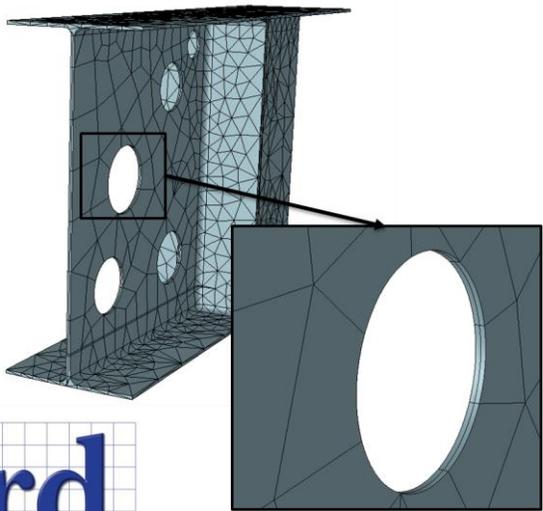
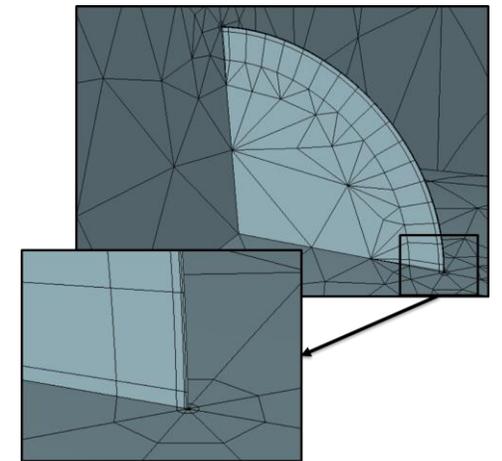


New Features and Enhancements in StressCheck v11.1



ESRD, Inc.
July 2022



New Features & Enhancements in SC 11.1



STRESSCHECK

- ❑ **General GUI Cleanup, Tune-ups, Optimizations & Fixes**
 - Performance Improvements for Object Rendering and Loads Display/Updating
 - Windows Layout Startup Preference Now Available in Options
- ❑ **New Thin Section Automesh Method** with Penta or Hexa-Dominant Option
- ❑ **Boundary Layer Automesh Method** Now with Mixed Mesh (Hexa/Penta/Tetra) and Shrink-To-Fit/Trim-to-Fit Options
- ❑ **Crack Front Automesh Method** Now with Curvature D/H, Mixed Mesh, Integration Layer, and Grade Toward Ends Options
 - Also Extended to Cracks at Symmetry Planes

New Features & Enhancements in SC 11.1



STRESSCHECK

- ❑ **New Global-Local Features** for Load Scaling/Reversal
 - Parametric TLAP Scaling for Linear and Incremental Nonlinear Analyses
 - Point Load and Point Constraint Object Displays Now Available in Case Definitions Dialogs
- ❑ **Improvements to COM API** Functionality and Online Documentation
 - Features Added for Multi-body Contact Analysis, TLAP CSV Importation and More
- ❑ **New Getting Started and Offline Documentation** Available in Help Menu
 - Easily Navigable and Searchable CHM Formats
- ❑ **Upgrades to Spatial Interop and MeshSim Libraries**
 - StressCheck v11.1 Now Supports InterOp2021.1.0.1 and MeshSim v17.0



GENERAL GUI CLEANUP, TUNE-UPS, OPTIMIZATIONS & FIXES

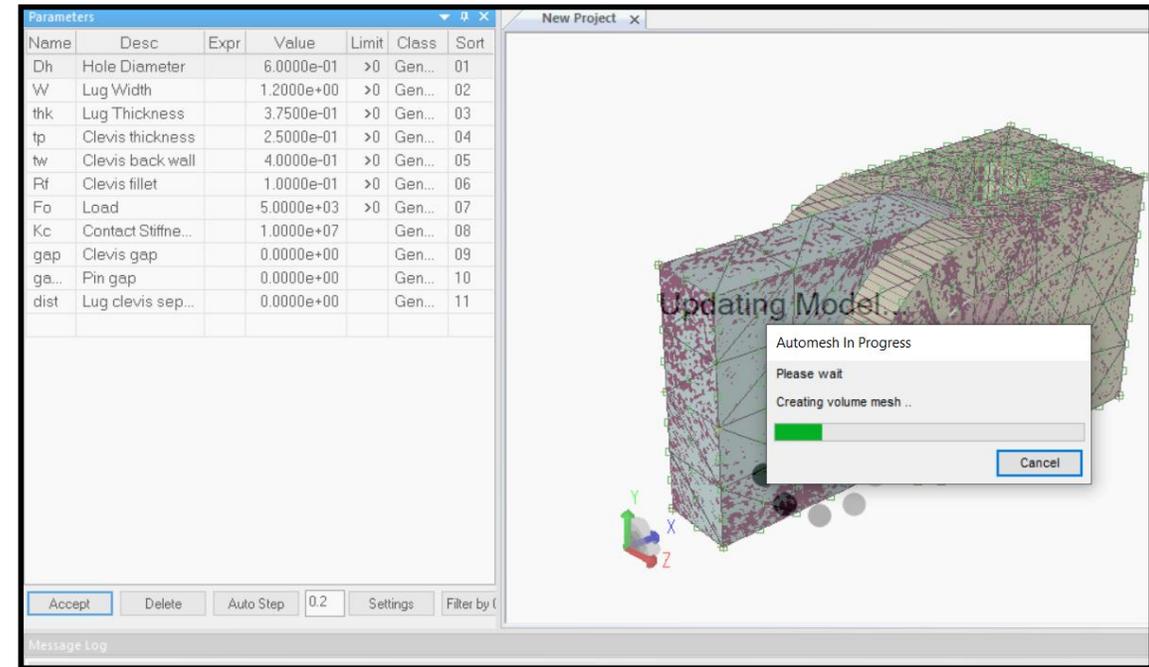
Performance improvements for object rendering and loads display/updating
Windows layout startup preference now available in Options

Optimized Grid/Pane/Dialog Behavior



STRESSCHECK

- ❑ The autohide of tabbed/pinned panes and dialogs has been significantly optimized, with no lag when gaining/losing focus.
- ❑ Automesh progress dialog now appears when changing parameters that force a re-mesh.
- ❑ Enhanced/upgraded grid controls for Parameters, Nonlinear Events, Point Load/Constraint Definitions, Laminate Stack, and other tabular input features.
- ❑ Improvements/fixes made to pane/dialog persistence between StressCheck sessions.

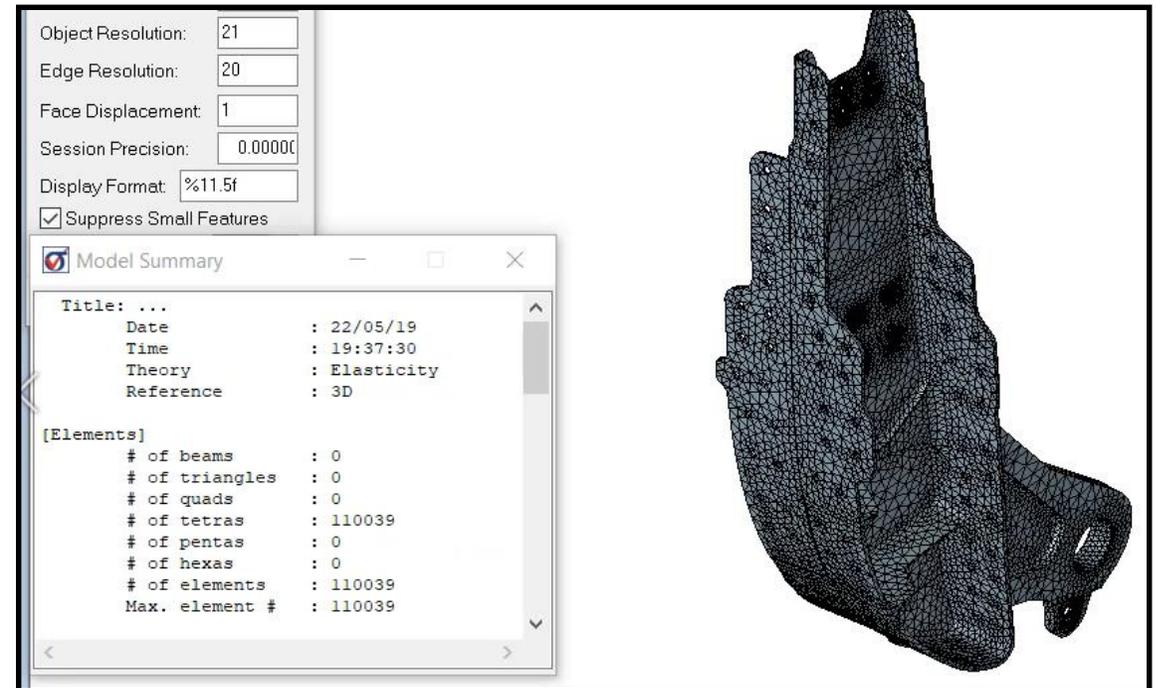


Object Rendering Enhancements



STRESSCHECK

- ❑ Significant enhancements made to HOOPs visualization features to optimize the speed of element/model rendering.
 - Reduced lag in drawing model updates.
 - Users with larger models (e.g. >50k elements) will notice at least 2-5X faster rotation/zoom/translation times when interacting with the model display, even at higher edge resolutions.
- ❑ Additional cleanup of HOOPs visualization features performed to enable larger model rendering and future architectural modifications.



Load Display/Updating Optimizations



STRESSCHECK

- ❑ Enhancements and re-factoring of the display of load attributes (arrows) and the general updating of load case records.
 - Significant improvements observed when displaying/updating loads for models with large numbers of TLAP Traction/Bearing load records.
 - Adding/replacing/deleting load records has been re-factored to reduce excessive checking.
- ❑ The summary tables on right are from a model with 89k elements and dozens of TLAP load records, with and without attributes enabled.

All values in seconds	StressCheck v11.0	StressCheck v11.1
Display load ID	115	40-45
Reset Display	195	95-100
Select load record	20	1
Replace load record	360	70
Delete load record	15	2
Check load ID	95	65-70
Disable/enable load ID	10	8
Add new load record	145	5-7
Open SCW/Solve p=3	1105	988

Load Attributes ENABLED

All values in seconds	StressCheck v11.0	StressCheck v11.1
Display load ID	N/A	N/A
Reset Display	12-15	10
Select load record	5-7	1
Replace load record	120-125	40
Delete load record	2-5	1
Check load ID	95-105	65
Enable/disable load ID	10-15	10
Add new load record	150	1
Open SCW/Solve p=3	940	815

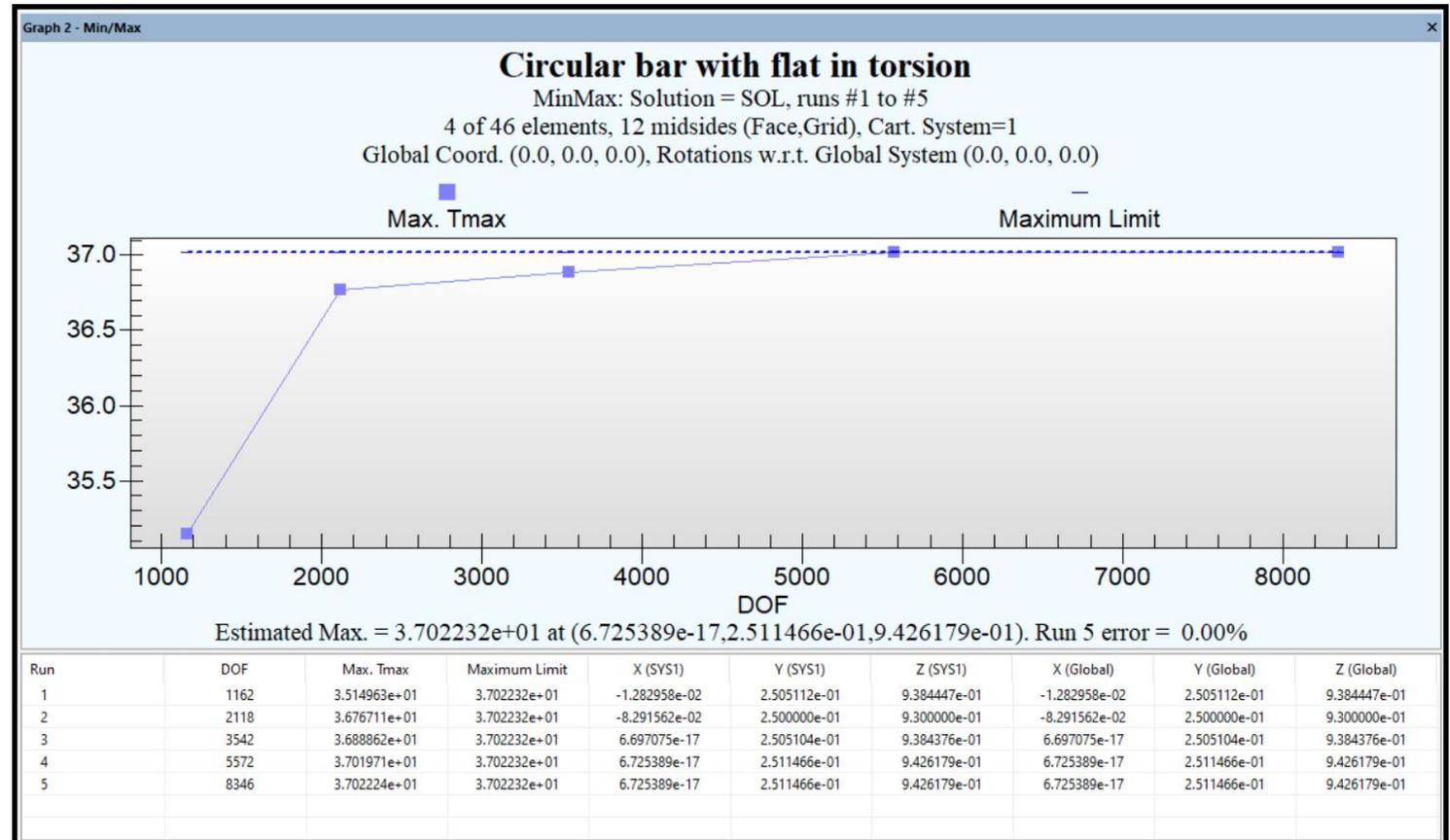
Load Attributes DISABLED

Improved Column Ordering for Extractions



STRESSCHECK

- Data table columns for Min/Max and Points extractions have been optimized for readability.
 - Run # and extraction function columns now precede XYZ/RTZ columns.
 - Local XYZ/RTZ columns now precede global XYZ/RTZ columns.

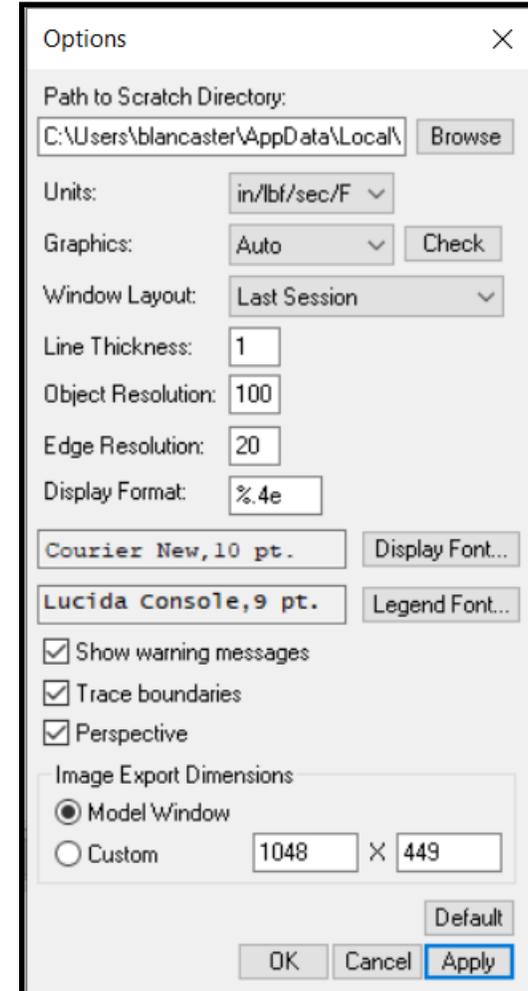


New Window Layout Startup Preference



STRESSCHECK

- A new preference is available under File > Options for the Window Layout.
 - The default preference is to use the window layout configuration from the user's last session (Last Session).
 - This preference can be set to any saved window layout available under View > Window Layout, or to use StressCheck v11.1's default window layout (Default).





NEW THIN SECTION AUTOMESH METHOD TM

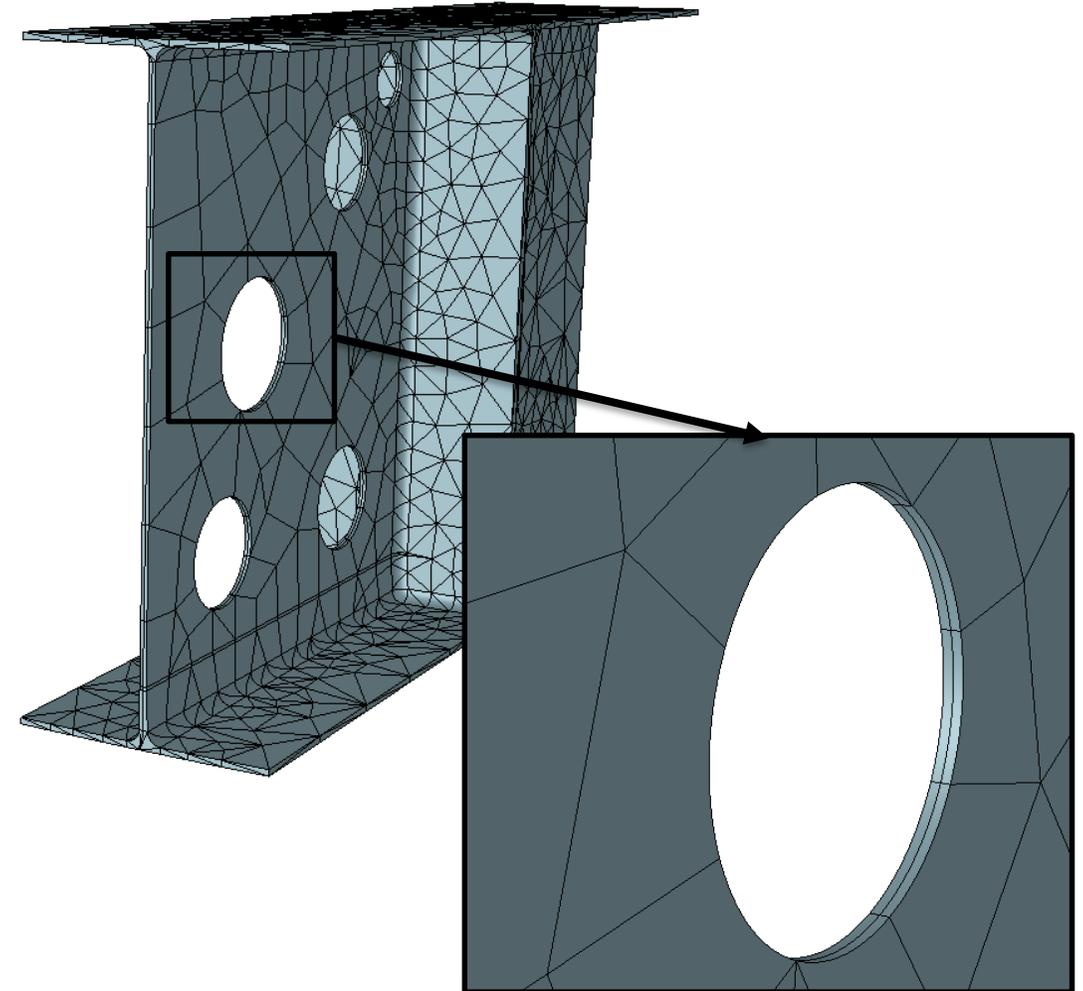
Incorporate pentas/hexas through thin structures/regions (e.g. webs, skins)

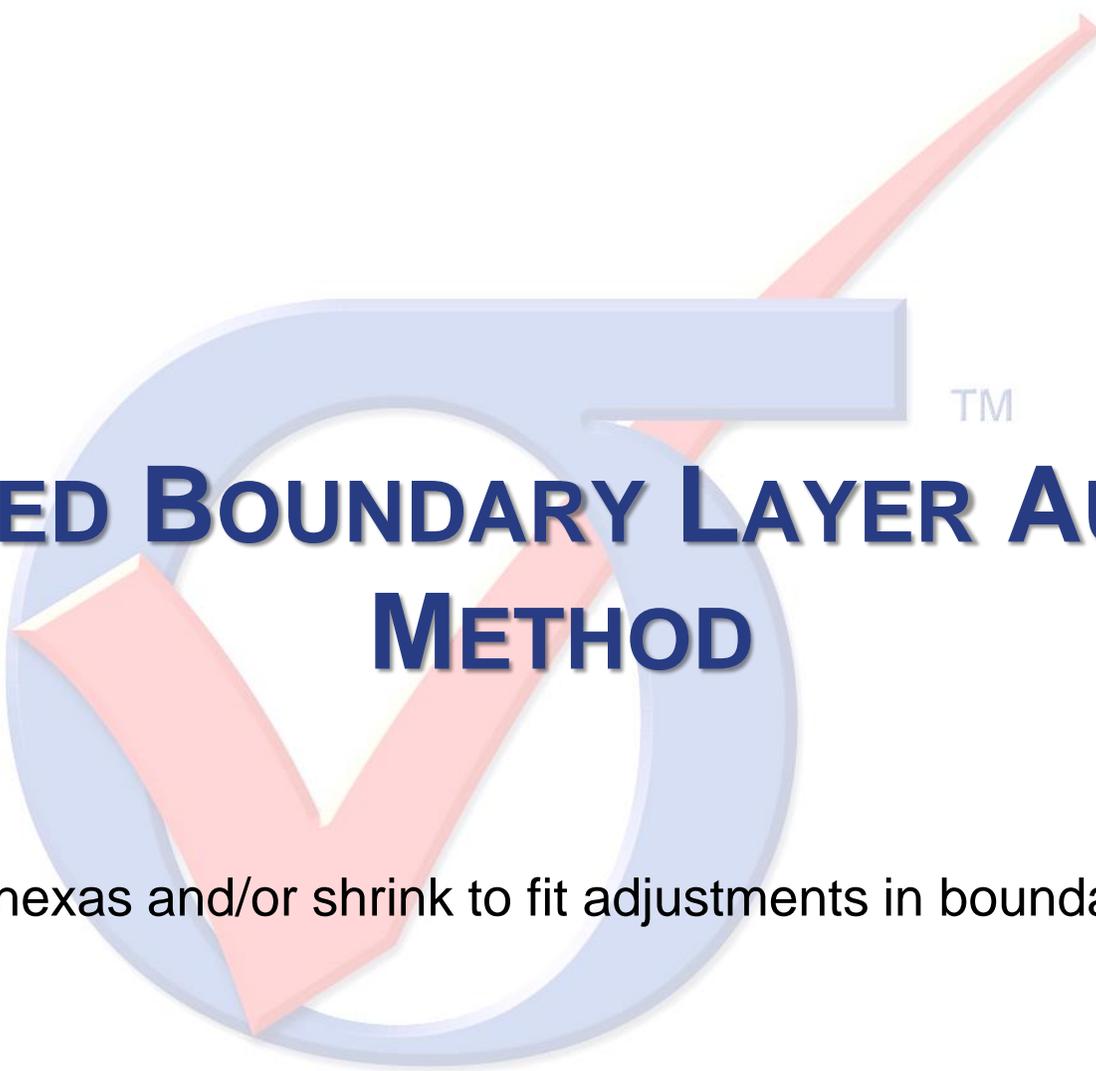
New Thin Section Automesh Method



STRESSCHECK

- This new and powerful automeshing feature creates a structured mesh of several layers through a “thin” region.
 - Specified by source and destination faces (similar to the Extrude method).
 - Supports mixed meshing (penta/hexa/tetra) via Pentahedron or Hexa-Dominant options.
- This feature is useful when meshing areas that would otherwise produce very high aspect ratio tetrahedrons that may negatively impact solution quality and computational time.





**ENHANCED BOUNDARY LAYER AUTOMESH
METHOD** TM

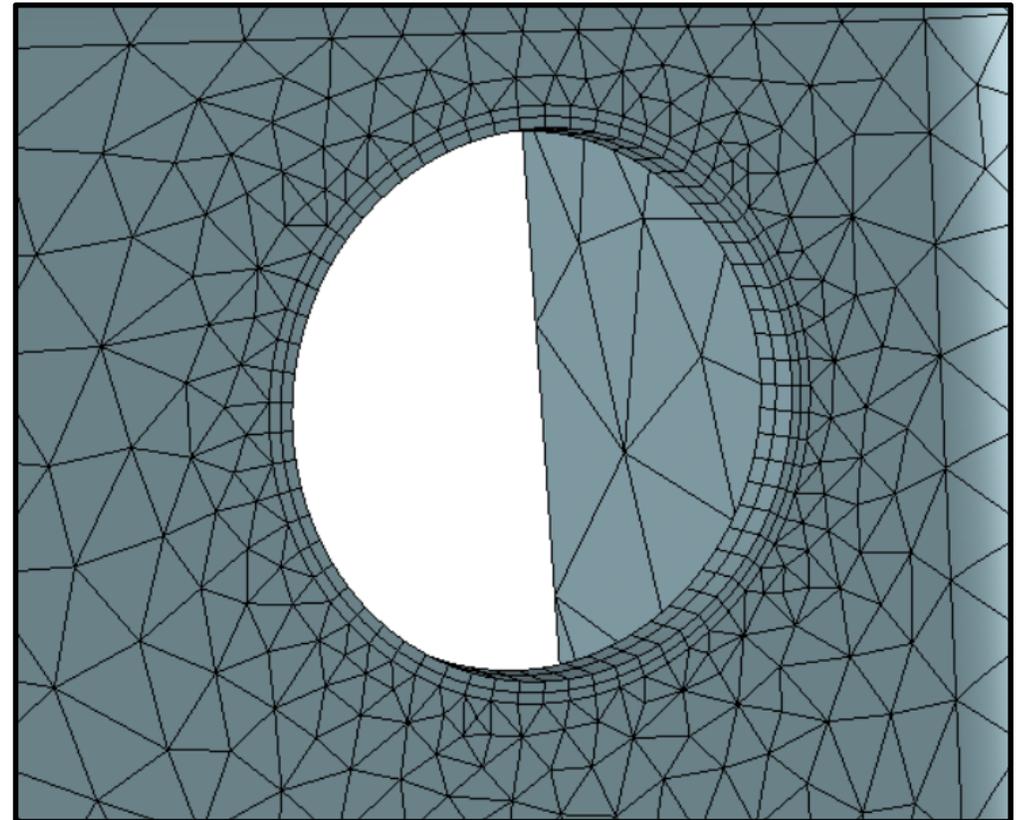
Include pentas/hexas and/or shrink to fit adjustments in boundary layer meshes

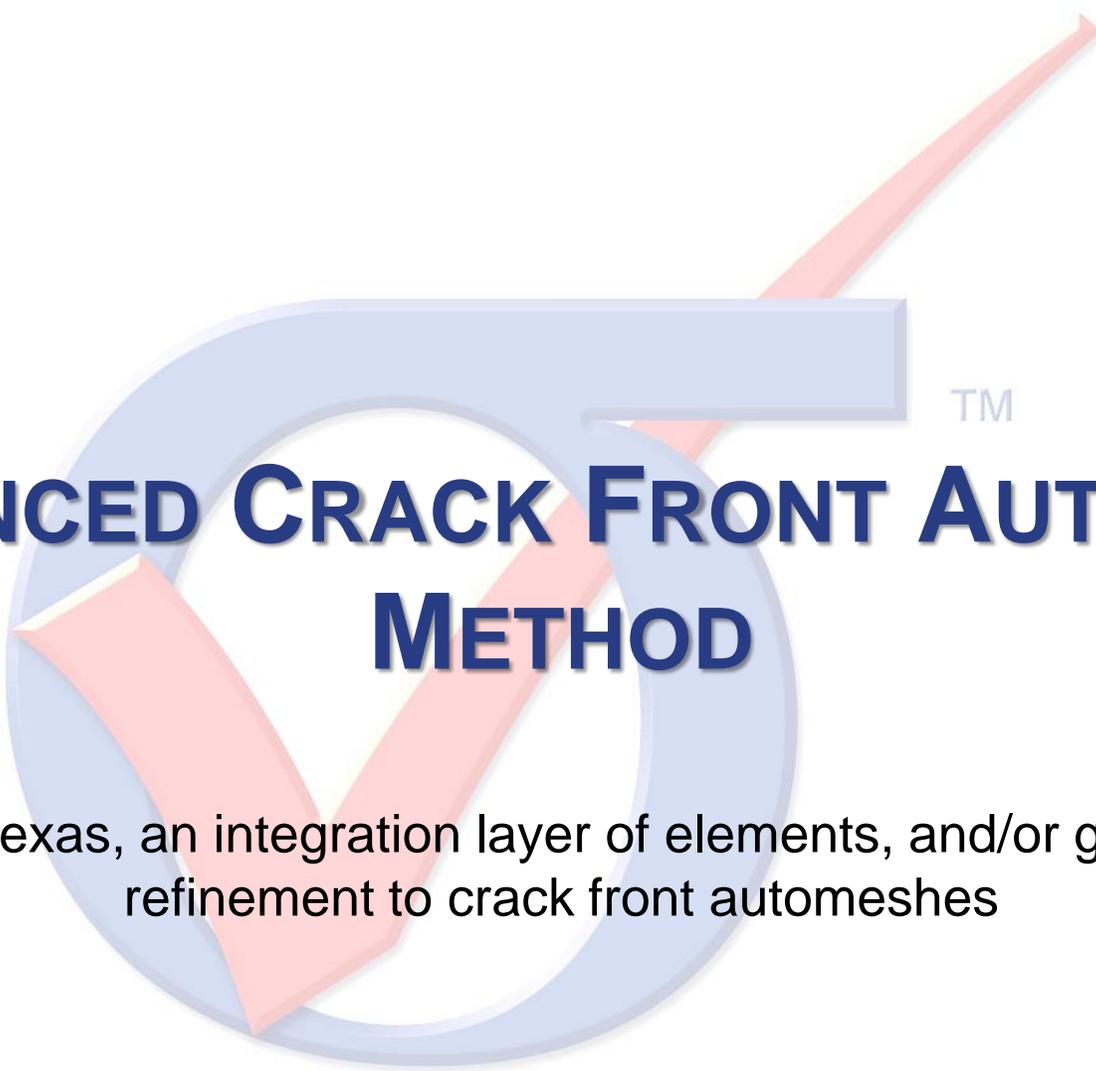
Upgraded Boundary Layer Automesh Method



STRESSCHECK

- ❑ The existing Boundary Layer automesh method has been enhanced to include Mixed Mesh and Shrink to Fit options.
 - Mixed Mesh (on by default) controls whether the boundary layer mesh will be constructed of only tetrahedrons (off) or a mix of pentahedrons & hexahedrons (on).
 - If the boundary layer is applied to a surface, the mesher will attempt to produce a quad-dominant mesh on the selected surface in order to produce a mostly hexahedral boundary layer mesh.
 - If applied, to a curve, the innermost layer of elements will be all pentahedrons, with hexahedrons in the outer layers.
 - Shrink to Fit (off by default) controls whether boundary layers will be trimmed or shrunk to avoid intersections.





ENHANCED CRACK FRONT AUTOMESH METHOD TM

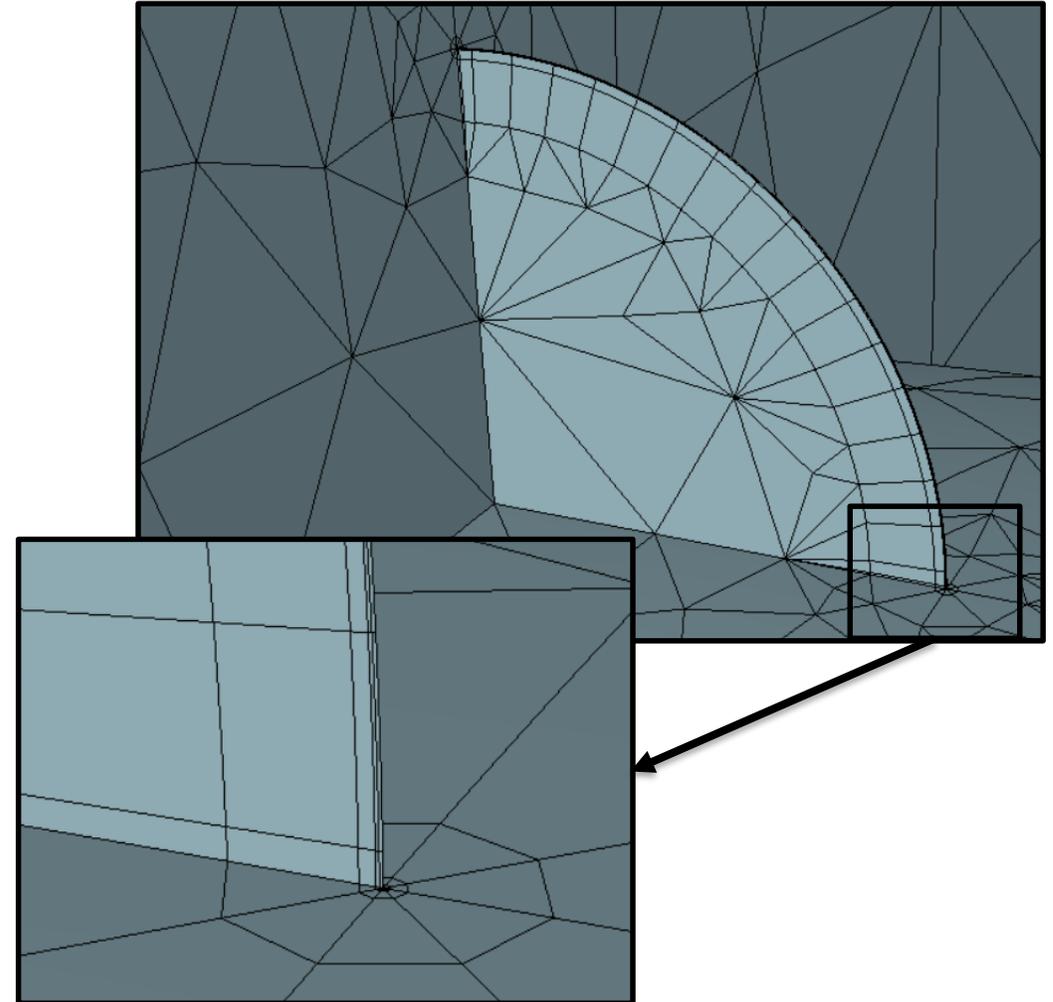
Include pentas/hexas, an integration layer of elements, and/or grade toward ends
refinement to crack front automeshes

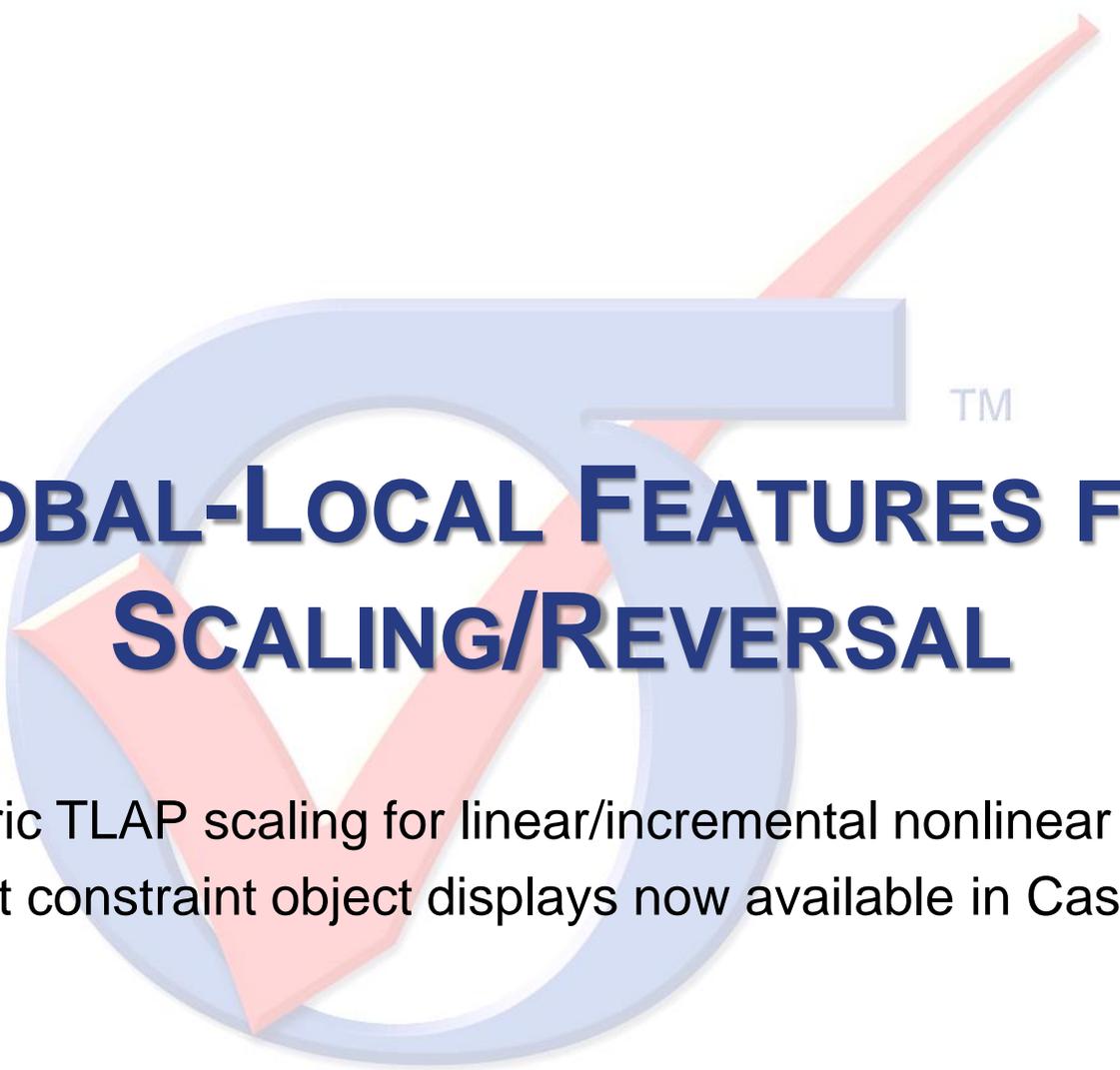
Upgraded Crack Front Automesh Method



STRESSCHECK®

- The existing Crack Front automesh method has been enhanced to include D/H Curvature, Mixed Mesh, Integration Layer and Grade Toward Ends options.
 - Mixed Mesh (on by default) functions the same as for the Boundary Layer method, controlling whether the mesh around the crack front is constructed entirely of tetras or a mix of pentas and hexas.
 - Integration Layer (on by default) will add an additional layer of refinement around the innermost layer for optimal fracture extractions.
 - Grade Toward Ends (off by default) will produce a geometric gradation toward either end of the selected curve.
- Crack Front method also extended to support refinement at symmetry planes.



The background features a large, semi-transparent watermark of the ESRD logo, which consists of a blue stylized 'E' and 'D' with a red arrow pointing upwards and to the right. The text 'ESRD' is written in a light blue font across the center of the logo.

NEW GLOBAL-LOCAL FEATURES FOR LOAD SCALING/REVERSAL

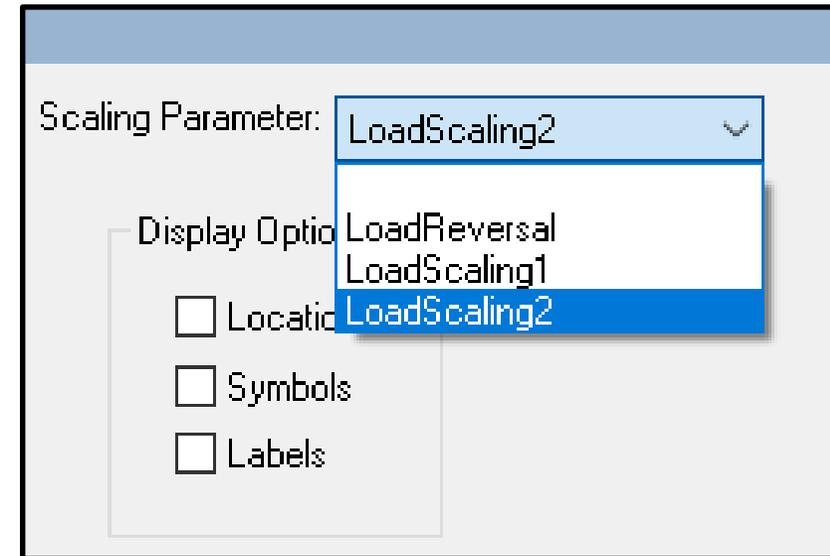
Parametric TLAP scaling for linear/incremental nonlinear analyses
Point Load and point constraint object displays now available in Case Definitions dialogs

New Parametric TLAP Scaling Feature



STRESSCHECK

- ❑ Users will now have the option to apply parametric scaling to TLAP loads.
 - This functionality is implemented such that all TLAPs under a single Case ID will be uniformly scaled (i.e multiplied) by the current value of a scaling parameter.
 - The scaling parameter may be any parameter defined within the model.
 - It is selected using the Scaling Parameter dropdown on the Point Load Case Definitions dialog as shown on right.
- ❑ Parametric TLAP scaling is applicable to linear, design study and incremental nonlinear analyses.
 - To be used in Nonlinear Events, it must be defined as Class “B. Cond.”

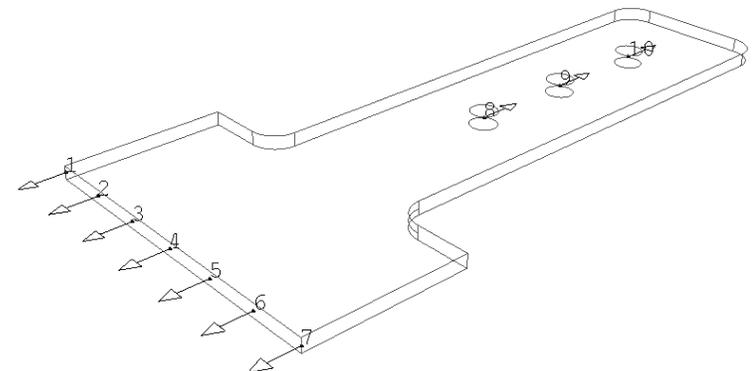
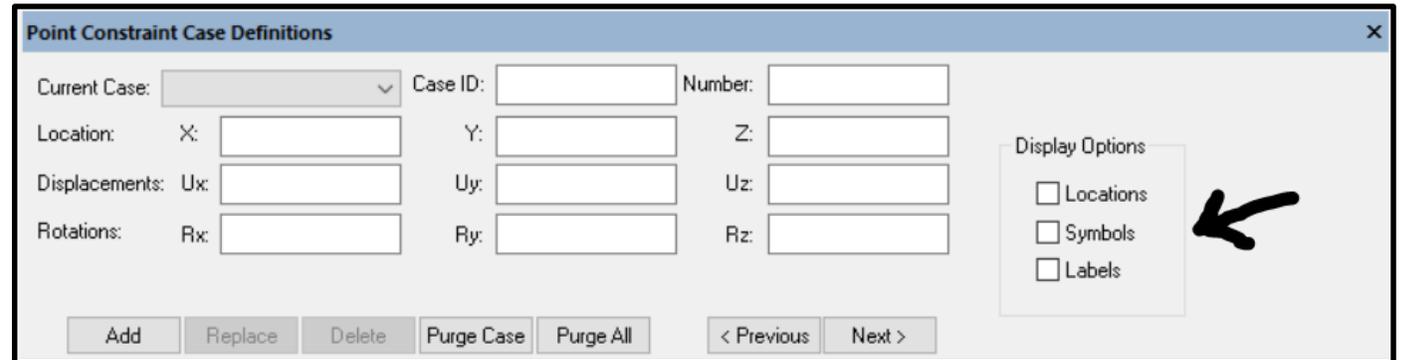
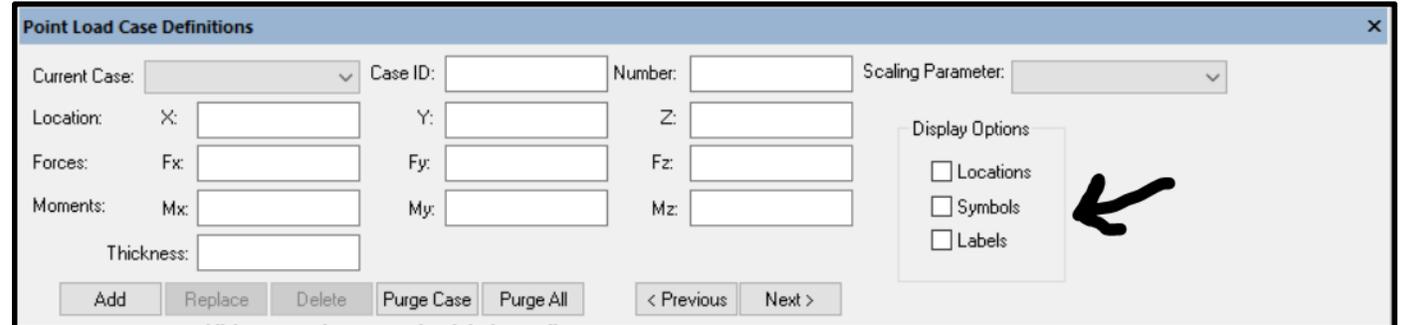


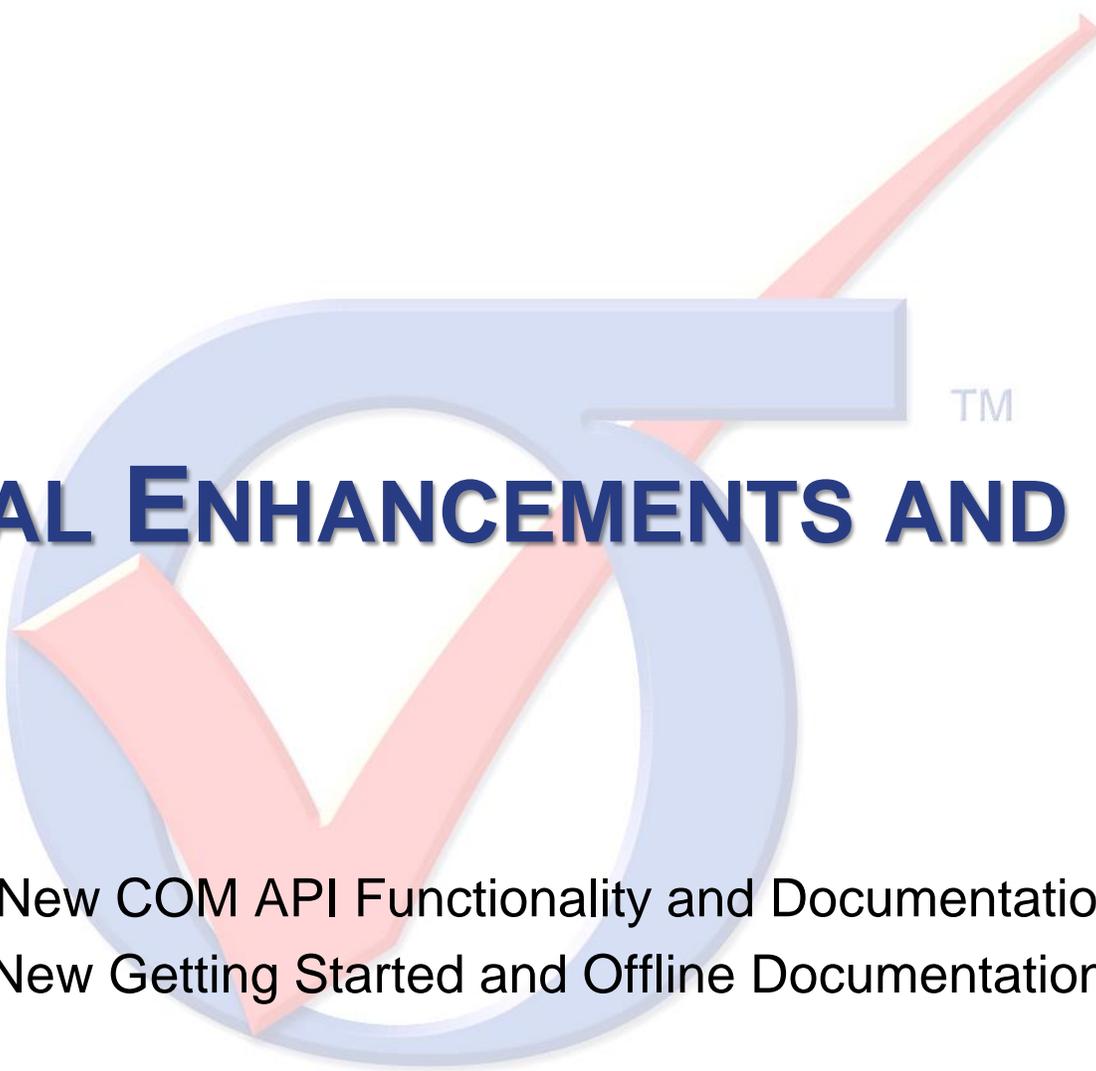
Extended Point Loads/Constraints Display Options



STRESSCHECK

- TLAP and imported running load display options are now available directly from the Point Load Case Definitions dialog (via Edit > Point Load Info).
- Imported point displacement/rotation display options are now available directly from the Point Constraint Case Definitions dialog (via Edit > Point Constraint Info).





ADDITIONAL ENHANCEMENTS AND FEATURES

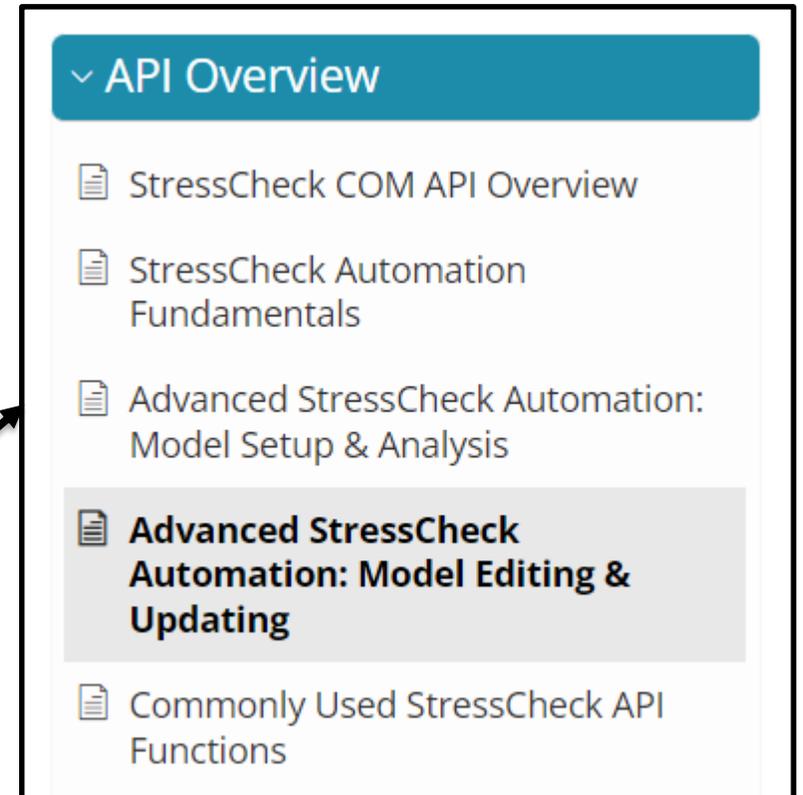
New COM API Functionality and Documentation
New Getting Started and Offline Documentations

New COM API Functionality and Documentation



STRESSCHECK

- Key enhancements incorporated into StressCheck's COM API include:
 - Multi-body contact solver options for iterations, max contact pressure error and ray tolerance
 - Support for importation of TLAP CSV file formats
 - Element face set extractions/plots optimized for performance
 - Surfaces collection now available for querying any surface in the model
- New online documentation articles available for users learning StressCheck's COM API.
 - <https://www.esrd.com/support/stresscheck-documentation/stresscheck-com-api-overview/>
 - Code snippets in VBA and Python

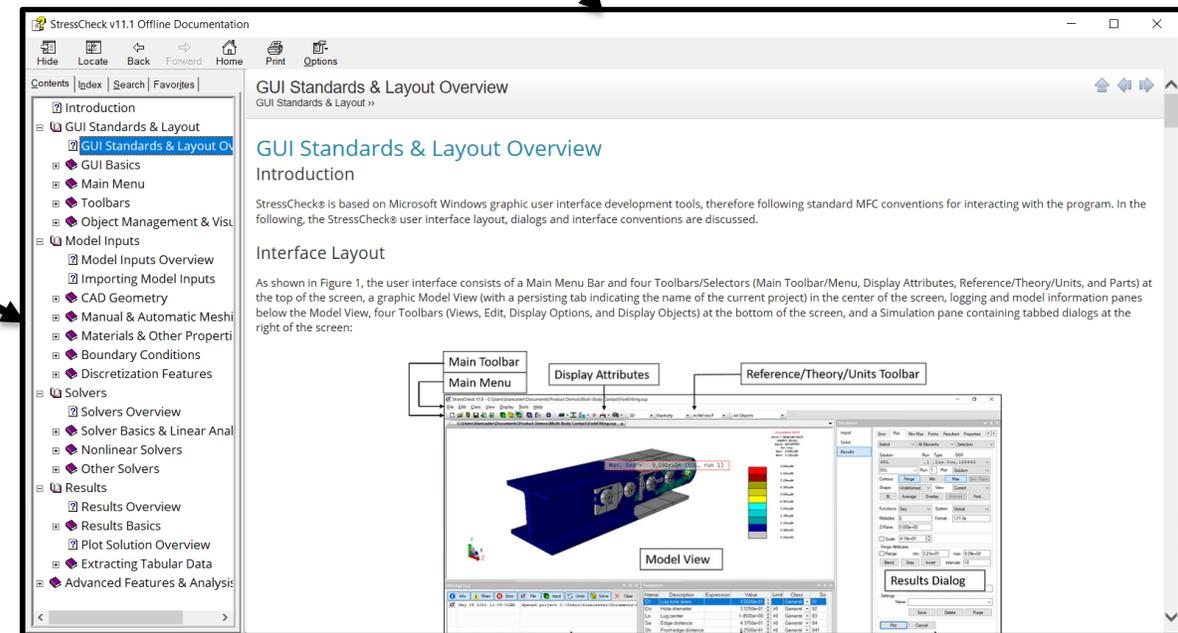
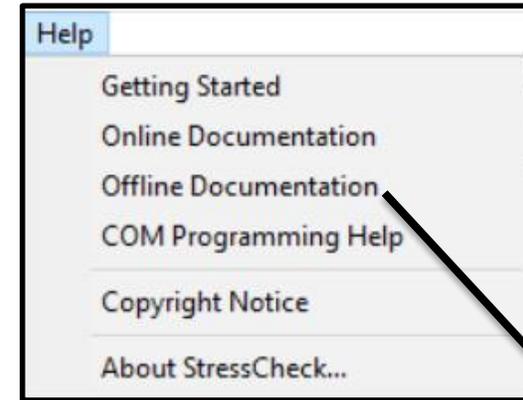


New Offline Documentations Available Under Help



STRESSCHECK

- ❑ The Help menu has been revamped to include new Getting Started and Offline Documentation options.
 - The **Getting Started** guide has been upgraded from a simple PDF to an easily navigable/searchable CHM file.
 - The **Offline Documentation** has been converted from a continuous PDF to an expansive, comprehensive CHM file organized by topic/keyword and incorporating playable GIFs of StressCheck's features.
- ❑ An Online Documentation option is still available for the latest documentation updates.
 - <https://www.esrd.com/support/stresscheck-documentation/>





QUESTIONS OR COMMENTS?

TM

Contact support@esrd.com