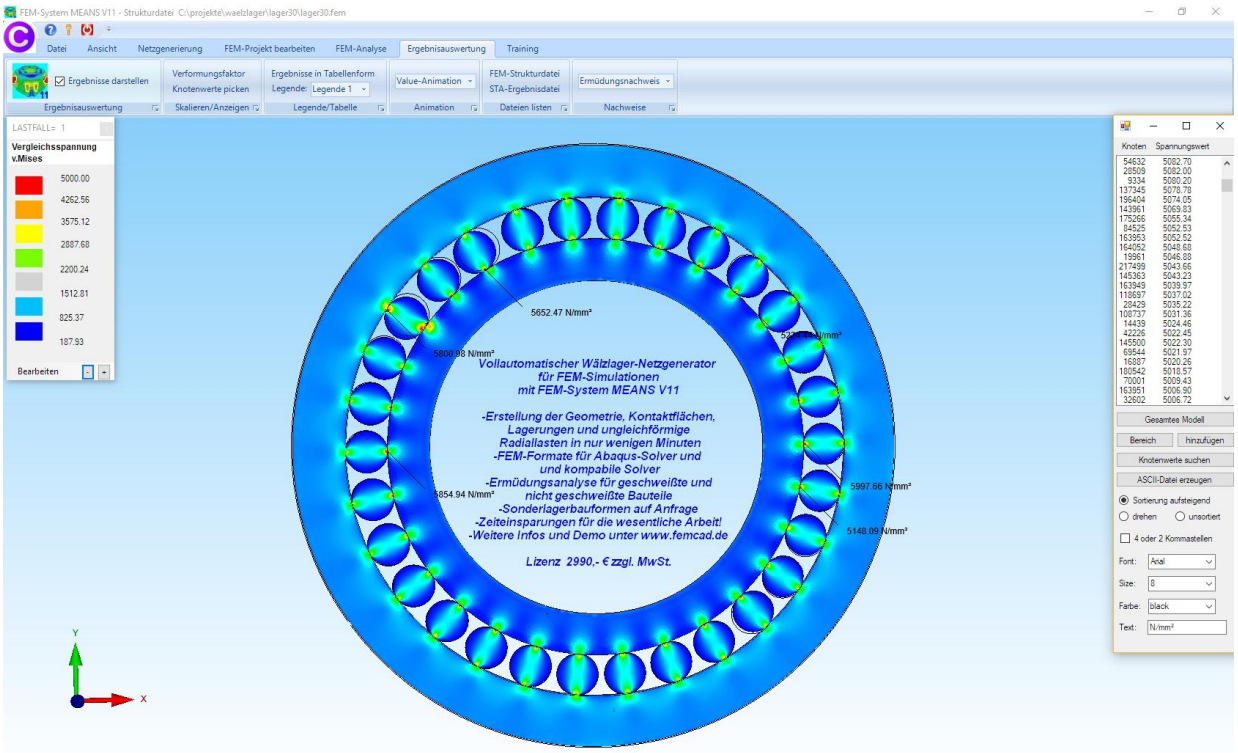
FEM-System

MEANS V11

Mesh Generator for Bearings

FEM-Calculations of
Bearing Deformations and
Hertz Contact Stress



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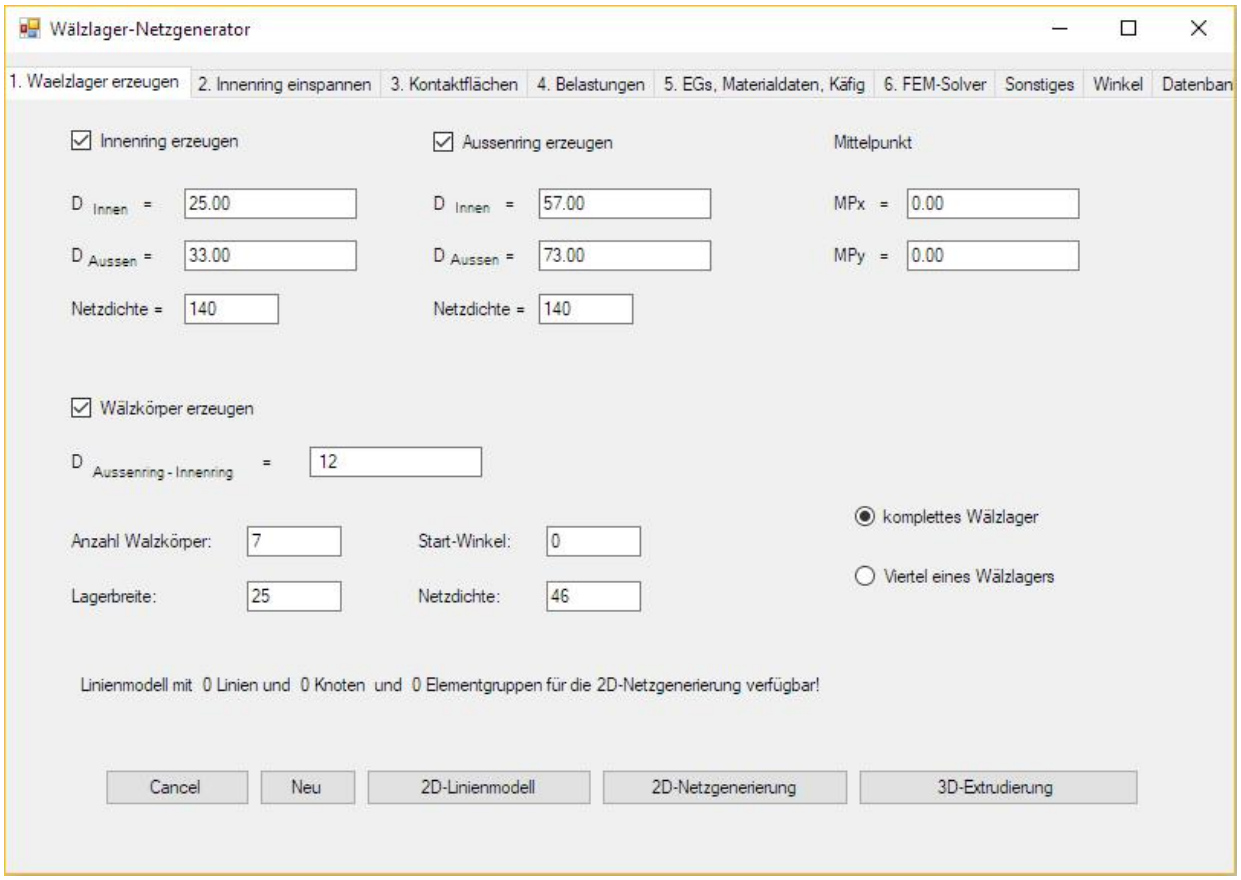
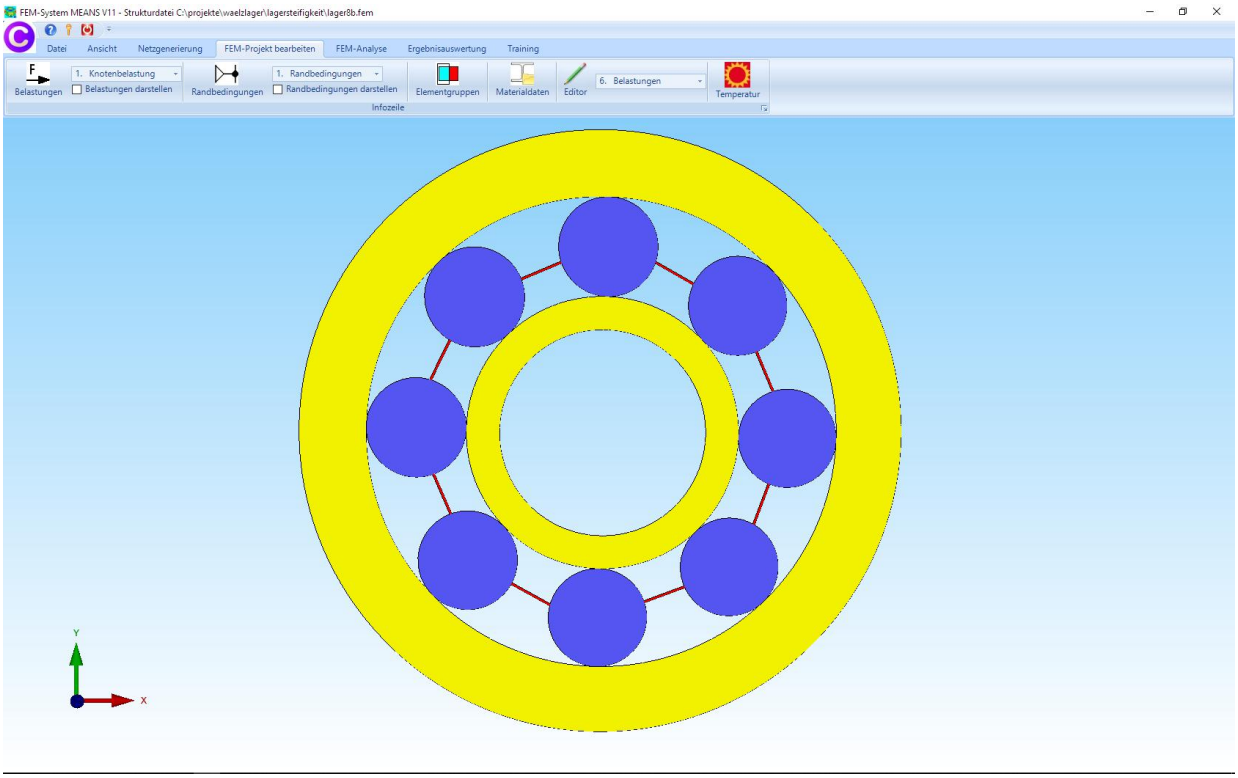
Part 12: Mesh Generator for Bearings

With the new mesh generator for bearings from FEM-System MEANS V11 it is now possible to generate and calculate complex rolling bearings with up to 100 rolling elements in just a few minutes. In addition to the Hertz Contact Stress, the bearing deformations of the inner and outer ring can also be calculated because a high oval deformation leads to a damage of the bearings.
With the conventional calculation programs such as e.g. Hexagon can be used to calculate the Hertz contact stress well, but in order to determine the bearing deformations in the entire rolling bearing assembly a FEM system with a special mesh generator is needed otherwise a 3D FEM model of a rolling bearing takes to much effort for the mesh generation. This is also confirmed by the few FEM rolling bearing calculations that can be googled on the internet.

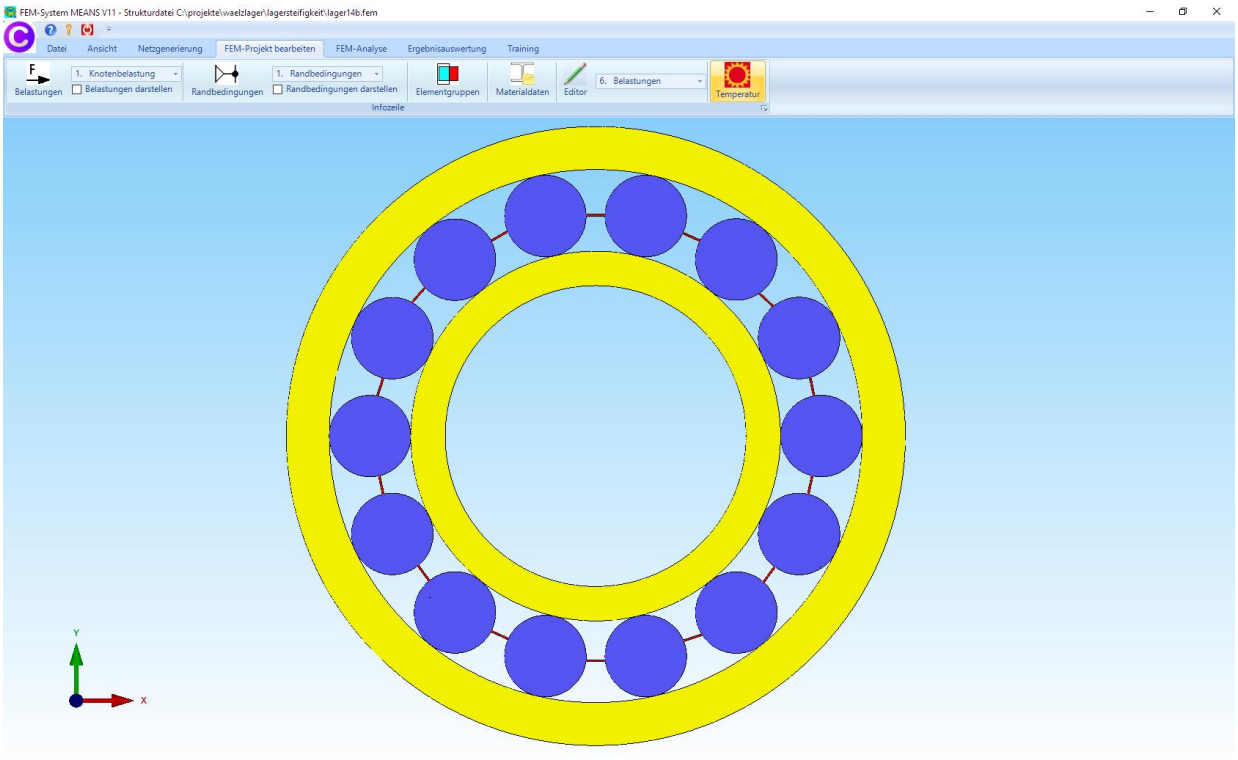


With just a few inputs, such as inside and outside diameter, number of rolling elements and bearing width, a 2D or 3D FEM model can be generated and calculated in just a few minutes.

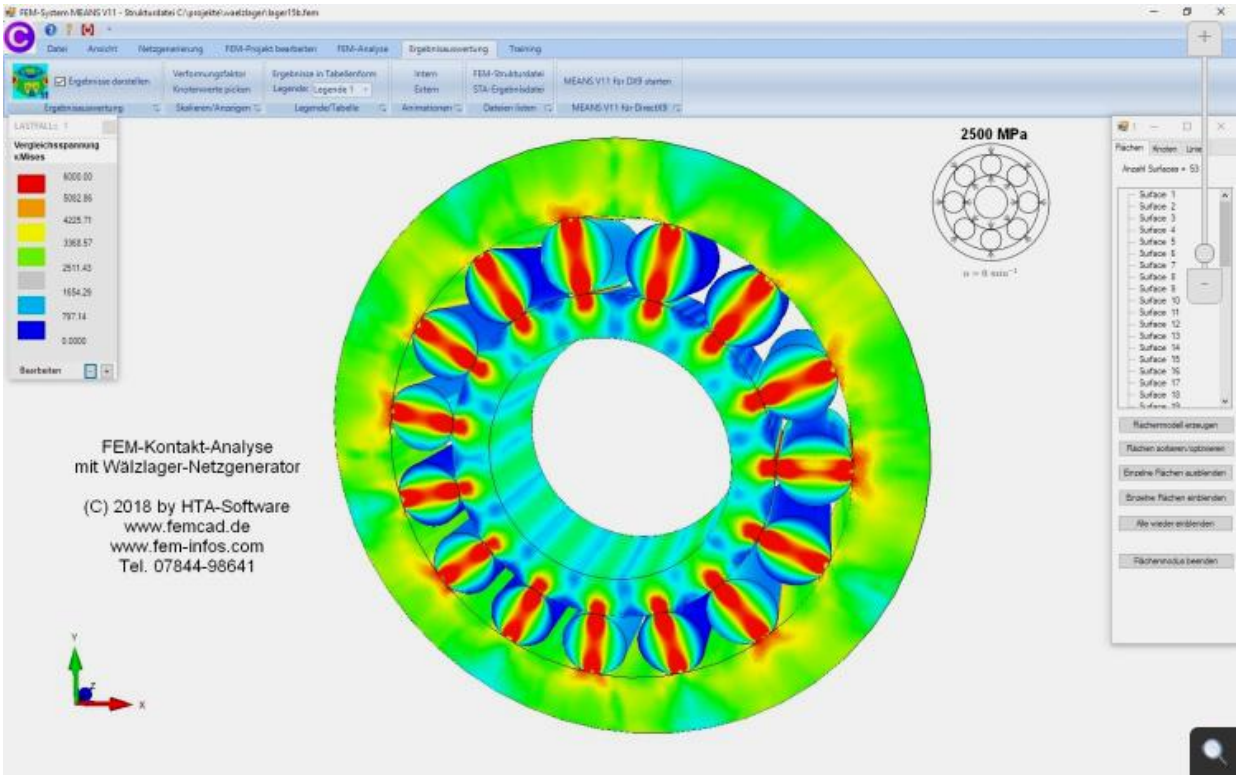
Rolling bearings with 8 rolling elements as a 2D model



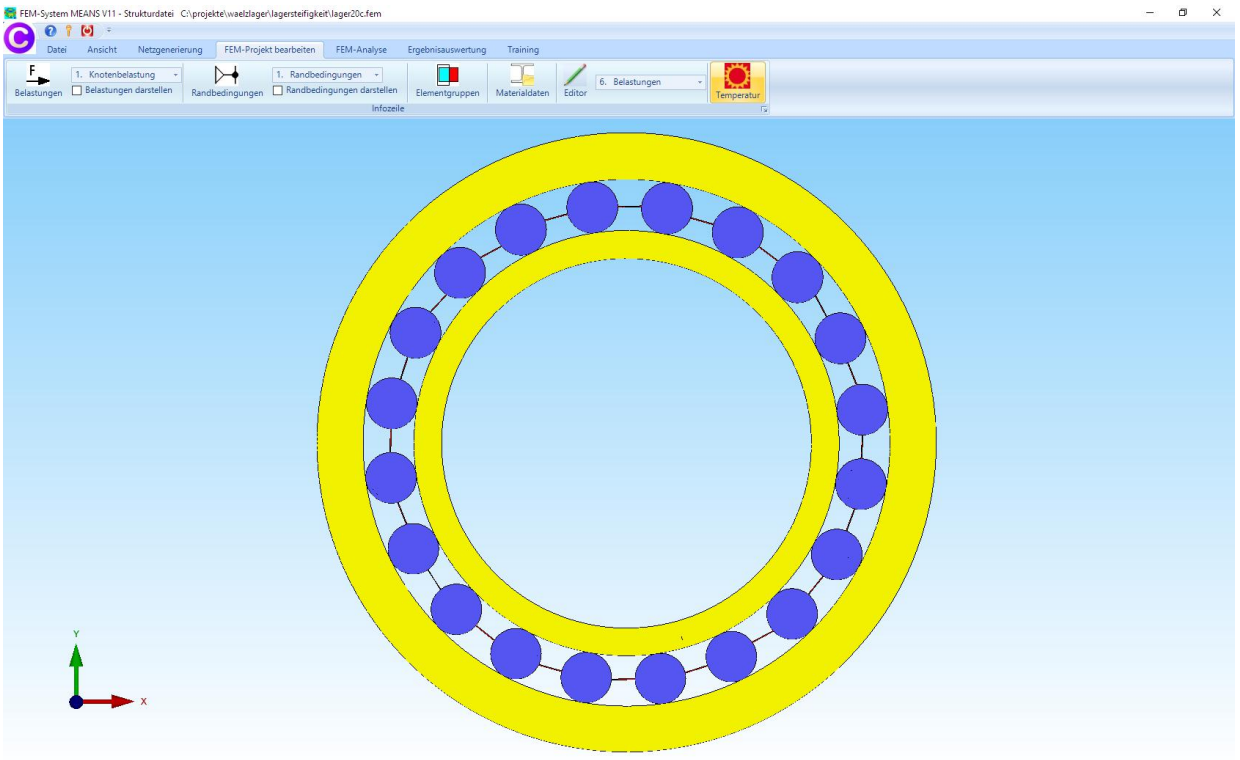
Rolling bearings with 14 rolling elements as a 2D model



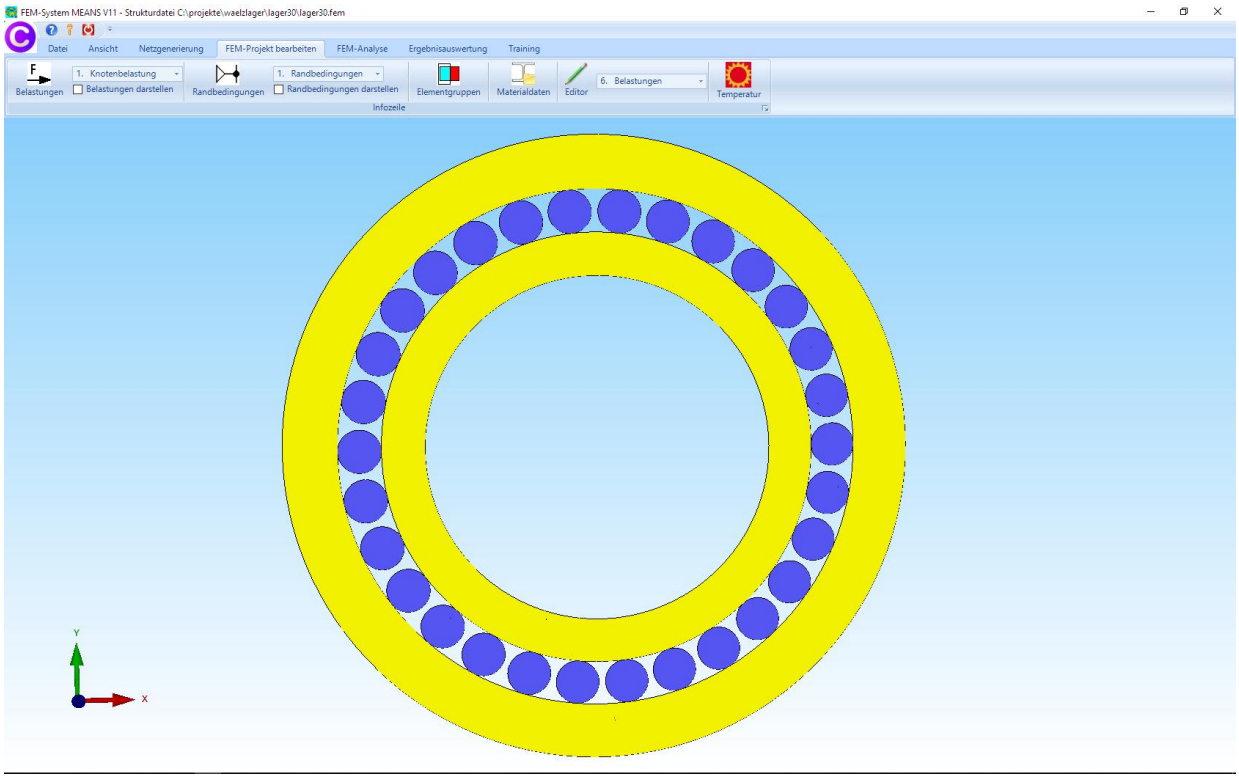
Rolling bearings with 15 rolling elements as a 3D model



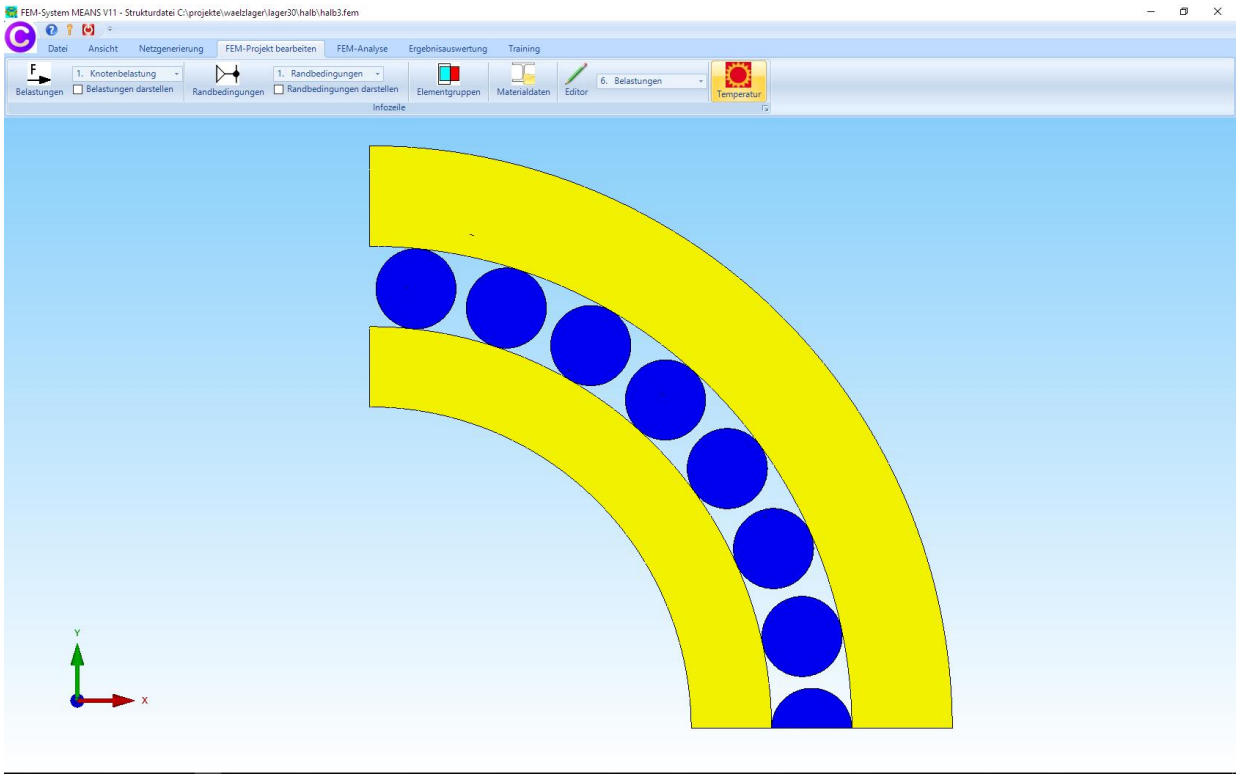
Rolling bearings with 20 rolling elements as a 2D model



Rolling bearings with 30 rolling elements as a 2D model

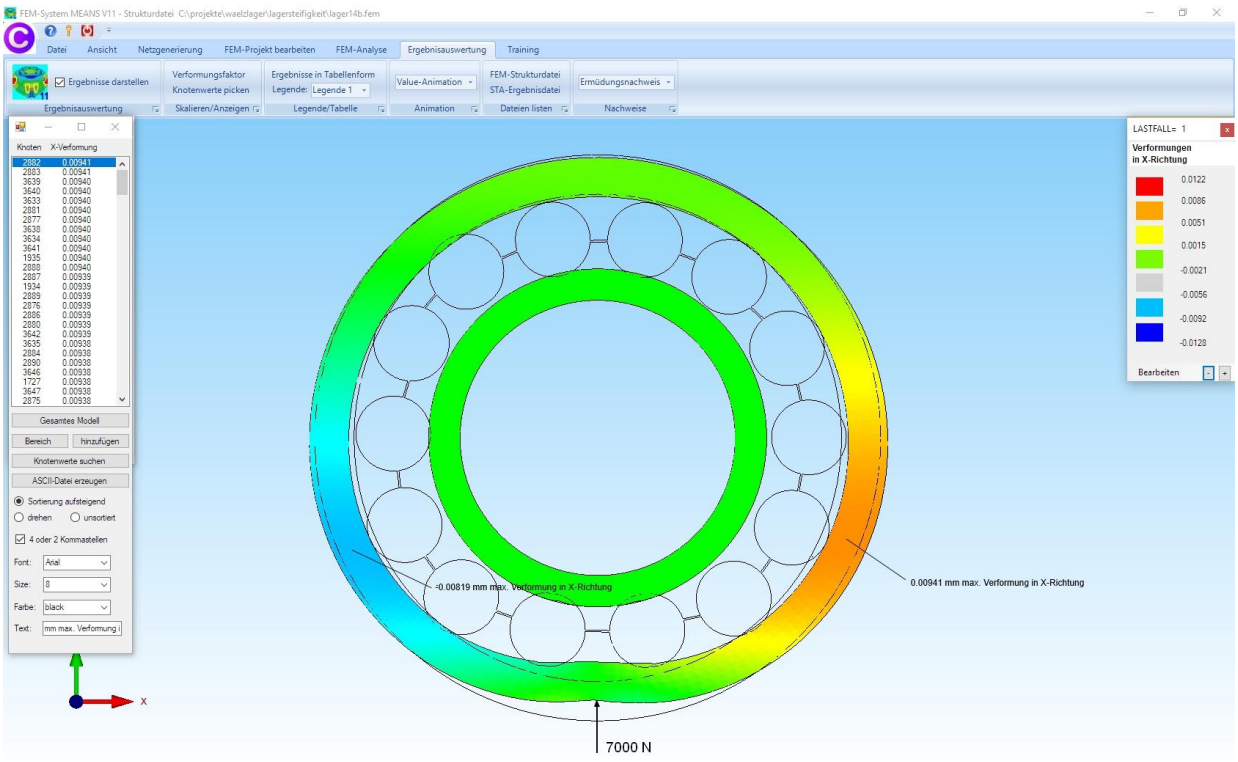


Rolling bearings with 30 rolling elements as a 2D quarter model

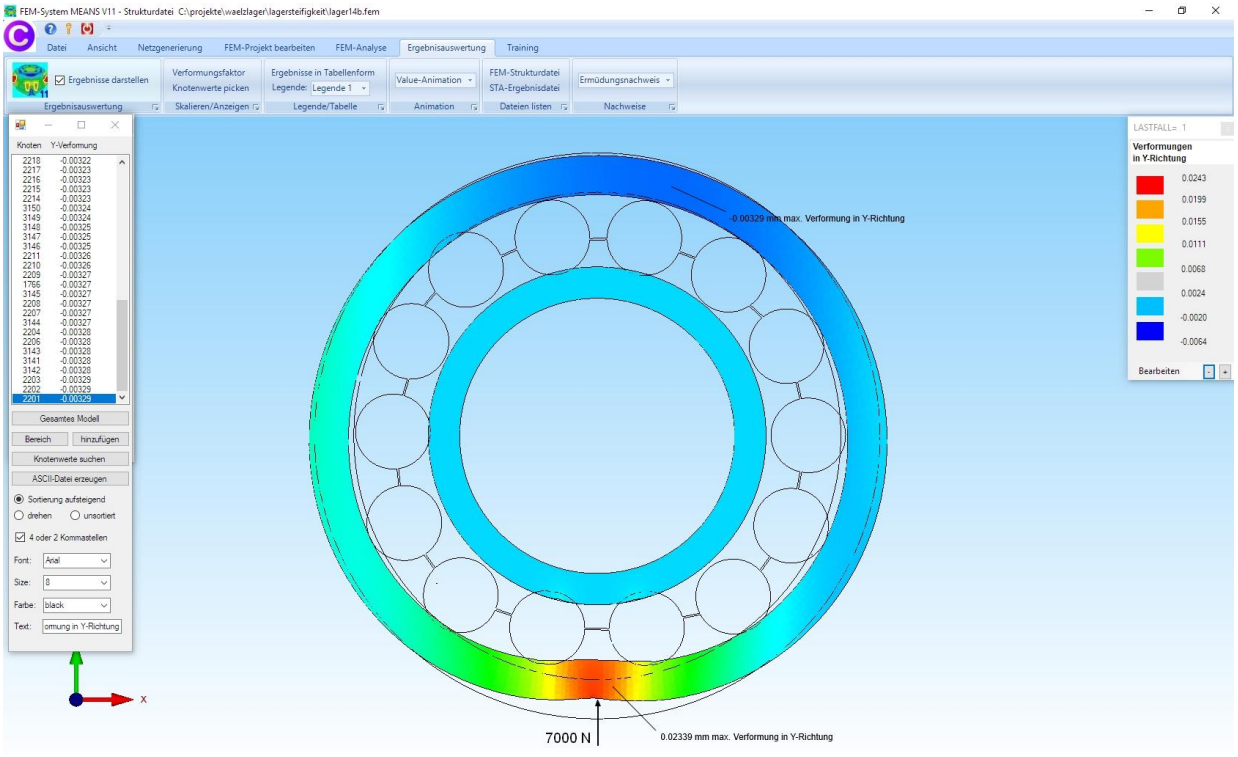


Calculation of the bearing deformations of a rolling bearing with 14 rolling elements

First, the deformations are evaluated at a load of 7000 N in the X- and Y direction.



Deformations in the X direction with a deformation factor of 100



Deformations in the Y direction with a deformation factor of 100

Max. Deformation in X-direction = 0.00941 mm

Max. Deformation in Y direction = 0.02339 mm

Bearing Deformation Ratio = Max. Y Deformation / Max. X Deformation

= 0.02339 mm / 0.00941 mm

= 2.48 with a load of 7000 N.