Femap Version 10 What's New

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FEMAP Version 10 What's New
VELOCITY SERIES

SIEMENS

FEMComp Engineering
Focusing On FEA

Release to manufacturing: **Q4 2008**
Includes **NX Nastran 6**
What's new:

- **Meshing**
- **64-bit** Femap with NX Nastran
- **Stress** and **displacement transformations**
- **Extended** NX Nastran support
- **Graphics**
- **FEM** mesh **geometry association**

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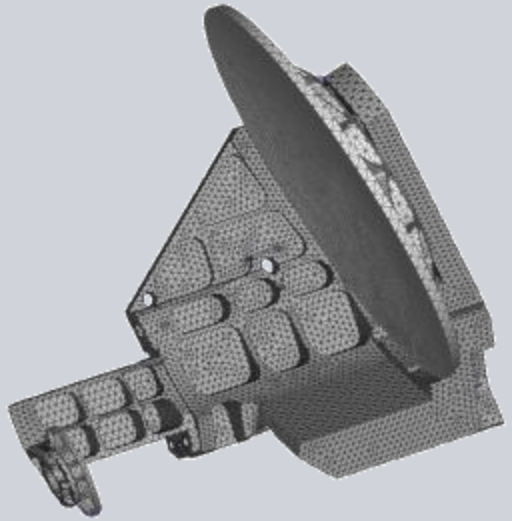
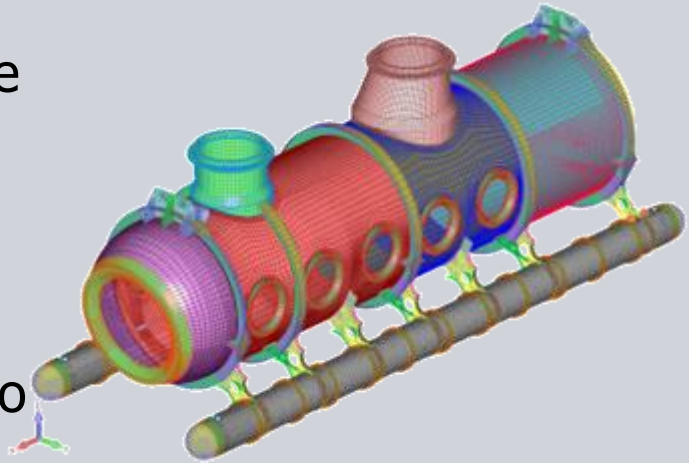
Improved Finite Element Meshing

- 3D **solid** and **surface** meshers
- **Interactive mesh** generation and verification
- New robust **mesh improvement tools**



Benefits

- **Improved accuracy** of FEA results with higher quality meshes
- **Reduced modeling times** with more intuitive workflows
- **Easier to use** with more automated meshing and simulation processes
- **Optimized modeling** processes with increased modeling fidelity where it's needed to ensure efficient analyses



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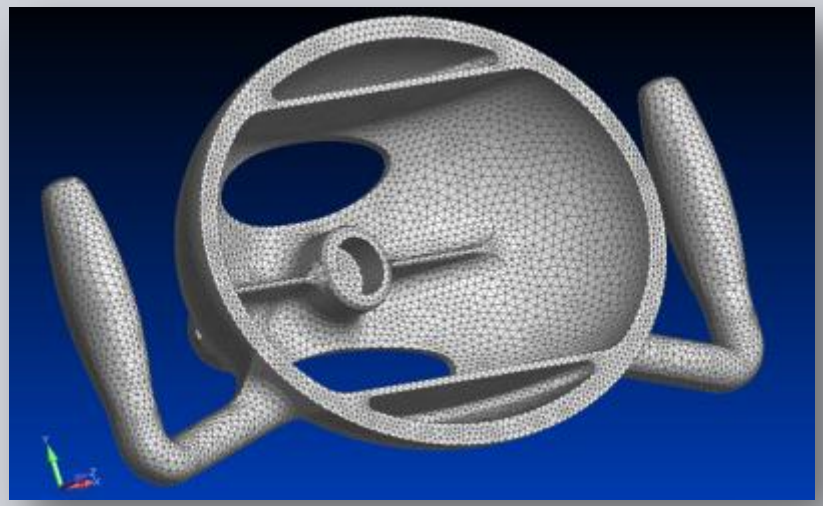
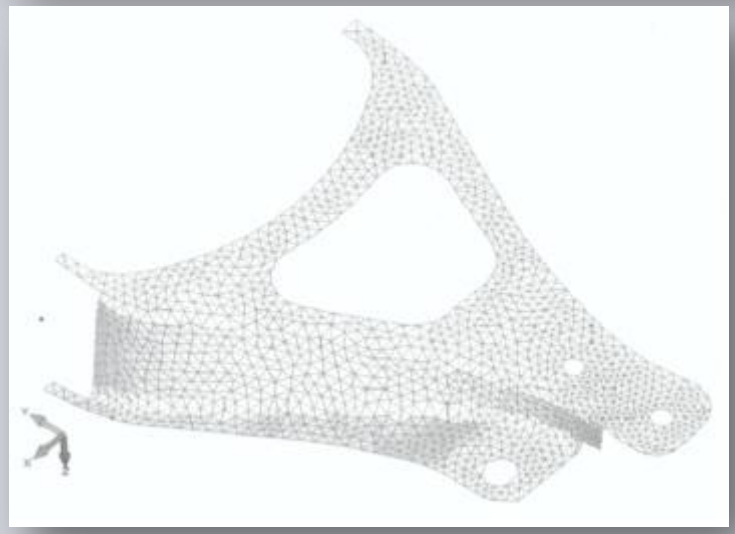
3D Solid and Surface Meshers

- Creation of **top quality meshes first time**
- Meshes in **3D space** rather than parametric space
- **Improved meshing** on curved non-planar surfaces
- Mesh options are saved for **easy re-meshing**





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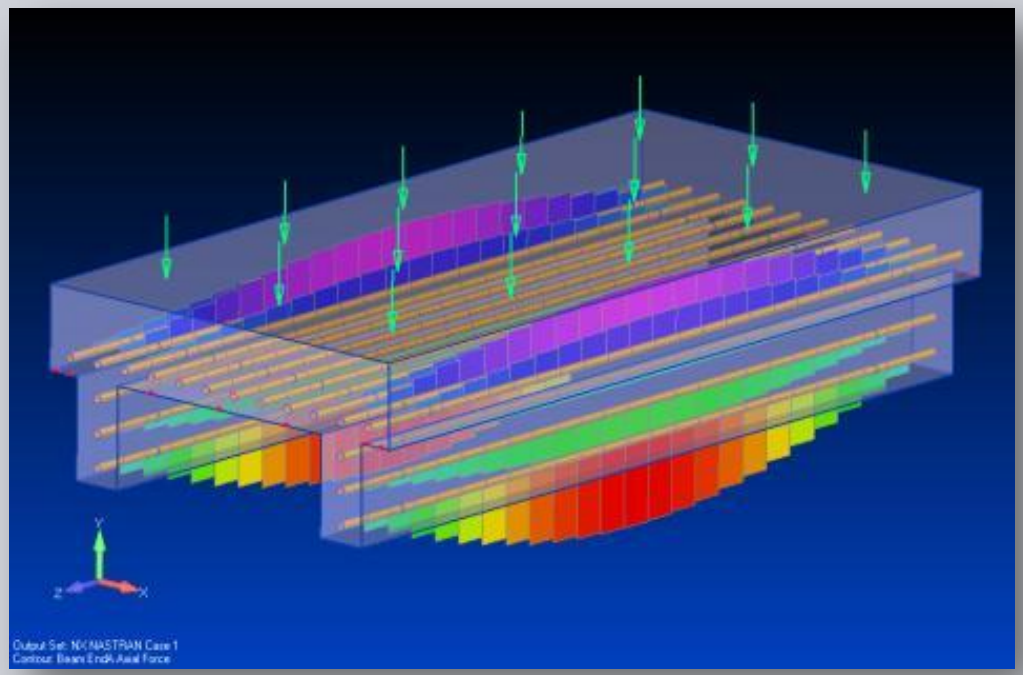
3D Solid and Surface Meshers

- Internal and branching **faces** and **curves** are **accounted** for **within a solid**
- Create a **consistent mesh** in volumes containing **3D, 2D** and **1D** entities



Example:

- **Reinforced concrete model**: steel beam elements with concrete tetra elements in a matched mesh

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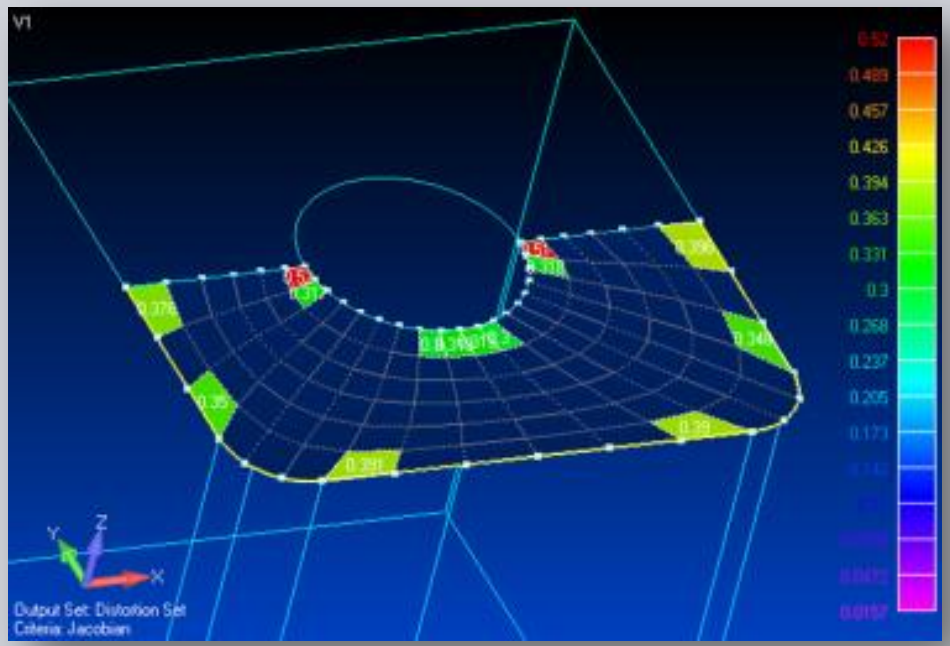
Interactive Mesh Generation and Quality Feedback

- **Move nodes interactively** by sliding on surfaces and curves
  - **One** node at a time or **several at a time**
- **Increase/decrease nodes** on edge by updating mesh size on curves
- Interactive **element quality feedback** display



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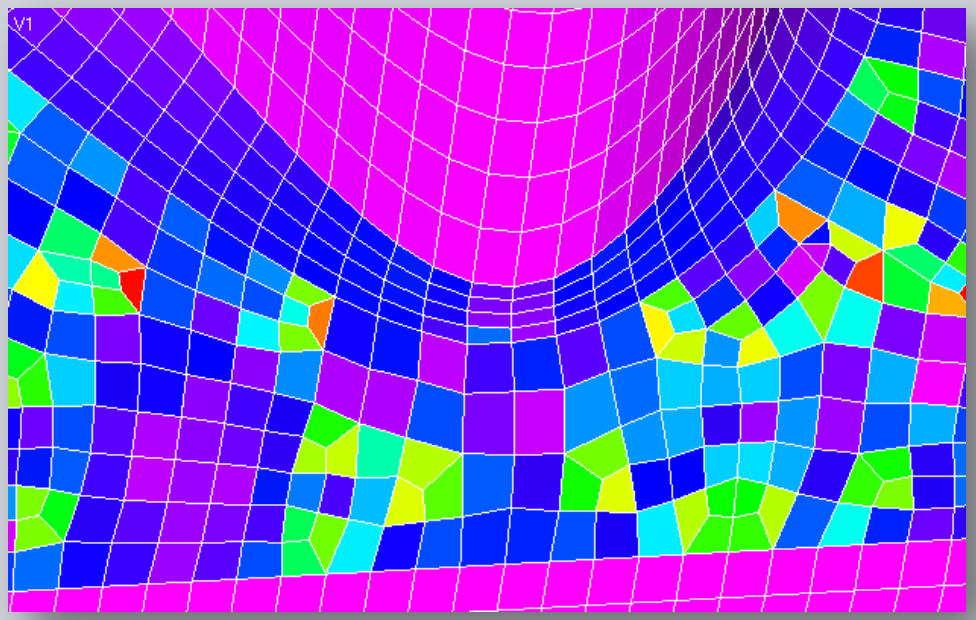
Interactive Mesh Generation and Quality Feedback

- **Interactive tetra** meshing
- **Modify** external triangular mesh of a solid
- **Interactive** feedback
- Geometry **idealization**
- **Feature** suppression



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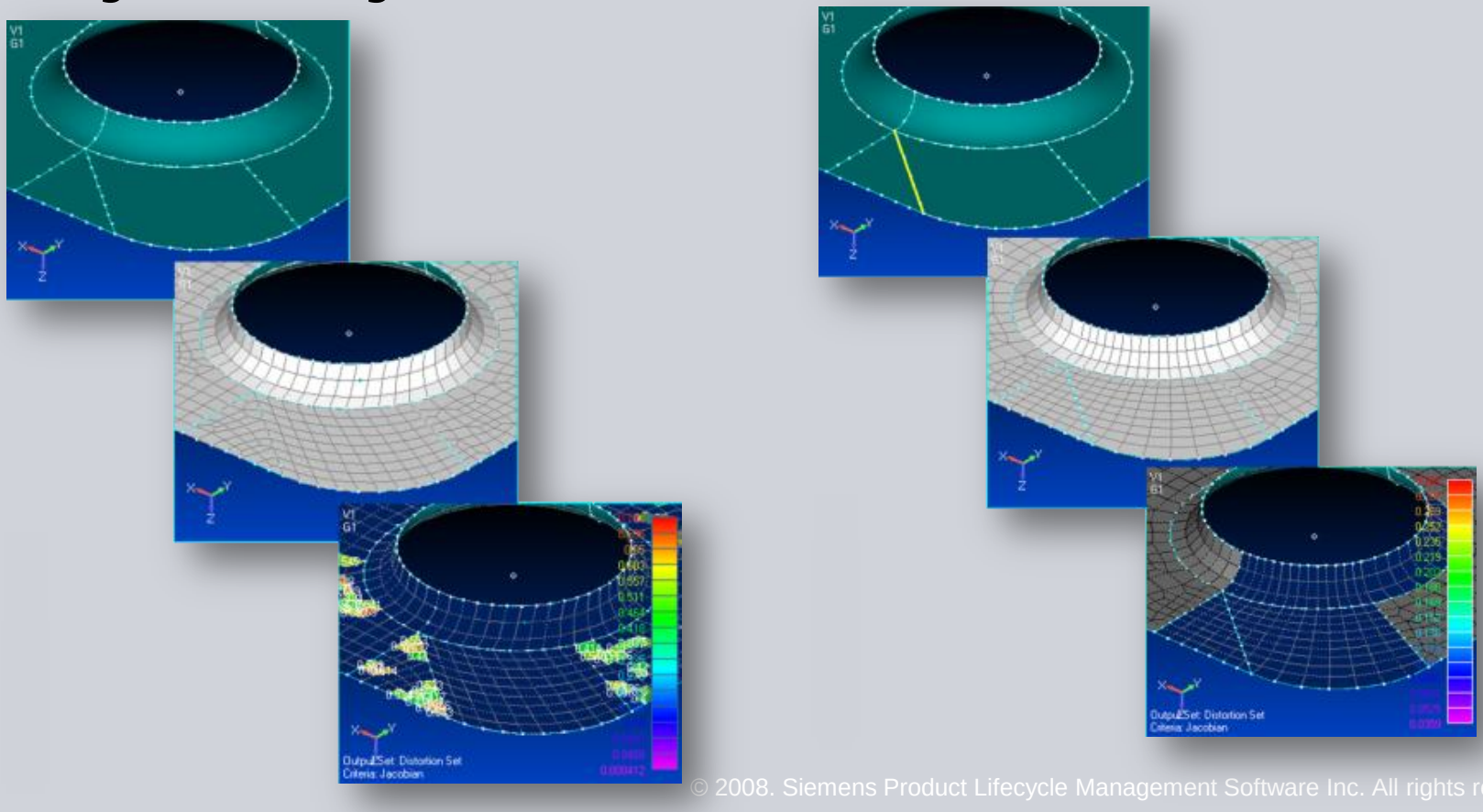
Interactive Mesh Generation and Quality Feedback

- **Interactive Boundary Editing** - adjacent curves can be combined by picking the dividing curve



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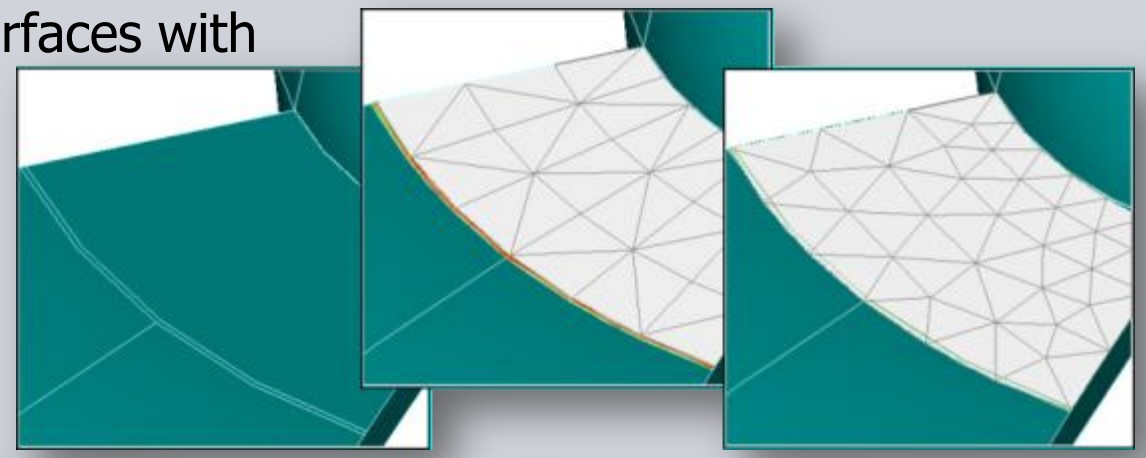
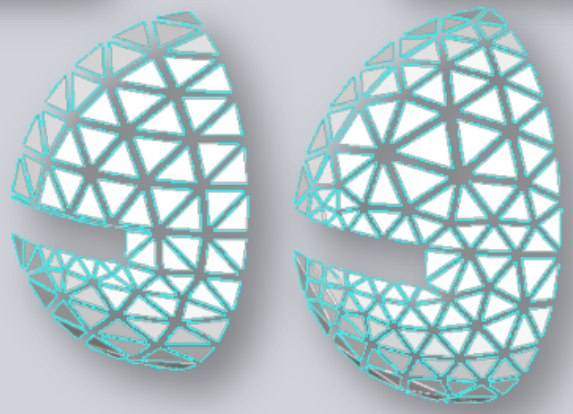
Robust **Mesh Improvement Tools**

- Dealing with **problematic geometry**
- **Combination** of **sliver** surfaces with adjacent surfaces



- Hanging **edge cleanup** and **topology update**



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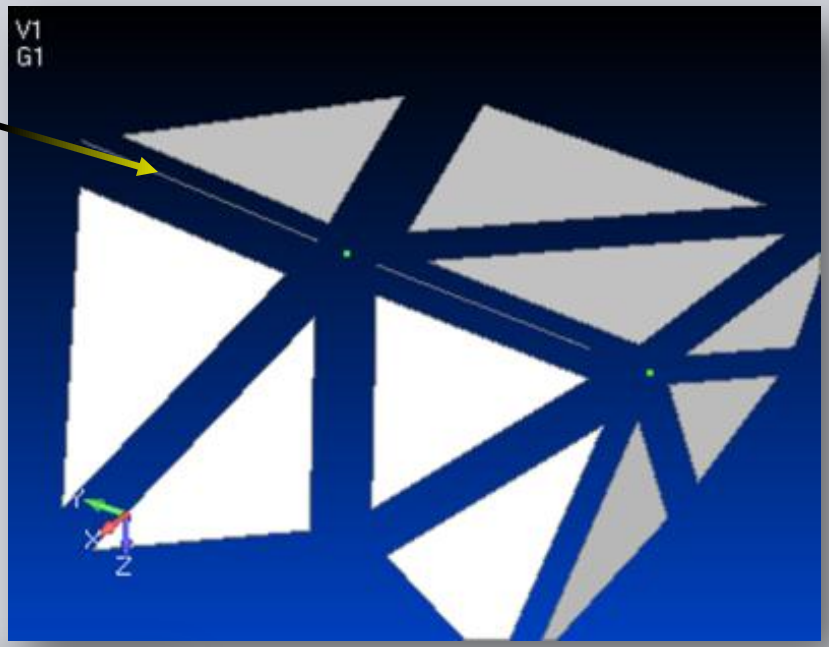
Robust **Mesh Improvement Tools**

- **Automatic removal** of sliver elements



- **Improvements** to **complex boundary surface** handling and meshing

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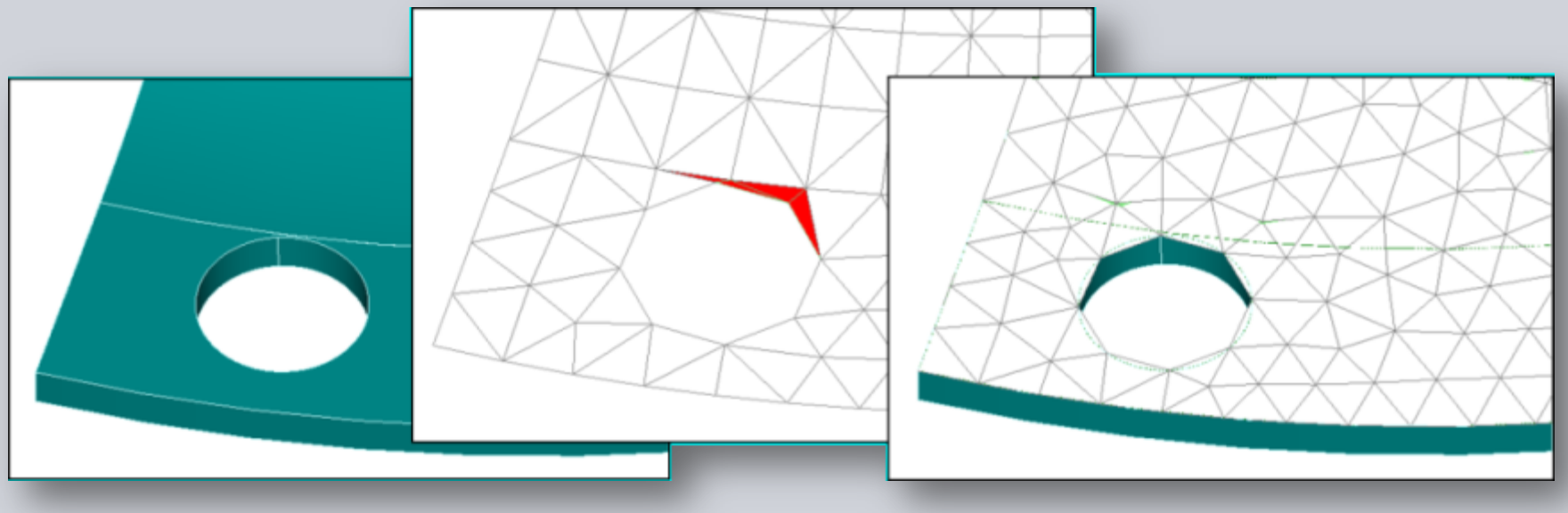
Robust **Mesh Improvement Tools**

- **Mesh Seeding** Improvements
- Adjacent **small feature recognition** and **small feature** proximity **meshing**



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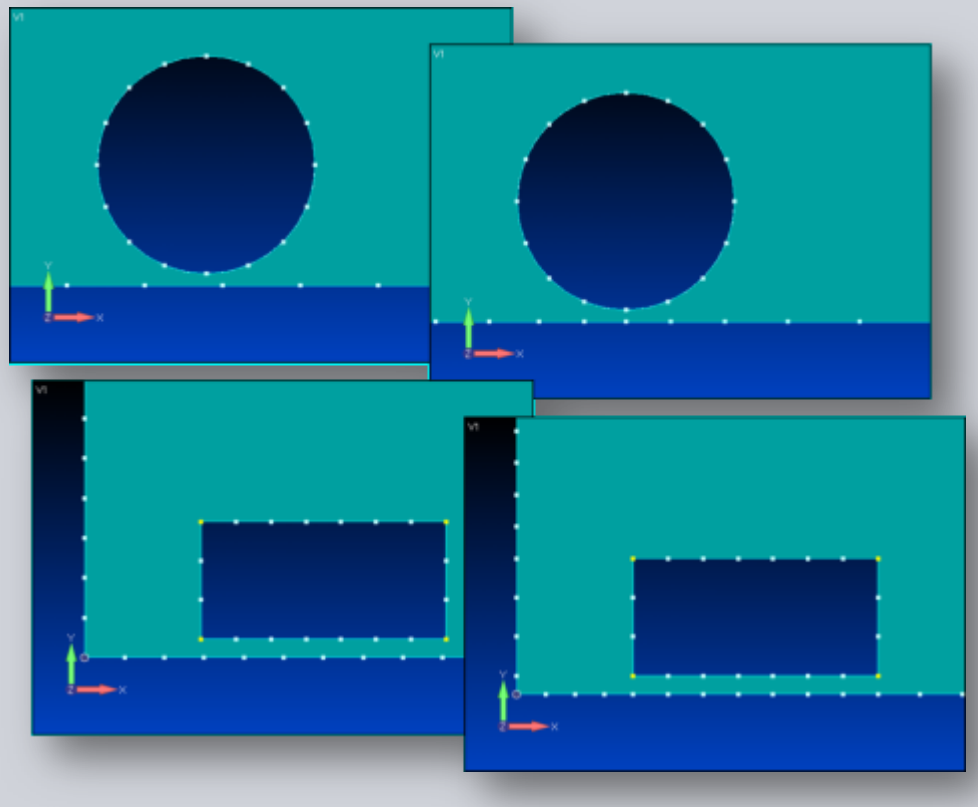
Robust **Mesh Improvement Tools**

- **Mesh Seeding** Improvements
- Mesh sizing **improvements** with **alignment of mesh** seed in long narrow sections, with local refinement



- Improved mesh seeding/sizing to **maximize element quality** on thin or closed features

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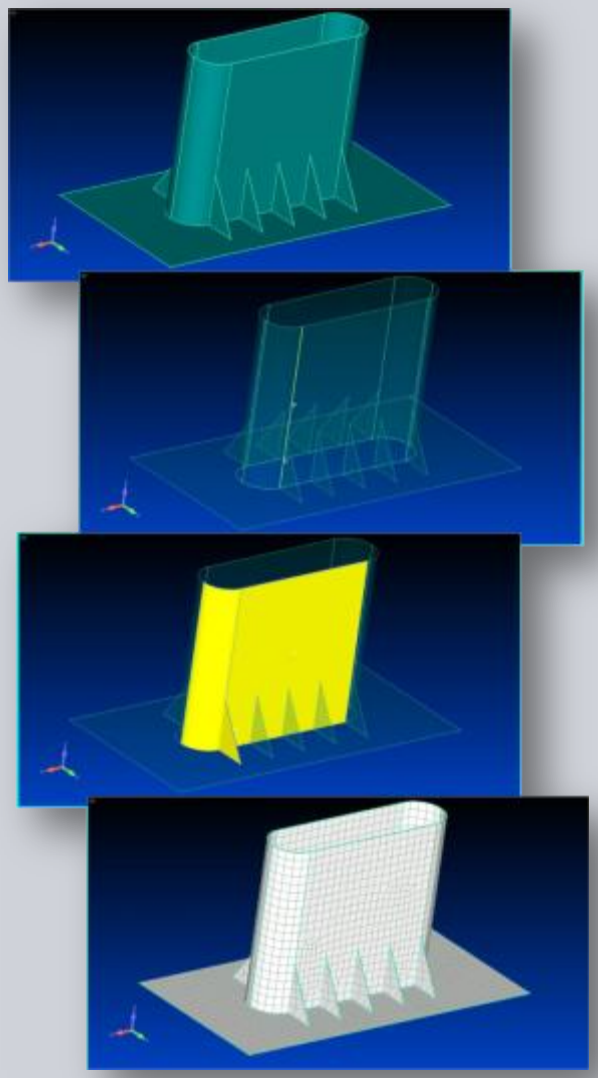
Robust **Mesh Improvement Tools**

- **Improved** Geometry Handling – **Shells**
- Create contiguous **meshes** through **complex geometry intersections**, where three or more surfaces share the same curve, e.g. **T-junctions**
- Mesh will **connect and match** on all surfaces
- Previously a limitation in Parasolid



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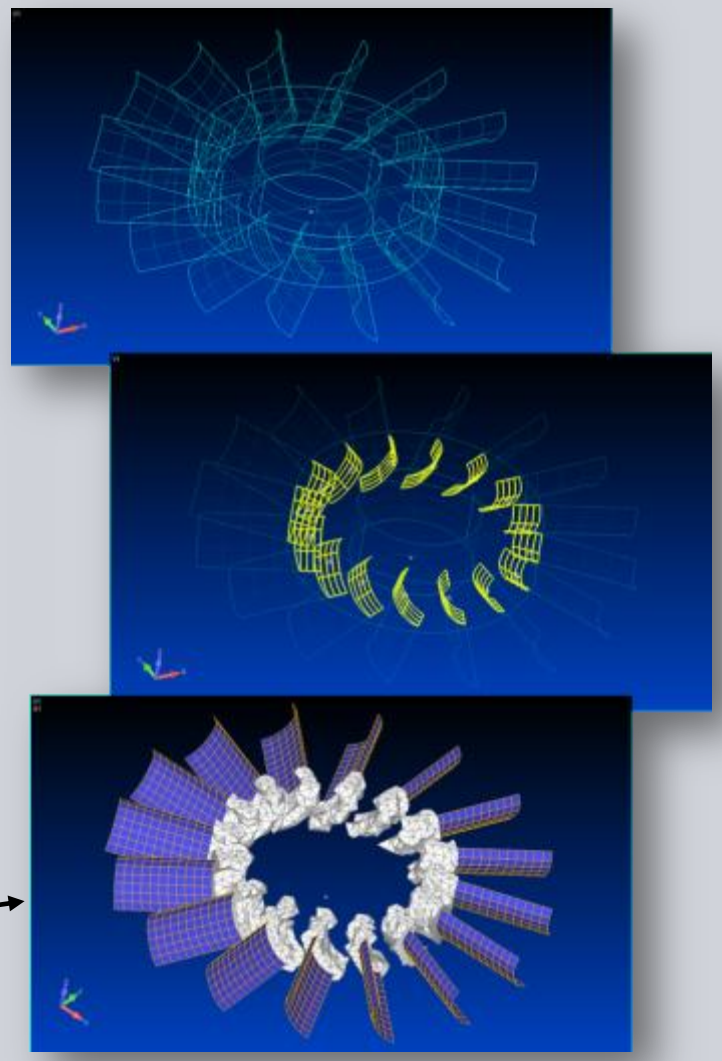
Robust **Mesh Improvement Tools**

- **Improved** Geometry Handling – **Shells** and **Solids**
- **Combine surface** geometry and **solid** geometry to join solid and shell **meshed components** together
- **Internal** faces have edges that are **T-junctions**
- Tetra Mesher handles **internal** triangles or quads and creates a **combined** shell/solid **mesh** with slight embed for moment transfer

Group with all attached shell and tet-elements



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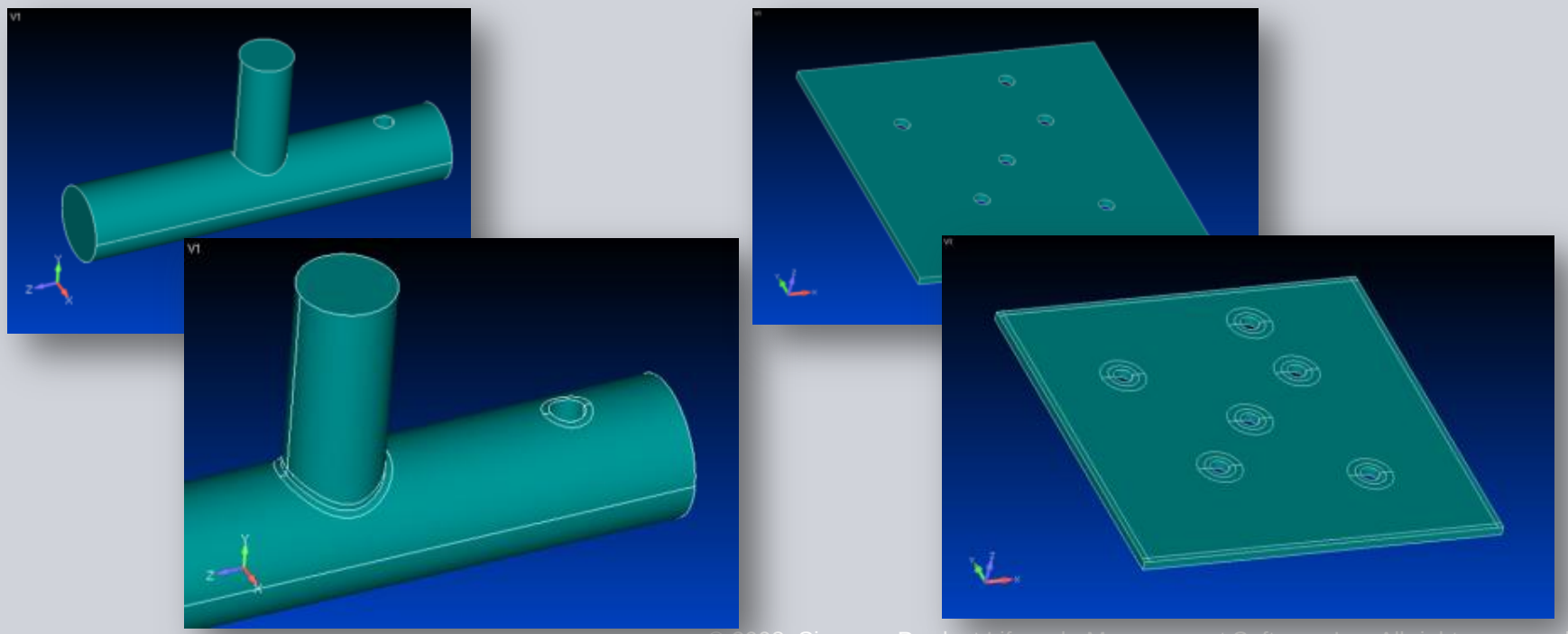
Robust **Mesh Improvement Tools**

- Mesh **Density** and **Control – Offset Curves**
- Control mesh **density around stress raisers**, like holes and fillets
- Maintain **good element shapes** minimizing distortion
- **Increase** the number of elements where **stress** gradients are **high**



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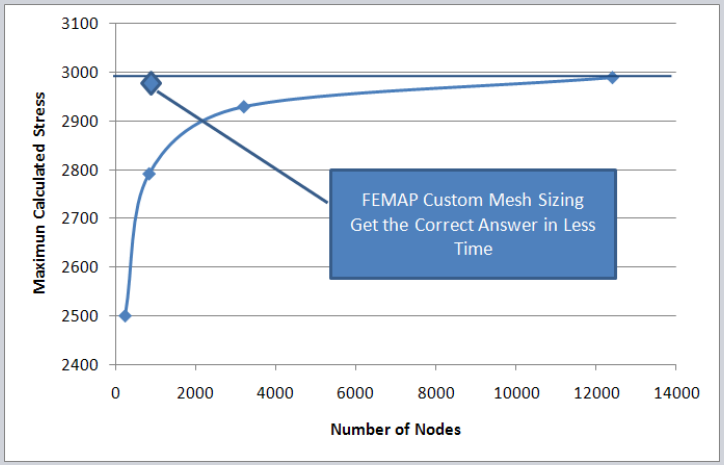
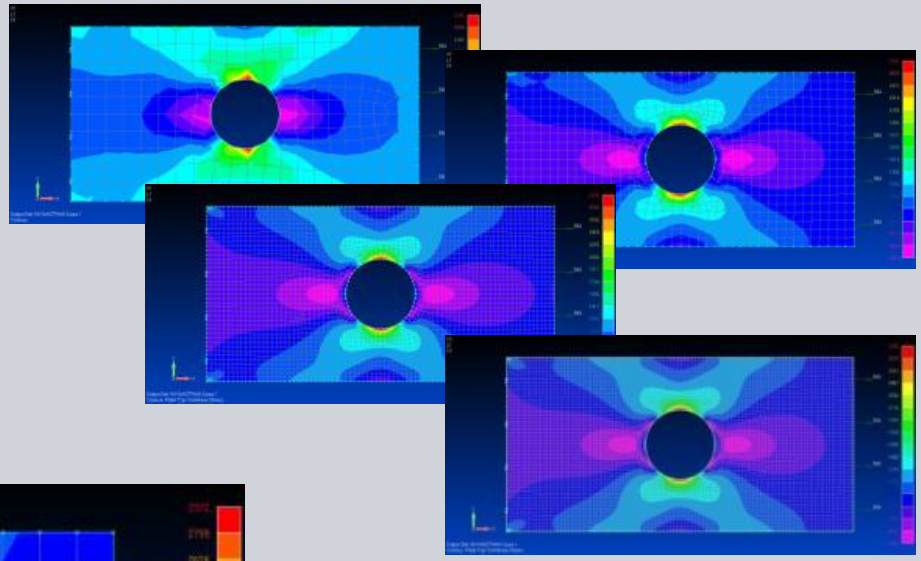
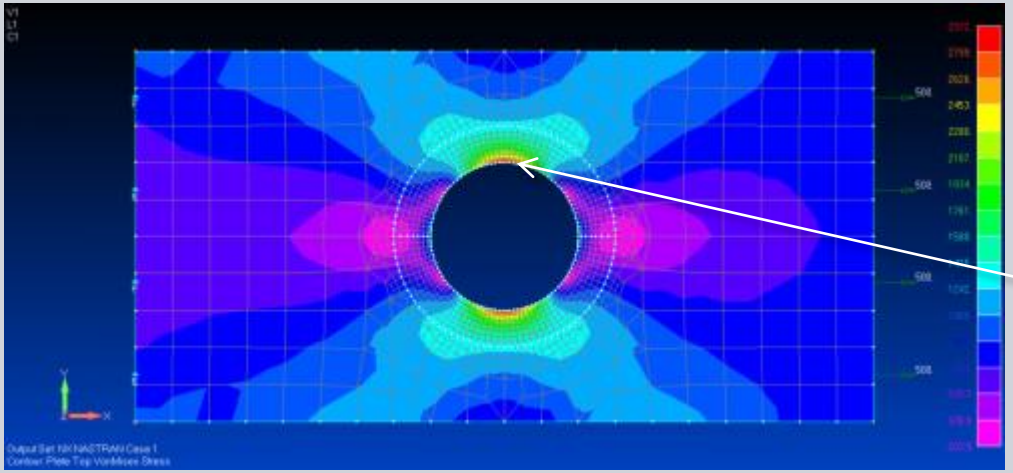
Robust **Mesh Improvement Tools**







With **Offset Curves** you can control mesh density where you need to around stress raisers
Minimize model size
Minimize analysis time
Maximize accuracy of results

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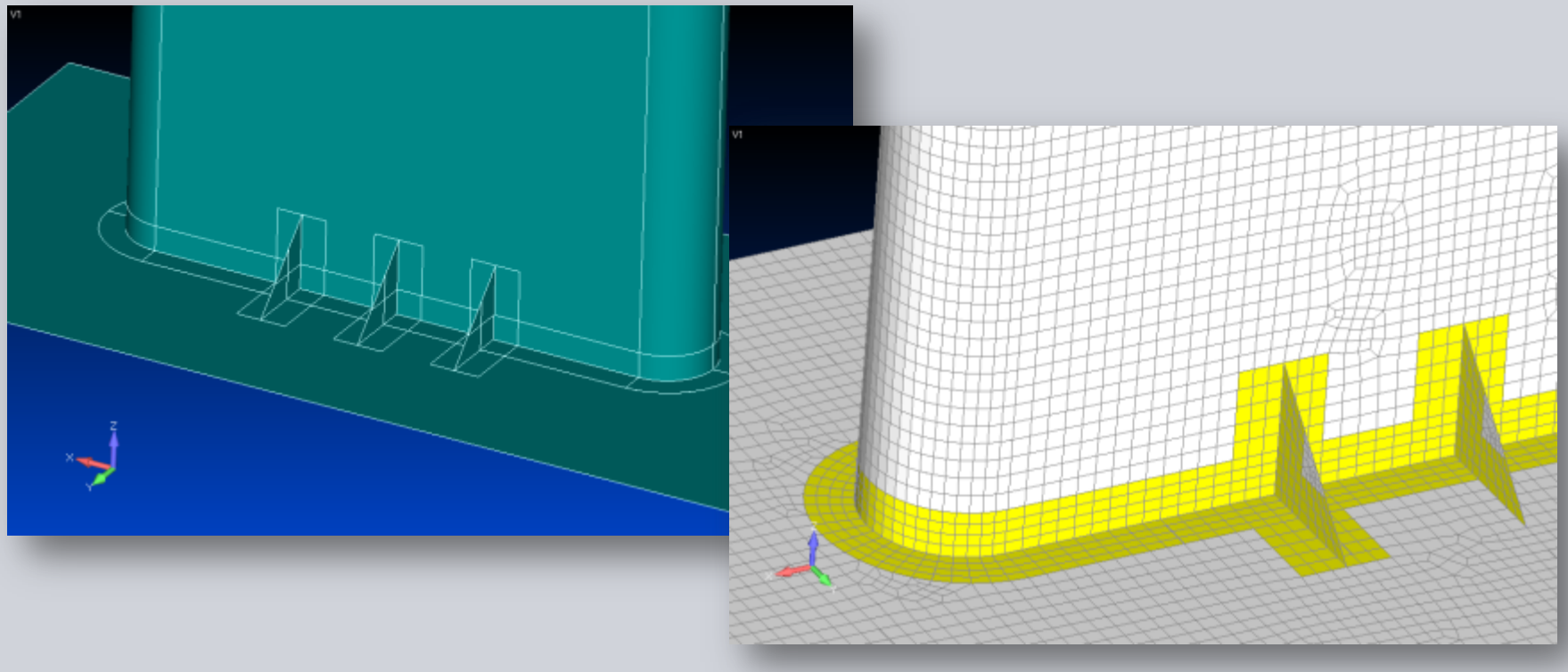
Robust **Mesh Improvement Tools**

- Mesh **Density** and **Control** – **Combined Fnctionality**
- Combine **Geometry Intersection** improvements with **Offset Curves** and can generate some awesome meshes!



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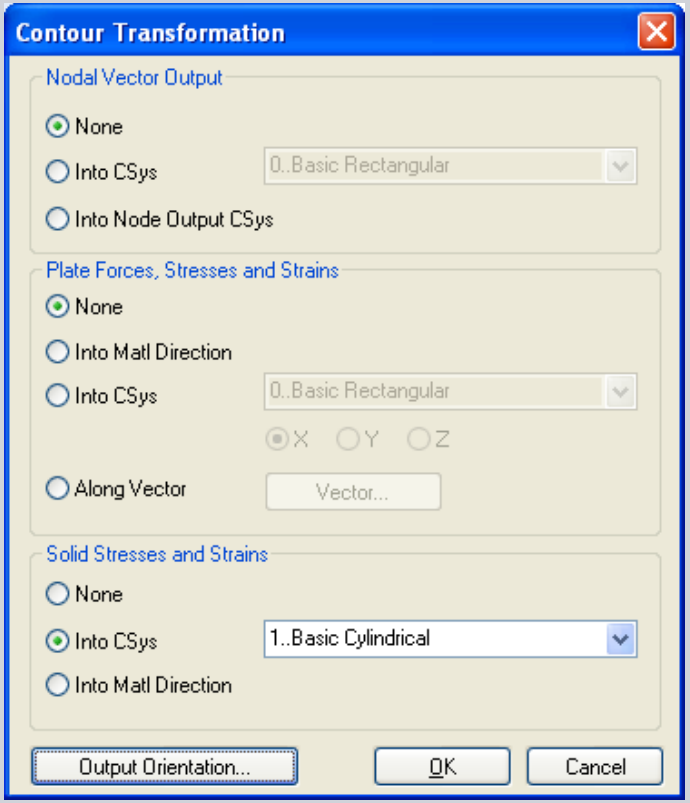
Stress and **Displacement** Transformations

Transformations

- Displacements and stresses
- **On-the-fly** transformation options

For example:

- View just the radial component of a displacement in any cylindrical coordinate system
- View hoop or longitudinal stresses



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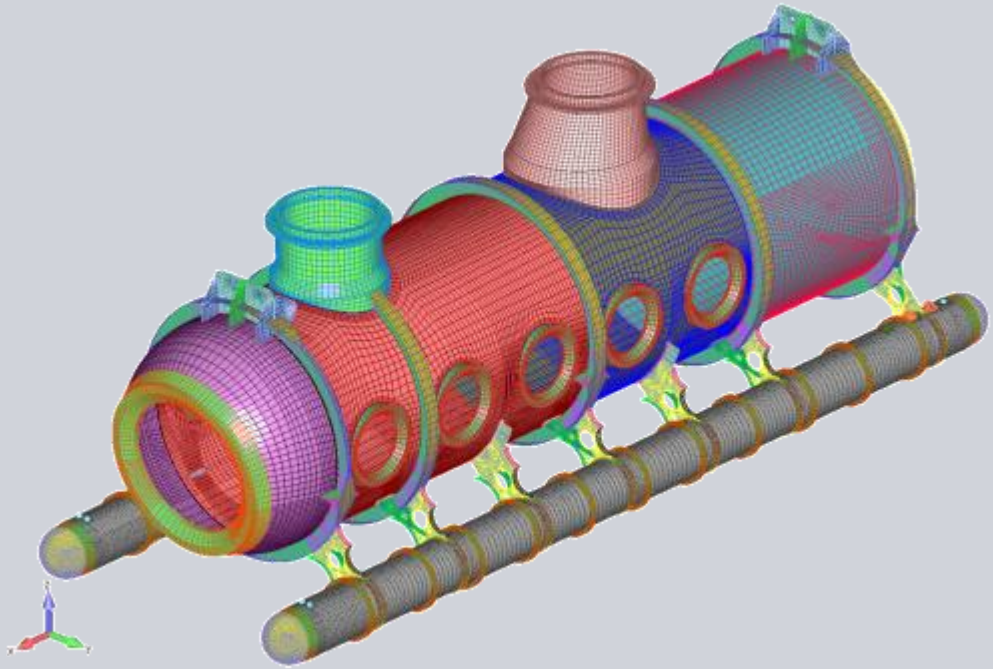
Graphics

More efficient face definition and storage

- **Faster** display
- **Reduced memory** use

Faceting

- Updated faceting gives **higher quality** images
- Faceting **match** between curves and surfaces



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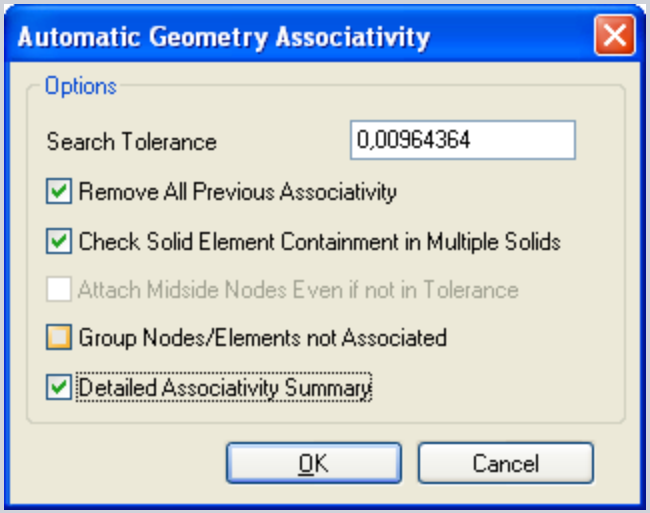
FEM **Mesh** - **Geometry Association**

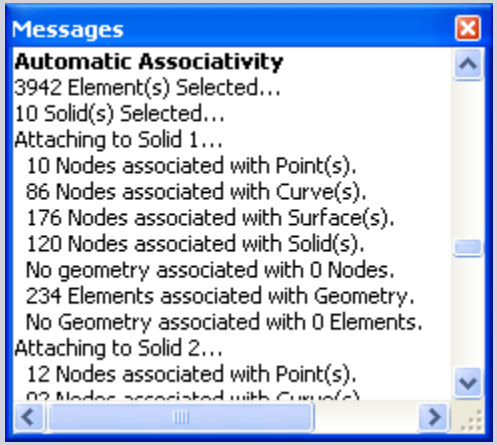
Associate **Existing** Meshes with Geometry

- Given Geometry
- Given Orphan Mesh

Femap will **automatically** associate the **mesh** with the **geometry**

- Nodes to Points
- Nodes to Curves
- Nodes to Surfaces
- Elements to Curves
- Elements to Surfaces
- Elements to Solids





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API Extensions

New API **methods** added

- AddOutput on Data Table object
- feElementFreeEdge and feElementFreeFace on the Application object
- SelectID on all entity objects
- GetCentroid, GetEdgeNodes, GetFaceNodes, and IsParabolic on the Element object

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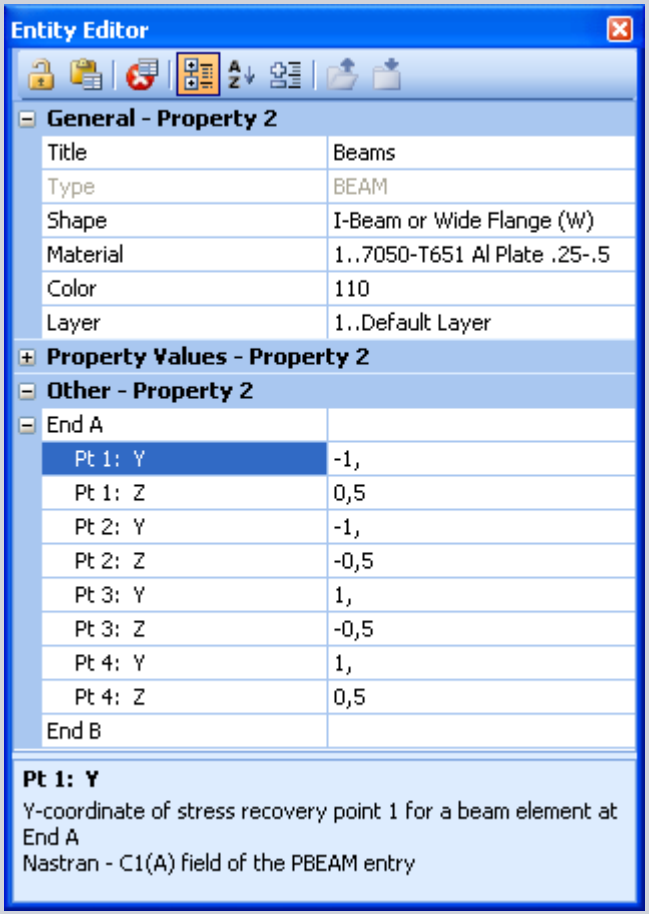
Other Features

- **Cross section dimension comments** – bar/beam cross section dimensions are written as comments in the Nastran read/write
- **File open detection** during read operation
- Nastran **single field** format **precision improvement**
- **Quad** pattern Quad_4Tria pattern mesh **available** in **mesh editing**
- **Highlighting enhancement** – highlights entities already selected when activated
- **Full Windows Vista** support



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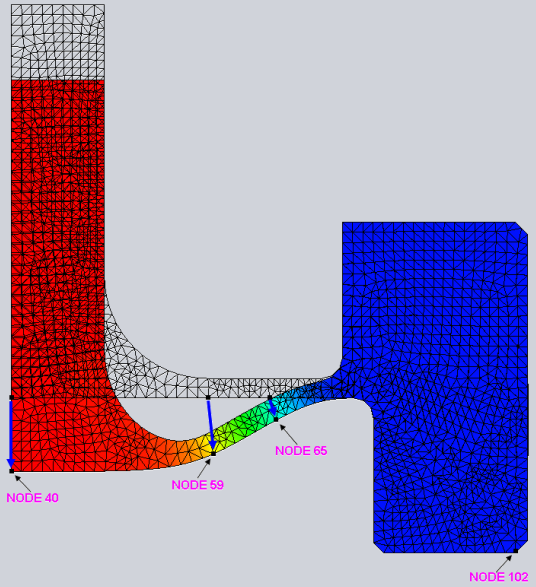
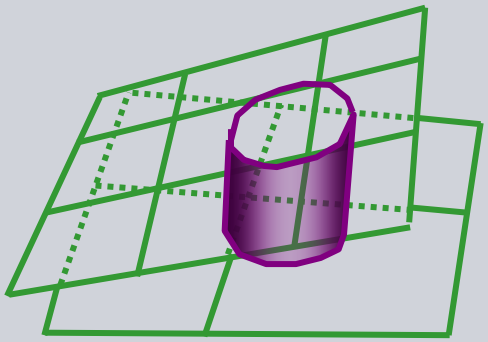
NX Nastran v6 support

- **New axisymmetric** elements (quads and trias)
- **Solution monitor** display in Femap
- **CWELD extensions** to the existing fastener and weld element – patch connection
- **CFAST** – introduction of a **new fastener** element
- **Linear contact extensions** – separation distance output
- **Glued contact extensions** – gluing of non-coincident surfaces
- **Access** NX Nastran element **quality checks**
  - Consistency between Femap and NX Nastran
- **Expand** legacy model **read functionality**
  - Thermal
  - Dynamic





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64-bit Femap with NX Nastran

Combining **64-bit Femap** with the **64-bit** capabilities of **NX Nastran** and with sufficient RAM you'll be able to preprocess and solve **larger models** in **shorter times**

"We knew that [*the 64-bit version*] would be better, but we are still amazed about it"

Mark Harrison, Engineering Manager, RPC Technologies Australia

Before: **32-bit**, 1 x dual core CPU, 4 GB RAM
250,000 nodes – 1,450,746 DOF
Elapsed time: over 2 ½ **hours**

After: **64-bit**, 2 x quad core CPU, 16 GB RAM
250,000 nodes – 1,450,746 DOF
Elapsed time: 4 ½ **minutes**

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Thanks!

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