

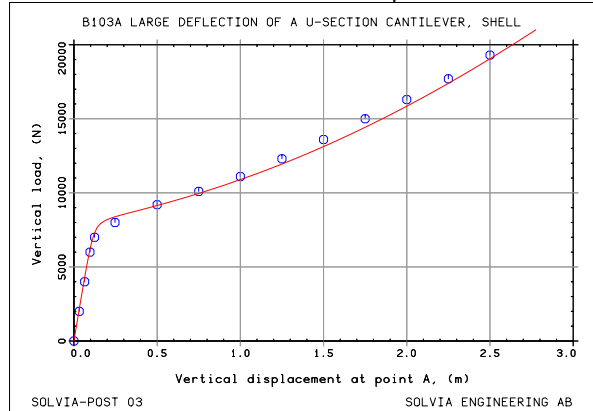
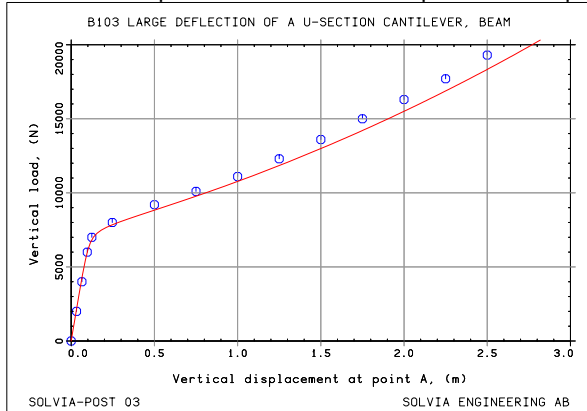
# Examples of Capabilities in the SOLVIA® Finite Element System

## Large Deflection of a U-section Cantilever

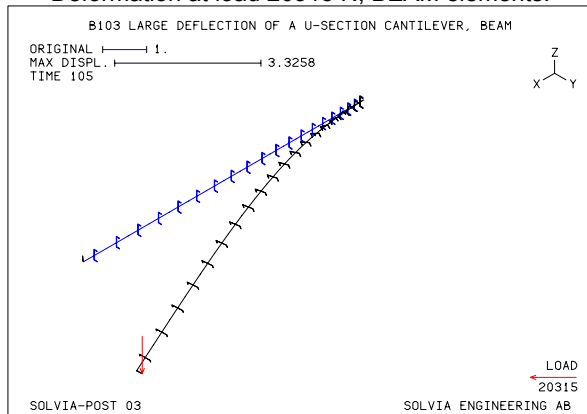
The 3D co-rotational BEAM element in SOLVIA can be used when the rotations are small or very large as well as for buckling analysis. It is formulated for small strains and is a very effective element. The nodes and the shear center need not coincide with the centroid so the BEAM element may, for example, be used for U-section beams and for stiffeners.

In examples B103 and B103A of the Nonlinear Verification Manual the BEAM element and the total Lagrangian 9-node SHELL element, respectively, are used to model a U-section cantilever. The tip load is gradually increased so that the rotations become quite large. The results below are in good agreement with a reference beam solution.

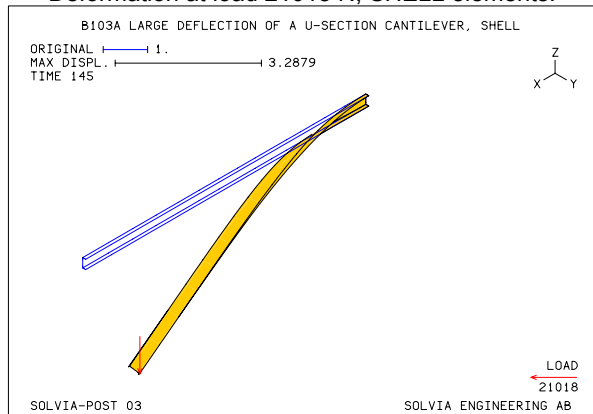
Tip load versus vertical displacement at point A at the web center line below the tip load.



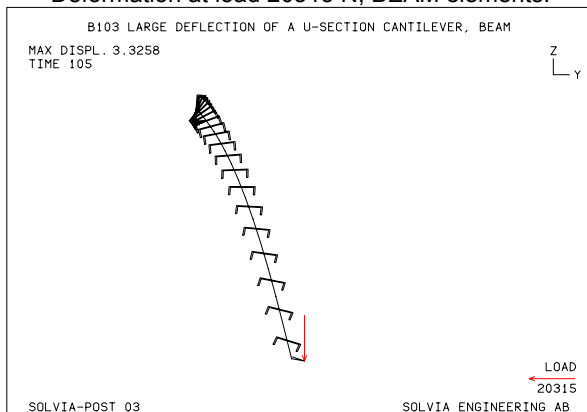
Deformation at load 20315 N, BEAM elements.



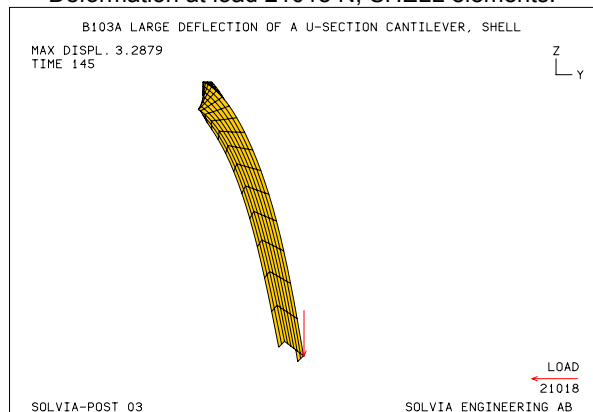
Deformation at load 21018 N, SHELL elements.



Deformation at load 20315 N, BEAM elements.



Deformation at load 21018 N, SHELL elements.



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