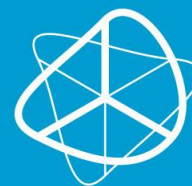


Debernardi T11 beam ATENA-C4A + ANSYS 2025R1

[1] ČERVENKA, V., ČERVENKA, J. A KADLEC, L. MODEL UNCERTAINTIES IN NUMERICAL SIMULATIONS OF REINFORCED CONCRETE STRUCTURES. *STRUCTURAL CONCRETE*. 2018, S. 1–18. DOI: 10.1002/SUCO.201700287.

[2] Červenka J., Červenka V., Laserna S. On crack band model in finite element analysis of concrete fracture in engineering practice. *Engineering Fracture Mechanics*. 2018;197:27-47. <https://doi.org/10.1016/j.engfracmech.2018.04.010>



DESIGNTEC
computer aided engineering

DEBERNARDI T11

- Modelled as symmetric half of the beam

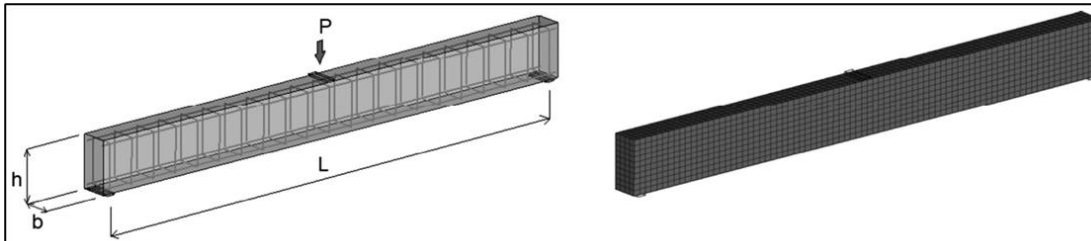
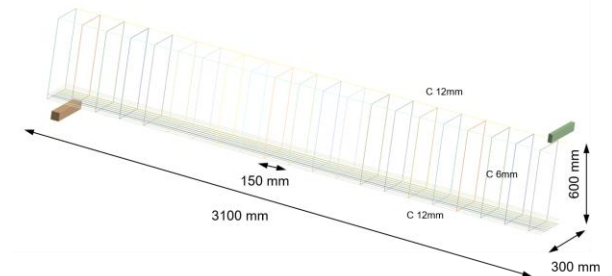
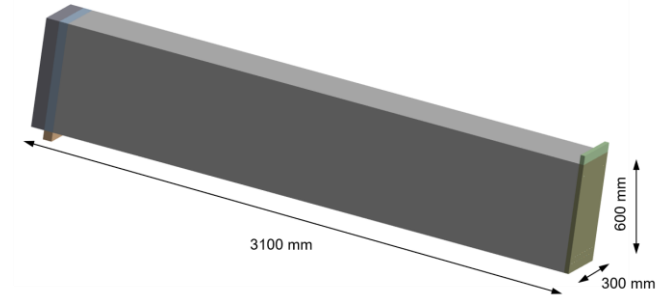


FIGURE 16 Beams tested by Debernardi and Taliano.¹⁸ Geometry (left), FE mesh (right)

TABLE 5 Parameters of Debernardi beams

Slab	Span (mm)	h (mm)	b (mm)	Tens. Reinf.	ρ_b	Cover Tens.	Comp. Reinf.	Cover Comp.	Stirrups
T1	2000	200	100	1Ø12	0.0064	24	1Ø8	22	Ø6/150
T2	2000	200	100	2Ø12	0.0129	24	2Ø8	22	Ø6/150
T3	2000	200	100	3Ø12	0.0193	24	2Ø8	22	Ø6/150
T4	4,000	400	200	2Ø12	0.0031	35	2Ø10	45	Ø6/200
T5	4,000	400	200	4Ø12	0.0062	35	2Ø10	45	Ø6/200
T6	4,000	400	200	8Ø12	0.0126	40	2Ø10	45	Ø6/200
T7	4,000	400	200	12Ø12	0.0194	50	2Ø12	45	Ø6/200
T8	6,000	600	300	2Ø12	0.0013	35	2Ø12	70	Ø6/150
T9	6,000	600	300	4Ø12	0.0027	35	2Ø12	70	Ø6/150
T10	6,000	600	300	9Ø12	0.0060	35	2Ø12	70	Ø6/150
T11	6,000	600	300	18Ø12	0.0123	50	2Ø12	70	Ø6/150



ANSYS Deformation from 0 to 150 mm
Free rotation of loading plate

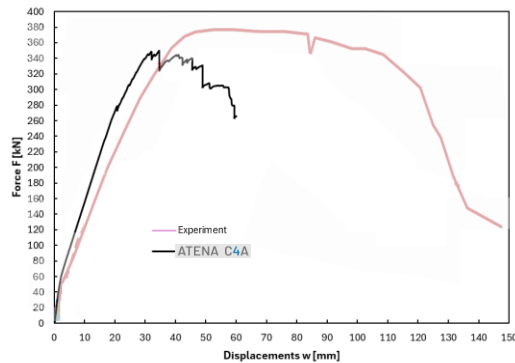
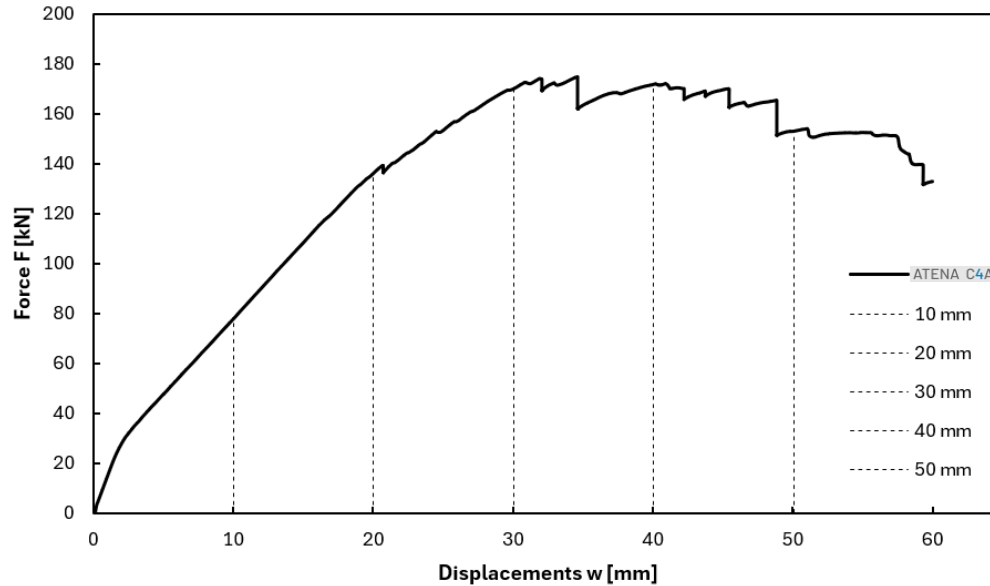


$u_x = \text{free}$
 $u_y = 0$
 $u_z = 0$

Symmetrical
geometry
 $u_x = 0$

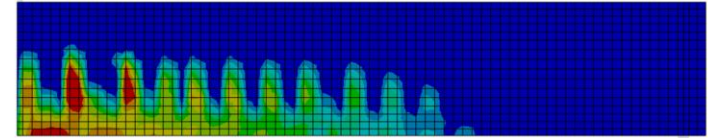
RESULTS

L-D diagram



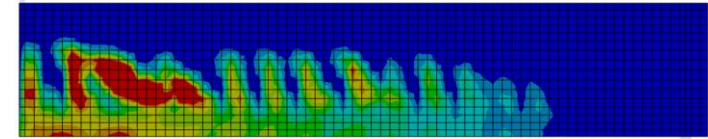
SVAR49 - Crack width for material direction X
Expression: SVAR50
Time: 10. s
7/16/2026 8:16:03 AM

7.6072e-5 Max
5e-5
4.375e-5
3.75e-5
3.125e-5
2.5e-5
1.875e-5
1.25e-5
6.25e-6
0 Min



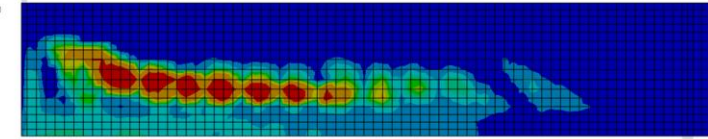
SVAR49 - Crack width for material direction X
Expression: SVAR50
Time: 20. s
7/16/2026 8:17:01 AM

0.00025264 Max
0.0001
8.75e-5
7.5e-5
6.25e-5
5e-5
3.75e-5
2.5e-5
1.25e-5
0 Min



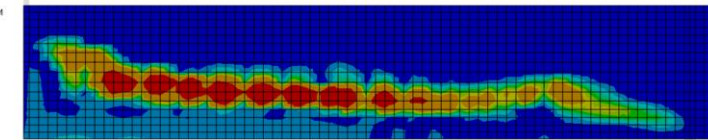
SVAR49 - Crack width for material direction X
Expression: SVAR50
Time: 30.096 s
7/16/2026 8:17:52 AM

0.0011059 Max
0.0005
0.0003
0.00025714
0.00021429
0.00017143
0.00012857
8.5714e-5
4.2857e-5
0 Min



SVAR49 - Crack width for material direction X
Expression: SVAR50
Time: 40.005 s
7/16/2026 8:18:53 AM

0.0026732 Max
0.001
0.0005
0.00042857
0.00035714
0.00028571
0.00021429
0.00014286
7.1429e-5
0 Min



SVAR49 - Crack width for material direction X
Expression: SVAR50
Time: 50.061 s
7/16/2026 8:20:08 AM

0.0040628 Max
0.001
0.0005
0.00042857
0.00035714
0.00028571
0.00021429
0.00014286
7.1429e-5
0 Min

