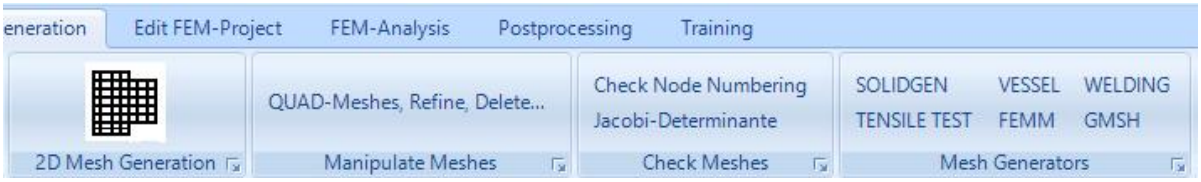
Part 36 - Calculating a Press Fit with Prescribed Boundary Conditions

The contact stresses on the clamped inner pipe from Part 35 are calculated with prescribed boundary conditions on a simple 3D cylinder.

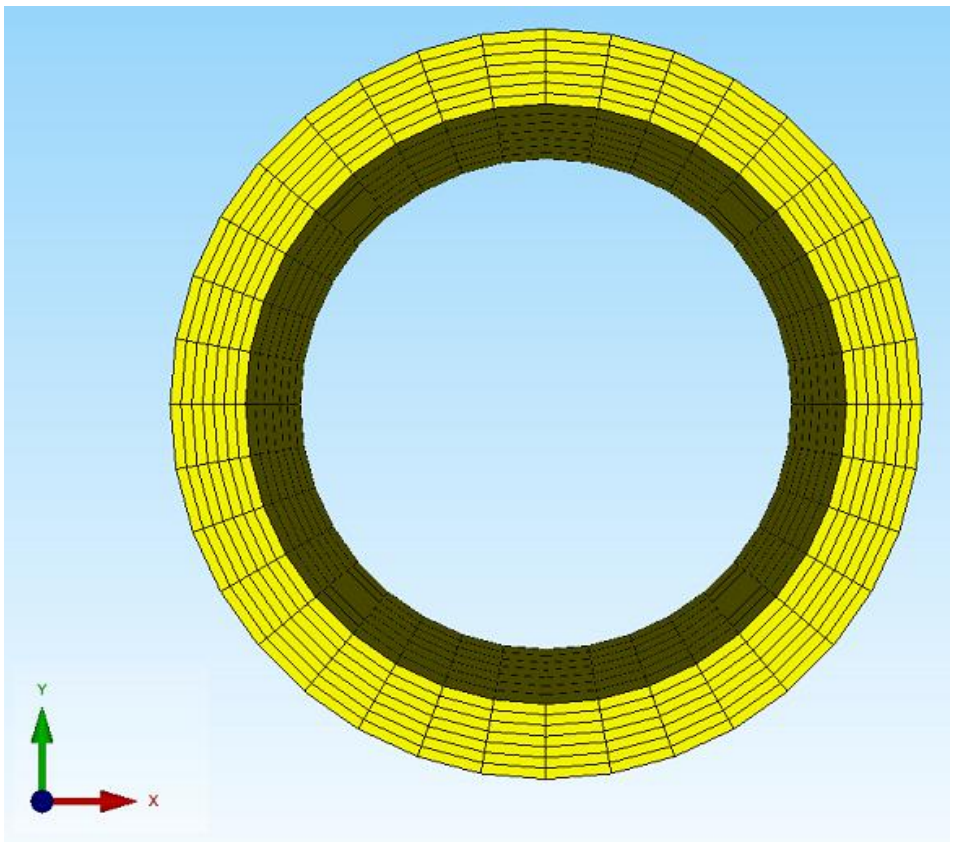
Hexahedron model

A hexahedron mesh with an outer diameter of 50 mm and an inner diameter of 40 mm is generated with SOLIDGEN cylinders.

Select the “Mesh Generators” and “SOLIDGEN” tabs and enter

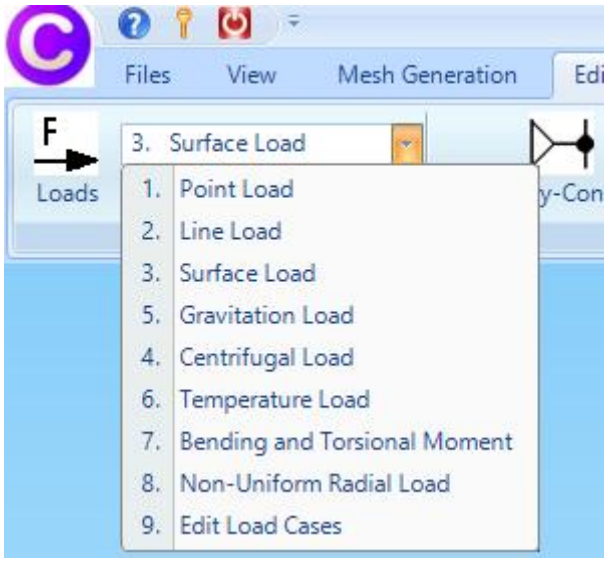


Enter the following datas to create a 3D mesh of 1260 hexahedra:

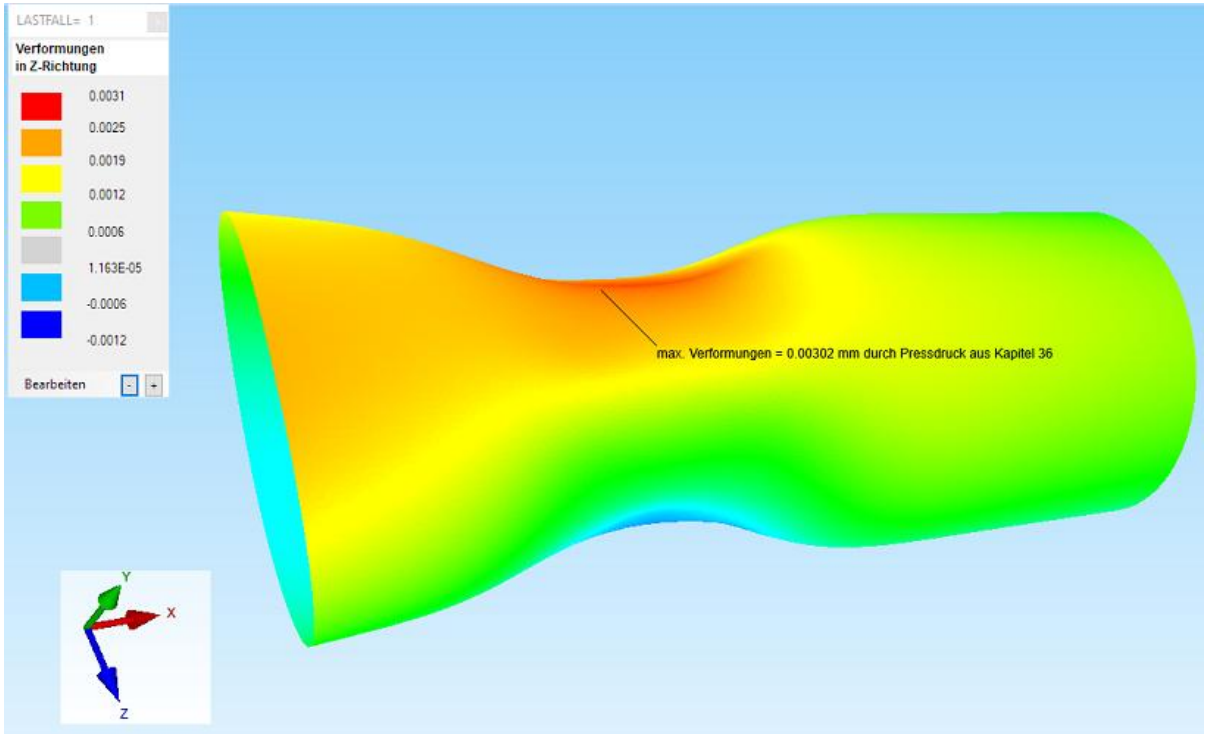


Create a Radial Load

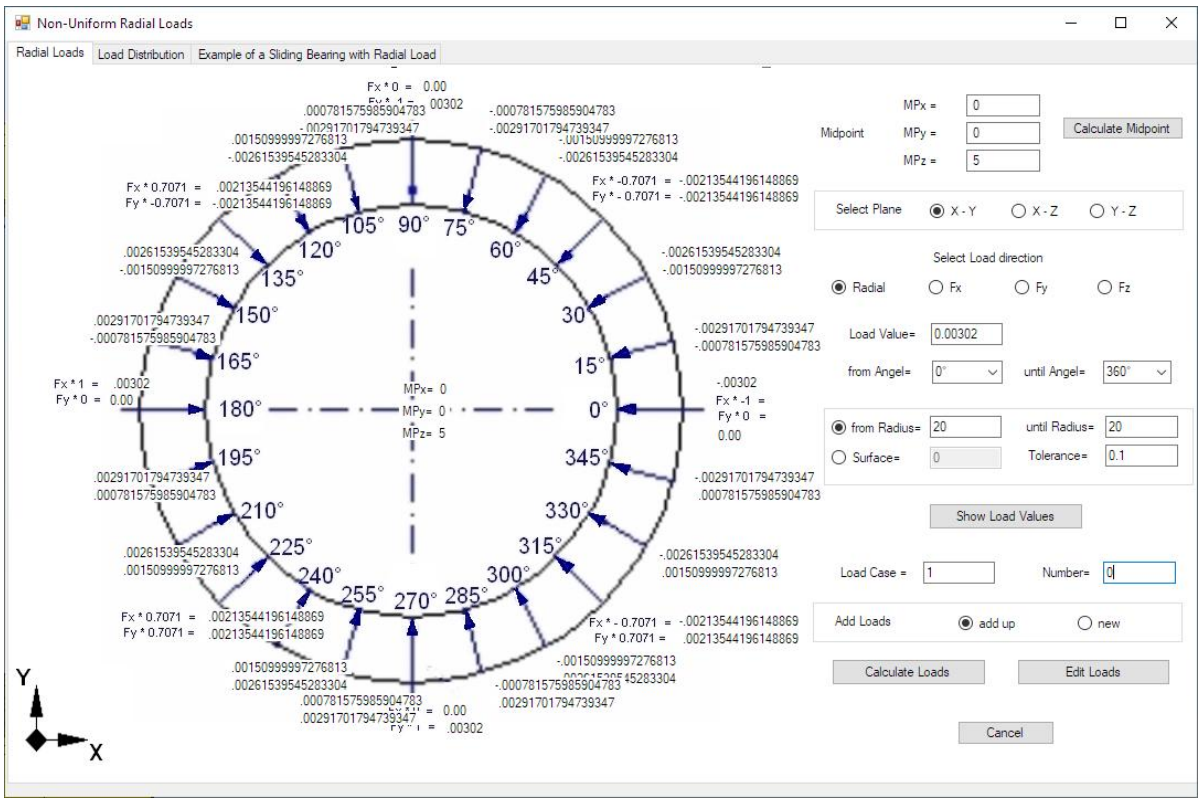
Select the “Edit FEM project” and “Non-Uniform Radial Load” tabs to first generate a radial nodal load that can be converted into prescribed boundary conditions in the load editor.



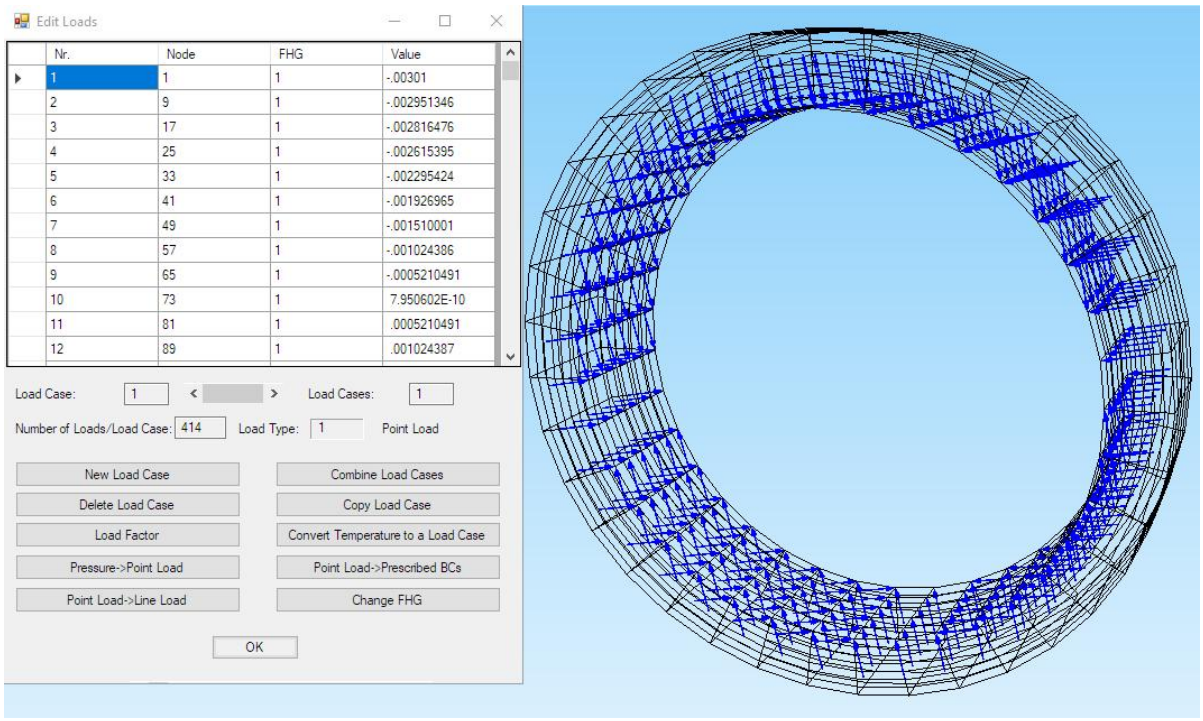
From Part 36, a maximum deformation of 0.00302 mm in the Z direction is read from the displacement distribution.



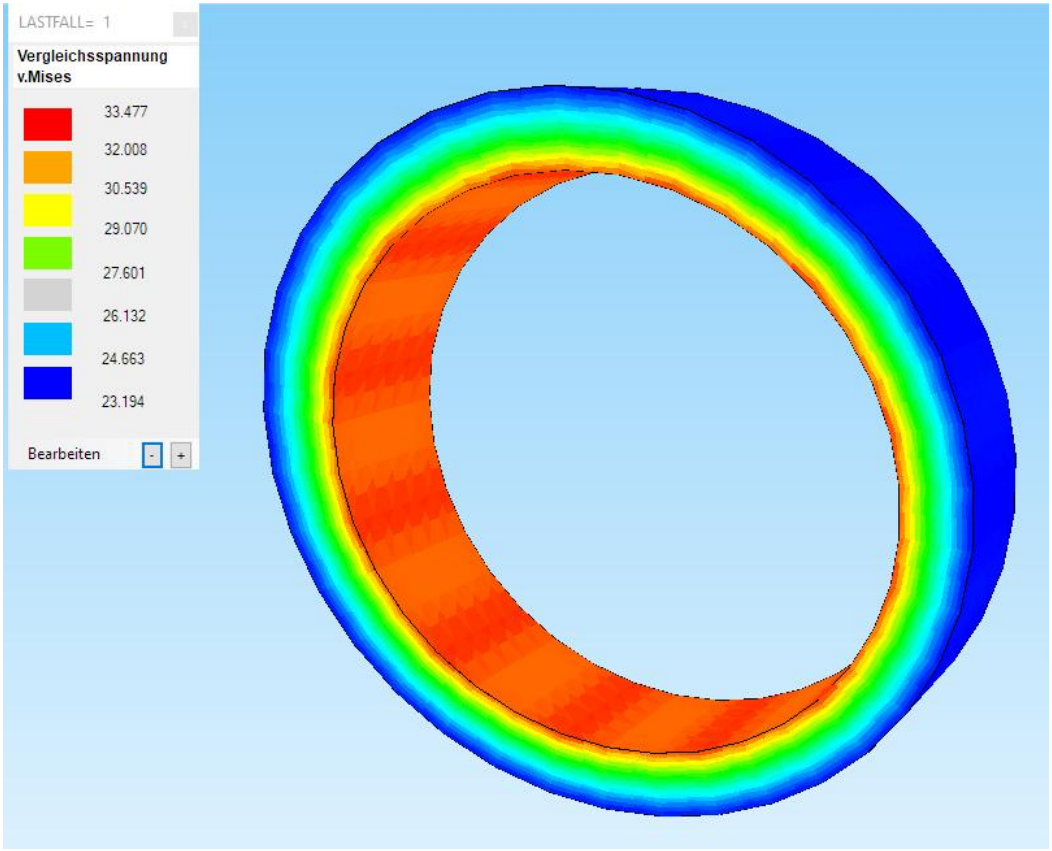
This is entered as a load value and a radius of 20 mm in the dialog box. Using the menus "Show Load Values" and "Calculate Loads" as well as the menu "Edit Loads", a radial node load is generated by transforming the displayed load values precisely to the positions of the mesh.



In the Load Editor, select the menu “Nodal Load->Prescribed BCs” to create 415 boundary conditions. Then a new linear static analysis without loading is carried out using the Quick Solver.



A maximum v.Mises nodal stress of 33.4 N/mm² is calculated. This is higher than 16.4 N/mm² in Part 36, but it also selected the maximum deformation value for the entire inner radius.



These contact stresses of 33.4 N/mm² are obtained when a pipe with D = 50 mm and a wall thickness = 5 mm is compressed with an external pressure of 2500 N

or

when the same pipe section is pressed inwards by 0.00302 mm.