STRESSCHECK® 10.5 RELEASE NOTES

MAY 2019

Changes incorporated in the 64-bit StressCheck® 10.5 Professional Edition. All work files (SCW) and project files (SCP) created in StressCheck® 10.4 are compatible with StressCheck® 10.5. However, any file created in StressCheck® 10.5 cannot be opened in previous versions due to the file format changes incorporated into this release to support additional features and future enhancements.

RESOLVED ISSUES

- Several bug fixes including resolving issues with:
  - 3D Mouse
  - Automesh
  - COM API
  - Contact
  - Design Study
  - Display and UI
  - Error and Warning message handling
  - Extraction methods and saved settings
  - Geometry
  - H-discretization
  - Loads and Constraints
  - Min/Max labels
  - Parameters and Formulae
  - TLAP Traction and TLAP Bearing

UPDATES

In this release we have incorporated several updates to StressCheck® Professional and to the Master Guide documentation. They include: improved Parasolid tracking; new option to define Traction Loads (Force/Moment); new TLAP Traction Cross Section option; new option to specify solid or surface bodies for assignment; corrective traction option for Bearing and TLAP Bearing loads; Plastic strain extractions for 3D Incremental Theory of Plasticity (ITP) solutions; Log improvements for ITP; Name sorting for ITP solutions; Face/Face Surface element blanking; Resolution control for curves display; The StressCheck build number associated with a loaded file is now available on the Project Log; Wrapping of long solution names in the Plot legend; Automatic and manual selection of the 3D graphics driver; COM version updated to 3.5; miscellaneous GUI improvements. The most significant functionality and updates are described in the following sections.

NEW FORCE/MOMENT METHOD

A new method "Force/Moment" to define traction loads on a 3D cross sectional selection has been implemented (Figure 1). The directional components of the force and moment vectors are converted into a statically equivalent linear traction distribution, applied over the selected surfaces or element faces, defined as:

$$T_{x_c} = \frac{F_{x_c}}{A} - \frac{1}{2}\frac{M_{z_c}}{I_{x_c}}y_c \qquad T_{y_c} = \frac{F_{y_c}}{A} + \frac{1}{2}\frac{M_{z_c}}{I_{y_c}}x_c \qquad T_{z_c} = \frac{F_{z_c}}{A} - \frac{M_{y_c}}{I_{y_c}}x_c + \frac{M_{x_c}}{I_{x_c}}y_c$$

Where (x_c, y_c, z_c) are the centroidal coordinates along the cross section principal directions (computed automatically).
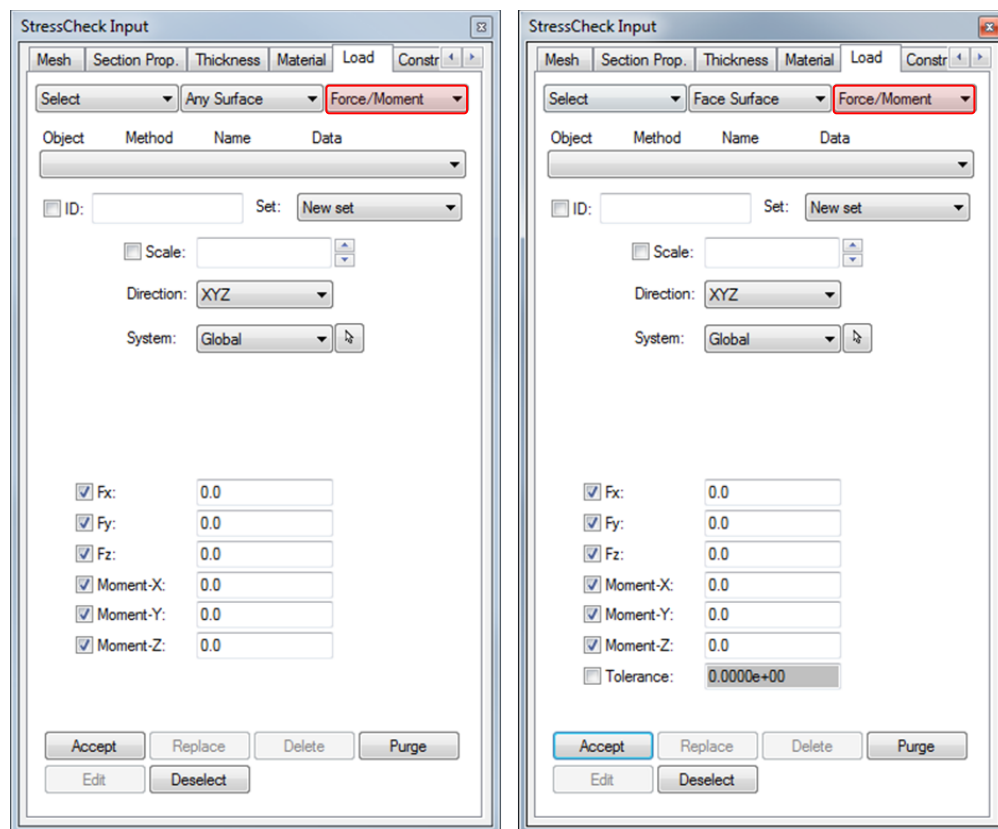
Figure 1: New Force/Moment option.

Remark: This option can only be applied to coplanar selections.

TLAP TRACTION CROSS SECTION

With the new TLAP Traction option Cross Section (Figure 2), the TLAP force and moment components are converted into a statically equivalent linear traction distribution, applied over the selected surfaces or element faces.
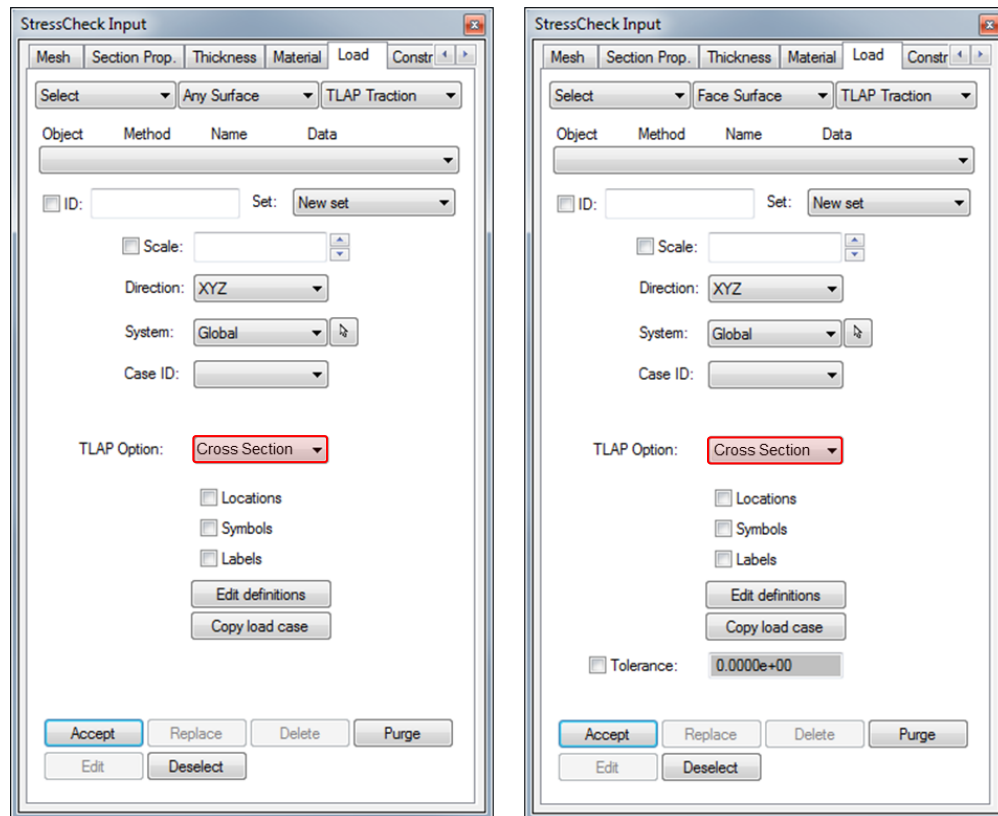

Figure 2: TLAP Traction, new Cross Section option.

Remark: This option can **only** be applied to coplanar selections.

See PDF page 719 of the Master Guide for details.

TLAP BEARING AND BEARING LOADS CORRECTION

In order to account for small deviations from ideal geometry such as non-cylindrical holes or suboptimal meshes, corrective tractions can now be added to the TLAP Bearing or Bearing traction distributions to correct for deviations on the input resultants (see Figure 3).

The correction is enabled by checking the Autocorrect option (ON by default). If a correction is not desired, the Autocorrect option can be unchecked and no corrective tractions will be added.
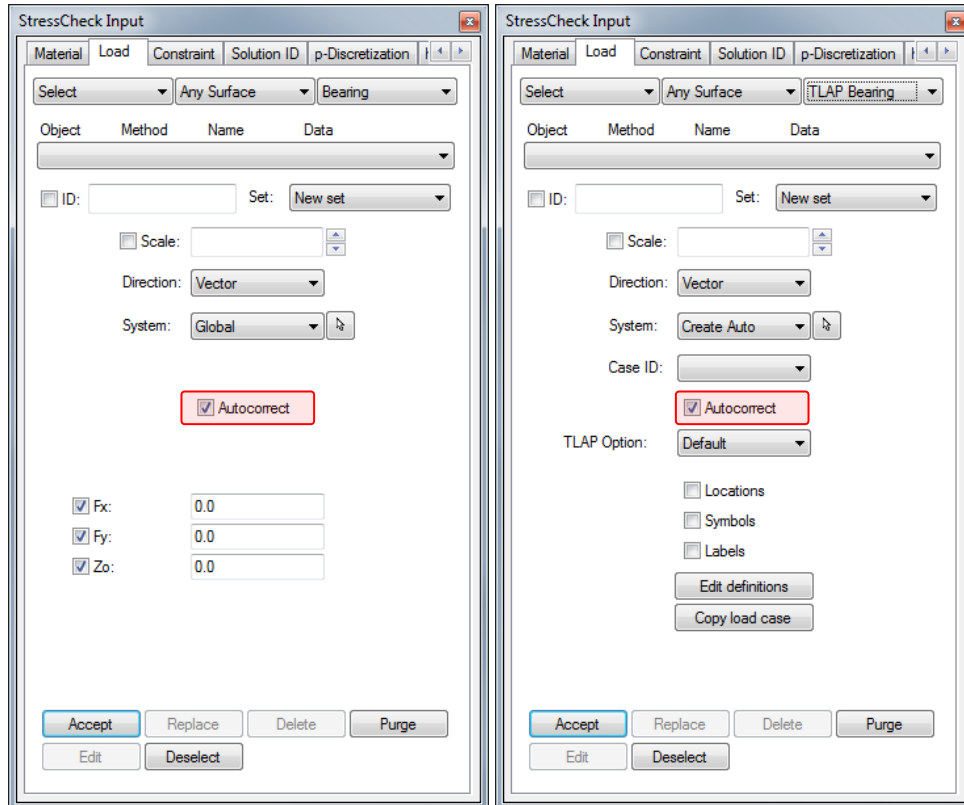
Figure 3: New option for Bearing and TLAP Bearing corrections.

Older files with existing TLAP Bearing records will be displayed with the Autocorrect option unchecked when retrieved.

Remark: Note that the Bearing and TLAP Bearing load corrections will always correct the resultant force/moment to match the input force/moment even if the geometry is not a full cylindrical hole. This may lead to an unexpected-looking traction distribution if, for example, the selected geometry is only half of a hole which is not aligned with the bearing direction.

See PDF page 706 of the Master Guide for details.

ANY BODY ASSIGNMENT OPTION

Attributes such as material assignments, p-discretization, and body loadings may be assigned according to whether an element is associated with a body. As with the Mesh Region method, this feature is particularly useful for assigning attributes to automatically generated meshes.
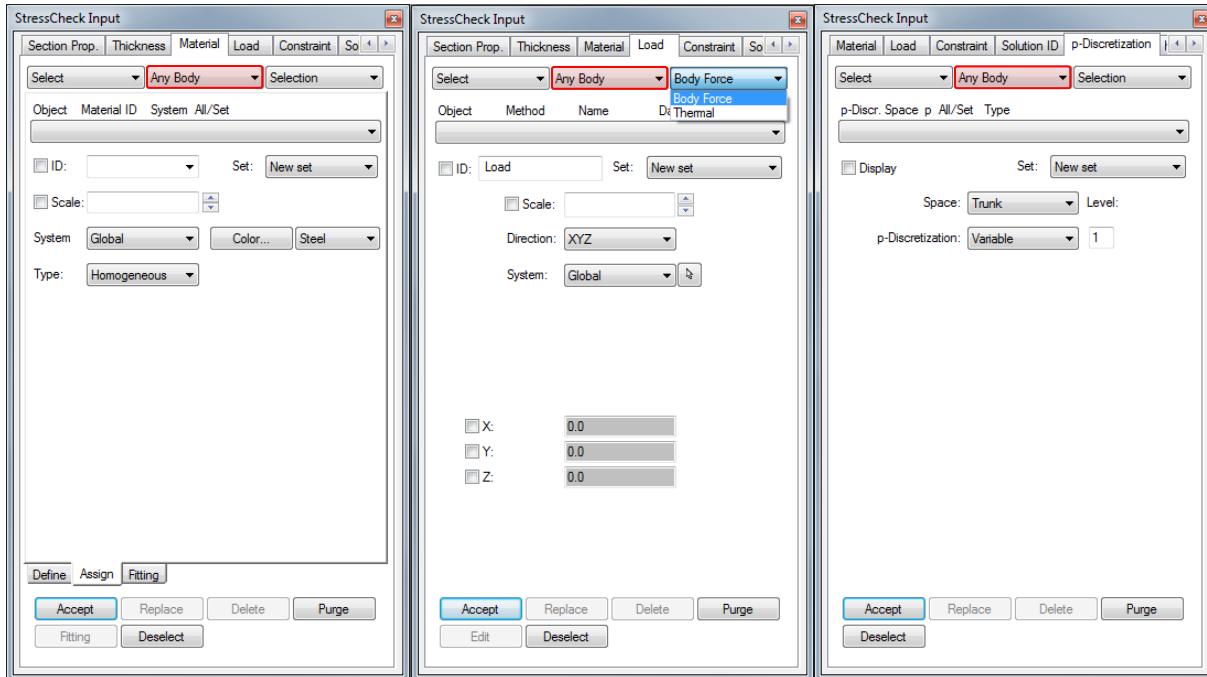
Figure 4: Any Body method for assignment.

Remark: The "Mesh Region" and "Any Body" methods are complementary. Elements created inside the body but not associated to the body will not be recognized by the option "Any Body" but will be by the option "Mesh Region". Elements associated to the body that are not fully contained in the body will not be recognized by the option "Mesh Region" but will be recognized by the option "Any Body".

PLASTIC STRAINS FOR 3D INCREMENTAL THEORY OF PLASTICITY (ITP) SOLUTIONS

New extraction functions for plastic strains are available for the Plot, Min/Max and Points tabs in the Results StressCheck® dialog (also available in COM) when 3D Incremental Theory of Plasticity solutions are selected during results processing.
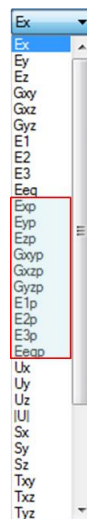
Figure 5: New plastic strain extraction functions for ITP.

LOG IMPROVEMENTS FOR INCREMENTAL THEORY OF PLASTICITY (ITP) SOLUTIONS

The solution log information for Incremental Theory of Plasticity solutions has been significantly improved to provide more and clearer information.

Figure 6: ITP Log improvements (execution settings).

Figure 7: ITP Log improvements (Event and Step information).

LONG SOLUTION NAMES ARE NOW WRAPPED IN THE PLOT LEGEND

Long solution names that were previously truncated in the Plot Legend are now wrapped (up to three lines).
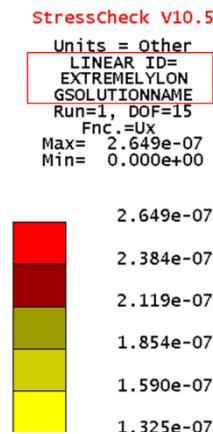

Figure 8: Updated Bearing Load Error Messages.

NAME SORTING FOR INCREMENTAL THEORY OF PLASTICITY (ITP) SOLUTIONS

IPT solutions are now sorted sequentially based on linear solution run, event, and step number respectively.
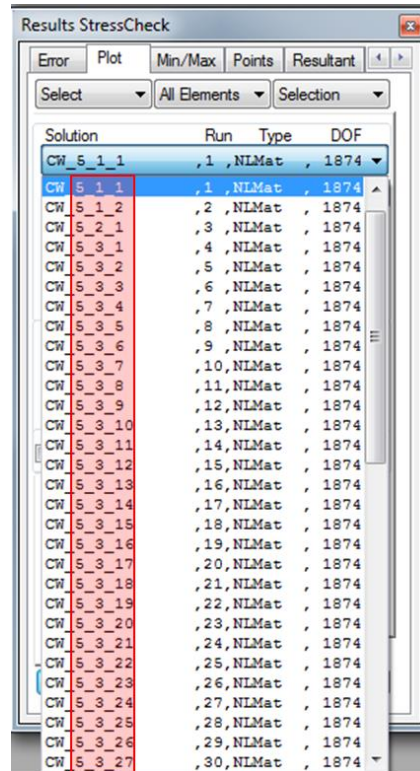

Figure 9: New IMO TLAP Bearing option.

FILE BUILD NUMBER IS NOW RECORDED IN THE PROJECT LOG

The StressCheck® Build Number used to create or save a (*.scw or *.scp) file is now logged in the Project Log when the file is read in StressCheck®.
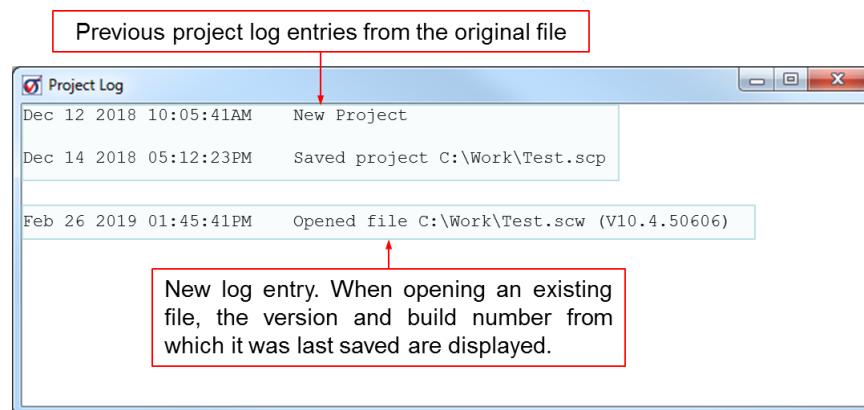

Figure 10: Build number.

FACE/FACE SURFACE ELEMENT BLANK

Elements can now be blanked when selecting their faces (Face Surface or Face selection).
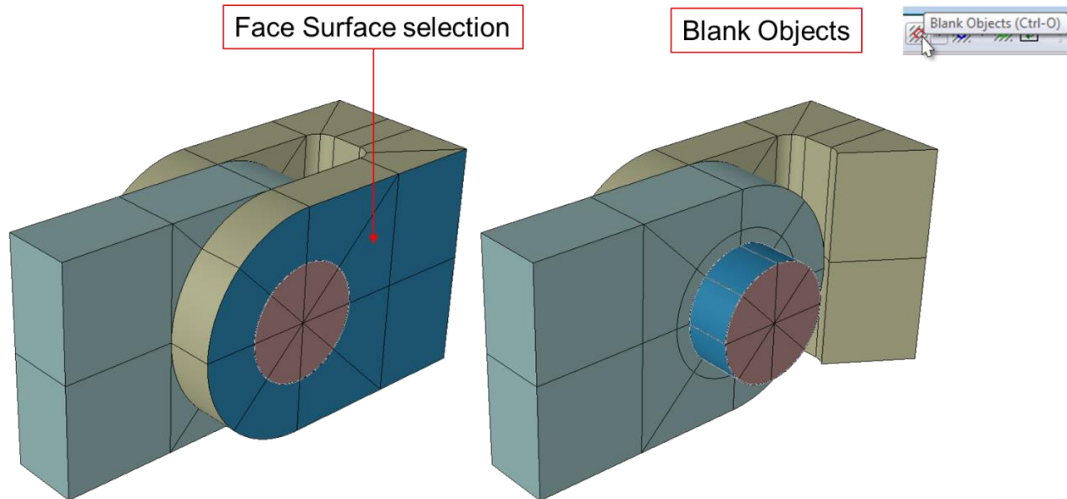

Figure 11: Example of element blanking using Face Surface selection (for better display Wetted Faces are off).

CURVES RESOLUTION CAN NOW BE CONTROLLED

Object Resolution can now be used to control the resolution of curves as well as surfaces.
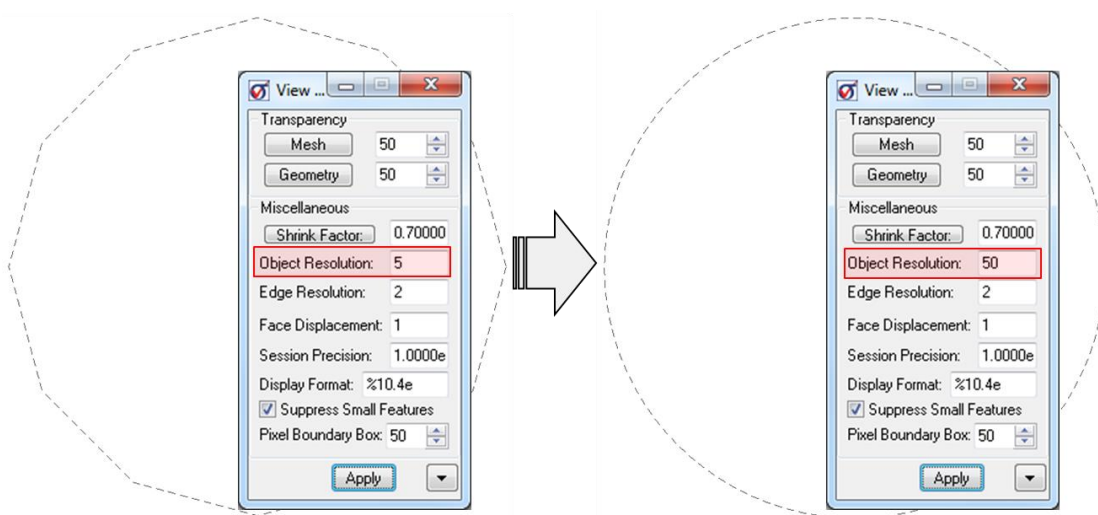

Figure 12: Curve resolution update.

AUTOMATIC AND MANUAL SELECTION OF GRAPHIC DRIVERS

By default, StressCheck® automatically selects the most appropriate graphics driver based on the current runtime environment. In case needed or desired by the user an option has been added in the Options dialog to choose between driver preferences: Automatic, DirectX 11, DirectX 9, OpenGL 2, and OpenGL (see Figure 13).
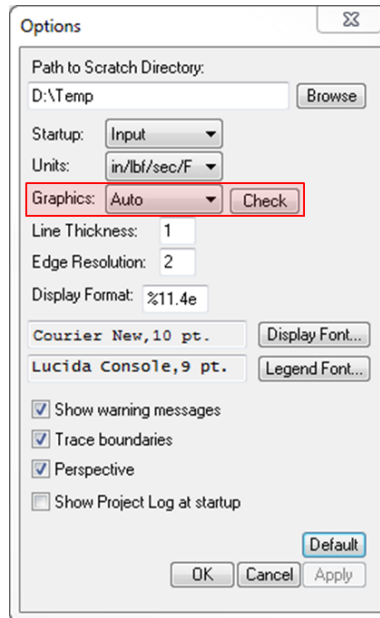

Figure 13: User option to select graphics driver.

The Check button displays a message indicating which driver is currently in use, the recommended selection (Auto), and the stored preference (Auto, DirectX 11, DirectX 9, OpenGL 2, or OpenGL as selected by the user).

Remark: Note that changes to driver preference will not take effect until StressCheck® is restarted.

IMPORTANT NOTE REGARDING THE PARASOLID TRACKING UPGRADE

Significant changes in the way StressCheck 10.5® tracks Parasolid entities have been implemented. These changes are designed to improve stability, parametric modeling capabilities and performance. A file generated using a previous version will be upgraded when read in StressCheck 10.5®. After reading, the status bar should indicate that the file upgrade succeeded. It is recommended that you save the upgraded file with a different name or in a different location easy to identify (e.g., adding "10_5" in the name) in case you encounter any issues with the upgraded file. If you do, please contact support at support@esrd.com.