# Examples of Capabilities in the SOLVIA® Finite Element System
## Eccentric Stiffeners of Shells under Large Displacements

The 3D co-rotational BEAM element in SOLVIA is very effective. It is based on the assumption of small strains and can be used when the rotations are small or very large as well as for buckling analysis. The nodes and the shear center need not coincide with the centroid so the BEAM element may conveniently be used for stiffeners.

In example B105 of the Nonlinear Verification Manual the BEAM element is used to model a stiffener of a plate under a corner load, see the figures below. The results are in good agreement with a reference solution and with a model where total Lagrangian 9-node SHELL elements are used both for the plate and for the stiffener.
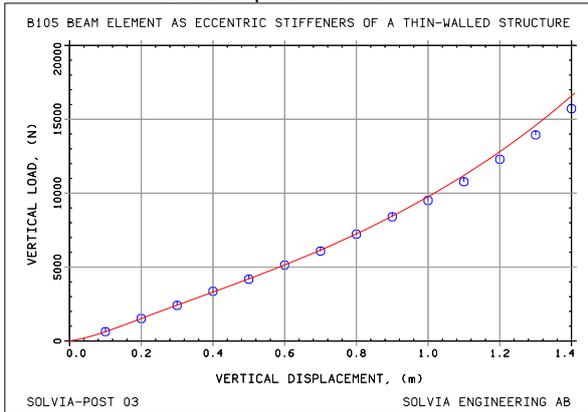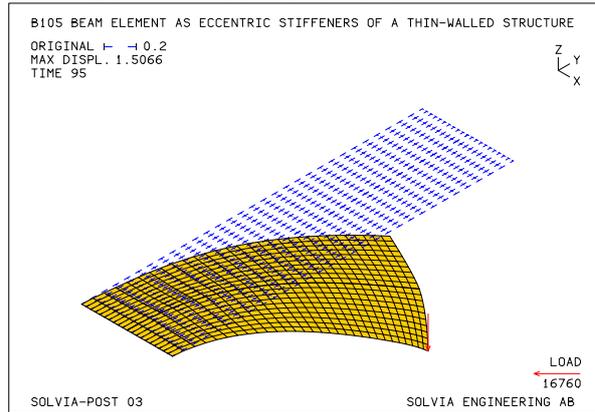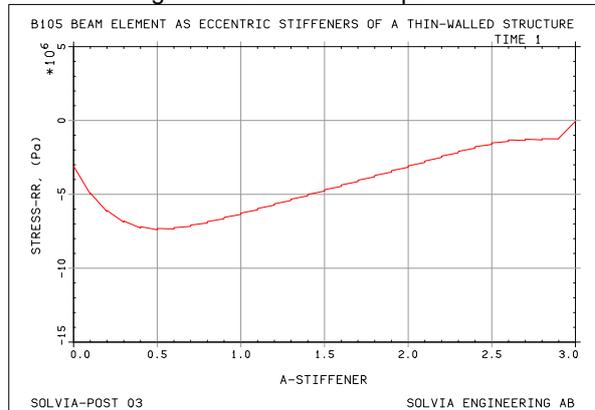
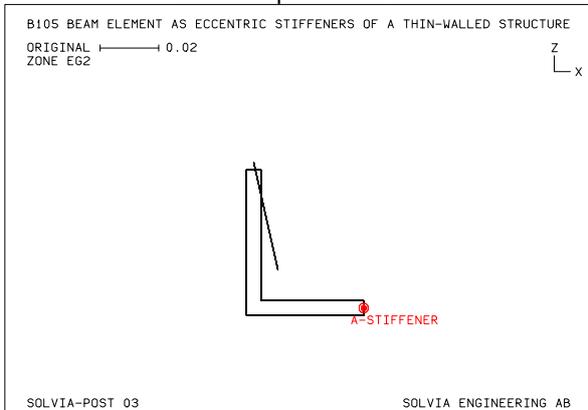Model B105 with applied load.
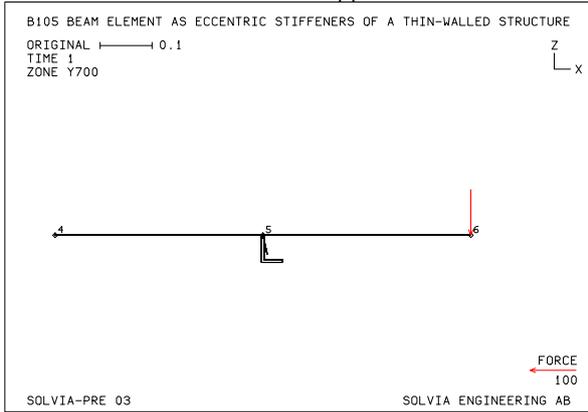
BEAM user section.
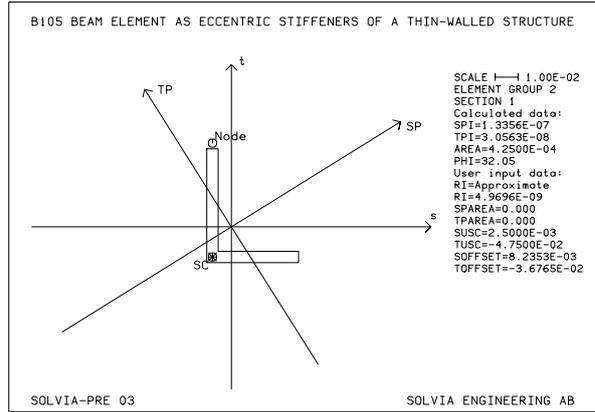
Load-displacement curve.

Deformed mesh with a load of 16760 N.

Element point line A-STIFFENER and axial stress along the line at the first step.

SOLVIA Engineering AB
engineering@solvia.se   www.solvia.com
Phone: +46 21-144050