

Beam Analysis Tool — Validation Report

Disclaimer: This report documents validation of the beam analysis engine against the test cases presented. Results are provided as an engineering calculation aid and should be independently reviewed and verified by a qualified professional before use in design or construction.

Generated 2026-09-06 19:24:29 | Engine: Beam_Analysis.py v1.1.0 (sha256: c2e321221e46...) | Independent reference: beam_symbolic.py (exact calculus solution)

Maximum difference found across all checks: 0.02%

How this report works: every case below is solved two independent ways -- once by the app's engine (Beam_Analysis.py), and once by a separate solver using exact calculus instead of the app's numerical method (beam_symbolic.py). The two must agree closely for the app's results to be trusted. Elastic modulus $E = 200,000 \text{ MPa}$ throughout; beam length L and moment of inertia I vary by load type and are shown at the top of each case below.

Quantity	Expected	Computed	Difference	Diff %	Verified
P1. Point load — at support A					Date verified: Sep 06, 2026
<i>$L=6.00 \text{ m}$, $I=8.0e6 \text{ mm}^4$ Point load $P=20 \text{ kN}$ @ $a=0.00 \text{ m}$</i>					
RA (kN)	20.0000	20.0000	0.00000	0.000%	✓
RB (kN)	0.0000	0.0000	0.00000	n/a	✓
Mmax (kN·m)	0.0000	0.0000	0.00000	n/a	✓
Mmax location (m)	6.0000	6.0000	0.00000	0.000%	✓
Vmax (kN)	20.0000	20.0000	0.00000	0.000%	✓
Deflection max (mm)	0.0000	0.0000	0.00000	n/a	✓
Deflection max location (m)	0.0000	0.0000	0.00000	n/a	✓
Deflection @ L/4 (mm)	0.0000	0.0000	0.00000	n/a	✓
Deflection @ L/2 (mm)	0.0000	0.0000	0.00000	n/a	✓
Deflection @ 3L/4 (mm)	0.0000	0.0000	0.00000	n/a	✓
P2. Point load — at L/4					Date verified: Sep 06, 2026
<i>$L=6.00 \text{ m}$, $I=8.0e6 \text{ mm}^4$ Point load $P=20 \text{ kN}$ @ $a=1.50 \text{ m}$</i>					
RA (kN)	15.0000	15.0000	0.00000	0.000%	✓
RB (kN)	5.0000	5.0000	0.00000	0.000%	✓
Mmax (kN·m)	22.5000	22.5000	0.00000	0.000%	✓
Mmax location (m)	1.5000	1.5000	0.00000	0.000%	✓
Vmax (kN)	15.0000	15.0000	0.00000	0.000%	✓
Deflection max (mm)	-39.3059	-39.3051	0.00079	0.002%	✓
Deflection max location (m)	2.6460	2.6459	0.00008	0.003%	✓
Deflection @ L/4 (mm)	-31.6406	-31.6396	0.00105	0.003%	✓
Deflection @ L/2 (mm)	-38.6719	-38.6712	0.00070	0.002%	✓
Deflection @ 3L/4 (mm)	-24.6094	-24.6090	0.00035	0.001%	✓

Beam Analysis Tool — Validation Report (continued)

Quantity	Expected	Computed	Difference	Diff %	Verified
P3. Point load — at midspan (L/2)				Date verified:	Sep 06, 2026
<i>L=6.00 m, I=8.0e6 mm^4 Point load P=20 kN @ a=3.00 m</i>					
RA (kN)	10.0000	10.0000	0.00000	0.000%	☒
RB (kN)	10.0000	10.0000	0.00000	0.000%	☒
Mmax (kN·m)	30.0000	30.0000	0.00000	0.000%	☒
Mmax location (m)	3.0000	3.0000	0.00000	0.000%	☒
Vmax (kN)	-10.0000	-10.0000	0.00000	0.000%	☒
Deflection max (mm)	-56.2500	-56.2486	0.00141	0.003%	☒
Deflection max location (m)	3.0000	3.0000	0.00000	0.000%	☒
Deflection @ L/4 (mm)	-38.6719	-38.6712	0.00070	0.002%	☒
Deflection @ L/2 (mm)	-56.2500	-56.2486	0.00141	0.003%	☒
Deflection @ 3L/4 (mm)	-38.6719	-38.6712	0.00070	0.002%	☒
P4. Point load — at 3L/4				Date verified:	Sep 06, 2026
<i>L=6.00 m, I=8.0e6 mm^4 Point load P=20 kN @ a=4.50 m</i>					
RA (kN)	5.0000	5.0000	0.00000	0.000%	☒
RB (kN)	15.0000	15.0000	0.00000	0.000%	☒
Mmax (kN·m)	22.5000	22.5000	0.00000	0.000%	☒
Mmax location (m)	4.5000	4.5000	0.00000	0.000%	☒
Vmax (kN)	-15.0000	-15.0000	0.00000	0.000%	☒
Deflection max (mm)	-39.3059	-39.3051	0.00079	0.002%	☒
Deflection max location (m)	3.3540	3.3541	0.00008	0.002%	☒
Deflection @ L/4 (mm)	-24.6094	-24.6090	0.00035	0.001%	☒
Deflection @ L/2 (mm)	-38.6719	-38.6712	0.00070	0.002%	☒
Deflection @ 3L/4 (mm)	-31.6406	-31.6396	0.00105	0.003%	☒

Beam Analysis Tool — Validation Report (continued)

Quantity	Expected	Computed	Difference	Diff %	Verified
P5. Point load — at support B				Date verified:	Sep 06, 2026
<i>L=6.00 m, I=8.0e6 mm^4 Point load P=20 kN @ a=6.00 m</i>					
RA (kN)	0.0000	0.0000	0.00000	n/a	☒
RB (kN)	20.0000	20.0000	0.00000	0.000%	☒
Mmax (kN·m)	0.0000	0.0000	0.00000	n/a	☒
Mmax location (m)	6.0000	6.0000	0.00000	0.000%	☒
Vmax (kN)	-20.0000	-20.0000	0.00000	0.000%	☒
Deflection max (mm)	0.0000	0.0000	0.00000	n/a	☒
Deflection max location (m)	0.0000	0.0000	0.00000	n/a	☒
Deflection @ L/4 (mm)	0.0000	0.0000	0.00000	n/a	☒
Deflection @ L/2 (mm)	0.0000	0.0000	0.00000	n/a	☒
Deflection @ 3L/4 (mm)	0.0000	0.0000	0.00000	n/a	☒
U1. UDL — full span				Date verified:	Sep 06, 2026
<i>L=8.00 m, I=12.0e6 mm^4 UDL w=5 kN/m over x=[0.00, 8.00] m</i>					
RA (kN)	20.0000	20.0000	0.00000	0.000%	☒
RB (kN)	20.0000	20.0000	0.00000	0.000%	☒
Mmax (kN·m)	40.0000	40.0000	0.00000	0.000%	☒
Mmax location (m)	4.0000	4.0000	0.00000	0.000%	☒
Vmax (kN)	-20.0000	-20.0000	0.00000	0.000%	☒
Deflection max (mm)	-111.1111	-111.1067	0.00444	0.004%	☒
Deflection max location (m)	4.0000	4.0000	0.00000	0.000%	☒
Deflection @ L/4 (mm)	-79.1667	-79.1633	0.00333	0.004%	☒
Deflection @ L/2 (mm)	-111.1111	-111.1067	0.00444	0.004%	☒
Deflection @ 3L/4 (mm)	-79.1667	-79.1633	0.00333	0.004%	☒

Beam Analysis Tool — Validation Report (continued)

Quantity	Expected	Computed	Difference	Diff %	Verified
U2. UDL — left half				Date verified:	Sep 06, 2026
<i>L=8.00 m, I=12.0e6 mm^4 UDL w=5 kN/m over x=[0.00, 4.00] m</i>					
RA (kN)	15.0000	15.0000	0.00000	0.000%	☒
RB (kN)	5.0000	5.0000	0.00000	0.000%	☒
Mmax (kN·m)	22.5000	22.5000	0.00000	0.000%	☒
Mmax location (m)	3.0000	3.0000	0.00000	0.000%	☒
Vmax (kN)	15.0000	15.0000	0.00000	0.000%	☒
Deflection max (mm)	-56.0073	-56.0050	0.00237	0.004%	☒
Deflection max location (m)	3.6780	3.6782	0.00025	0.007%	☒
Deflection @ L/4 (mm)	-43.0556	-43.0533	0.00222	0.005%	☒
Deflection @ L/2 (mm)	-55.5556	-55.5533	0.00222	0.004%	☒
Deflection @ 3L/4 (mm)	-36.1111	-36.1100	0.00111	0.003%	☒
U3. UDL — right half				Date verified:	Sep 06, 2026
<i>L=8.00 m, I=12.0e6 mm^4 UDL w=5 kN/m over x=[4.00, 8.00] m</i>					
RA (kN)	5.0000	5.0000	0.00000	0.000%	☒
RB (kN)	15.0000	15.0000	0.00000	0.000%	☒
Mmax (kN·m)	22.5000	22.5000	0.00000	0.000%	☒
Mmax location (m)	5.0000	5.0000	0.00000	0.000%	☒
Vmax (kN)	-15.0000	-15.0000	0.00000	0.000%	☒
Deflection max (mm)	-56.0073	-56.0050	0.00237	0.004%	☒
Deflection max location (m)	4.3220	4.3218	0.00025	0.006%	☒
Deflection @ L/4 (mm)	-36.1111	-36.1100	0.00111	0.003%	☒
Deflection @ L/2 (mm)	-55.5556	-55.5533	0.00222	0.004%	☒
Deflection @ 3L/4 (mm)	-43.0556	-43.0533	0.00222	0.005%	☒

Beam Analysis Tool — Validation Report (continued)

Quantity	Expected	Computed	Difference	Diff %	Verified
U4. UDL — middle half (L/4 to 3L/4)				Date verified:	Sep 06, 2026
<i>L=8.00 m, I=12.0e6 mm^4 UDL w=5 kN/m over x=[2.00, 6.00] m</i>					
RA (kN)	10.0000	10.0000	0.00000	0.000%	☒
RB (kN)	10.0000	10.0000	0.00000	0.000%	☒
Mmax (kN·m)	30.0000	30.0000	0.00000	0.000%	☒
Mmax location (m)	4.0000	4.0000	0.00000	0.000%	☒
Vmax (kN)	-10.0000	-10.0000	0.00000	0.000%	☒
Deflection max (mm)	-79.1667	-79.1633	0.00333	0.004%	☒
Deflection max location (m)	4.0000	4.0000	0.00000	0.000%	☒
Deflection @ L/4 (mm)	-55.5556	-55.5533	0.00222	0.004%	☒
Deflection @ L/2 (mm)	-79.1667	-79.1633	0.00333	0.004%	☒
Deflection @ 3L/4 (mm)	-55.5556	-55.5533	0.00222	0.004%	☒
U5. UDL — left quarter				Date verified:	Sep 06, 2026
<i>L=8.00 m, I=12.0e6 mm^4 UDL w=5 kN/m over x=[0.00, 2.00] m</i>					
RA (kN)	8.7500	8.7500	0.00000	0.000%	☒
RB (kN)	1.2500	1.2500	0.00000	0.000%	☒
Mmax (kN·m)	7.6562	7.6562	0.00000	0.000%	☒
Mmax location (m)	1.7500	1.7500	0.00000	0.000%	☒
Vmax (kN)	8.7500	8.7500	0.00000	0.000%	☒
Deflection max (mm)	-16.3111	-16.3105	0.00063	0.004%	☒
Deflection max location (m)	3.4540	3.4540	0.00001	0.000%	☒
Deflection @ L/4 (mm)	-13.5417	-13.5408	0.00083	0.006%	☒
Deflection @ L/2 (mm)	-15.9722	-15.9717	0.00056	0.003%	☒
Deflection @ 3L/4 (mm)	-10.0694	-10.0692	0.00028	0.003%	☒

Beam Analysis Tool — Validation Report (continued)

Quantity	Expected	Computed	Difference	Diff %	Verified
U6. UDL — right quarter				Date verified:	Sep 06, 2026
<i>L=8.00 m, I=12.0e6 mm⁴ UDL w=5 kN/m over x=[6.00, 8.00] m</i>					
RA (kN)	1.2500	1.2500	0.00000	0.000%	✓
RB (kN)	8.7500	8.7500	0.00000	0.000%	✓
Mmax (kN·m)	7.6562	7.6562	0.00000	0.000%	✓
Mmax location (m)	6.2500	6.2500	0.00000	0.000%	✓
Vmax (kN)	-8.7500	-8.7500	0.00000	0.000%	✓
Deflection max (mm)	-16.3111	-16.3105	0.00063	0.004%	✓
Deflection max location (m)	4.5460	4.5460	0.00001	0.000%	✓
Deflection @ L/4 (mm)	-10.0694	-10.0692	0.00028	0.003%	✓
Deflection @ L/2 (mm)	-15.9722	-15.9717	0.00056	0.003%	✓
Deflection @ 3L/4 (mm)	-13.5417	-13.5408	0.00083	0.006%	✓
M1. Applied moment — at support A				Date verified:	Sep 06, 2026
<i>L=5.00 m, I=6.0e6 mm⁴ Applied moment M=10 kN·m (CW+) @ a=0.00 m</i>					
RA (kN)	-2.0000	-2.0000	0.00000	0.000%	✓
RB (kN)	2.0000	2.0000	0.00000	0.000%	✓
Mmax (kN·m)	10.0000	10.0000	0.00000	0.000%	✓
Mmax location (m)	0.0000	0.0000	0.00000	n/a	✓
Vmax (kN)	-2.0000	-2.0000	0.00000	0.000%	✓
Deflection max (mm)	-13.3646	-13.3646	0.00000	0.000%	✓
Deflection max location (m)	2.1138	2.1133	0.00049	0.023%	✓
Deflection @ L/4 (mm)	-11.3932	-11.3932	0.00000	0.000%	✓
Deflection @ L/2 (mm)	-13.0208	-13.0208	0.00000	0.000%	✓
Deflection @ 3L/4 (mm)	-8.1380	-8.1380	0.00000	0.000%	✓

Beam Analysis Tool — Validation Report (continued)

Quantity	Expected	Computed	Difference	Diff %	Verified
M2. Applied moment — at L/4				Date verified:	Sep 06, 2026
<i>L=5.00 m, I=6.0e6 mm^4 Applied moment M=10 kN·m (CW+) @ a=1.25 m</i>					
RA (kN)	-2.0000	-2.0000	0.00000	0.000%	✓
RB (kN)	2.0000	2.0000	0.00000	0.000%	✓
Mmax (kN·m)	7.5000	7.5000	0.00000	0.000%	✓
Mmax location (m)	1.2500	1.2500	0.00000	0.000%	✓
Vmax (kN)	-2.0000	-2.0000	0.00000	0.000%	✓
Deflection max (mm)	-9.7879	-9.7879	0.00000	0.000%	✓
Deflection max location (m)	2.3975	2.3979	0.00041	0.017%	✓
Deflection @ L/4 (mm)	-6.5104	-6.5104	0.00000	0.000%	✓
Deflection @ L/2 (mm)	-9.7656	-9.7656	0.00000	0.000%	✓
Deflection @ 3L/4 (mm)	-6.5104	-6.5104	0.00000	0.000%	✓
M3. Applied moment — at midspan (L/2)				Date verified:	Sep 06, 2026
<i>L=5.00 m, I=6.0e6 mm^4 Applied moment M=10 kN·m (CW+) @ a=2.50 m</i>					
RA (kN)	-2.0000	-2.0000	0.00000	0.000%	✓
RB (kN)	2.0000	2.0000	0.00000	0.000%	✓
Mmax (kN·m)	5.0000	5.0000	0.00000	0.000%	✓
Mmax location (m)	2.5000	2.5000	0.00000	0.000%	✓
Vmax (kN)	-2.0000	-2.0000	0.00000	0.000%	✓
Deflection max (mm)	-1.6706	-1.6706	0.00000	0.000%	✓
Deflection max location (m)	3.5562	3.5566	0.00038	0.011%	✓
Deflection @ L/4 (mm)	1.6276	1.6276	0.00000	0.000%	✓
Deflection @ L/2 (mm)	0.0000	0.0000	0.00000	n/a	✓
Deflection @ 3L/4 (mm)	-1.6276	-1.6276	0.00000	0.000%	✓

Beam Analysis Tool — Validation Report (continued)

Quantity	Expected	Computed	Difference	Diff %	Verified
M4. Applied moment — at 3L/4				Date verified:	Sep 06, 2026
<i>L=5.00 m, I=6.0e6 mm^4 Applied moment M=10 kN·m (CW+) @ a=3.75 m</i>					
RA (kN)	-2.0000	-2.0000	0.00000	0.000%	☒
RB (kN)	2.0000	2.0000	0.00000	0.000%	☒
Mmax (kN·m)	-7.5000	-7.5000	0.00000	0.000%	☒
Mmax location (m)	3.7500	3.7500	0.00000	0.000%	☒
Vmax (kN)	-2.0000	-2.0000	0.00000	0.000%	☒
Deflection max (mm)	9.7879	9.7879	0.00000	0.000%	☒
Deflection max location (m)	2.6025	2.6021	0.00041	0.016%	☒
Deflection @ L/4 (mm)	6.5104	6.5104	0.00000	0.000%	☒
Deflection @ L/2 (mm)	9.7656	9.7656	0.00000	0.000%	☒
Deflection @ 3L/4 (mm)	6.5104	6.5104	0.00000	0.000%	☒
M5. Applied moment — at support B				Date verified:	Sep 06, 2026
<i>L=5.00 m, I=6.0e6 mm^4 Applied moment M=10 kN·m (CW+) @ a=5.00 m</i>					
RA (kN)	-2.0000	-2.0000	0.00000	0.000%	☒
RB (kN)	2.0000	2.0000	0.00000	0.000%	☒
Mmax (kN·m)	-10.0000	-10.0000	0.00000	0.000%	☒
Mmax location (m)	5.0000	5.0000	0.00000	0.000%	☒
Vmax (kN)	-2.0000	-2.0000	0.00000	0.000%	☒
Deflection max (mm)	13.3646	13.3646	0.00000	0.000%	☒
Deflection max location (m)	2.8862	2.8867	0.00049	0.017%	☒
Deflection @ L/4 (mm)	8.1380	8.1380	0.00000	0.000%	☒
Deflection @ L/2 (mm)	13.0208	13.0208	0.00000	0.000%	☒
Deflection @ 3L/4 (mm)	11.3932	11.3932	0.00000	0.000%	☒

Beam Analysis Tool — Validation Report (continued)

Quantity	Expected	Computed	Difference	Diff %	Verified
C1. Combination — 4 point loads (mixed sign)				Date verified:	Sep 06, 2026
<i>L=7.00 m, I=10.0e6 mm^4 P=15@1.5, P=-10@3.0 (upward), P=20@4.5, P=8@6.5</i>					
RA (kN)	13.7857	13.7857	0.00000	0.000%	✓
RB (kN)	19.2143	19.2143	0.00000	0.000%	✓
Mmax (kN·m)	32.0357	32.0357	0.00000	0.000%	✓
Mmax location (m)	4.5000	4.5000	0.00000	0.000%	✓
Vmax (kN)	-19.2143	-19.2143	0.00000	0.000%	✓
Deflection max (mm)	-67.5697	-67.5668	0.00292	0.004%	✓
Deflection max location (m)	3.7170	3.7168	0.00017	0.005%	✓
Deflection @ L/4 (mm)	-47.1829	-47.1809	0.00204	0.004%	✓
Deflection @ L/2 (mm)	-67.2812	-67.2786	0.00267	0.004%	✓
Deflection @ 3L/4 (mm)	-50.8535	-50.8507	0.00282	0.006%	✓
C2. Combination — 4 UDLs tiling full span (mixed sign)				Date verified:	Sep 06, 2026
<i>L=7.00 m, I=10.0e6 mm^4 w=5@[0,1.75], w=-3@[1.75,3.5] (upward), w=6@[3.5,5.25], w=4@[5.25,7.0]</i>					
RA (kN)	9.1875	9.1875	0.00000	0.000%	✓
RB (kN)	11.8125	11.8125	0.00000	0.000%	✓
Mmax (kN·m)	16.4769	16.4769	0.00000	0.000%	✓
Mmax location (m)	4.4485	4.4479	0.00058	0.013%	✓
Vmax (kN)	-11.8125	-11.8125	0.00000	0.000%	✓
Deflection max (mm)	-37.2281	-37.2266	0.00155	0.004%	✓
Deflection max location (m)	3.7853	3.7847	0.00058	0.015%	✓
Deflection @ L/4 (mm)	-24.7173	-24.7165	0.00086	0.003%	✓
Deflection @ L/2 (mm)	-36.9294	-36.9280	0.00141	0.004%	✓
Deflection @ 3L/4 (mm)	-28.6252	-28.6237	0.00148	0.005%	✓

Beam Analysis Tool — Validation Report (continued)

Quantity	Expected	Computed	Difference	Diff %	Verified
C3. Combination — 4 applied moments (mixed sign)				Date verified:	Sep 06, 2026
<i>L=7.00 m, I=10.0e6 mm⁴ M=10@1.5, M=-8@3.0, M=12@4.5, M=-6@6.5</i>					
RA (kN)	-1.1429	-1.1429	0.00000	0.000%	✓
RB (kN)	1.1429	1.1429	0.00000	0.000%	✓
Mmax (kN·m)	8.8571	8.8571	0.00000	0.000%	✓
Mmax location (m)	4.5000	4.5000	0.00000	0.000%	✓
Vmax (kN)	-1.1429	-1.1429	0.00000	0.000%	✓
Deflection max (mm)	-9.6443	-9.6443	0.00000	0.000%	✓
Deflection max location (m)	4.7233	4.7236	0.00040	0.008%	✓
Deflection @ L/4 (mm)	-7.6875	-7.6875	0.00000	0.000%	✓
Deflection @ L/2 (mm)	-9.2500	-9.2500	0.00000	0.000%	✓
Deflection @ 3L/4 (mm)	-9.0625	-9.0625	0.00000	0.000%	✓
C4. Combination — 2 point loads + 2 UDLs				Date verified:	Sep 06, 2026
<i>L=7.00 m, I=10.0e6 mm⁴ P=20@2.0, w=5@[2.5,4.5], P=-10@5.5 (upward), w=3@[5.5,7.0]</i>					
RA (kN)	17.6250	17.6250	0.00000	0.000%	✓
RB (kN)	6.8750	6.8750	0.00000	0.000%	✓
Mmax (kN·m)	35.2500	35.2500	0.00000	0.000%	✓
Mmax location (m)	2.0000	2.0000	0.00000	0.000%	✓
Vmax (kN)	17.6250	17.6250	0.00000	0.000%	✓
Deflection max (mm)	-73.3306	-73.3276	0.00301	0.004%	✓
Deflection max location (m)	3.1535	3.1531	0.00040	0.013%	✓
Deflection @ L/4 (mm)	-56.9530	-56.9501	0.00286	0.005%	✓
Deflection @ L/2 (mm)	-72.4056	-72.4028	0.00282	0.004%	✓
Deflection @ 3L/4 (mm)	-45.0789	-45.0779	0.00105	0.002%	✓

Beam Analysis Tool — Validation Report (continued)

Quantity	Expected	Computed	Difference	Diff %	Verified
C5. Combination — point + UDL + moment + point				Date verified:	Sep 06, 2026
<i>L=7.00 m, I=10.0e6 mm^4 P=15@1.0, w=6@[1.0,3.5], M=10@4.0, P=12@6.0</i>					
RA (kN)	23.3214	23.3214	0.00000	0.000%	✓
RB (kN)	18.6786	18.6786	0.00000	0.000%	✓
Mmax (kN·m)	32.0357	32.0357	0.00000	0.000%	✓
Mmax location (m)	4.0000	4.0000	0.00000	0.000%	✓
Vmax (kN)	23.3214	23.3214	0.00000	0.000%	✓
Deflection max (mm)	-78.5517	-78.5482	0.00345	0.004%	✓
Deflection max location (m)	3.4300	3.4293	0.00074	0.021%	✓
Deflection @ L/4 (mm)	-58.8667	-58.8633	0.00344	0.006%	✓
Deflection @ L/2 (mm)	-78.5195	-78.5161	0.00342	0.004%	✓
Deflection @ 3L/4 (mm)	-56.5830	-56.5805	0.00247	0.004%	✓
C6. Combination — 2 superimposed point loads + 2 UDLs				Date verified:	Sep 06, 2026
<i>L=7.00 m, I=10.0e6 mm^4 P=10@3.5 and P=15@3.5 (same position), w=4@[0,1.75], w=4@[5.25,7.0]</i>					
RA (kN)	19.5000	19.5000	0.00000	0.000%	✓
RB (kN)	19.5000	19.5000	0.00000	0.000%	✓
Mmax (kN·m)	49.8750	49.8750	0.00000	0.000%	✓
Mmax location (m)	3.5000	3.5000	0.00000	0.000%	✓
Vmax (kN)	-19.5000	-19.5000	0.00000	0.000%	✓
Deflection max (mm)	-107.2992	-107.2963	0.00286	0.003%	✓
Deflection max location (m)	3.5000	3.5000	0.00000	0.000%	✓
Deflection @ L/4 (mm)	-74.6963	-74.6945	0.00174	0.002%	✓
Deflection @ L/2 (mm)	-107.2992	-107.2963	0.00286	0.003%	✓
Deflection @ 3L/4 (mm)	-74.6963	-74.6945	0.00174	0.002%	✓