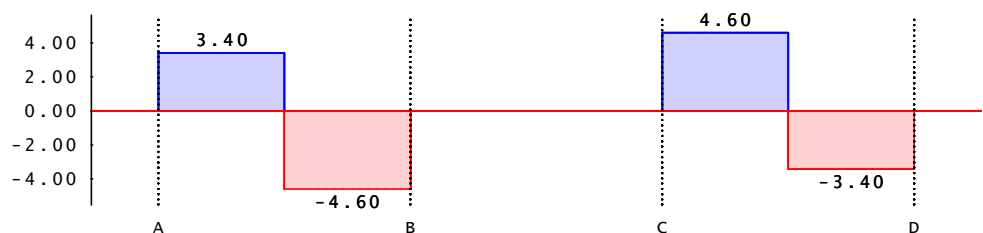
Aufl.	x [m]	F_z, k [kN]	F_y, k [kN]
A	0.80	4.60	2.66
B	3.80	6.85	3.97
C	6.80	6.85	3.96
D	9.80	4.60	2.66

Einwirkung wind90

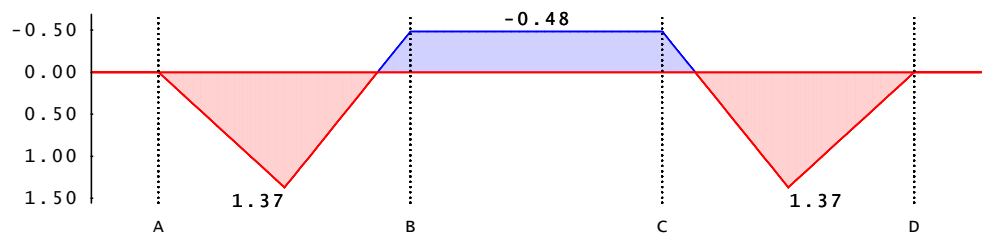
M 1:90

Moment M_y, k [kNm]


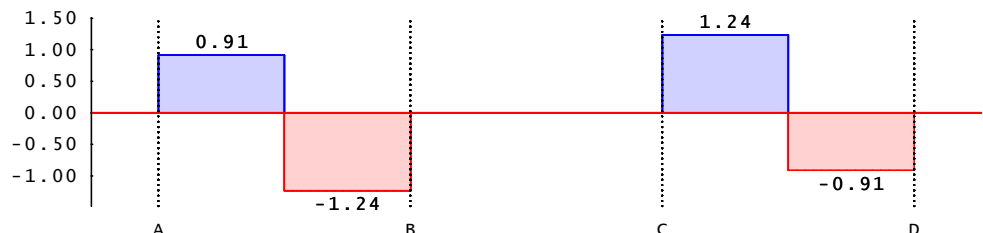
M 1:90

Querkraft v_z, k [kN]


M 1:90

Moment M_z, k [kNm]


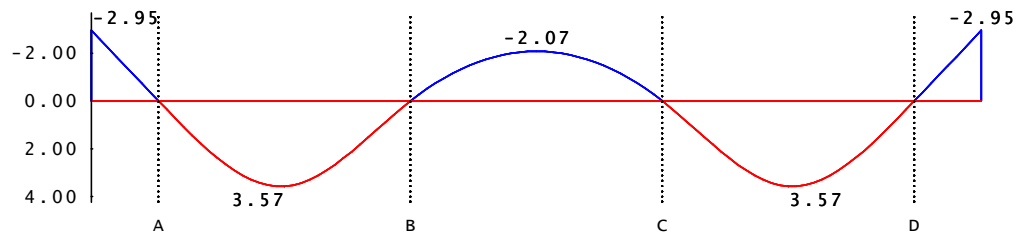
M 1:90

Querkraft v_y, k [kN]

Schnittgrößen

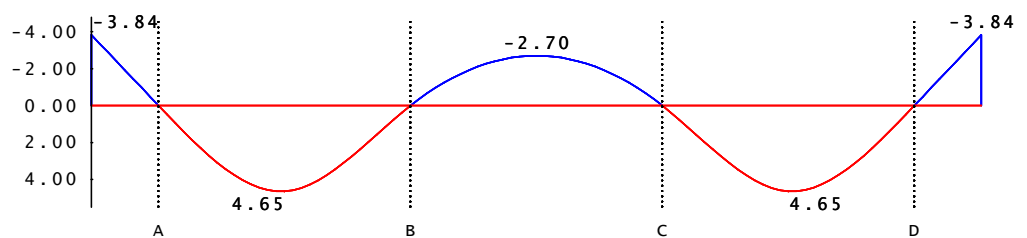
Feld	x [m]	N_x, k [kN]	M_y, k [kNm]	V_z, k [kN]	M_z, k [kNm]	V_y, k [kN]
Kl	0.00	0.00	0.00*	0.00*	0.00*	0.00*
1	0.80	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	3.40*	0.00	0.91*
	1.50	0.00	5.10*	3.40	1.37*	0.91
	1.50	0.00	5.10	-4.60*	1.37	-1.24*
2	3.00	0.00	-1.80	-4.60	-0.48	-1.24
	0.00	0.00	-1.80	0.00	-0.48*	0.00
	3.00	0.00	-1.80*	0.00	-0.48	0.00
3	0.00	0.00	-1.80	4.60*	-0.48	1.24*
	1.50	0.00	5.10	4.60	1.37	1.24
	1.50	0.00	5.10*	-3.40*	1.37*	-0.91*
	3.00	0.00	0.00	-3.40	0.00	-0.91
Kr	0.00	0.00	0.00*	0.00*	0.00*	0.00*

Feld	x [m]	N_x, k [kN]	M_y, k [kNm]	V_z, k [kN]	M_z, k [kNm]	V_y, k [kN]
	0.80	0.00	0.00	0.00	0.00	0.00

M 1:90

 Verformung w_k [mm]


M 1:90

 Verformung v_k [mm]


Verformungen

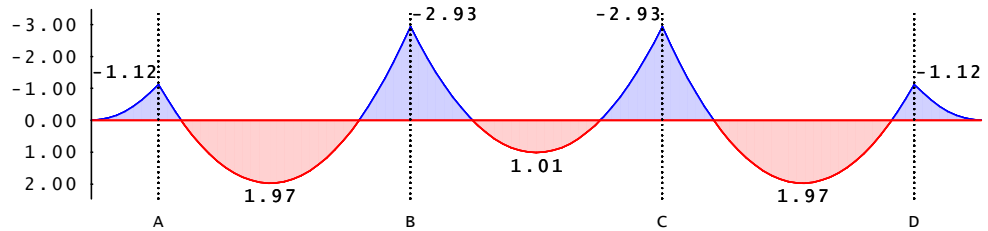
Feld	x [m]	w_k [mm]	v_k [mm]
Kl	0.00	-2.95*	-3.84*
	0.80	0.00*	0.00*
1	0.00	0.00*	0.00*
	1.50	3.57*	4.65*
	1.50	3.57	4.65
	3.00	0.00	0.00
2	0.00	0.00*	0.00*
	1.50	-2.07*	-2.70*
	3.00	0.00	0.00
3	0.00	0.00*	0.00*
	1.50	3.57	4.65
	1.50	3.57*	4.65*
	3.00	0.00	0.00
Kr	0.00	0.00*	0.00*
	0.80	-2.95*	-3.84*

Auflagerkräfte

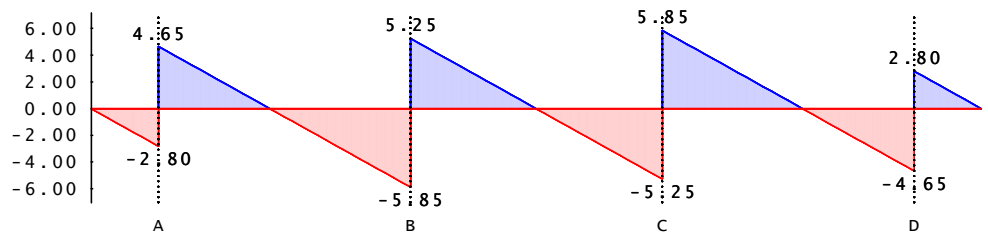
Aufl.	x [m]	F_z, k [kN]	F_y, k [kN]
A	0.80	3.40	0.91
B	3.80	4.60	1.24
C	6.80	4.60	1.24
D	9.80	3.40	0.91

Einwirkung SchneeA

M 1:90

 Moment $M_{y,k}$ [kNm]


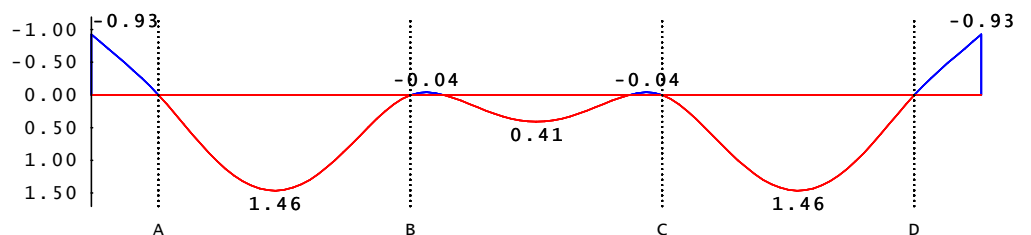
M 1:90

 Querkraft $V_{z,k}$ [kN]


Schnittgrößen

Feld	x [m]	$N_{x,k}$ [kN]	$M_{y,k}$ [kNm]	$V_{z,k}$ [kN]	$M_{z,k}$ [kNm]	$V_{y,k}$ [kN]
Kl	0.00	0.00	0.00*	0.00	0.00*	0.00*
	0.80	0.00	-1.12*	-2.80*	0.00	0.00
1	0.00	0.00	-1.12	4.65	0.00*	0.00*
	1.33	0.00	1.97*	-0.00	0.00	0.00
2	3.00	0.00	-2.93	-5.85*	0.00	0.00
	0.00	0.00	-2.93	5.25	0.00*	0.00*
	1.50	0.00	1.01*	0.00	0.00	0.00
	3.00	0.00	-2.93*	-5.25	0.00	0.00
3	0.00	0.00	-2.93	5.85*	0.00*	0.00*
	1.67	0.00	1.97*	0.00	0.00	0.00
Kr	3.00	0.00	-1.12	-4.65	0.00	0.00
	0.00	0.00	-1.12*	2.80*	0.00*	0.00*
	0.80	0.00	0.00*	0.00	0.00	0.00

M 1:90

 Verformung w_k [mm]


Verformungen

Feld	x [m]	w_k [mm]	v_k [mm]
Kl	0.00	-0.93*	0.00*
	0.80	0.00*	0.00
1	0.00	0.00*	0.00*
	1.38	1.46*	0.00
	3.00	0.00	0.00
	0.00	0.00	0.00*
	0.18	-0.04*	0.00
	1.50	0.41*	0.00
	3.00	0.00	0.00
	0.00	0.00*	0.00*

Feld	x [m]	W _k [mm]	V _k [mm]
	1.62	1.46*	0.00
	3.00	0.00	0.00
Kr	0.00	0.00*	0.00*
	0.80	-0.93*	0.00

Auflagerkräfte

Aufl.	x [m]	F _{z, k} [kN]	F _{y, k} [kN]
A	0.80	7.45	0.00
B	3.80	11.10	0.00
C	6.80	11.10	0.00
D	9.80	7.45	0.00

Kombinationen

Nachfolgend werden die für die Nachweise maßgebenden Kombinationen je Bemessungssituation ausgegeben.

ständige und vorübergehende Bemessungssituation

Ek	Σ (γ * ψ * EW)		
5	1.35*ständig	+1.50*wind0	+0.75*SchneeA
6	1.35*ständig	+0.90*wind0	+1.50*SchneeA
7	1.35*ständig	+1.50*wind90	+0.75*SchneeA
8	1.35*ständig	+0.90*wind90	+1.50*SchneeA

quasi-ständige Bemessungssituation

Ek	Σ (γ * ψ * EW)
17	1.00*ständig

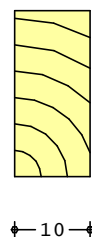
Die kombinierten Verformungen enthalten schon die Kriechanteile k_{def} .

**Bemessung
Material**

Holz	f _{m, k}	f _{t0k}	f _{c0k}	f _{c90k}	f _{vk}	E _{0mean}
NH C24	24.0	14.0	21.0	2.5	2.0	11000

Querschnittswerte

b	h	A	I _y	I _z
[cm]	[cm]	[cm ²]	[cm ⁴]	[cm ⁴]
10.0	22.0	220.0	8873.3	1833.3

**Schnitt
M 1:10**
Holzbalcken

**Nachweise
Grenzzustand der Tragfähigkeit**

Normal- und
Biegespannung
DIN 1052, 10.2, 10.3

Feld	x	Ek	k _{mod}	N _{xd} M _{yd} M _{zd}	σ _{0d} σ _{myd} σ _{mzd}	f _{0d} f _{myd} f _{mzd}	η
	[m]		[-]	[kNm] [N/mm ²]	[N/mm ²]	[N/mm ²]	[-]
Kl (L = 0.80 m, k _{cy} = 0.97, k _{cz} = 0.73, k _m = 1.00)							
	0.00	-	-	0.00 0.00 0.00	0.00 0.00 0.00	- - -	0.00
	0.80	6	0.90	0.00 -3.00 -0.36	0.00 3.72 0.98	9.69 16.62 16.62	0.27*
1 (L = 3.00 m, k _{cy} = 0.82, k _{cz} = 0.28, k _m = 1.00)							
	0.00	5	0.90	-30.00 -2.57 -0.60	1.36 3.19 1.64	14.54 16.62 16.62	0.57
	1.50	7	0.90	0.00 10.27 2.06	0.00 12.74 5.61	9.69 16.62 16.62	1.00*
	3.00	5	0.90	-30.00 -6.72 -1.57	1.36 8.33 4.27	14.54 16.62 16.62	0.94
2 (L = 3.00 m, k _{cy} = 0.82, k _{cz} = 0.28, k _m = 1.00)							
	0.00	5	0.90	-30.00 -6.72 -1.57	1.36 8.33 4.27	14.54 16.62 16.62	0.94
	3.00	5	0.90	-30.00 -6.72 -1.57	1.36 8.33 4.27	14.54 16.62 16.62	0.94*
3 (L = 3.00 m, k _{cy} = 0.82, k _{cz} = 0.28, k _m = 1.00)							
	0.00	5	0.90	-30.00 -6.72 -1.57	1.36 8.33 4.27	14.54 16.62 16.62	0.94
	1.50	7	0.90	0.00 10.27 2.06	0.00 12.74 5.61	9.69 16.62 16.62	1.00*
	3.00	5	0.90	-30.00 -2.57 -0.60	1.36 3.19 1.64	14.54 16.62 16.62	0.57
Kr (L = 0.80 m, k _{cy} = 0.97, k _{cz} = 0.73, k _m = 1.00)							
	0.00	6	0.90	0.00 -3.00 -0.36	0.00 3.72 0.98	9.69 16.62 16.62	0.27*
	0.80	-	-	0.00 0.00 0.00	0.00 0.00 0.00	- - -	0.00

Der Einfluss der Stabilität ist im Nachweis der Biegefestigkeit enthalten. Die dabei berücksichtigten Ersatzstablängen sind für jedes Feld im Kapitel System ausgewiesen.

Schubspannung
DIN 1052, 10.2.9

Feld	x	Ek	k _{mod}	V _{zd} V _{yd}	τ _{zd} τ _{yd}	f _{zd} f _{yd}	η
	[m]		[-]	[kN] [N/mm ²]	[N/mm ²]	[N/mm ²]	[-]
Kl	0.48	6	0.90	-4.50 -0.54	0.31 0.04	1.38 1.38	0.22*

Feld	x	Ek	k _{mod}	V _{zd} V _{yd}	τ _{zd} τ _{yd}	f _{zd} f _{yd}	η
	[m]		[-]	[kN] [N/mm ²]	[N/mm ²]	[N/mm ²]	[-]
1	0.32	8	0.90	10.54 0.82	0.72 0.06	1.38 1.38	0.52
	2.68	8	0.90	-14.18 -1.11	0.97 0.08	1.38 1.38	0.70*
2	0.32	6	0.90	11.05 1.33	0.75 0.09	1.38 1.38	0.54*
	2.68	6	0.90	-11.05 -1.33	0.75 0.09	1.38 1.38	0.54
3	0.32	8	0.90	14.18 1.11	0.97 0.08	1.38 1.38	0.70*
	2.68	8	0.90	-10.54 -0.82	0.72 0.06	1.38 1.38	0.52
Kr	0.32	6	0.90	4.50 0.54	0.31 0.04	1.38 1.38	0.22*

 Auflagerpressung
DIN 1052, 10.2.4

Aufl.	Ek	k _{mod}	F _d	A _{ef}	k _{c90}	σ _{c90d}	f _{c90d}	η
		[-]	[kN]	[cm ²]	[-]	[N/mm ²]	[N/mm ²]	[-]
A	6	0.90	19.93	260.0	1.00	0.77	1.73	0.44
B	6	0.90	29.71	260.0	1.00	1.14	1.73	0.66
C	6	0.90	29.71	260.0	1.00	1.14	1.73	0.66
D	6	0.90	19.93	260.0	1.00	0.77	1.73	0.44

Grenzzustand der Gebrauchstauglichkeit

 max. Verformungen
DIN 1052, 9.2

Feld	x	Ek	w	v	res.wv	zu].wv	η
	[m]		[mm]	[mm]	[mm]	[mm]	[-]
Feld Kl (L = 0.80 m, NKL 1, kdef = 0.60)							
Gl(42)	0.00	17	-0.7	0.0	-0.7	8.0	0.09
Feld 1 (L = 3.00 m, NKL 1, kdef = 0.60)							
Gl(42)	1.38	17	1.1	0.0	1.1	15.0	0.07
Feld 2 (L = 3.00 m, NKL 1, kdef = 0.60)							
Gl(42)	1.50	17	0.3	0.0	0.3	15.0	0.02
Feld 3 (L = 3.00 m, NKL 1, kdef = 0.60)							
Gl(42)	1.62	17	1.1	0.0	1.1	15.0	0.07
Feld Kr (L = 0.80 m, NKL 1, kdef = 0.60)							
Gl(42)	0.80	17	-0.7	0.0	-0.7	8.0	0.09

 Auflagerkräfte
charakteristisch

Einwirk.	Aufl.	F _{v, k}	F _{h, k}
		[kN]	[kN]
ständig	A	3.43	0.00
	B	5.11	0.00
	C	5.11	0.00
	D	3.43	0.00
wind0	A	4.60	2.66
	B	6.85	3.97
	C	6.85	3.96
	D	4.60	2.66
wind90	A	3.40	0.91
	B	4.60	1.24
	C	4.60	1.24

Einwirk.	Aufl.	$F_{v,k}$ [kN]	$F_{h,k}$ [kN]
SchneeA	D	3.40	0.91
	A	7.45	0.00
	B	11.10	0.00
	C	11.10	0.00
	D	7.45	0.00