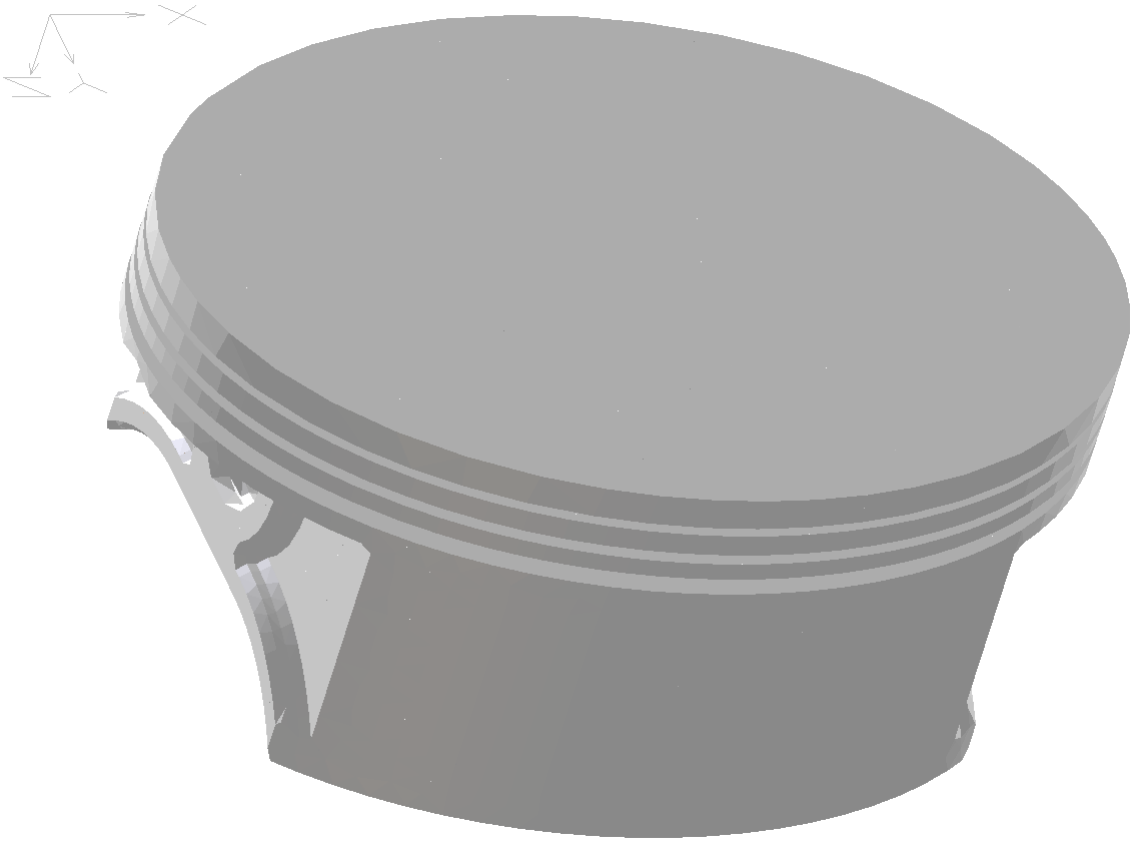
Z88 AURORA® EXAMPLE MANUAL

Example 4: Piston

(Tetrahedron No. 16 with 10 nodes)



4. Example: NASTRAN-Import (Tetrahedron No. 16 with 10 nodes)

As shown in previous chapters it is possible to import data from leading 2D- and 3D-CAD and FE-systems into Z88 Aurora.

Here, the shown example is a piston; constructed in PTC Pro/MECHANICA, a copy is saved as a NASTRAN-file. On the basis of this part the import of the NASTRAN format and the calculation with meshes of tetrahedrons is demonstrated in Z88 Aurora.

Input file:

b19_g.nas → Data with structure and boundary conditions of the FE-system

At first it is necessary to create a new project with and Create Folder. In this case, e.g. *Example4,* you have to confirm the dialogue with *Enter* and close the window with *OK*.

With Import/Export the example file *b19_g.nas* can be imported. On the right hand a context menu is opened (*Figure 1*), with which it is possible to load the NASTRAN file Nastran-File

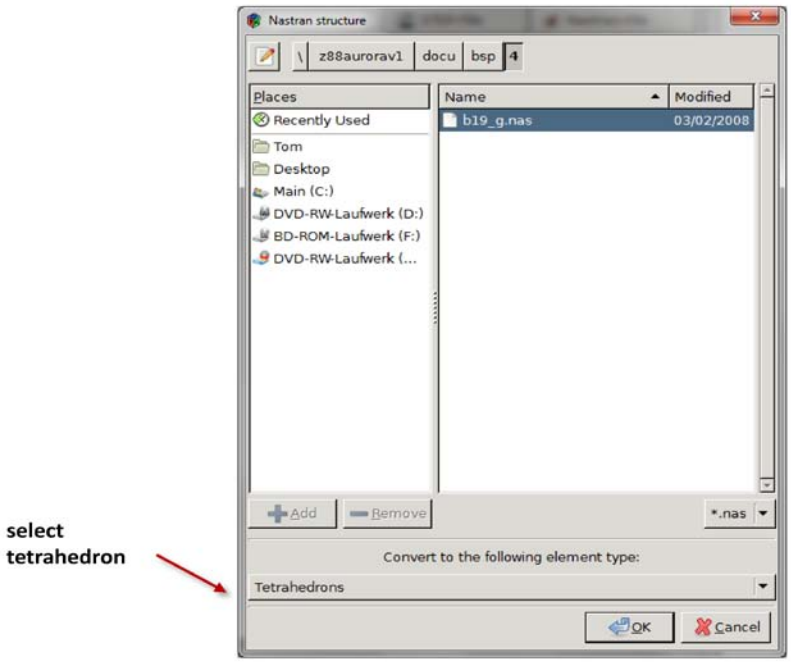


Figure 1: NASTRAN import with mesh of tetrahedrons

The model is illustrated in the shaded view. You can switch the design surface-mesh with , to demonstrate the structure of the tetrahedrons (quadratic tetrahedron type 16, see Z88 Aurora User Manual). In the left corner on the bottom of the picture it is shown that the structure of the part exists already a ready to run *mesh of finite elements* where *all elements* are illustrated.

With the button you change to the preprocessor. On the right side of the window you can see the load cases and that already a load case with boundary conditions exists. If you click there the loads and the internal stress is shown (*Figure 2*). To blank the display with the boundary conditions deselect the load case with clicking "--".

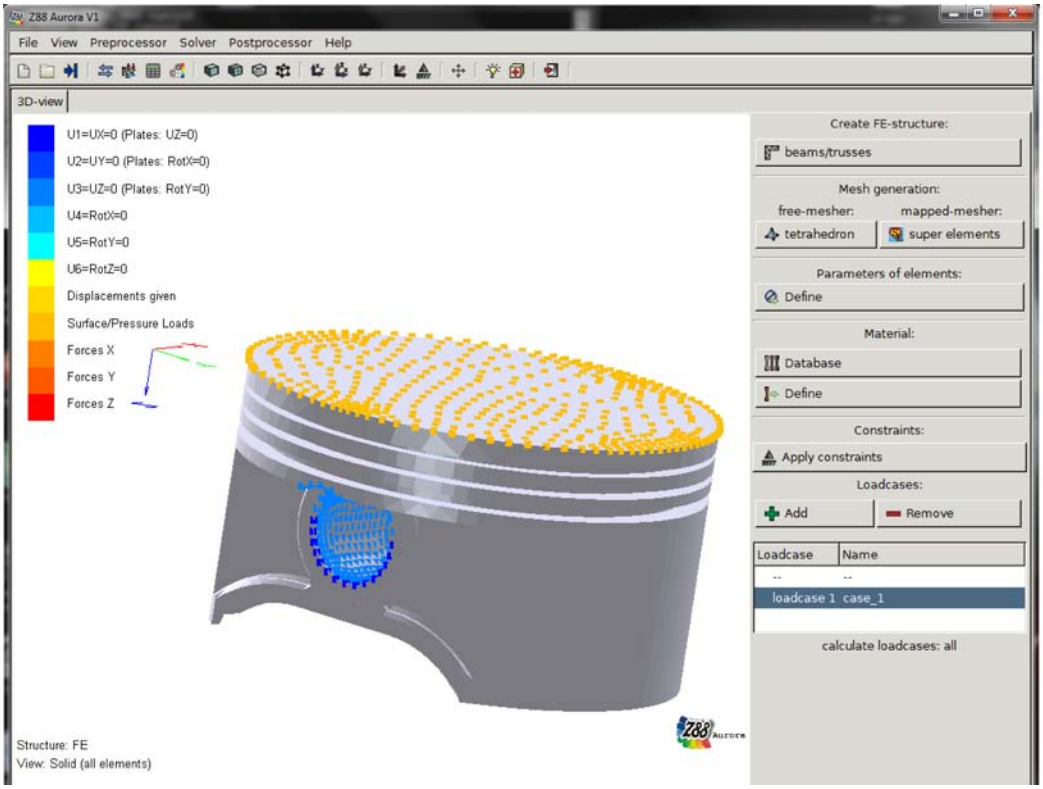


Figure 2: Shadowed visualization with shown boundary conditions in the Z88 Aurora preprocessor

The legend on the left hand indicates what kind of boundary condition is displayed: displacements, pressures, surface loads, loads, etc. With *View* → *Size constraints* you can minimize or maximize the single nodes.

With the button you can switch into the solver menu. Therein you have a selection of different solvers (see Z88 Aurora Theory Manual). Because of the amount of nodes and the large structure of the part, it is recommended to use a sparse-solver, e.g. the Pardi-

so-solver (sparse, direct, multicore ability). To accelerate the computation you can select among *Options* the amount of cores of your processor. Furthermore, it is possible to choose the amount of *Gauss points* (here: 3x3(x3)) for the computation with tetrahedrons type 16 as well as the computation for *von Mises stress* (*Figure 3*).

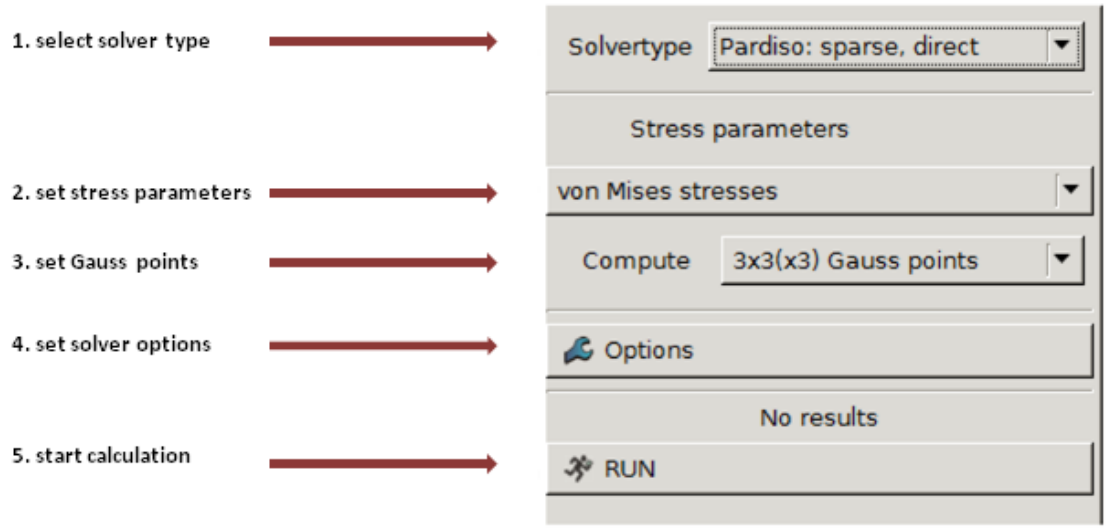


Figure 3: Adjustment for the Pardiso solver

After pressing the *RUN* button a new window is opening, which starts the calculation if the *OK* button has been clicked (*Figure 4*).

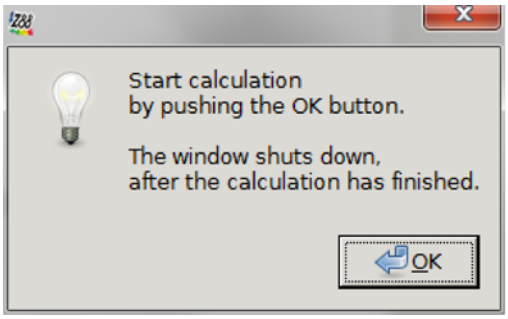


Figure 4: Start calculation

If the calculation was successfully, *Figure 4* disappears and you can select the postprocessor with the button.

On the right hand of the monitor a new context menu exists (*Figure 5*). There you have to select *loadcase 1*; moreover you have the possibility to advertise the parts as *deflected*, *undeflected* or as well *both* conditions.

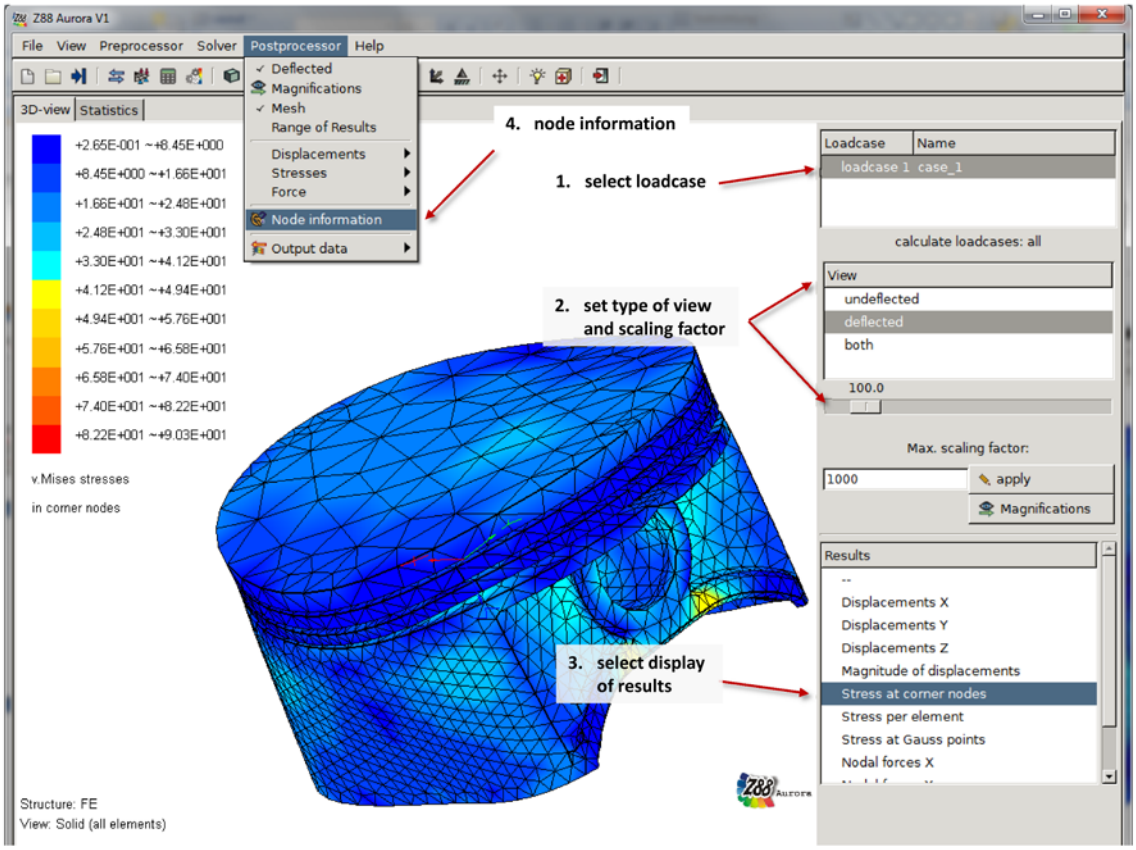


Figure 5: Z88 Aurora postprocessor

Beneath the *Max. scaling factor* you can find the *Results*: there you have the possibility to blend the *Displacements* (component-by-component or magnitude) as well as the stresses (at the nodes, averaged about the element and in the Gauss points).

The relative and the absolute data collection of the calculated stresses are shown with an integrated statistic (slider)(*Figure 6*). To use this function it is important to select a stress option in the 3D-view result window.

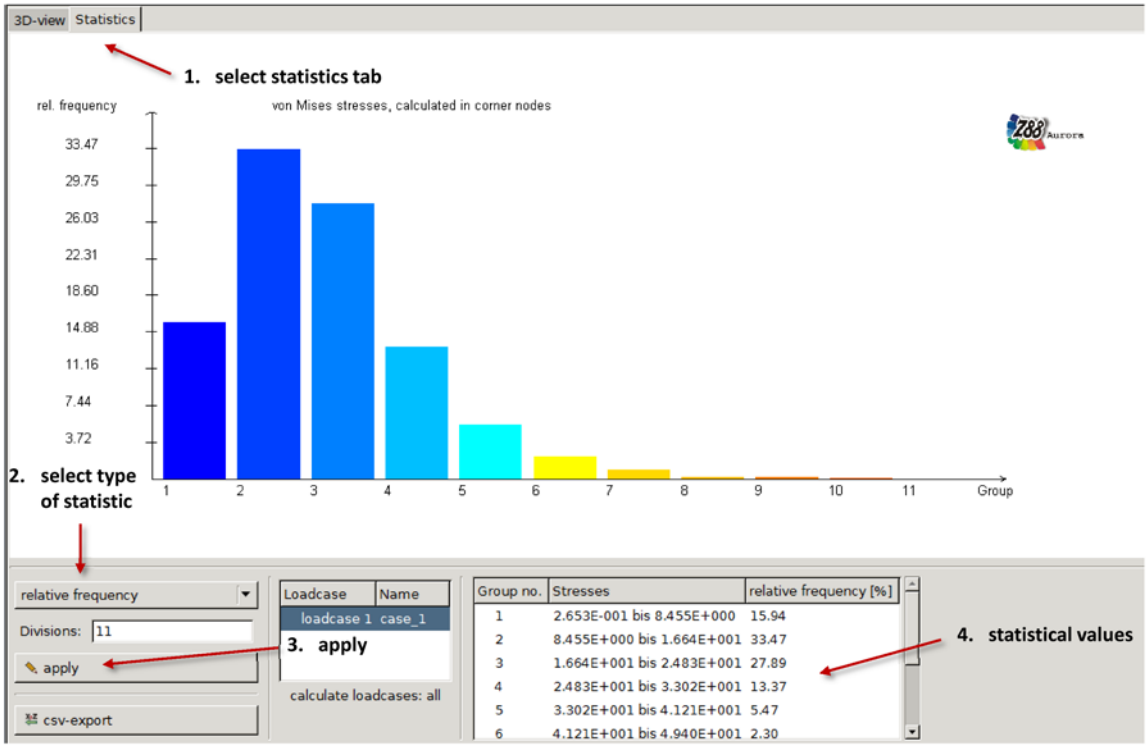


Figure 6: Statistics

If you don´t change the number of divisions of the bar chart (default value = 11), the colour of the bars are the same as the colours at the 3D-view. Further it is possible to plot the statistic as a data sheet. Therefore click on csv-Export and enter a name for your file.