



# Webinar: **What's New In NX and Simcenter 3D 12**

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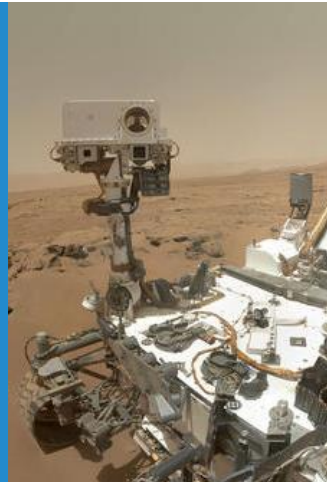
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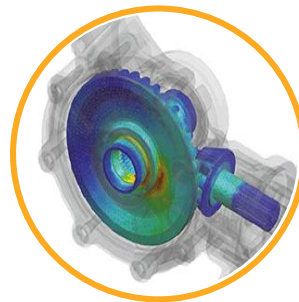
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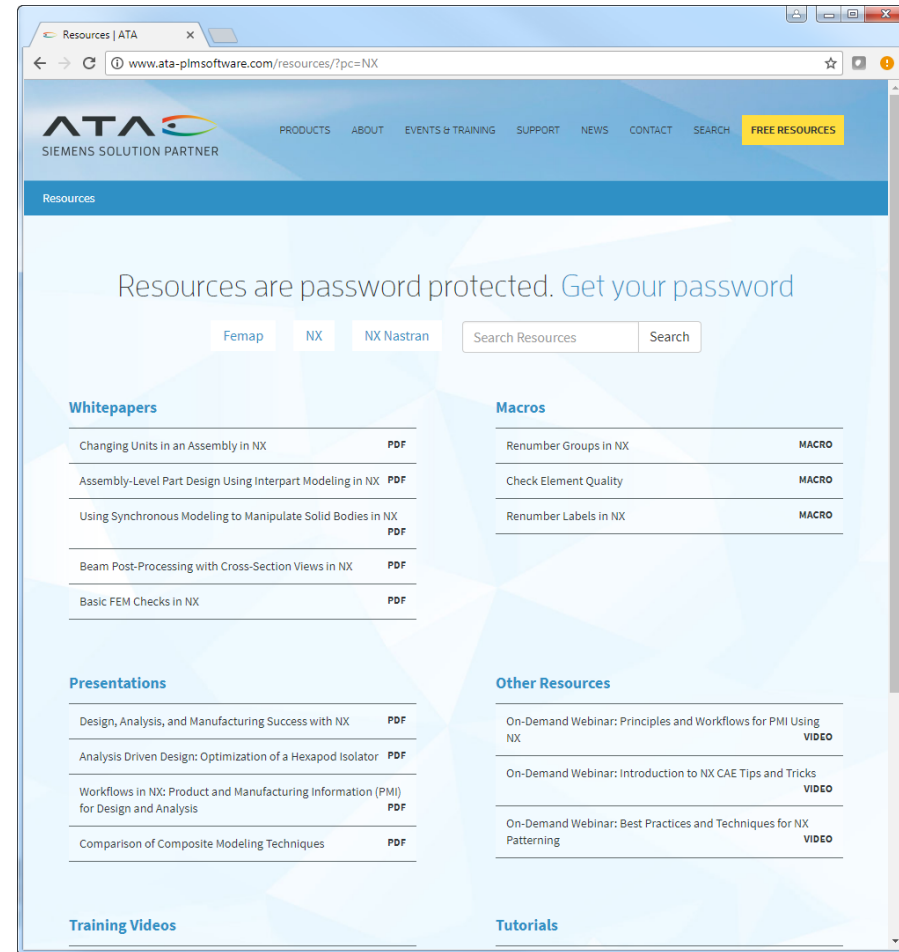
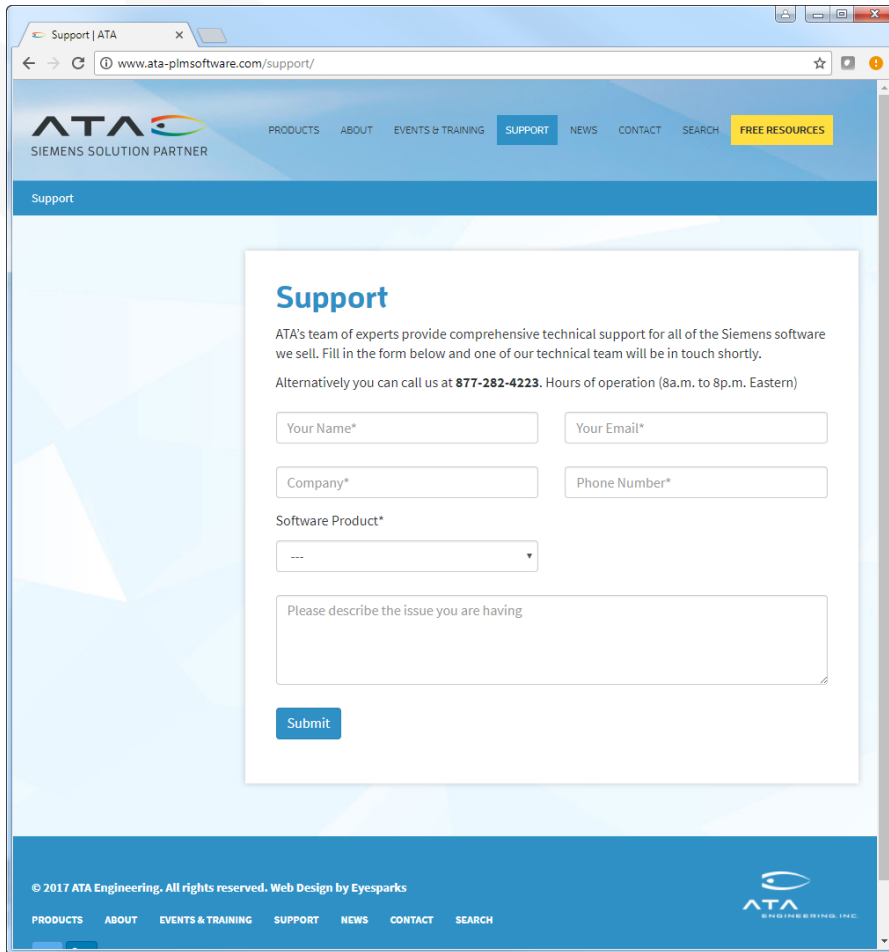
➤ Developer of the official NX Nastran training materials

➤ Preferred North American provider of NX Nastran training



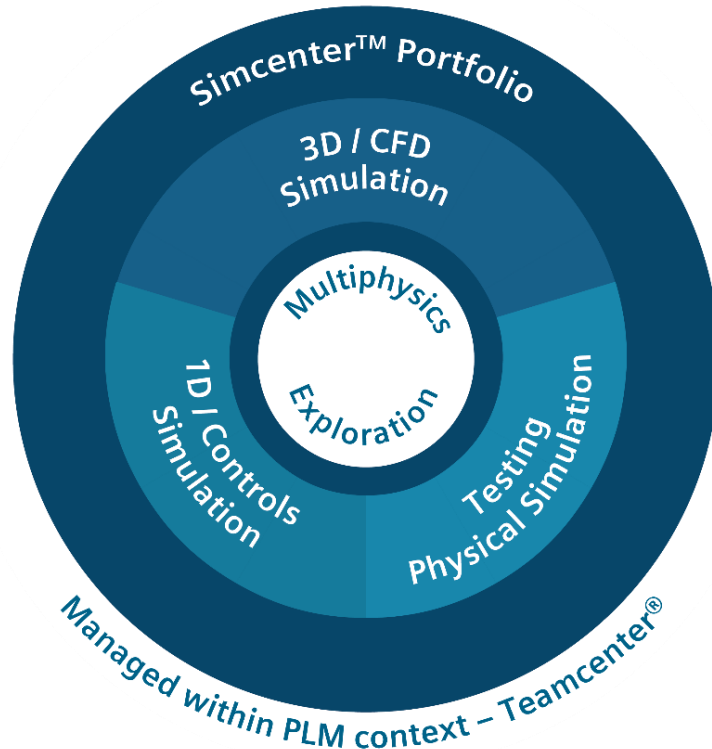
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# Introducing Simcenter 3D

- Supporting Generative Design
- Efficient Model Build
- Postprocessing Usability
- General Enhancements



# Enhancements Fall Into Four Categories

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## Modeling

- Convergent modeling enhancements
- Face from mesh tool
- Lattice tool for designing lightweight structures
- Variable offset face tool
- Assembly modeling improvements

## Pre/Post Continuous Improvements

- Topology optimization improvements
- Selection recipes
- New results viewer
- Mesh point enhancements
- 2D meshing
- Tet meshing
- Swept meshing
- Mesh control improvements
- Copying and rotating elements
- General enhancements

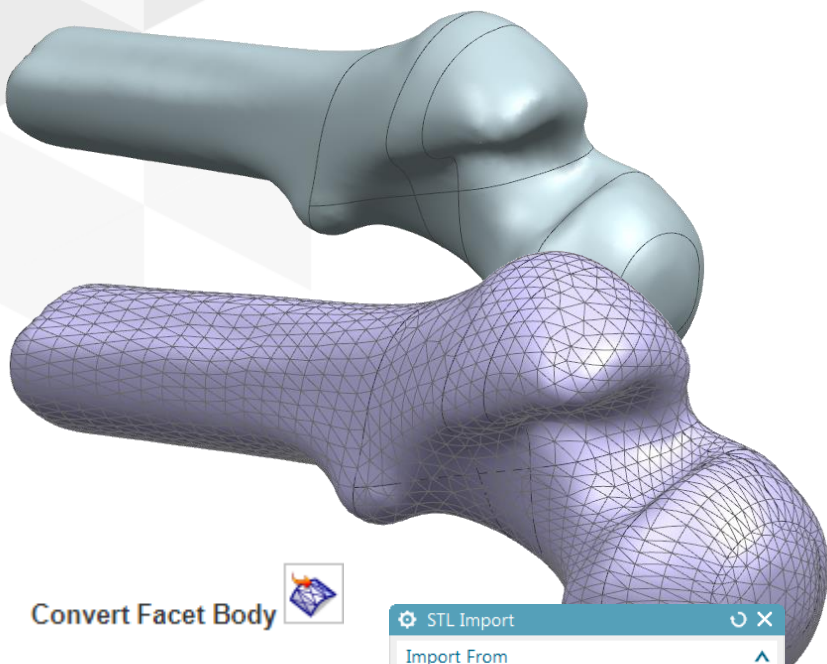
## User Interface

- Multiple display parts
- New zooming and deselecting gestures
- 3D box selection
- Undo enhancements

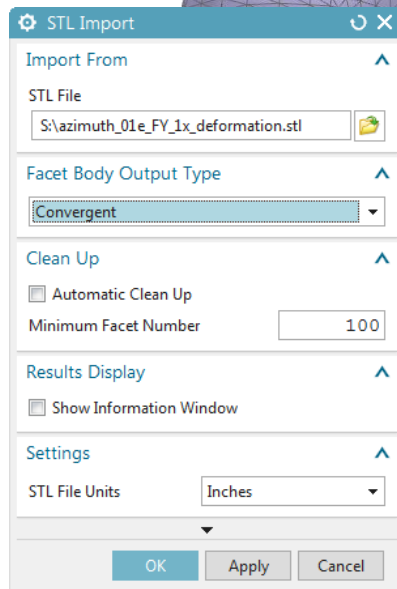
## Expanded Nonlinear Solutions

- SOL 401 new capabilities
- New SOL 402 for systems with rigid body mechanisms
- Expanded capabilities for composite materials

# Convergent Modeling Enhancements



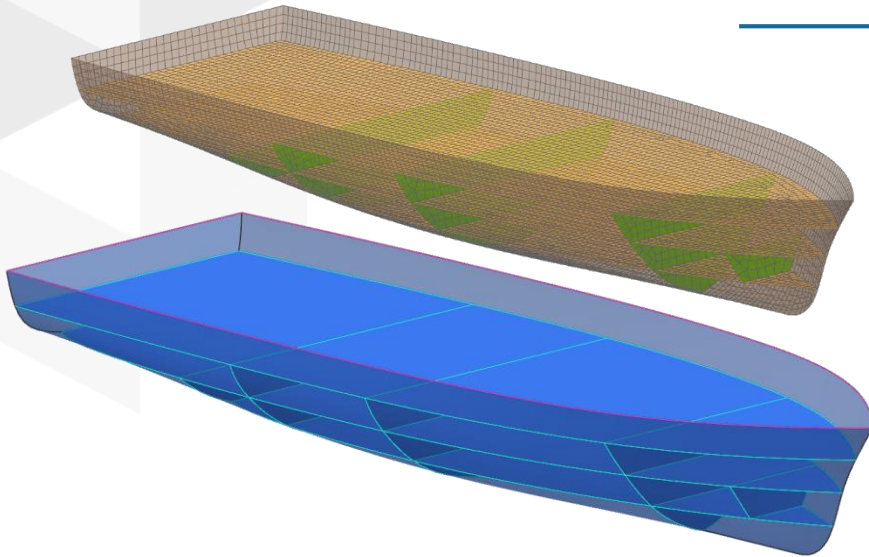
Convert Facet Body



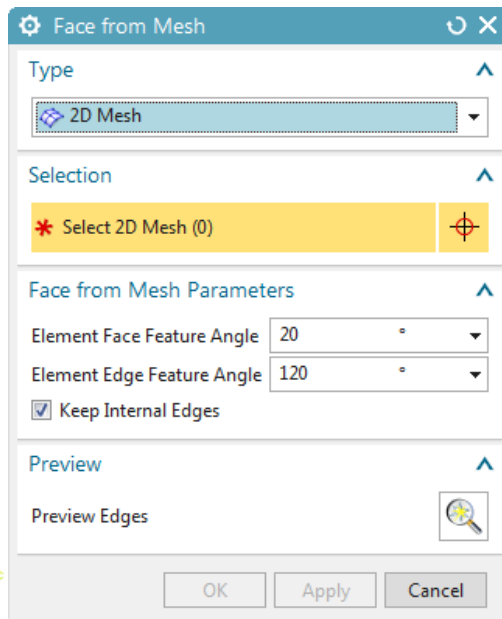
- First introduced in NX 11
- What is convergent modeling?
  - Working with solids, surfaces, and facets without having to do any geometry conversion
- Allows the user to quickly carry out studies on data from 3D scans
- Can now perform CAE analysis directly on facet bodies without converting to polygon bodies
- Use the *merge facet faces* or *divide facet faces* tools to create a useful topology
- Tools like *offset facet body*, *create transition*, and *local offset* give groundbreaking control of facet bodies to the user



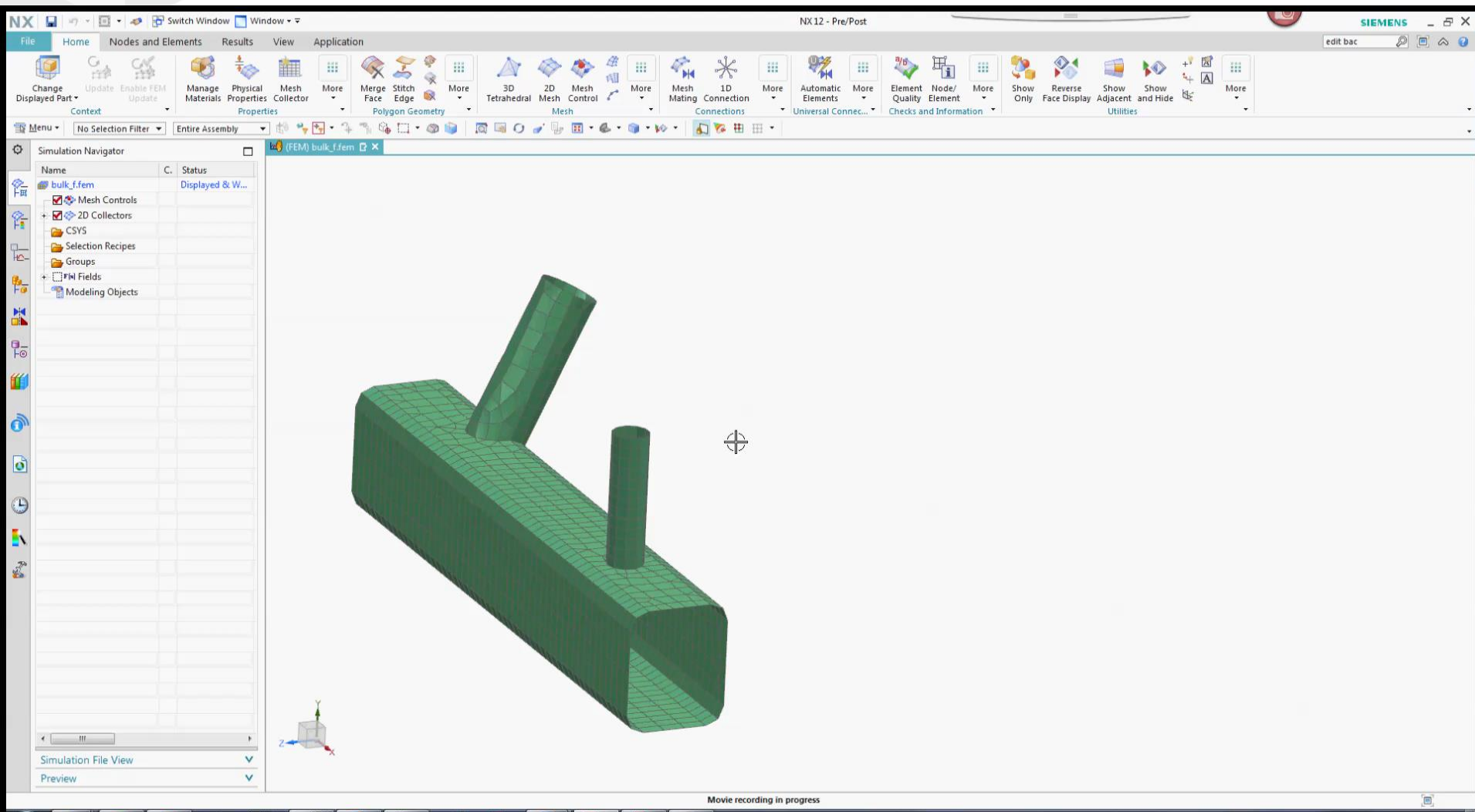
# Face from Mesh



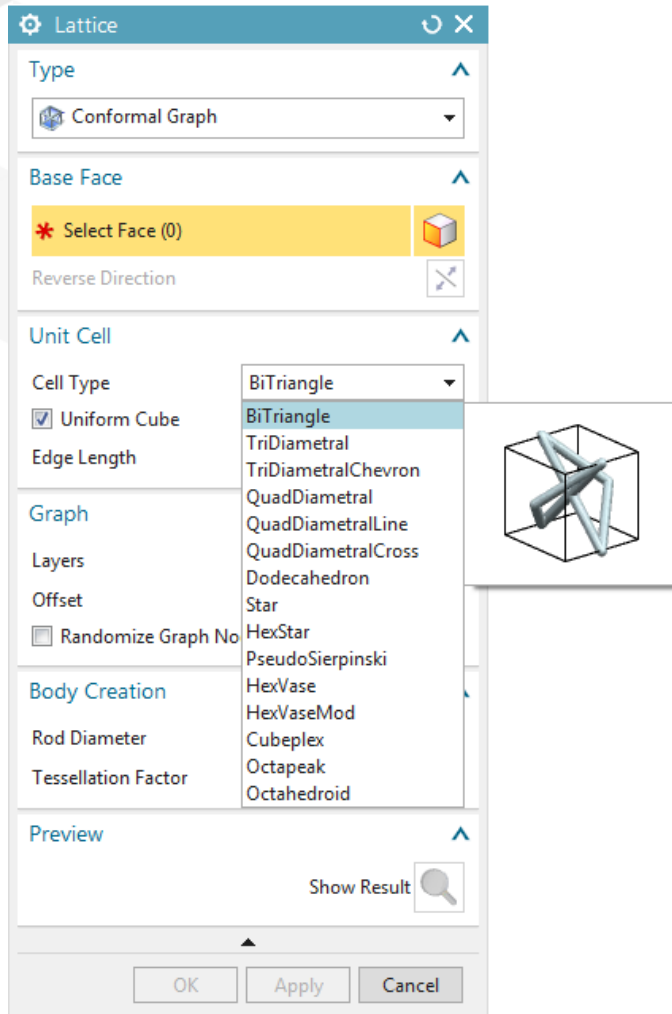
- Bring legacy mesh data to life
- Automatically convert meshes into polygon faces and bodies
- Rapid creation of new geometry for orphan meshes
- Make design changes using modeling tools and update the mesh
- New *2D Mesh* selection type added to command



# Face from Mesh: Demo

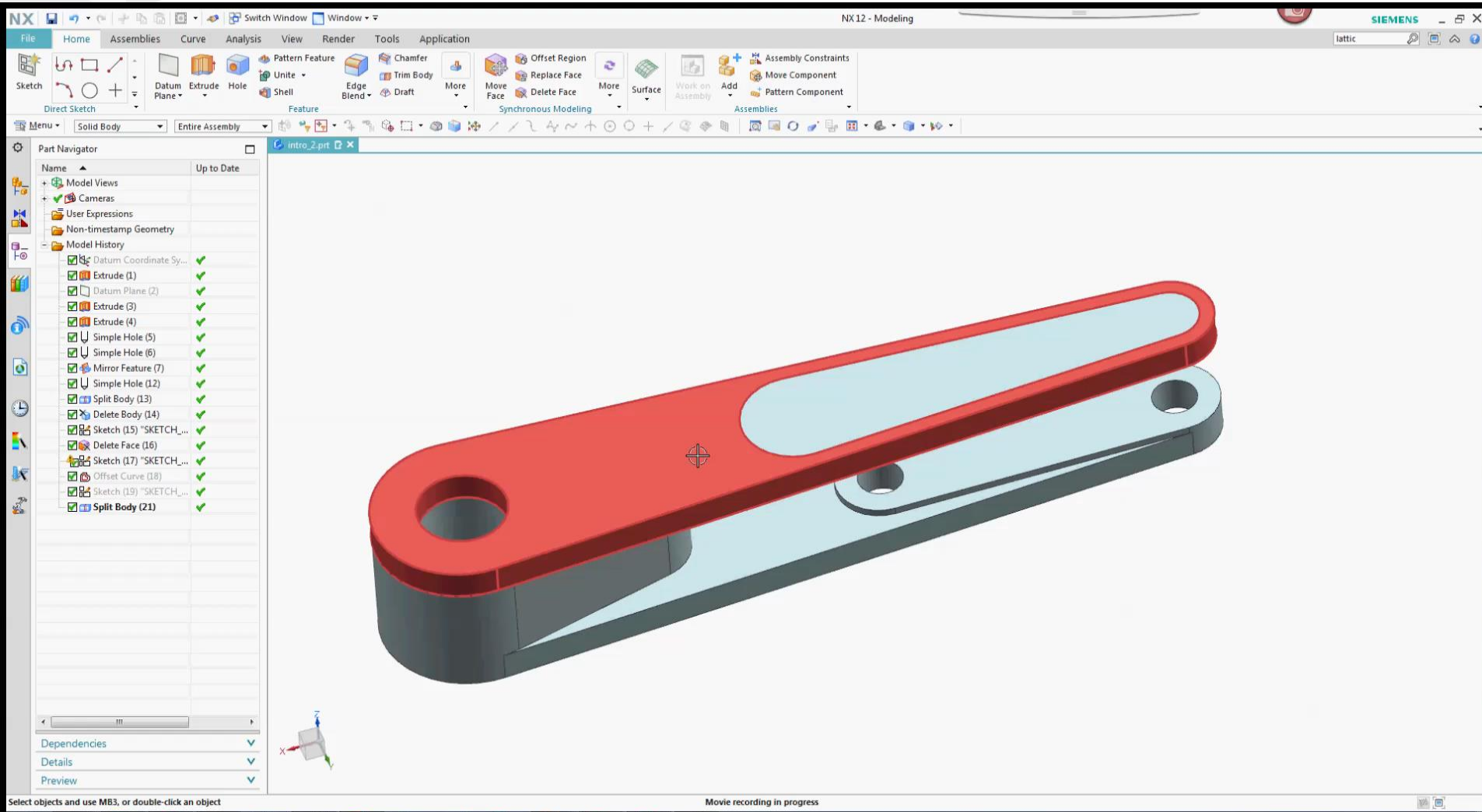


# Lattice Tool for Lightweight Structure Design



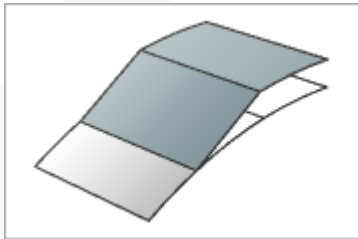
- Easily fill internal volume or surfaces with lattices
- Note that lattices are represented as facets
- Great tool for additive manufacturing

# Lattice Tool: Demo

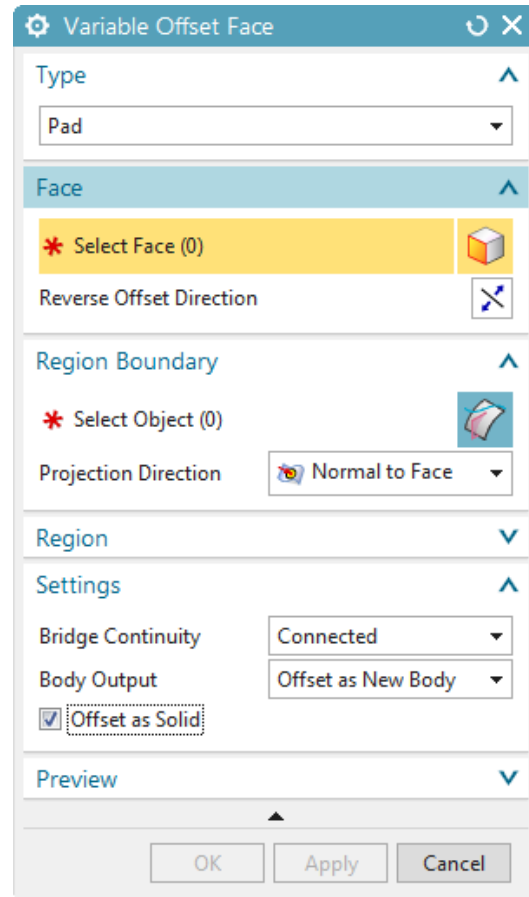
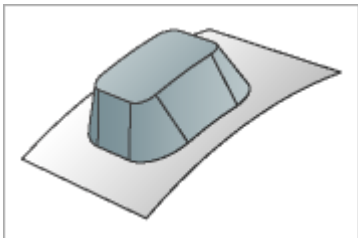


# Variable Offset Face

Panel

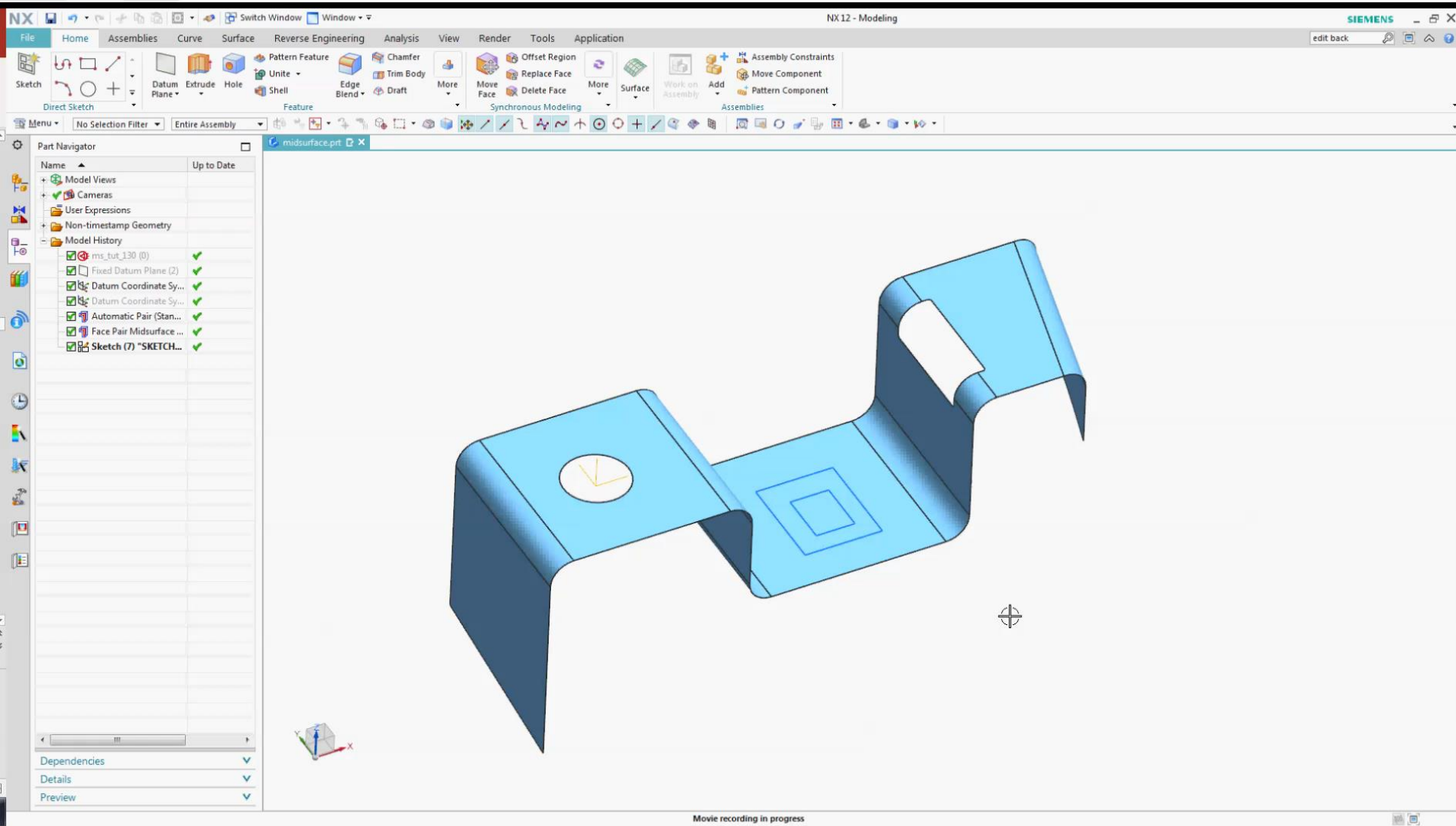


Pad

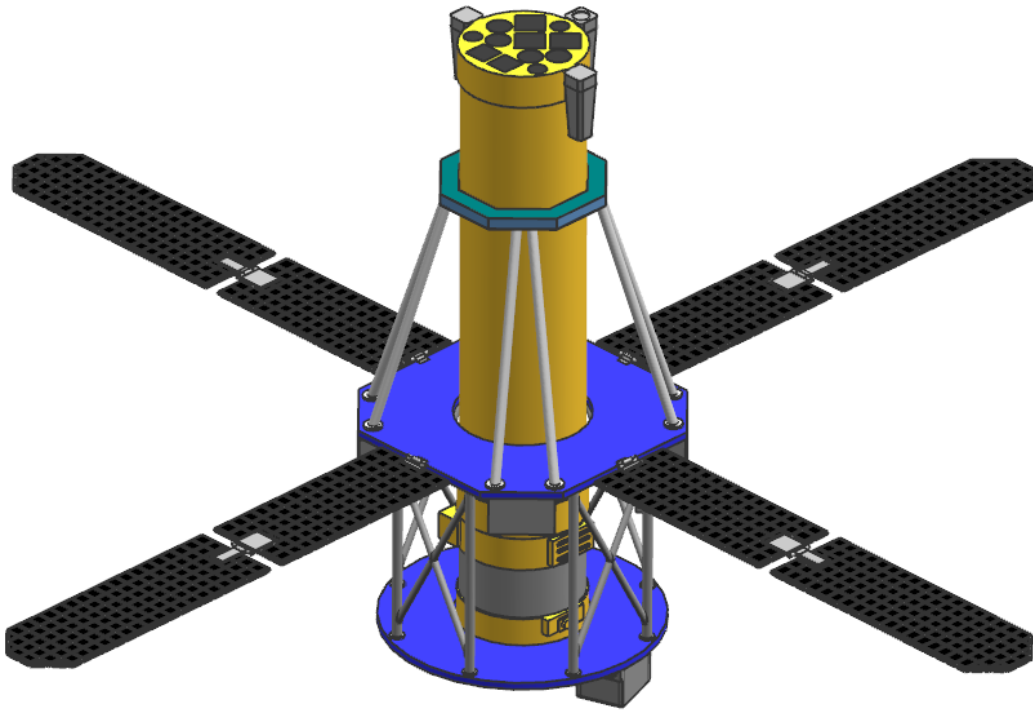


- Added new *Pad* offset face type
- Now have the option to *Offset as Solid*
- Useful for creating lightweight parts and embedded electronics

# Variable Offset Face: Demo

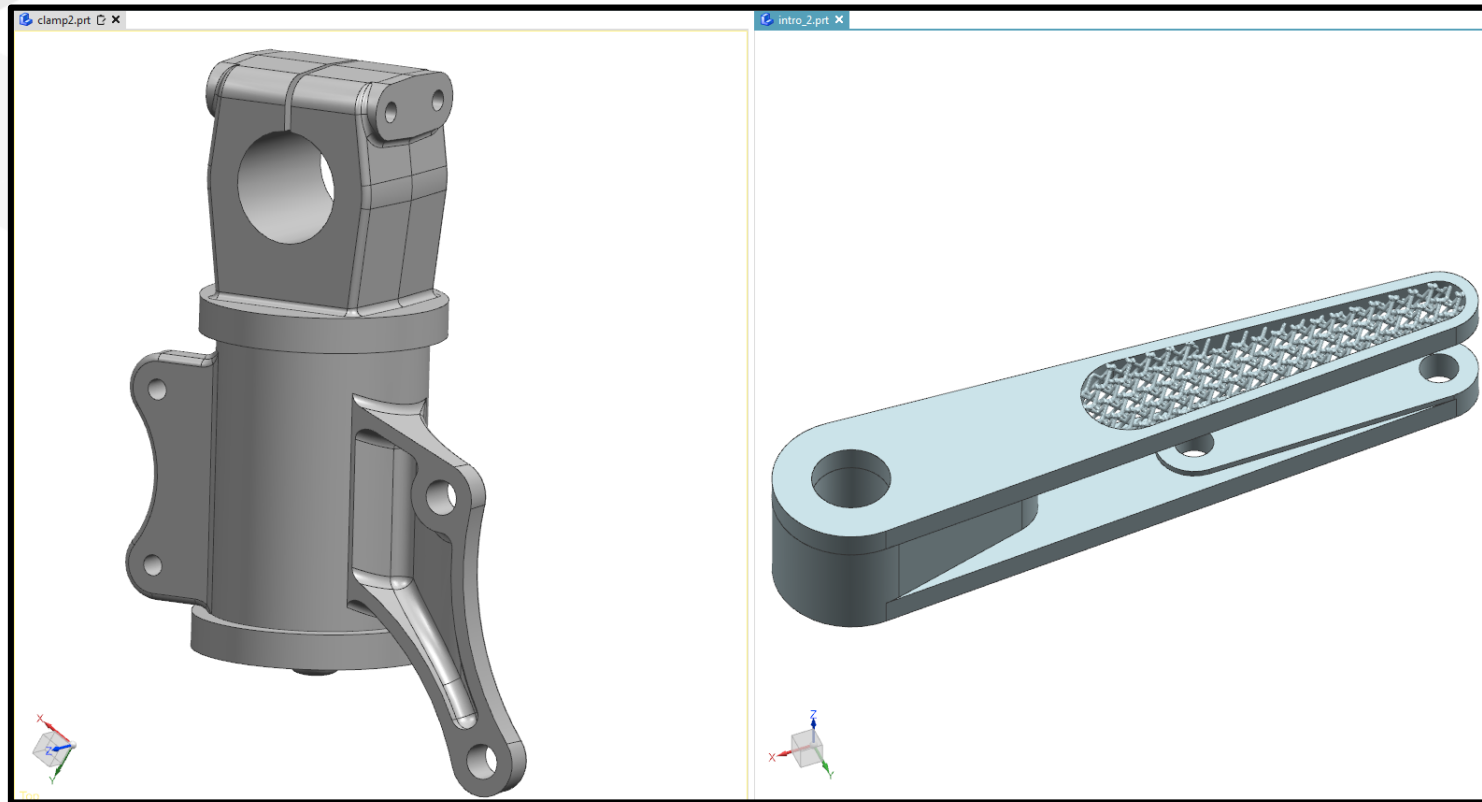


# Assembly Modeling Improvements



- Large assemblies now load much quicker and use less memory
- You can now load larger assembly models than ever before
- Now a single user interface for adding components to an assembly
- New smart component snapping to location based on assembly context

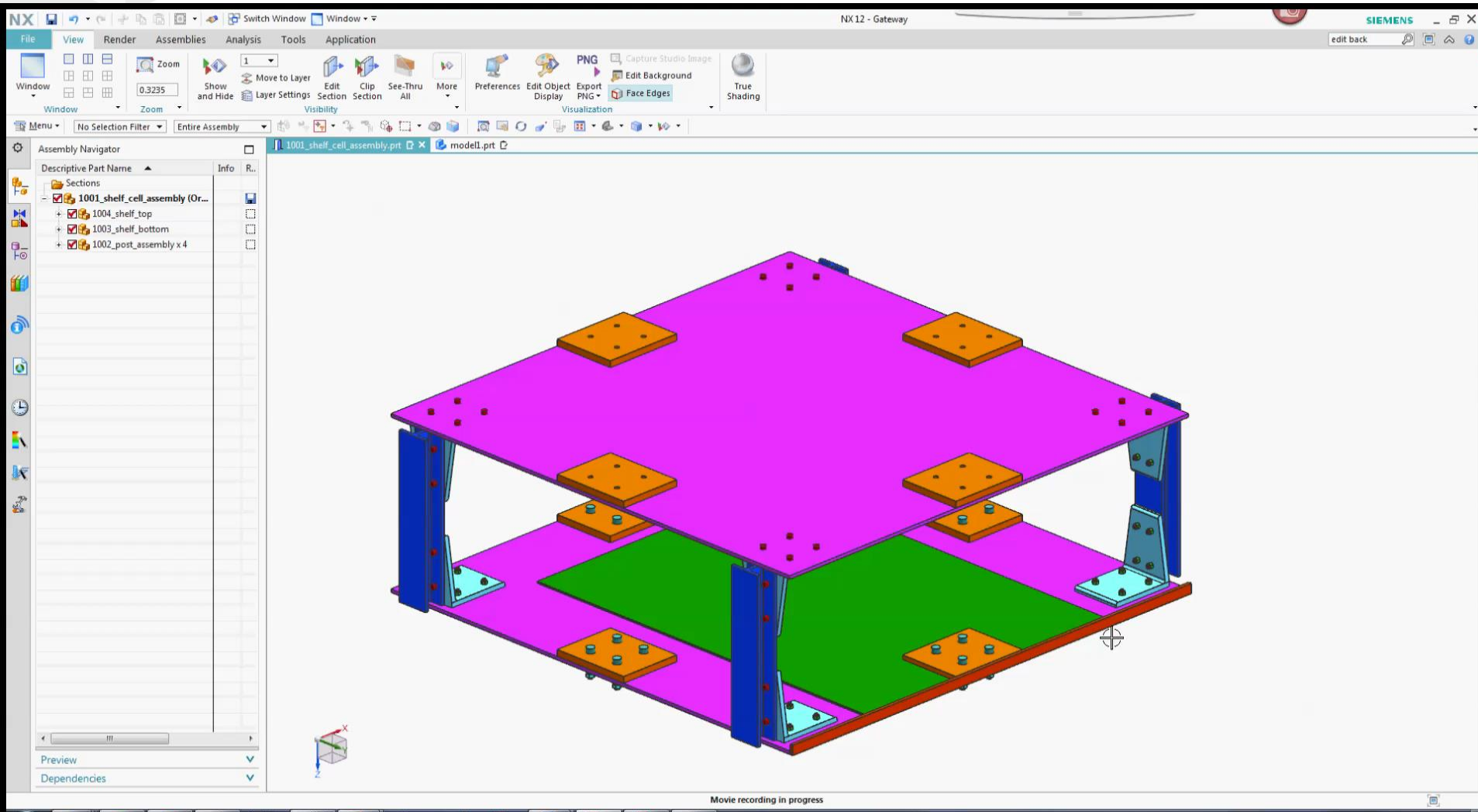
# Multiple Display Parts



- Can now display multiple parts in separate windows in NX
- You can also display parts in split screen
- See how modifying a part will directly effect an assembly
- Switch between parts and applications easier
- Available in all NX applications



# Multiple Display Parts: Demo



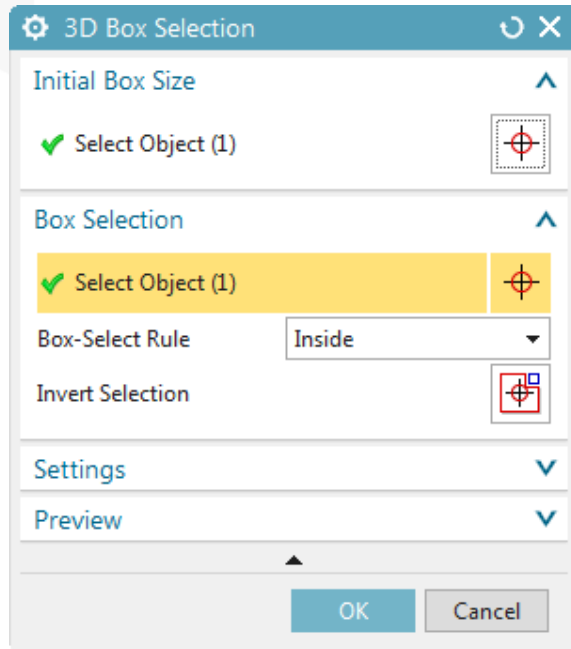
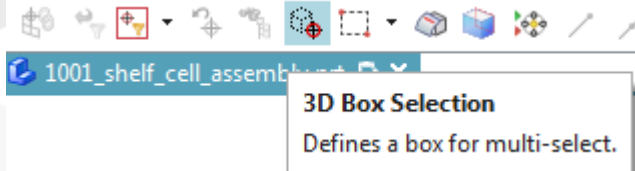
# New Zooming and Deselecting Features

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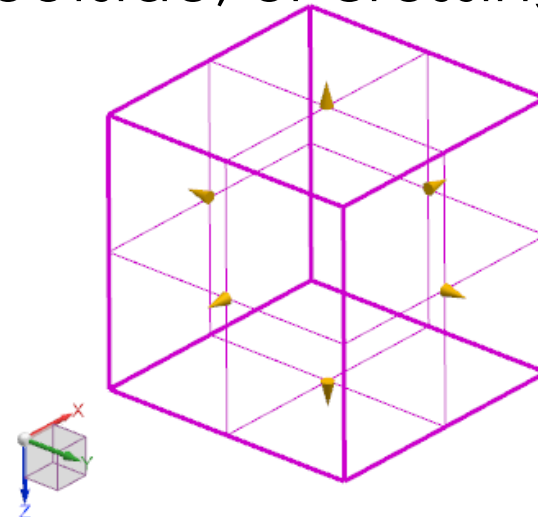


- New features have been added to allow the user to more efficiently use NX
- You can now double click in the background to fit your part to your view (can still use CTRL + F)
- You can now single click in the background to deselect any object (can still use ESC)

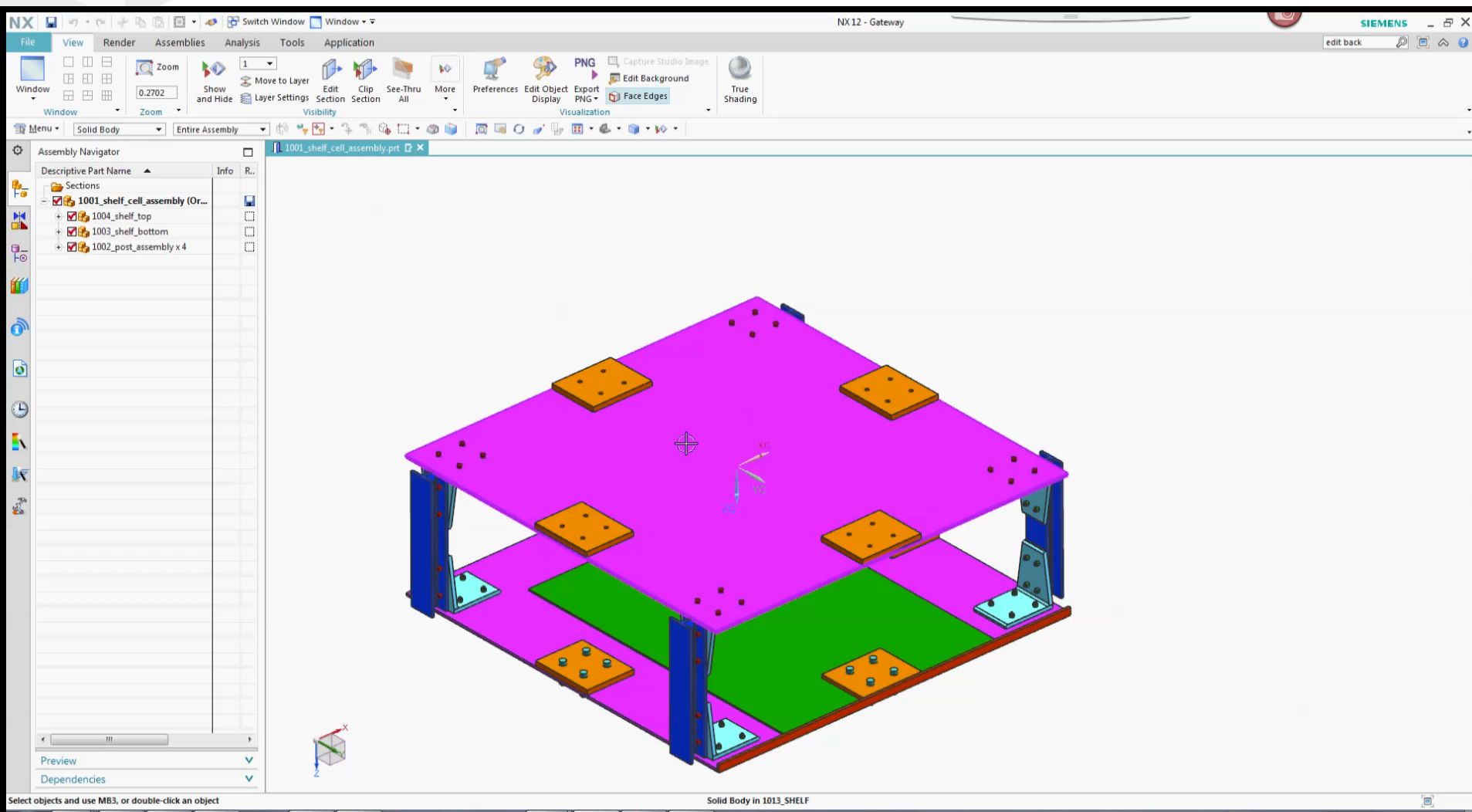
# 3D Box Selection



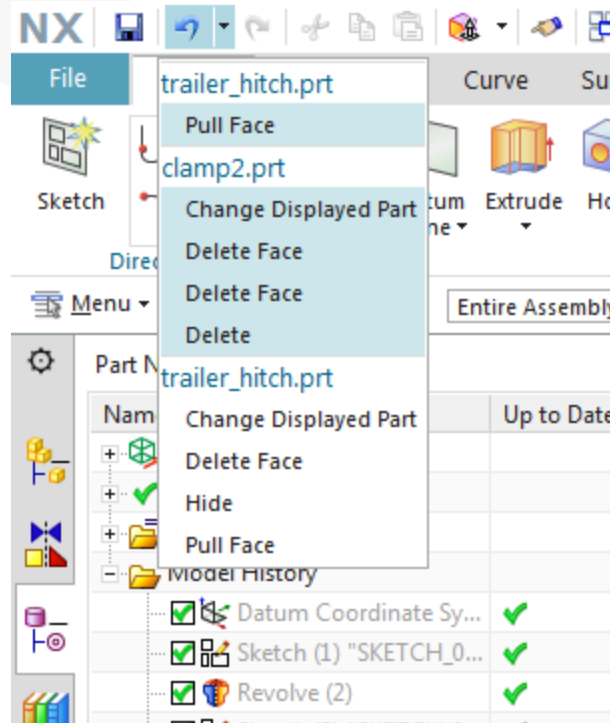
- New 3D box selection allows you to easily select parts in complex assemblies
- You can fully define size of the box
- You can specify the selection as what is inside, outside, or crossing the box



# 3D Box Selection: Demo

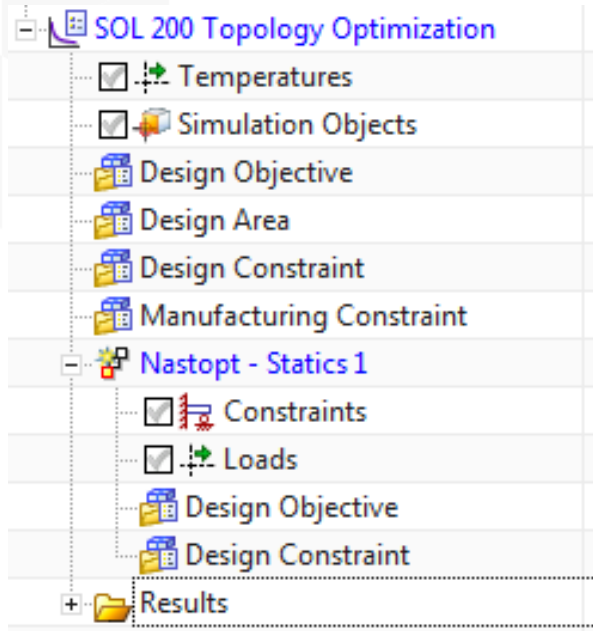


# Undo Enhancements



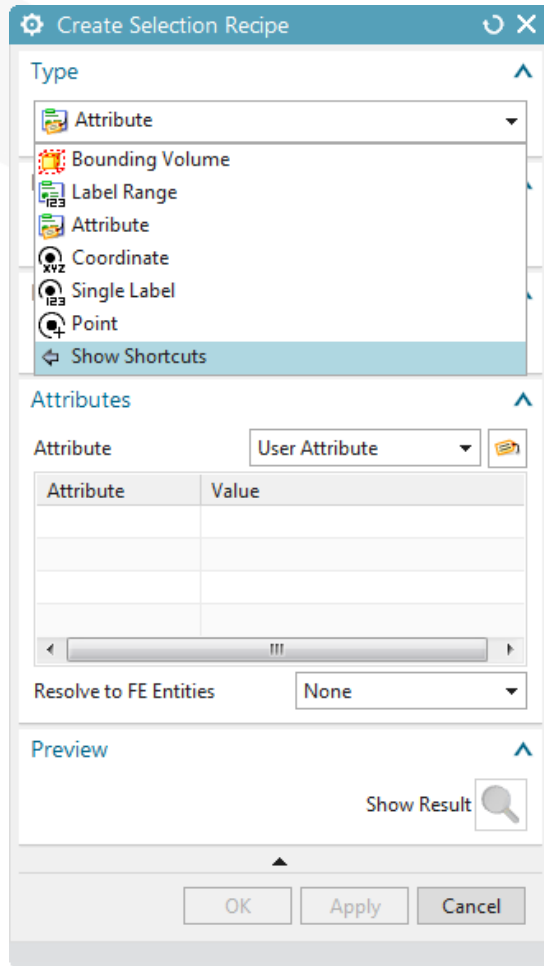
- Can now undo all of your commands from the undo list
- You can also visualize which commands are reverted when you click a particular item in the undo list
- Undo list now shows which part the command was executed in

# Topology Optimization



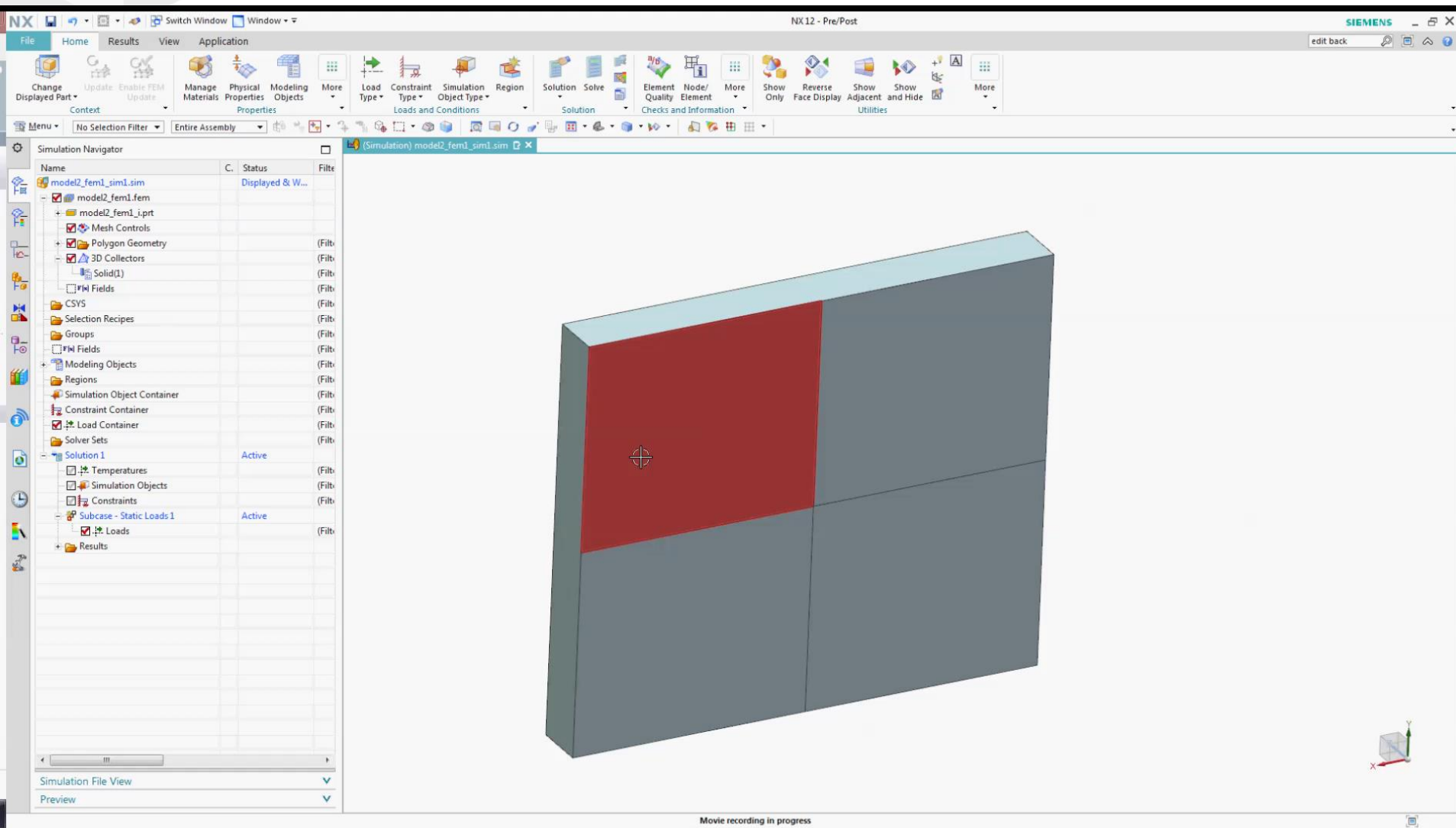
- Reduce weight and design complexity while maintaining structural characteristics of assembly
- Optimize design by taking into account multiple load cases and manufacturing constraints
- Output from topology optimization is generally faceted data, thus convergent modeling tools can be very useful for working with these parts
- Can now create a SOL 200 topology optimization solution

# Selection Recipes



- Selection recipes let you select FE or geometric entities based on a set of rules
- Can show/hide or apply loads/constraints to entities in your selection recipe
- Create data or select results to be displayed by attribute, bounding volume, single label, label range, coordinate, or point

# Selection Recipes: Demo





# New Results Viewer



Simcenter 12.0 Results Viewer

Post View

Result | Display | Deformation | Legend

Result Selection

101A

Static Step 1

Result Type

Rotation - Nodal

Magnitude

Result Combination

Combine At: None

Include Midnodes

Coordinate System

Coordinate System: Absolute Rectangular

Units: °

Scale: 1.0000

Absolute Value

Apply dB Scaling

dB Scaling

dB Factor: 20

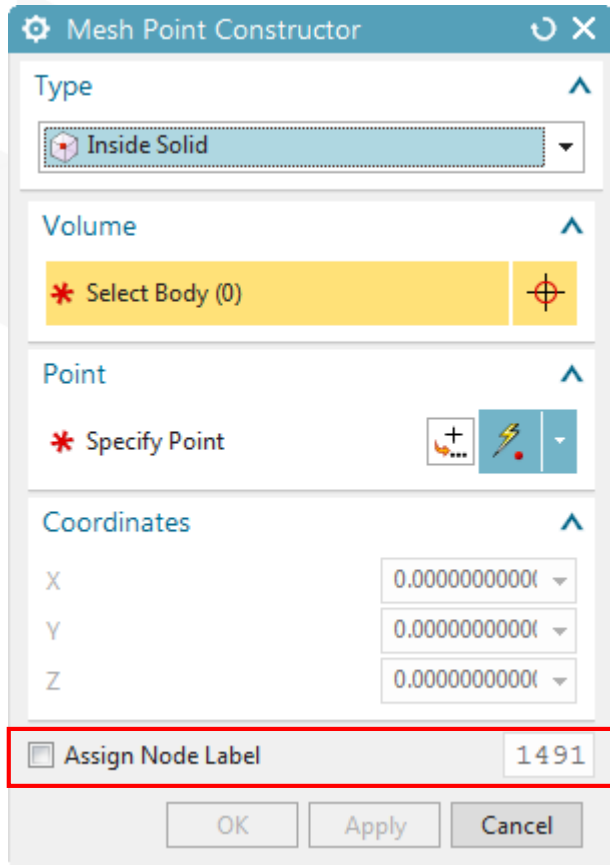
dB Reference: 1.0000

Reset to Defaults

OK Apply Cancel

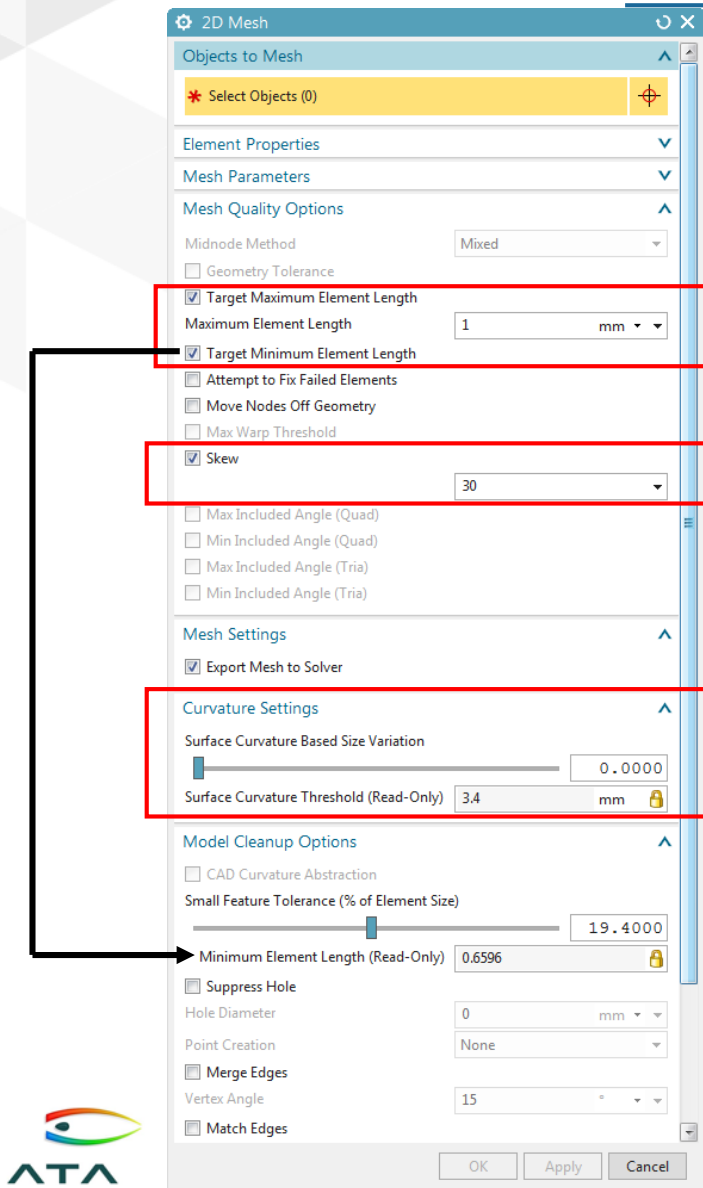
- New lightweight Simcenter 12.0 results viewer application
- View results without opening the entire Simcenter interface
- Can share results without Simcenter Pre/Post or Motion license
- New *Edit Post View* Dialog Box helps streamline post-processing by combining Set Result dialog

# Mesh Point Enhancements



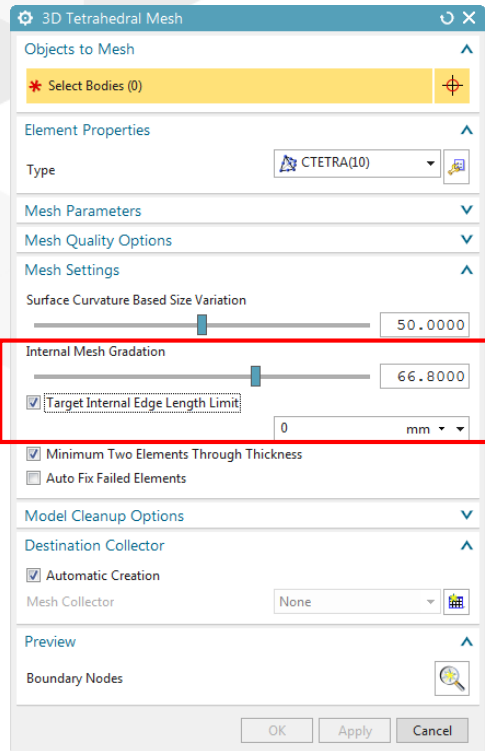
- Use new *Inside Solid* mesh point type to create a mesh point in the interior of a volume
- Use new *Assign Node Label* option in Mesh Point Constructor to specify node ID for node created at mesh point

# 2D Meshing Improvements

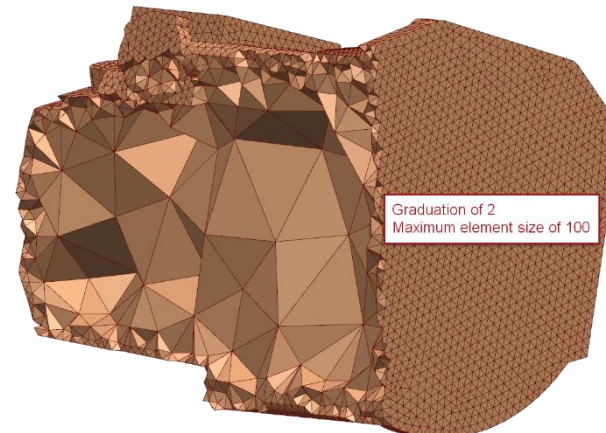
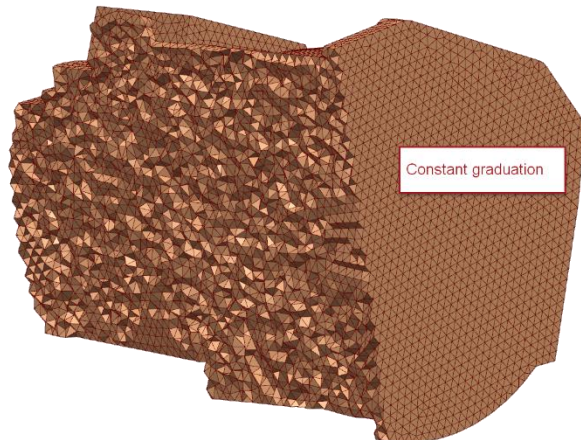


- New quality options such as *Target Maximum or Minimum Element Length*
- Check the *Skew* box to specify the maximum skew angle
- New *Surface Curvature Based Size Variation* slider replaces *Curvature Based Size Variation*
- Improved surface curvature refinement
- *Surface Curvature Threshold* box displays smallest element size based on variation slider parameter.

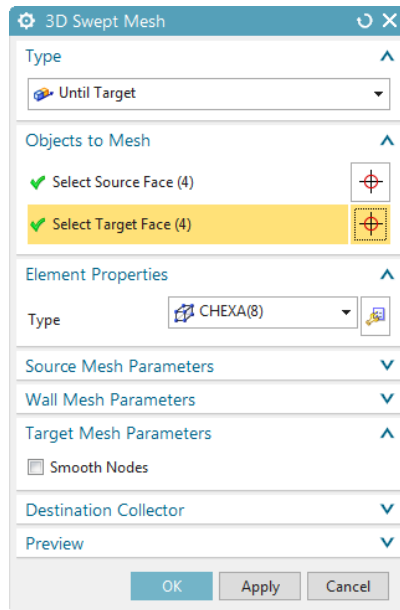
# Tetrahedral Meshing Improvements



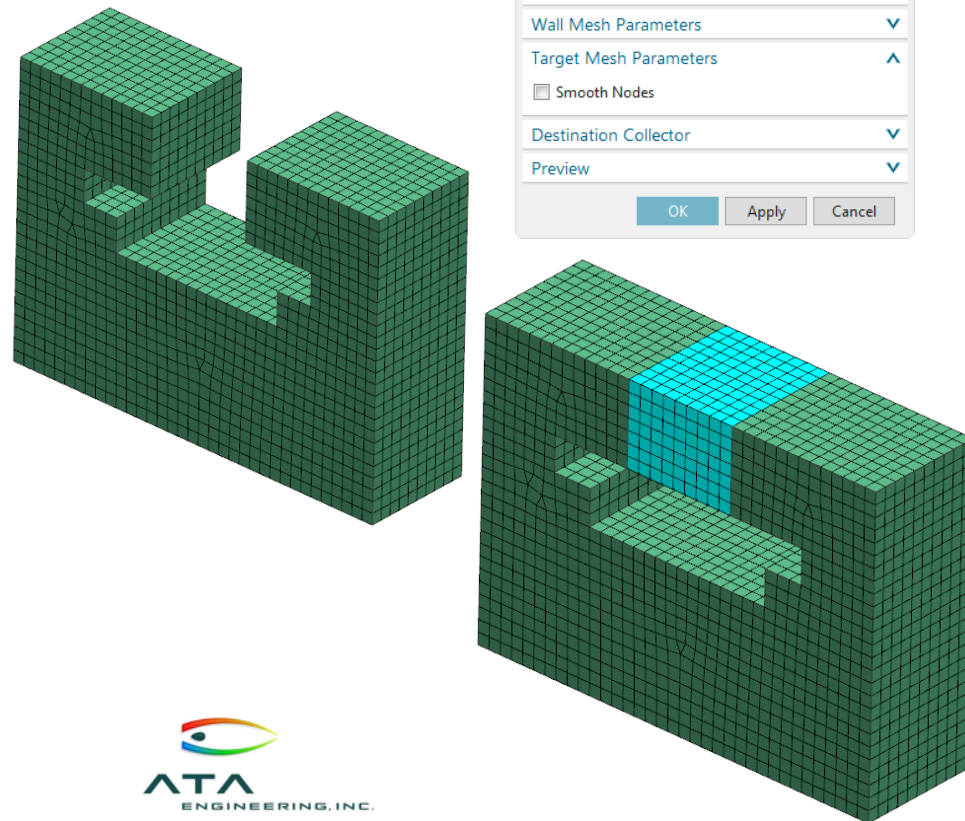
- *Internal Mesh Gradation* replaces *Element Growth Rate Through Volume*
- *Internal Mesh Gradation* slider defines the value that the software uses for increasing the length of one internal element edge to the next internal edge
- New *Target Internal Edge Length Limit*
- Constant gradation through volume would be a value of 1



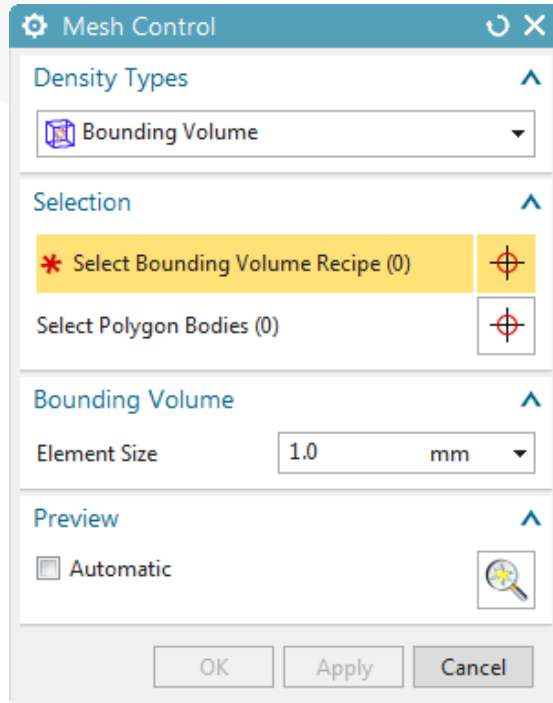
# 3D Swept Meshing Improvements



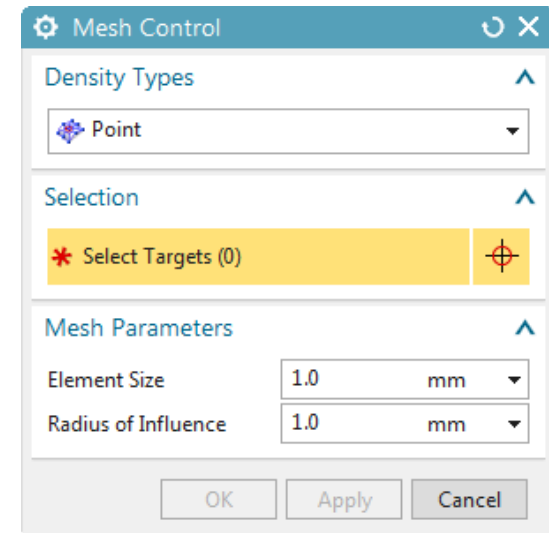
- Can now sweep a mesh from multiple source faces onto multiple target faces
- Could only sweep to a single target face in the past
- Selected number of source faces must match selected number of target faces and similar topology
- Can now use *Manual Between* type swept mesh using source and target faces in the same body.
- This can be useful for filling in voids in geometry



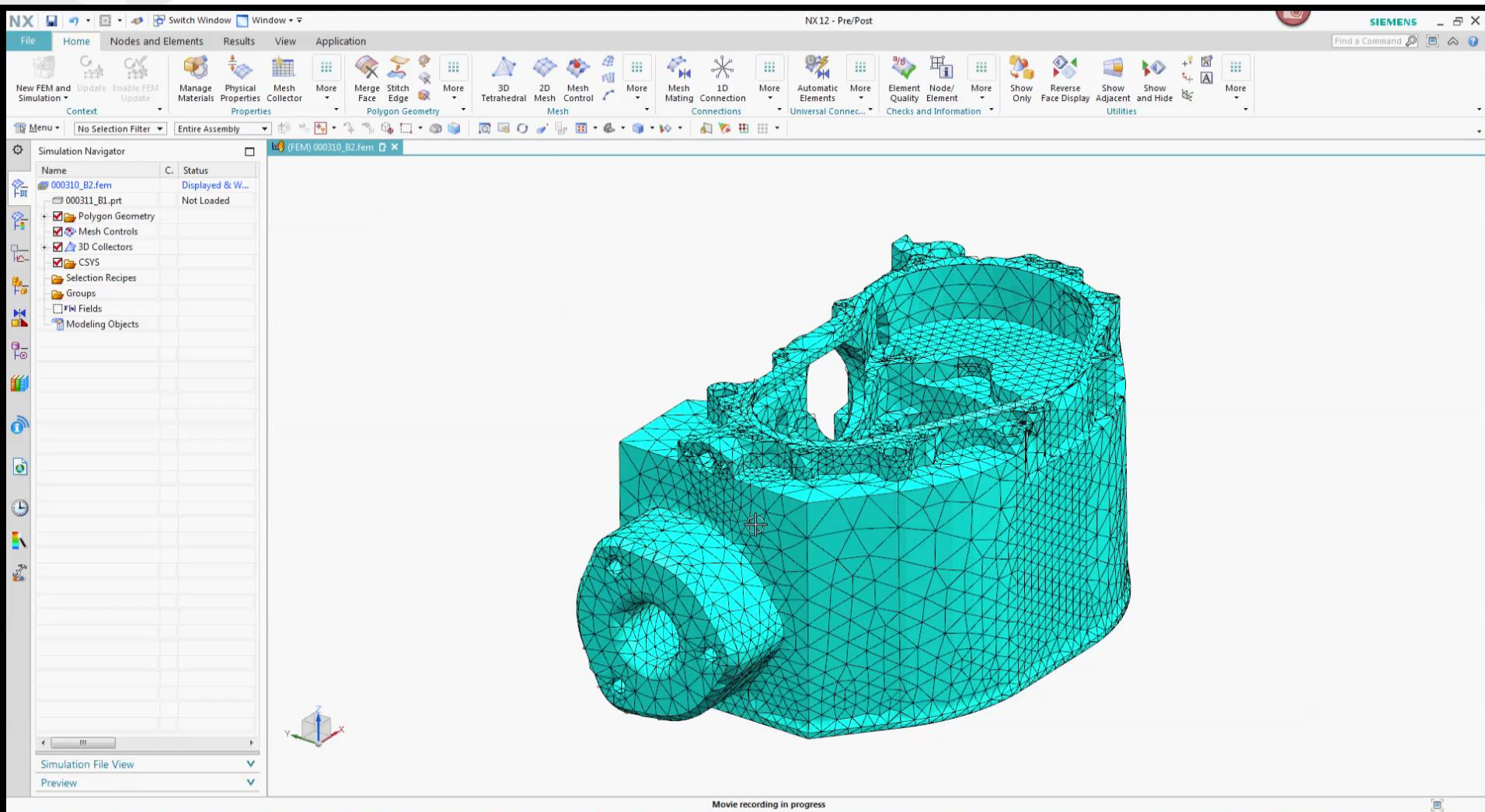
# Mesh Control Improvements



- New *Point* and *Bounding Volume* type
- *Bounding Volume* based on selection recipe



# Mesh Control Improvements: Demo



## ➤ Quality Checks:

Can now highlight elements whose surface area or volume is smaller than a particular threshold value

## ➤ Section Cut:

Can now see internal element edges when you do a capped section view of a mesh

## ➤ New Group:

Can now assign and change group label IDs instead of them being assigned automatically

## ➤ Display Nodal CSYS Command:

Can display the nodal reference or displacement CSYS for selected nodes or the entire model

## ➤ Node Create

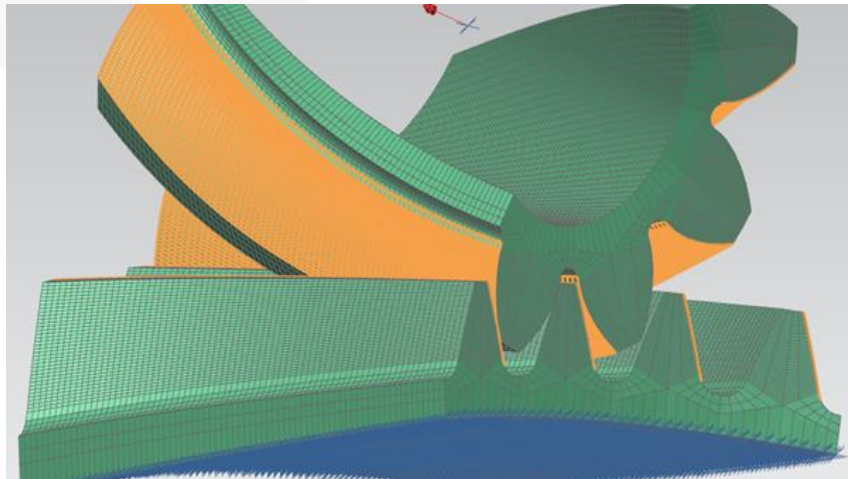
Can now define the nodal displacement CSYS in the *Node Create* command

## ➤ Element Rotate Command

Can use the new element rotate command to rotate selected elements about a specific point



# Expanded Nonlinear Solutions



- Shell, beam, and spring elements added to SOL 401 nonlinear analysis
- New SOL 402 (Multi-step Nonlinear Kinematics) analysis ideal for complex system with rigid body mechanisms
- SOL 402 supports large strains and large displacements, large rotations, and nonlinear materials, including hyperelastic
- Based on LMS Samcef solver
- Simcenter 3D users can also directly access the power of the LMS Samcef solver via the Samcef environment

# Thank You for Participating!



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