



Webinar:  
**What's New in**  
Simcenter 3D and  
Simcenter Nastran  
2019.1

Jonathan Hill, ATA Engineering  
April 4th 2019

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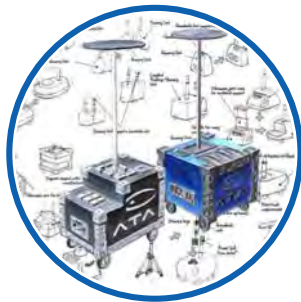


Consumer  
Products



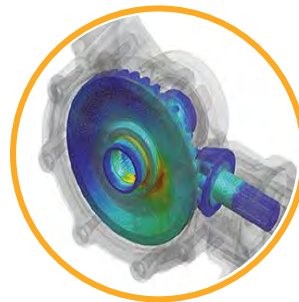
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- STAR-CCM+
- HEEDS
- Femap
- Simcenter Nastran (formerly NX Nastran)
- Simcenter 3D
- NX CAD & CAM
- Teamcenter
- Solid Edge

➤ Contact the hotline at 877-ATA-4CAE or

<http://ata-plmsoftware.com/support>

➤ Developer of the official Simcenter Nastran training materials

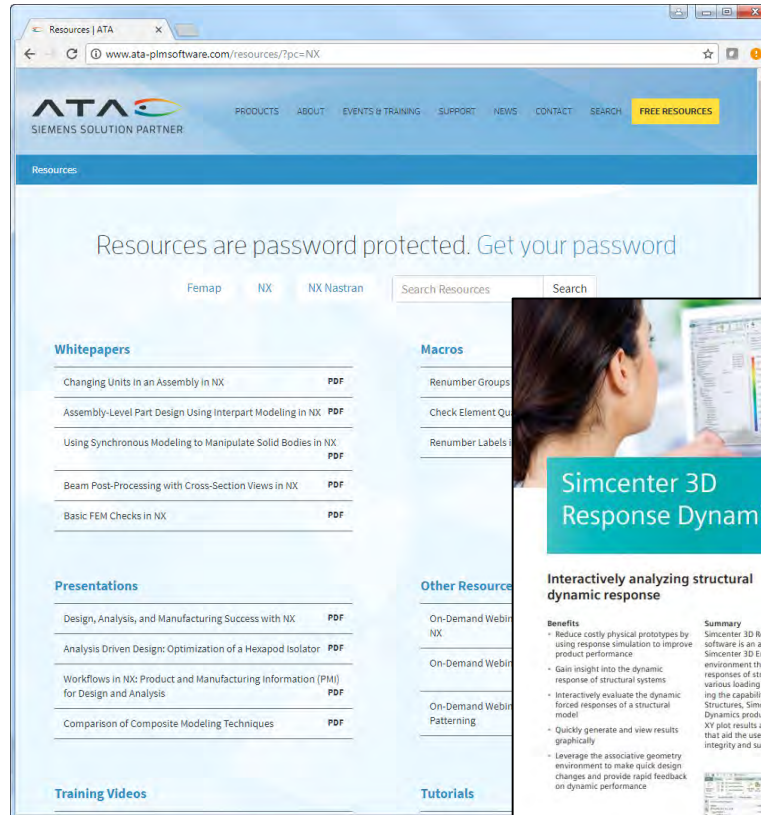
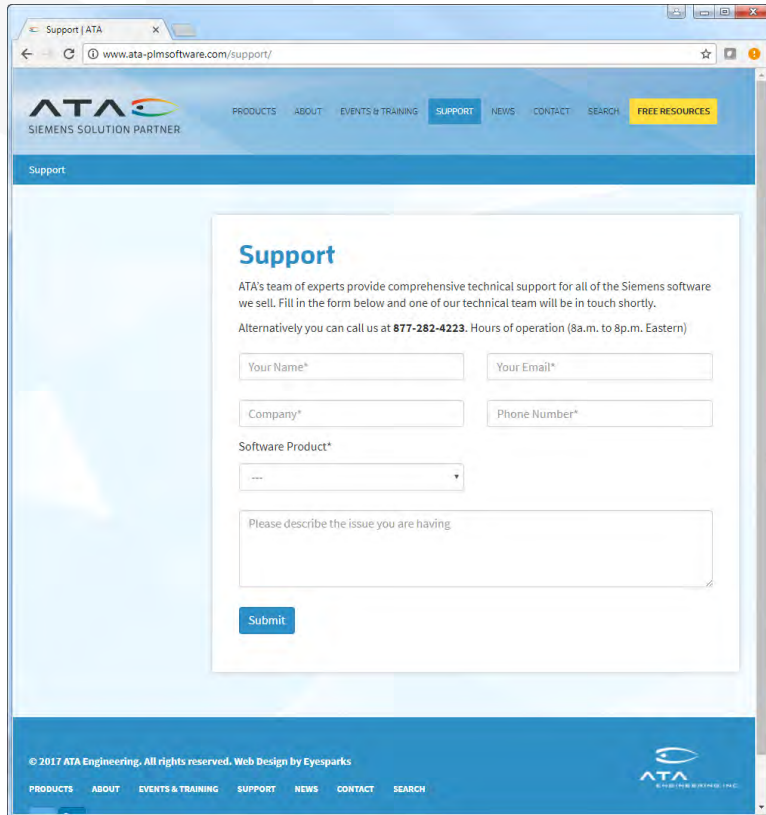
➤ Preferred North American provider of Simcenter Nastran training

➤ Recognized as Smart Expert Partner with validated expertise in Femap and STAR-CCM+



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The advertisement features a woman looking at a computer screen displaying a 3D model of a structure with stress analysis results. The text reads: 'Simcenter 3D Response Dynamics' and 'Interactively analyzing structural dynamic response'. Below this, there are several bullet points under 'Benefits' and a 'Summary' section. The 'Benefits' section includes: 'Reduce costly physical prototypes by using response simulation to improve product performance', 'Gain insights into the dynamic response of structural systems', 'Interactively evaluate the dynamic forced responses of a structural model', 'Quickly generate and view results graphically', and 'Leverage the associative geometry environment to make quick design changes and provide rapid feedback on dynamic performance'. The 'Summary' section states: 'Simcenter 3D Response Dynamics software is an add-on module to the Simcenter 3D Engineering Desktop environment that predicts the dynamic responses of structural systems under various loading conditions. Augmenting the capabilities of Simcenter 3D Structures, Simcenter 3D Response Dynamics produces a broad range of XY plot results and color contour results that aid the user in determining the integrity and suitability of product'. To the right, there is a small text block: 'designs subject to dynamic loads. Analysis information can then be used to perform design studies to enhance the new product development process and ensure the quality of designs prior to physical prototyping and production. A flexible way to predict responses Simcenter 3D Response Dynamics enables users to interactively evaluate the dynamic forced responses of a structural model. A set of flexible tools allows you to predict response of a model to a set of applied transient, frequency (harmonic), random vibratory or shock spectrum loads. A modal formulation is used to very efficiently calculate response using a prior solved set of mode shapes. The NX Nastran solver is used for solving mode shapes which are stored in a standard DP2 File format. Both normal modes and static modes for advanced methods are'. At the bottom, there is a screenshot of the software interface showing stress analysis results on a 3D model. The text below the screenshot reads: 'Calculate mean square (RMS) stress results for each ply in a laminate composite structure.' The footer contains the URL 'www.siemens.com/plm/simcenter3d'.





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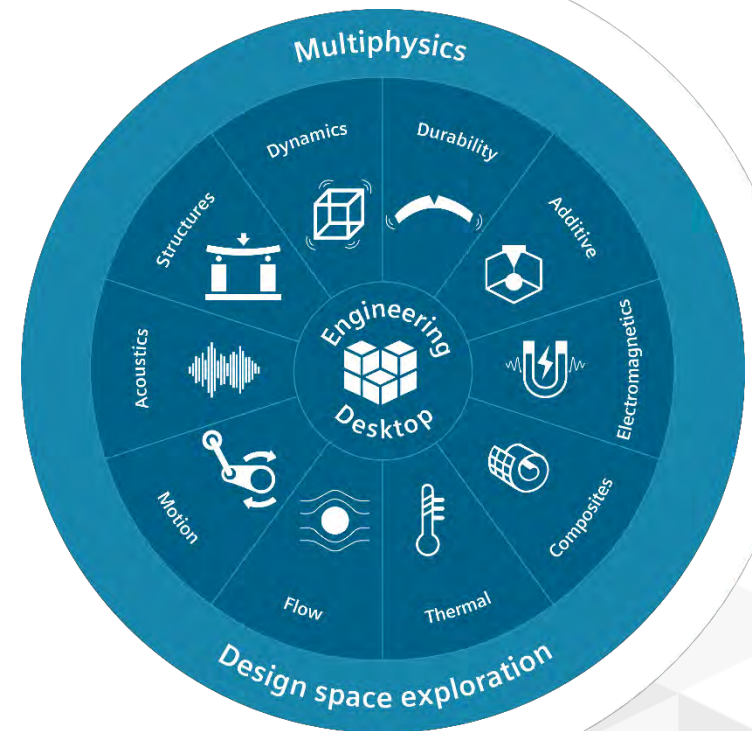
# Outline

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- New Names and Release Cadence
- User Interface Updates
- Pre-Processing Enhancements
  - Geometry
  - Meshing
- Post-Processing Enhancements
- Nastran Updates (SOL 401/402)
- Additional New Simcenter 3D Capabilities
- Summary and Q&A

# What is Simcenter 3D?

- The Simcenter portfolio includes best in class CAE simulation, system simulation, and testing solutions
  - This encompasses products such as Simcenter 3D, Simcenter Nastran, Femap, STAR-CCM+, HEEDS, and Teamcenter
- Simcenter 3D is a unified multidiscipline 3D analysis tool based on the NX platform
  - Available as a stand-alone application or completely integrated with NX



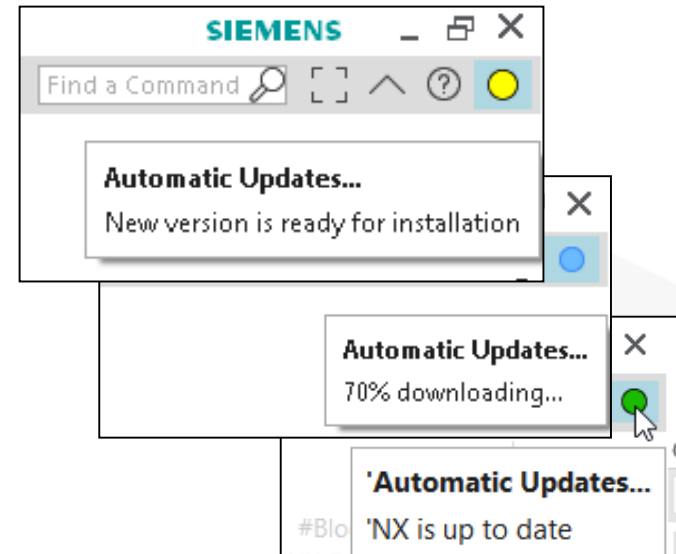


# New Names; Same Great Products

- New major releases were delivered in January 2019
  - NX supersedes NX 12
    - Release number is dropped to remove focus on it as a perceived indication of quality and deployment readiness
    - Major release in June 2019 will be NX
  - Simcenter 3D 2019.1 supersedes Simcenter 3D 12
    - Major release in June 2019 will be Simcenter 3D 2019.2
  - Simcenter Nastran 2019.1 supersedes NX Nastran 12
    - Major release in June 2019 will be Simcenter Nastran 2019.2
- Version numbers are available for NX and Simcenter 3D at File > Help > About
  - January 2019 release had a version number of 1847
- Download the latest version from GTAC:  
(<https://download.industrysoftware.automation.siemens.com/>)

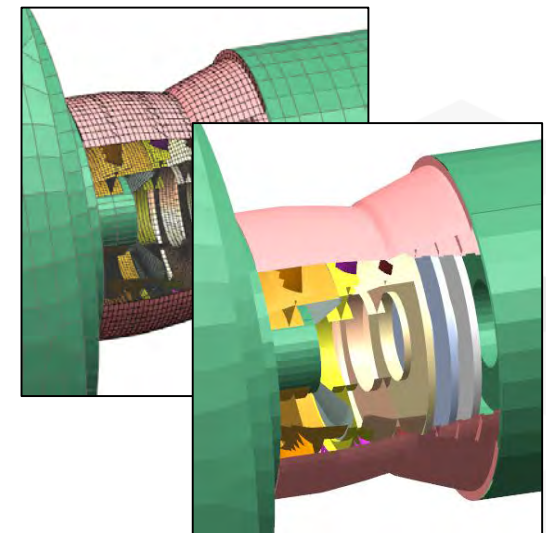
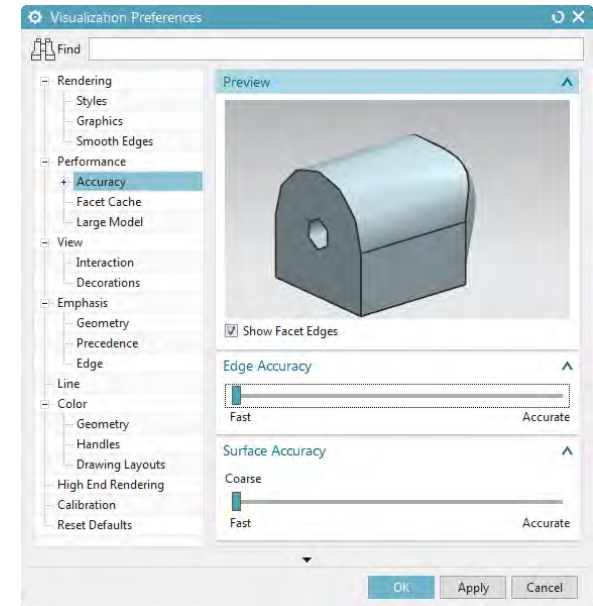
# New Release Cycle; Same Great Products

- Continuous Release for NX and Simcenter 3D
  - Major enhancement releases every 6 months with schema change
  - Monthly maintenance releases
- Designed to reduce cost of deployment so users can leverage advancements without delay
- Optional Automatic Updates to Notify or Notify and Download new versions
- Still possible to have multiple versions of software installed



# User Interface Updates

- Refreshed Icons provide clean modern look
- Visualization Preferences are simplified and consolidated
  - Level-of-Detail can be automatically reduced when zooming out on a Large Model
- New Predictive UI Toolbar 'learns' user workflows and predicts the next most likely commands
- Part Navigator allows for easier show/hide and current feature selection

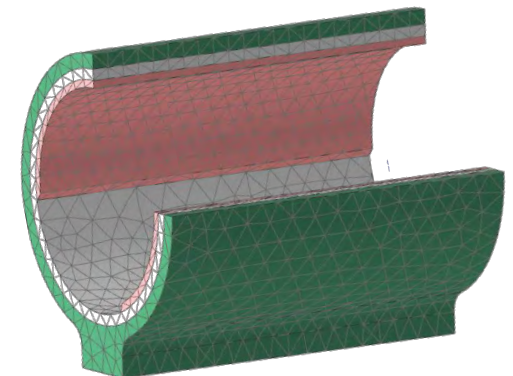
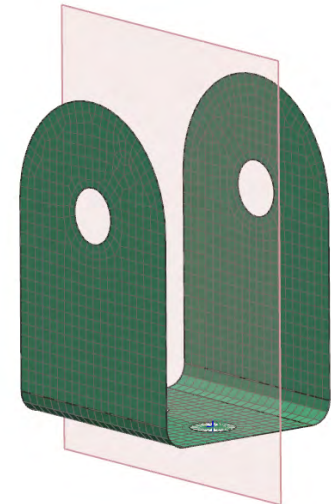
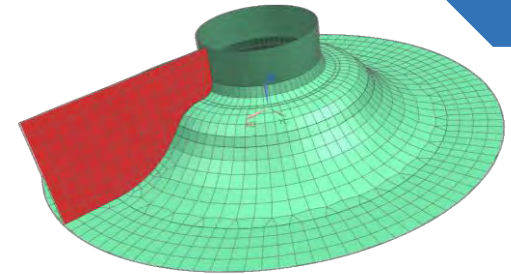


Part Navigator		
Name	Current Feature	Up to Date
+ ✓ Cameras		
+ Measures		
+ Non-timestamp Geometry		
- Model History		
Cylinder (0)		✓
Rectangular Groove (1)		✓
Fixed Datum Plane (2)		✓
Datum Plane (3)		✓
Rectangular Pocket (4)		✓
Edge Blend (5)		✓

# Geometry Updates

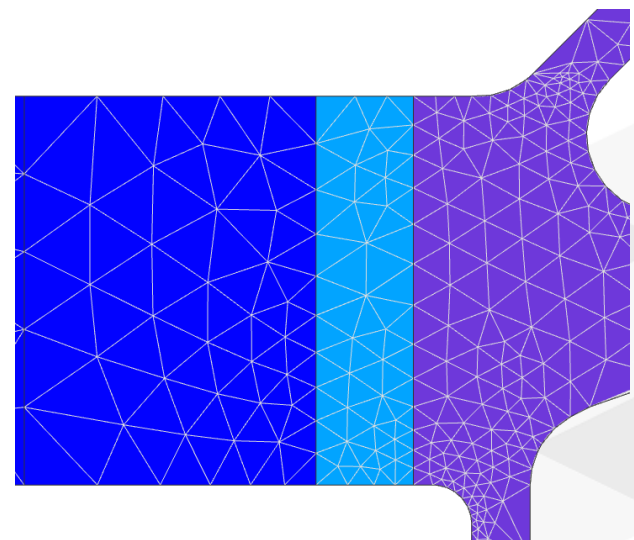
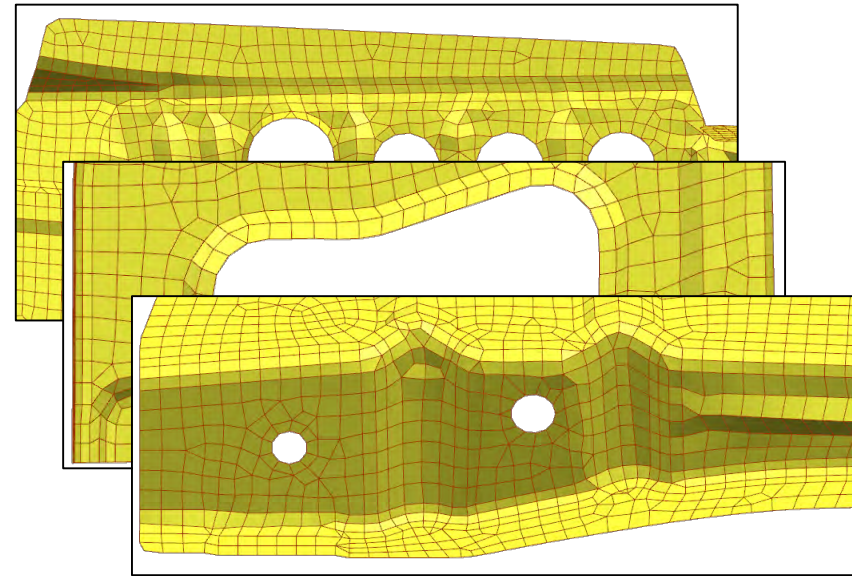
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- A more robust Face from Mesh handles complex geometries better and adds new feature edge controls
- Imprint adds Snap Ends and Normal to Face options
- Split Face by facet edges
- Create or import Datum Planes in the FE model
- Split Body improvements create all mesh mating conditions as glue coincident
- New Edge Separation command converts shared edges into separate edges



# Surface Meshing Enhancements

- Improve overall mesh quality with:
  - Better preservation of features such as ridge lines, stamped depressions, and fillet chains
  - More regular, isotropic elements around holes (Paver method + Multi-Block)
  - More gradual element size transitions across triangular meshes
  - Aspect Ratio and Min/Max Included Angle options in Mesh Quality Options
  - Create a separate mesh for each face

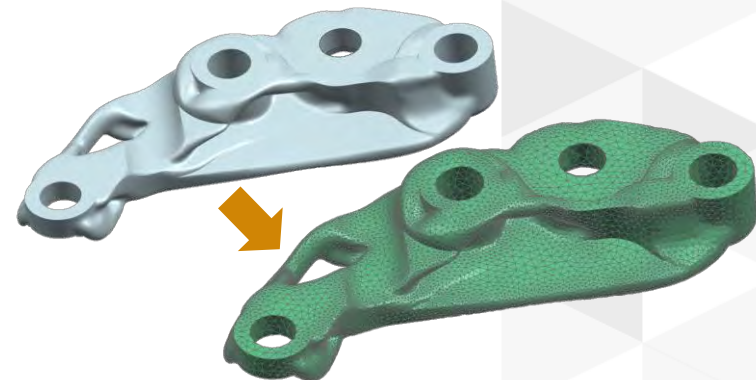
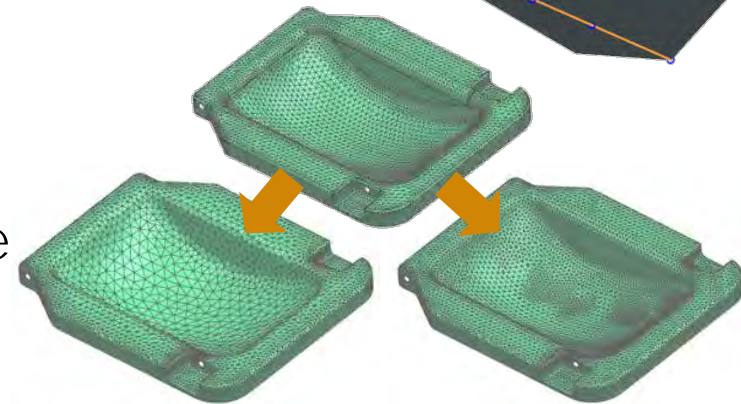
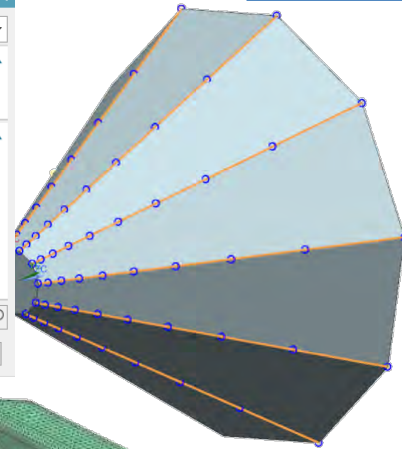
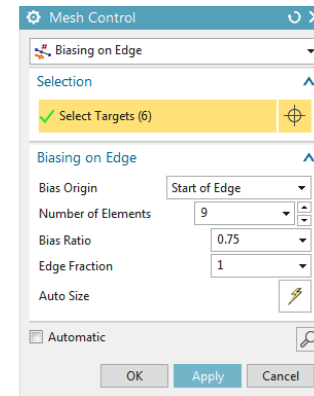




# Additional Meshing Enhancements

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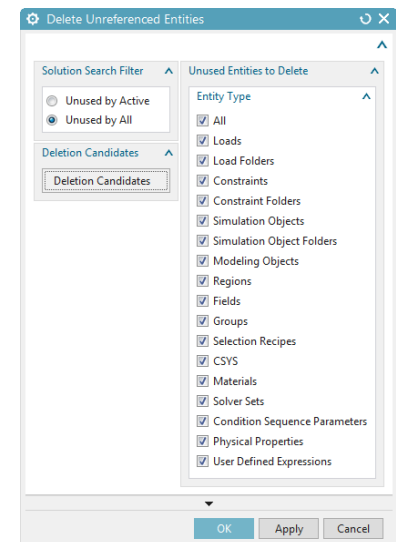
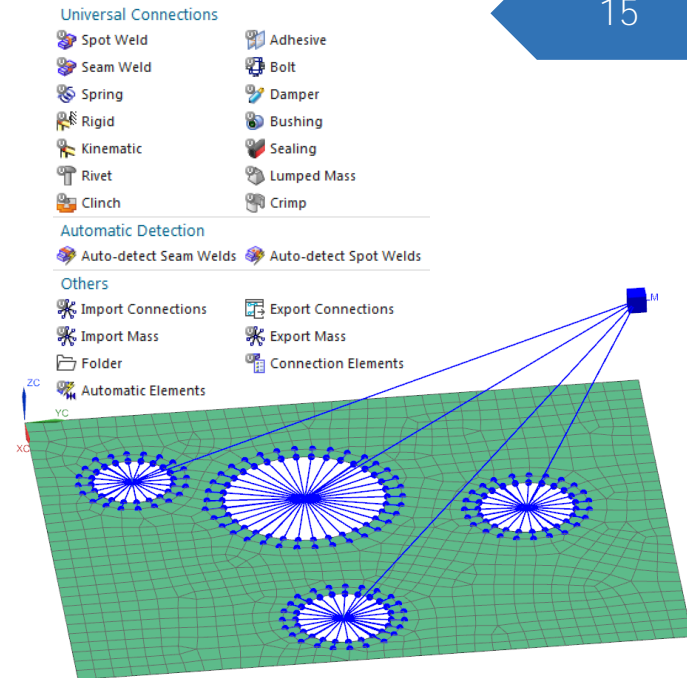
- Mesh Naming – specify meaningful names, and name 3D meshes after their polygon bodies
- Edge Mesh Control Improvements:
  - Distribute on Edges option handles connected edges as a single continuous edge
  - Biasing on Edge uses the first edge selected as a seed to determine direction of other selected edges
- New Remesh command can refine or coarsen an existing 2D mesh
- 2D Mesh from Facets generates a surface mesh on complex convergent or faceted geometry
- 1D mesh is automatically created for Lattice bodies from NX CAD



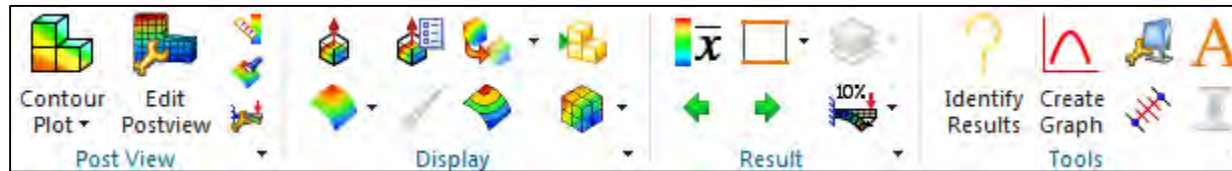
# Pre-Processing Enhancements

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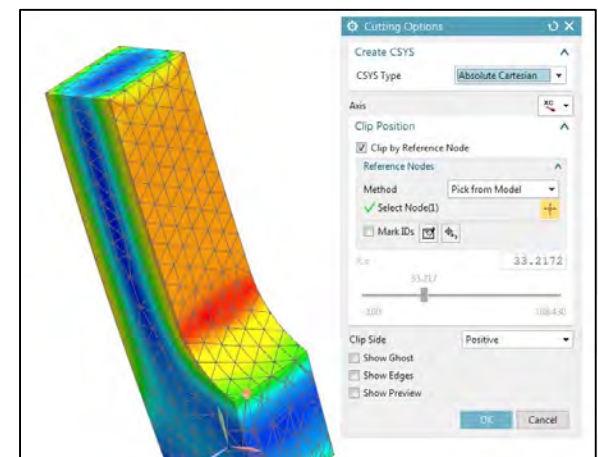
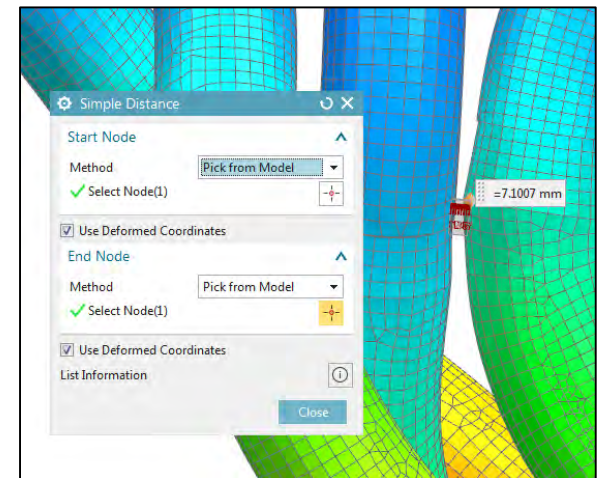
- New Universal Connection types: Crimp, Clinch, Lumped Mass, Kinematic Joint, and Rivet
- Accelerated assembly checks and updates with Component Sub-Assembly Label Conflicts and Component Update Pending
- Clean up a Simulation File with Delete Unreferenced Entities
- Element Add/Remove defines entities to add or remove during SOL 401 at a pre-defined time or strain
- Bolt Preload: Define axial displacement of a bolt and use 1D bolt preloads in SOL 401



# Post-Processing Enhancements

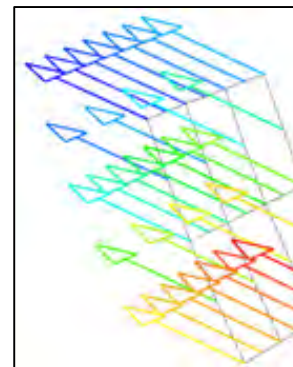
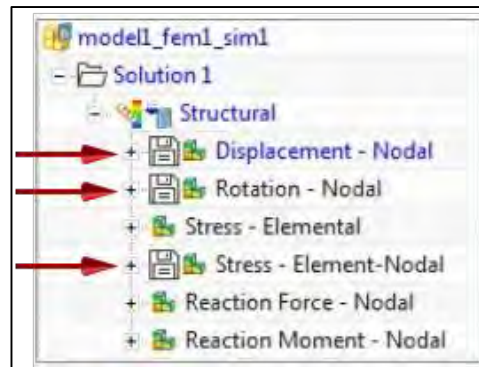
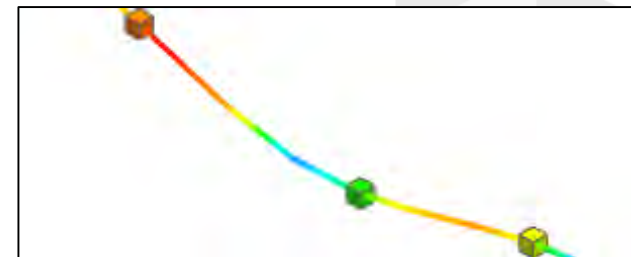
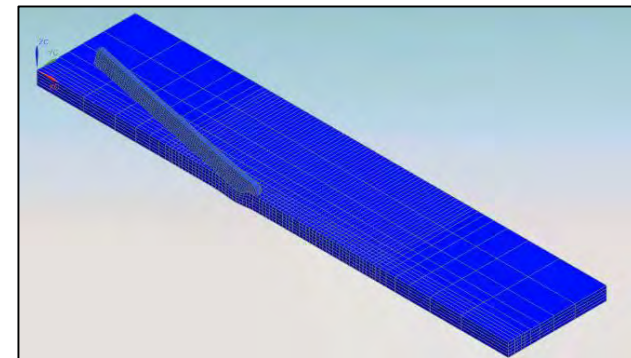
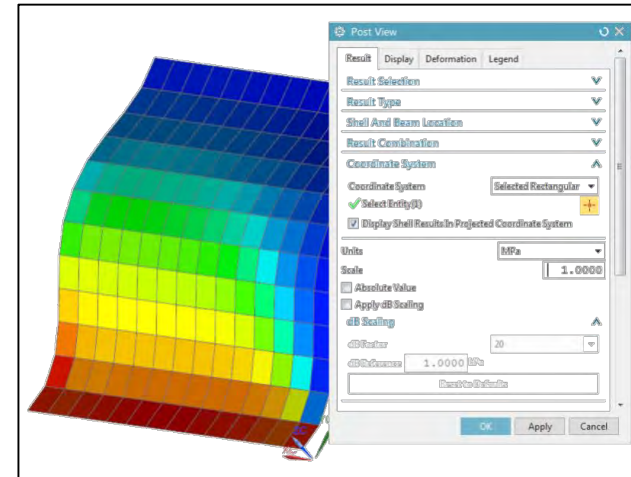


- Measure Deformed Distances in Post View
- Position the Cutting Plane with a reference node
- More customizable Post View Headers
- Legend Level Spacing:
  - Equally Spaced
  - Round Off
  - Level Increment



# Post-Processing Enhancements (cont.)

- Display shell results in Projected CSYS and Multiple Tensor Components simultaneously
- Display CBUSH results as arrows
- Display elements that are added or removed
- Cache Results to improve efficiency of working with them, especially for large result sets
- Lumped masses are displayed as contours based on node





# Nastran Enhancements

- Restarts and user-defined materials are now supported in SOL 401 & SOL 402

## SOL 401

- New dynamic transient subcase
- Contact improvements to help reach convergence:
  - Adaptive penalty stiffness
  - Gap / Penetration adjustment
- Element extensions:
  - Beam plasticity and creep
  - Add/remove capability
  - Mid-node thickness and pressure definitions for plane stress elements
  - Chocking support in “linear” solutions
- Bolt Preload extensions:
  - 1D beam elements as bolts
  - Intermediate results output for preload subcases

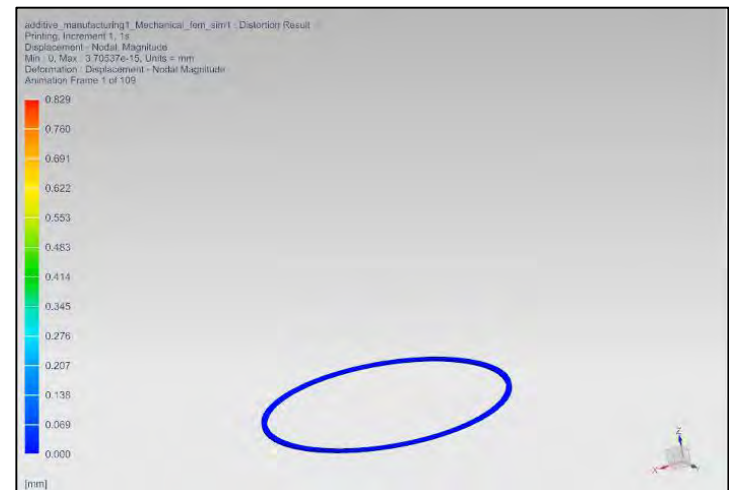
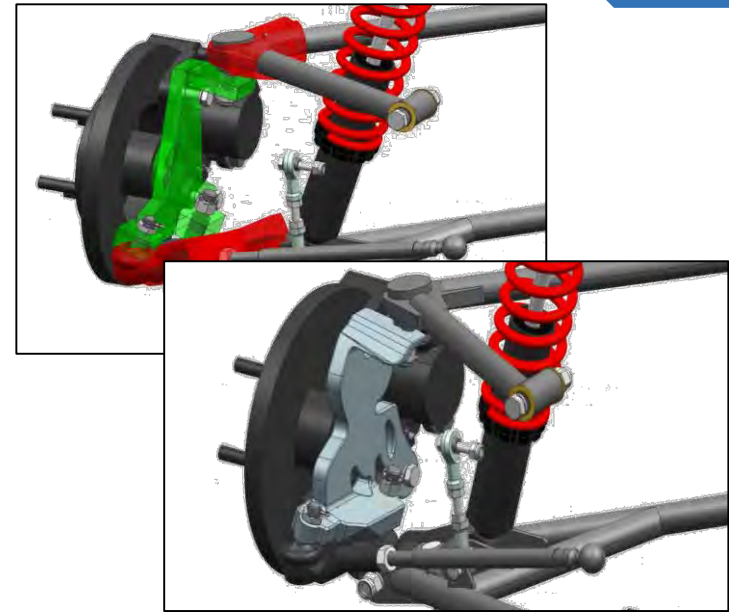
## SOL 402

- Facilitate nonlinear solutions with flexible and kinematic displacements
  - Kinematic Joint elements simulate mechanisms like hinges and sliders
- Nonlinear gasket and strain-rate dependent materials
- New complex modal subcase
  - Captures nonsymmetric stiffness from contact



# Enhanced Topology Optimization and Additive Manufacturing Process Simulation

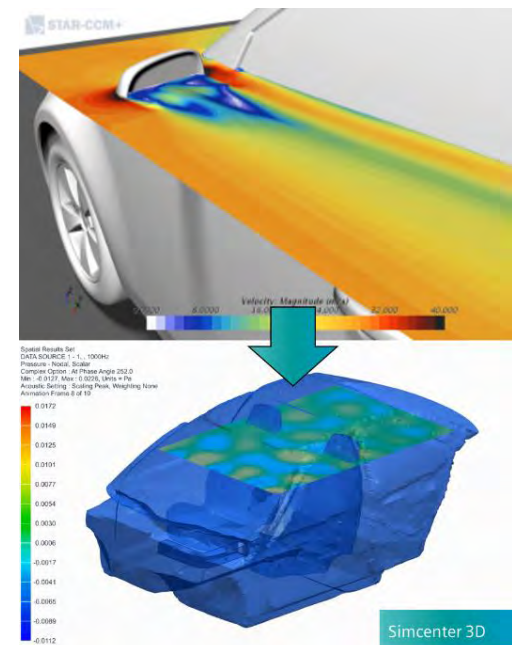
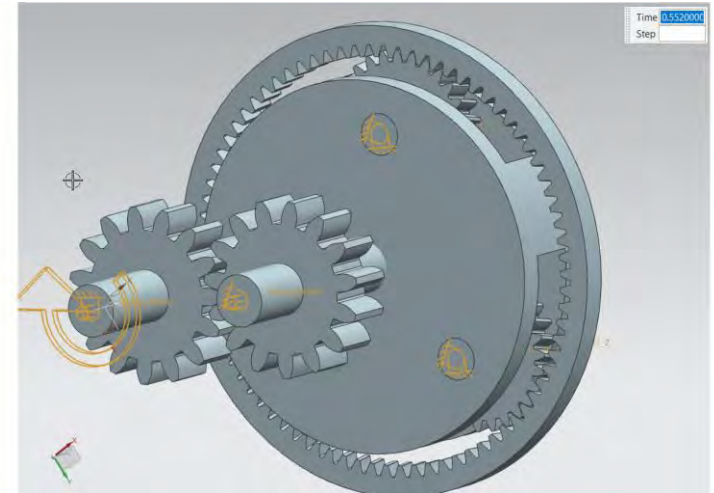
- Topology Optimization is more robust:
  - Added design objectives and constraints related to critical loads including buckling
  - Manufacturing constraint improvements produce results with better convergence and accuracy.
- New Additive Manufacturing Process Simulation
  - Simulate a powder bed fusion process to predict and avoid recoater collisions, distortion, and shrinkage during printing
  - Calculated distortions can be used to compensate the geometric model



# Transmission Builder, Aerostructures with Composites, and Coupling with STAR-CCM+

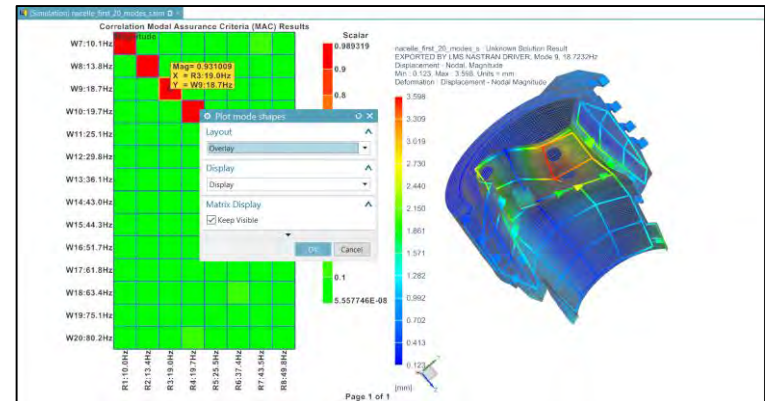
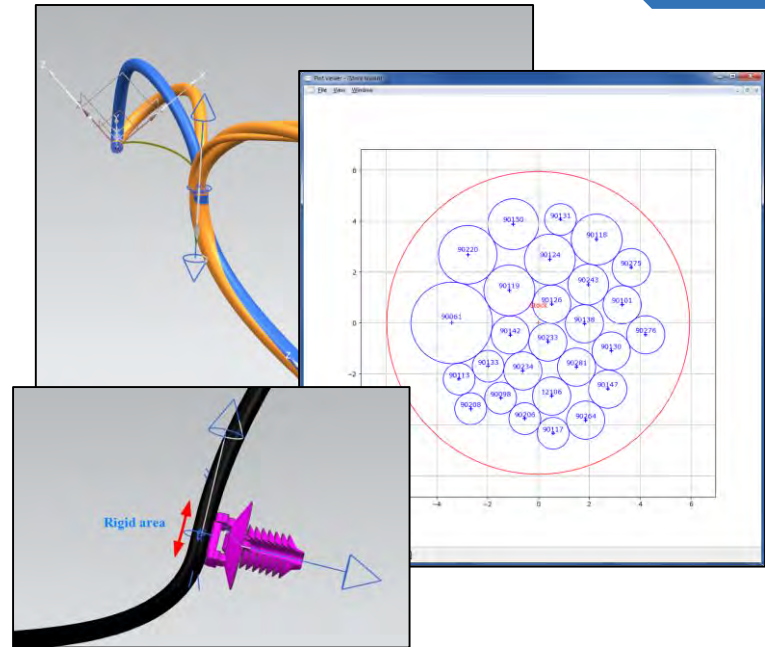
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- New Transmission Builder automates the creation and simulation of transmission motion simulation models
  - Extremely fast gear simulation and as accurate as FE
  - Combine with Simcenter 3D Acoustics for gear whine analyses
- Simcenter 3D Aerostructures adds support for composite structures
- 1-way coupling with STAR-CCM+ and Simcenter 3D for aero-acoustics



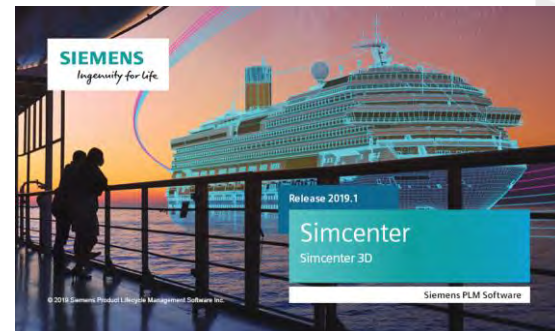
# Flexible Pipe, Specialist Durability, and Correlation

- With Simcenter 3D Flexible Pipe, study how an electrical wire harness will bend and move within your assembly
  - Import stocks from NX Routing
  - Model interaction between cables, external taping, contact, and section distribution changes
- Simcenter 3D Specialist Durability brings functionality from LMS Virtual.Lab durability solvers, including the analysis of welds and composite materials
- Simcenter 3D Correlation compares and correlates simulation results with physical modal test results captured in Simcenter Test.Lab



# Summary

- Simcenter 3D 2019.1 begins a new continuous release cadence with major enhancements every 6 months
- Pre-Processing sees improved robustness in geometry manipulation, surface meshing, and mesh control
- Post-Processing allows for measuring deformed distances and provides greater control over the legend, header, and cutting plane
- SOL 401 and 402 support restarts in addition to element and material extensions
- Additive manufacturing process simulation and the transmission builder extend Simcenter 3D capabilities
- This is just the beginning! Read more at the [Siemens Documentation Center](#)





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