Design Studio for GENESIS

A Graphical User Interface
for the ***GENESIS***
Structural Analysis and Optimization Software

New Features and Enhancements

Version 17.0

May 2018

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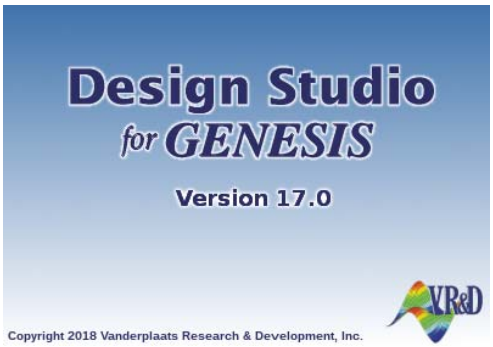
1 Introduction

This document describes the enhancements and new features added in Design Studio for *GENESIS* 17.0.

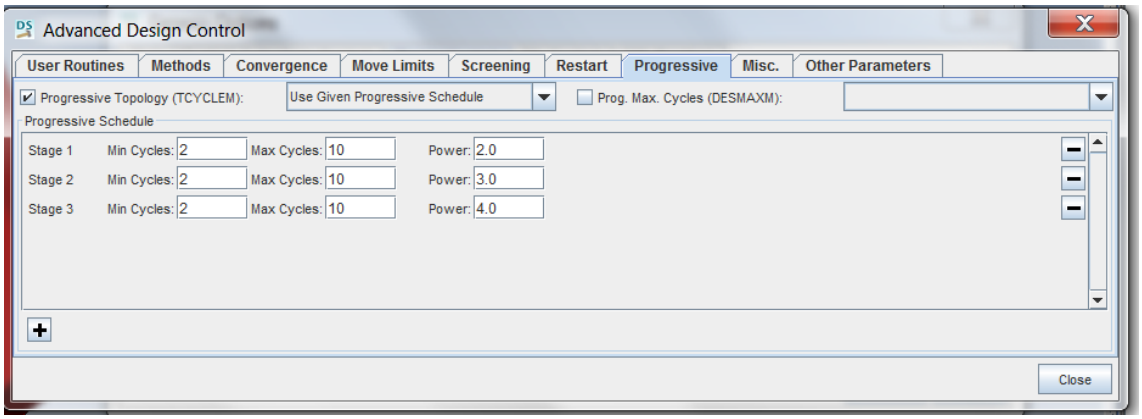
Enhancement Summary

- *GENESIS* 17.0 Compatibility
- Import/Export the View Catalog
- Pick Grids on a Feature Line
- Manuals Available From Help Menu
- Print Output Coordinate System when Identifying Grids
- Draw CSLIB2 Bar Element Cross-Sections
- Renumber Item in Edit Menu
- Create Elements from Voxel Cover
- Create/Edit Heat Transfer Loading
- Quick Move Grid-to-Grid
- New Merge Grid Option
- Find Bad RBE3 Elements
- Deform Scale Displayed in Viewport
- New Synthetic Result Functions
- Smear Topology Results
- Pick Feature Bounded Surface in Color Mesh
- Easier to Get Detail Popup on Charts
- Show/Hide Chart Windows

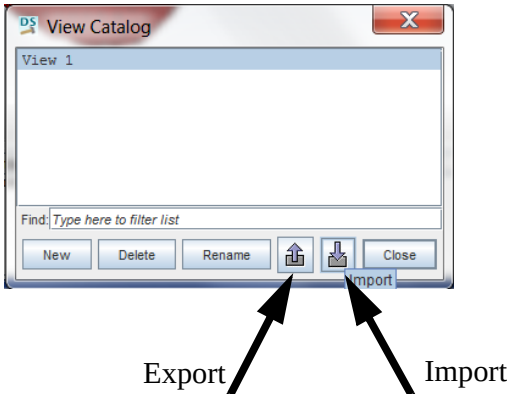


2 General Enhancements

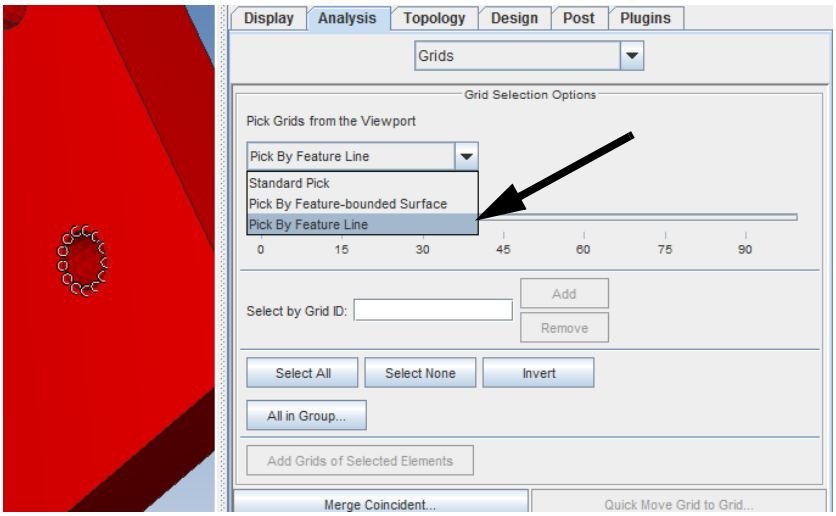
1. *GENESIS* 17.0 Compatibility. Design Studio has been enhanced to handle all of the new capabilities of *GENESIS* 17.0. New features in *GENESIS* 17.0 include: Progressive rule topology, Von Mises stress index response, Coupled fluid-structure frequency response analysis, Random RMS and PSD stress responses.



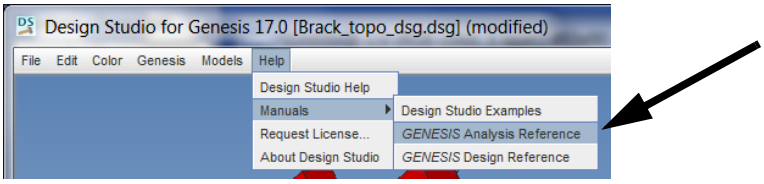
2. Import/Export the View Catalog. The View Catalog dialog now has two additional buttons: Import and Export. These buttons will bring up a file selection dialog to allow choosing or naming a file to hold the View Catalog data. View data includes the camera position, orientation and zoom factor. These allow one to save any defined views and then load those into another model. This makes it easy to get pictures of different models from the same camera point. The View Catalog has always been saved as special comments in exported input data, and the new Import/Export uses the same format. That means that in addition to selecting *.dsview files exported from the View Catalog, any exported input data file can also be selected in the Import dialog to load all the views from that model. .



3. Pick Grids on a Feature Line. The standard grid selection panel contains a new option to select all grids along a chosen feature line. This option is an alternative to the existing standard pick (click on a grid or drag a box) and the pick all grids on a feature-bounded surface. The previous check box for picking a surface is replaced with a drop-down menu to choose among the three options. After switching the option to “Pick By Feature Line”, then clicking on feature line in the viewport will select all grids along that line (in both directions) until the line either ends or branches. The same angle control for Feature-bounded Surface also applies to Feature Line picking.



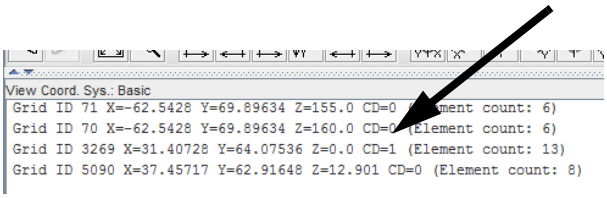
4. Manuals Available From Help Menu. The Help Menu has a new Manuals submenu to give easy access to the Design Studio Exampls manual and the *GENESIS* reference manuals.



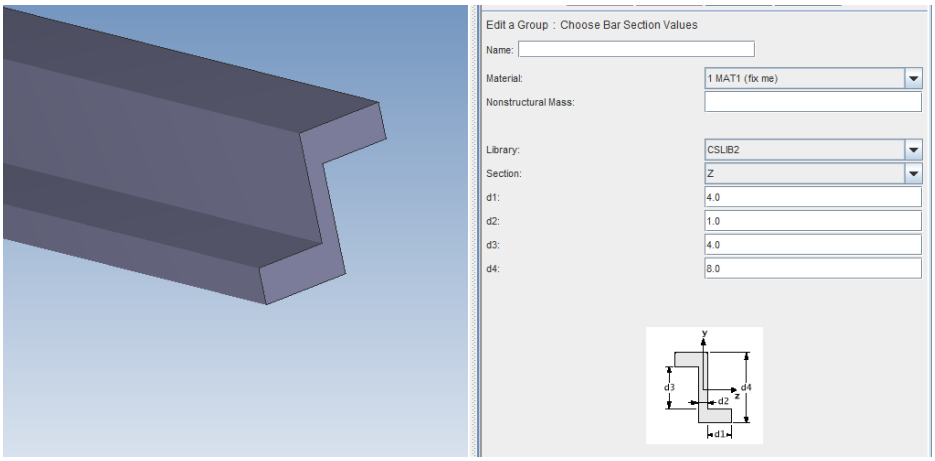
5. New Examples. There are five new step-by-step example problems in the Design Studio Examples manual that illustrate new capabilities of *GENESIS*.

3 Display Enhancements

1. Print Output Coordinate System when Identifying Grids. Now the information printed in the Report Window for each identified grid includes CD= to show the ID of the output (displacement) coordinate system that has been assigned to the grid.

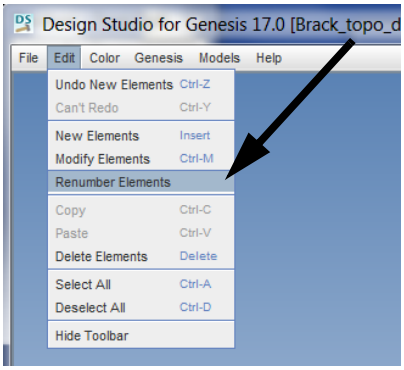


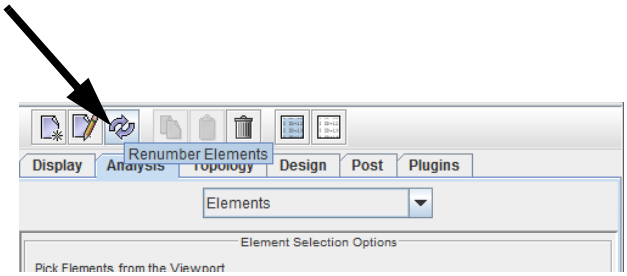
2. Draw CSLIB2 Bar Element Cross-Sections. In the previous version, a feature was added to draw bars as solid, revealing their actual cross section dimensions. This feature only applied to bars that used PBARL/PBEAML CSLIB1 cross sections, while CSLIB2 cross sections drew as a circle with the same bar area. Now, all the CSLIB2 cross sections also draw showing their actual cross section and dimensions.



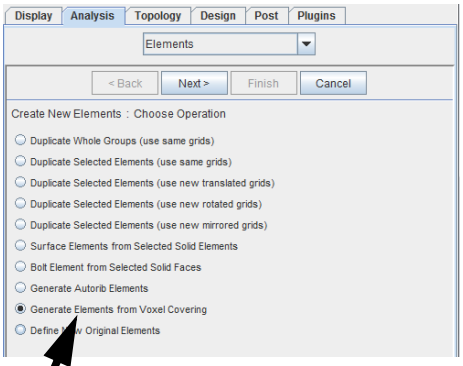
4 Analysis Preprocessing Enhancements

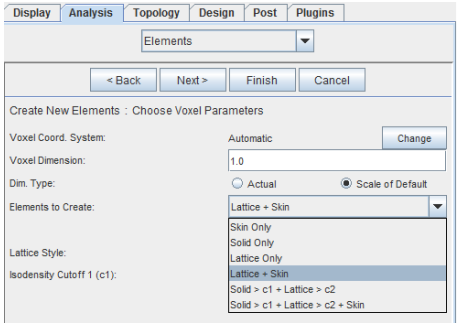
1. Renumber Item in Edit Menu. In previous versions, the renumber item trail was a hidden capability that required shift-clicking on the Modify item edit toolbar icon. Now, there is a Renumber item in the Edit menu, and a corresponding Renumber button in the edit toolbar.

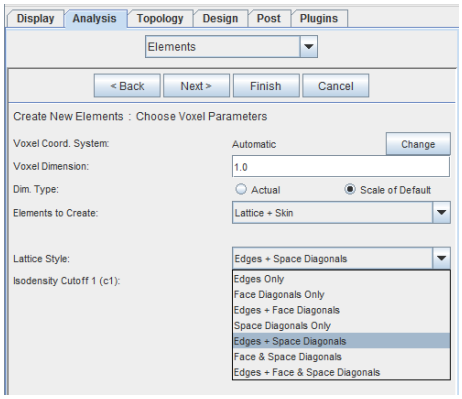


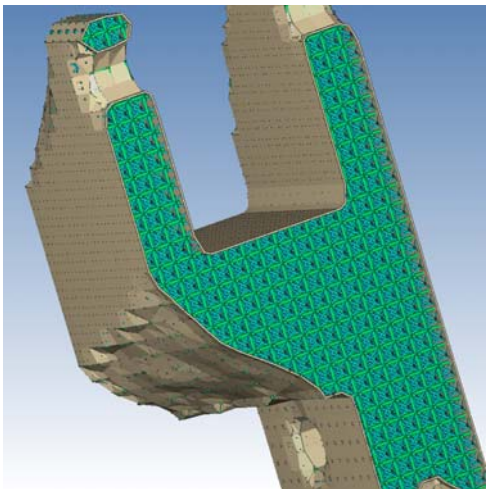


2. Create Elements from Voxel Cover.There is a new option in the Create Elements trail to create elements from a voxelization that covers an existing solid group. This can create new mostly CHEXA meshes or can create lattice bar elements. There is also an option to create skin elements. A topology result can also be selected to limit the created elements to the kept results of the topology.

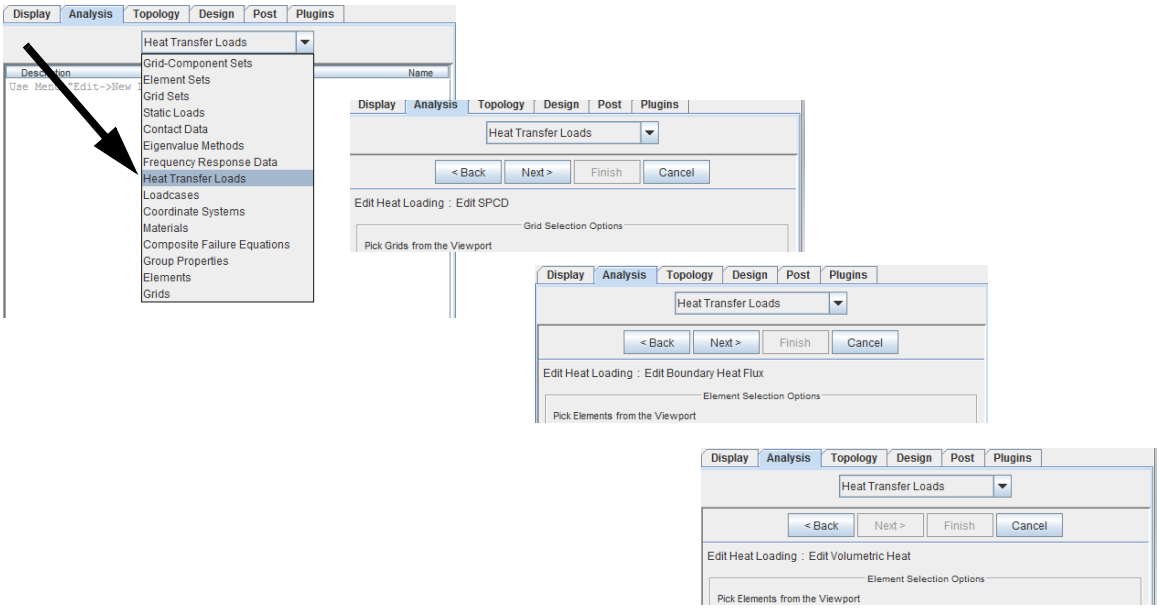




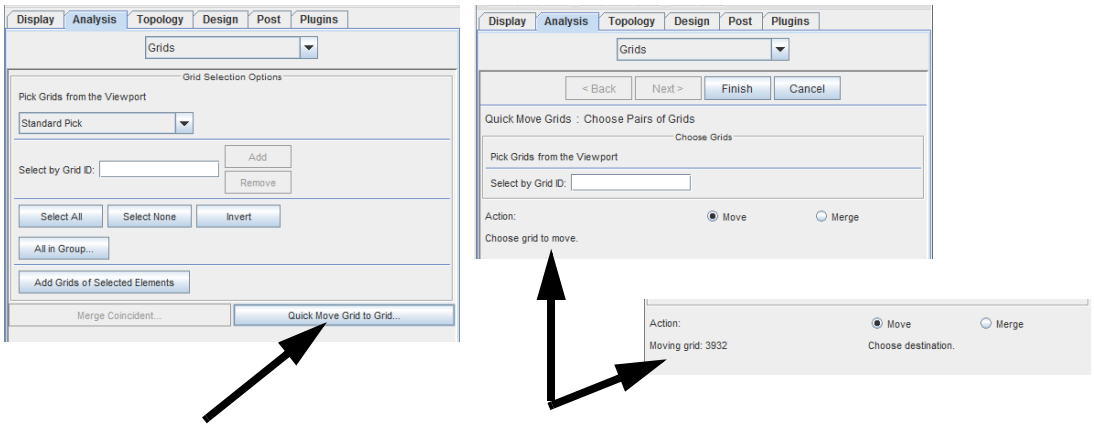




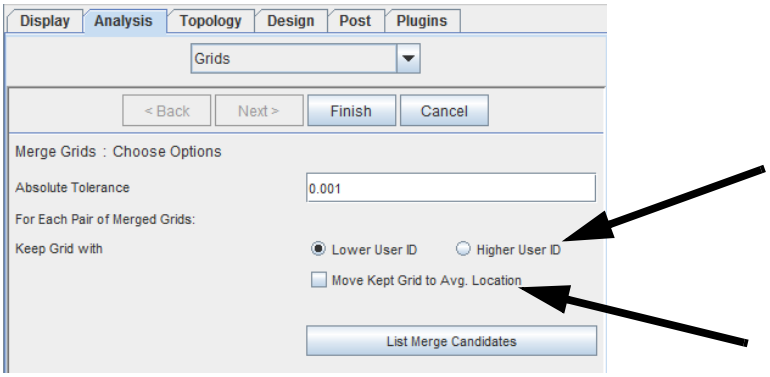
3. Create/Edit Heat Transfer Loading. There is a new category in the Analysis Tab to allow the creation and editing of heat transfer loading. This enables one to create/edit enforced temperatures (SPCD), heat boundary fluxes (QBDY1) and/or volumetric heat generation (QVOL). In addition, CHBDYE elements can be created in the Elements category to allow definition of boundary fluxes and convection boundary conditions.



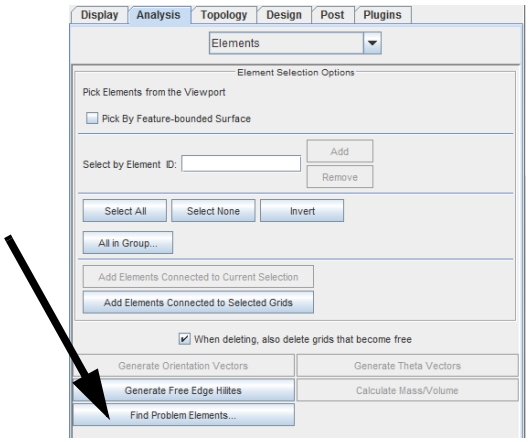
4. Quick Move Grid-to-Grid. A new quick edit trail is available in the Grids category to easily move one grid to coincide with another. This operation takes pairs of selected grids and instantly moves the first to the second. There is also an option to automatically merge the newly coincident grids.

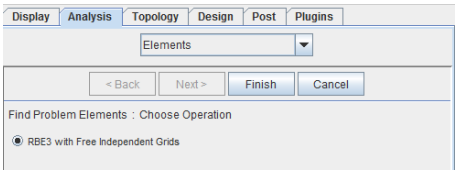


5. New Merge Grid Option. There are new options in the Merge Coincident Grids trail. Now one can select which of the merging grids to keep based on ID. There is also an option to move the kept grid to the average location of the merging pair.



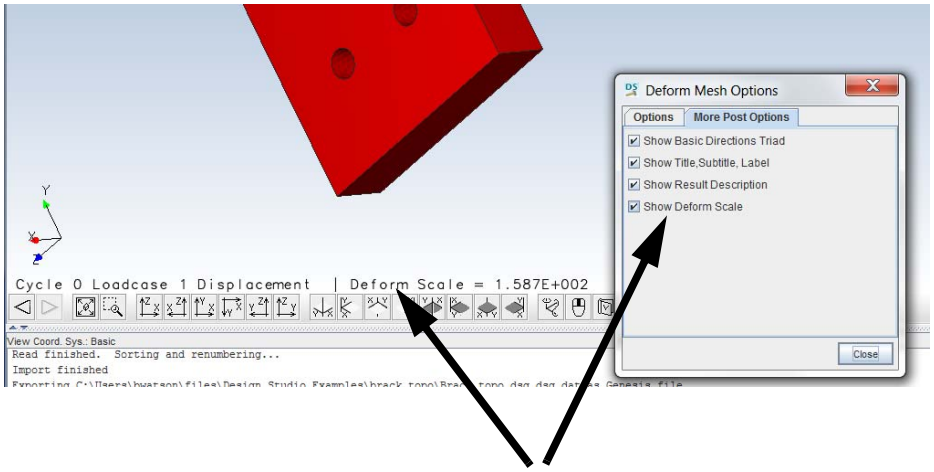
6. Find Bad RBE3 Elements. There is a new quick trail in the Elements category to find problem elements. Currently this has a single option to select RBE3 elements that have independent grids which are not connected to any other elements. These types of RBE3 elements cause numerical problems, and should be fixed.



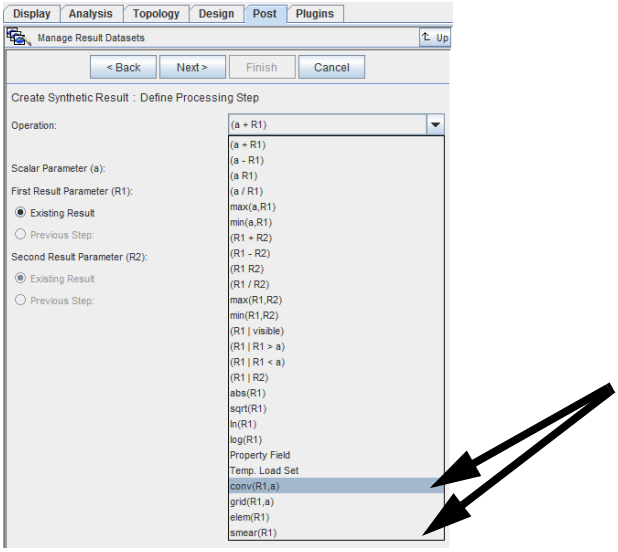


5 Postprocessing Enhancements

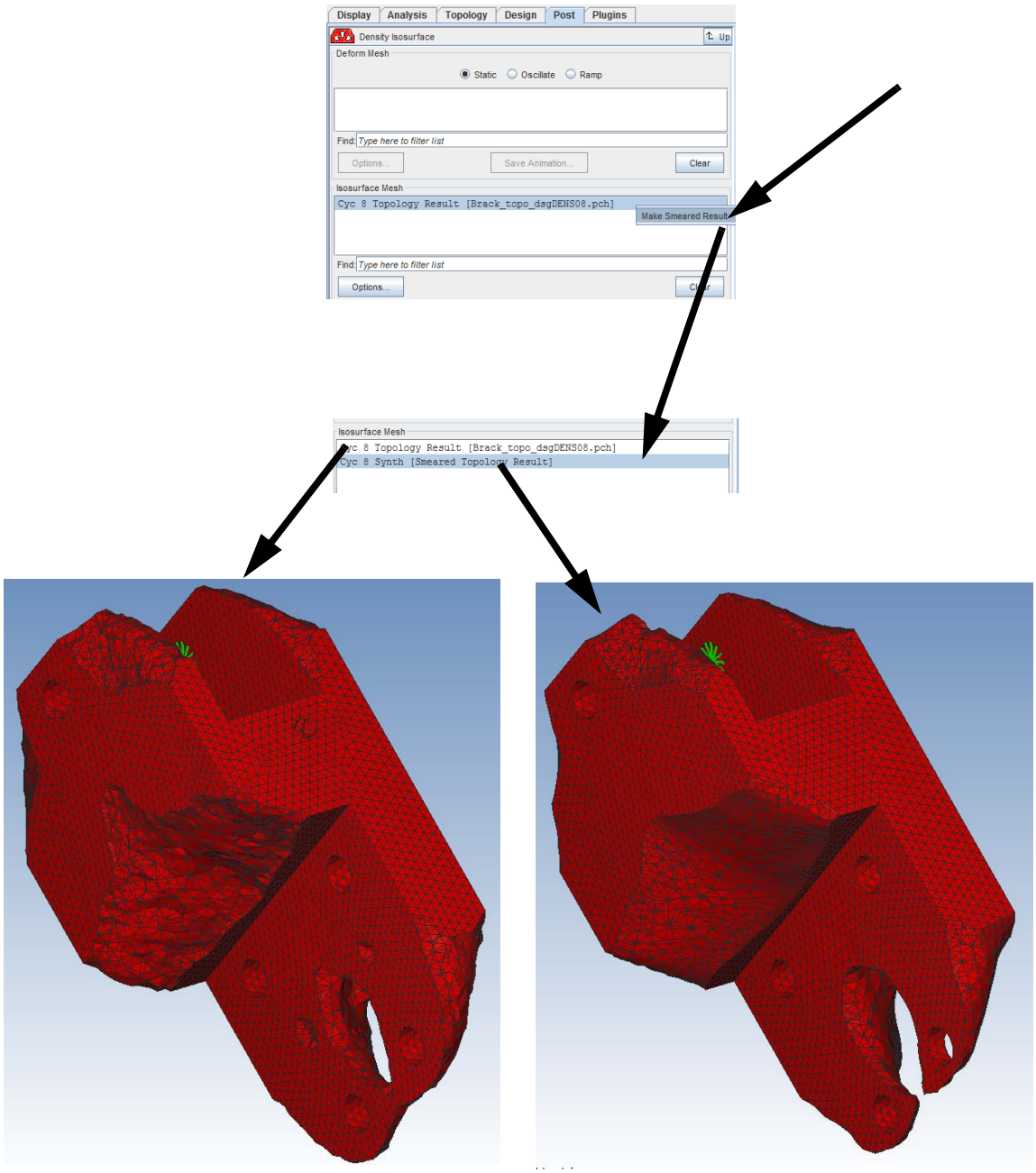
1. Deform Scale Displayed in Viewport. Now when a deform result is selected, the scale factor is displayed in the Viewport Window. There is an option in the Deform Options dialog to turn this off.



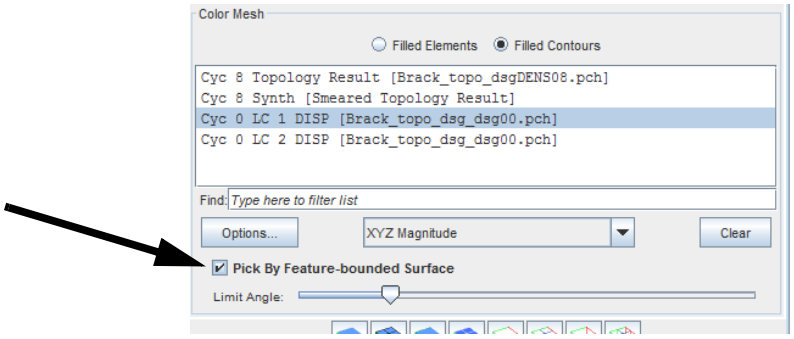
2. New Synthetic Result Functions. There are four new functions available when creating synthetic results: conv(R1, a), grid(R1, a), elem(R1) and smear(R1). ‘conv’ performs a convolution of the selected result R1. There are 7 different convolution kernels available, selected using integers 0 - 6 in the ‘a’ parameter. Convolutions tend to smooth out results, and can be useful for smoothing topology results. ‘grid’ averages element results to the grids. The parameter ‘a’ selects between using volume weighting (a = 1) or not (a = 0) in the averaging algorithm. ‘elem’ averages grid results to the elements. ‘smear’ is a smearing algorithm designed to smooth out topology results.



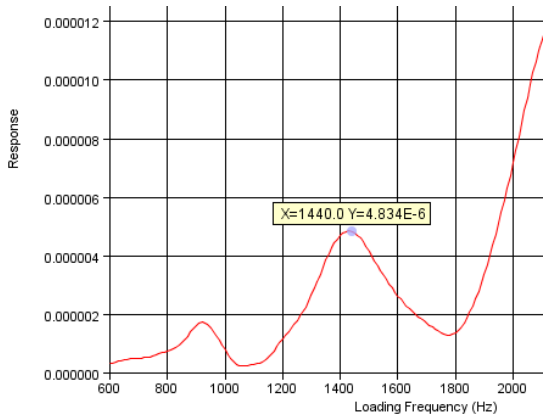
3. Smear Topology Results. There is a shortcut to create a synthetic result using the smear function on a topology density result. In the Isosurface Result list, a right-click on a result brings up a menu option to make a smeared result.



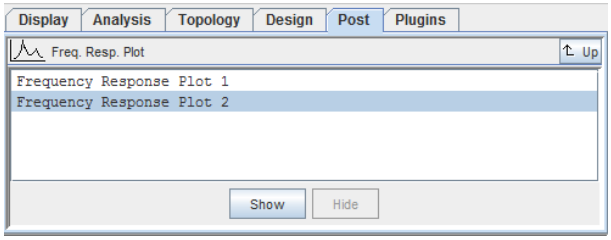
4. Pick Feature Bounded Surface in Color Mesh. When displaying a Color Mesh Result, a click on the model will identify the grid/element and its corresponding result value. Dragging a box will identify the top and bottom ten grids/elements in the selection and print those results. There is a new option to allow clicking on a feature bounded surface to identify the top and bottom ten grids/elements on that surface, and print those results. There is a check box below the Color Mesh Result list to enable this option. If the option is selected, a convenience slider is displayed to adjust the angle cutoff for feature lines.



5. Easier to Get Detail Popup on Charts. A large tolerance has been added when tracking curves under the mouse cursor. Now it is significantly easier to get the detail popup showing the exact X and Y values for a point on a curve.Also, the point on the curve corresponding to the popup is identified with a selection marker.

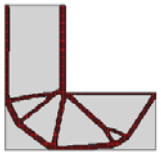
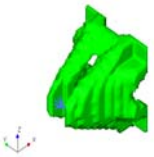
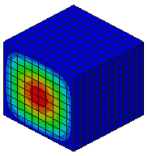
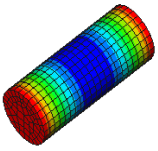
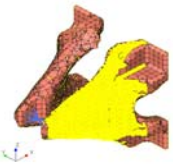


6. Show/Hide Chart Windows. Previously, attempting to close a chart window, such as frequency response plots or path xy charts, whose edit trail had been exited would result in the chart being deleted. Now the window will only be hidden, and the chart will continue to exist unless deleted with the Edit menu/toolbar. There are buttons at the bottom of the chart window lists to show/hide the selected chart window, depending on its current state.



6 New Example Problems

The following table describes new examples and their corresponding input file names. The listed files are provided with the installation:

Name	Problem	Special Features	Figure
`TPDSG038.dat`	Topology Optimization to minimize Mass with Stress Constraint	• Minimizing mass • Constraint on von-Mises stress index	
`TPDSG039.dat`	Reanalysis of Topology Optimization interpreted results	• Creating mesh of interpreted topology result	
`FRDSG011.dat`	Acoustic Analysis of Coupled Fluid/Structure Cubic Model	• Defining fluid element • Performing frequency response analysis	
`FRDSG012.dat`	Acoustic Analysis of Coupled Fluid/Structure Cylindrical Model	• Defining fluid element • Cylindrical domain • Performing frequency response analysis	
`AMDSG013.dat`	Lattice Mesh from Topology Optimization Results	• Creating Lattice Mesh based onTopology results	

7 Compatibility with Previous Versions

1. Design Studio database files (*.dsg) written with version 16.0 or earlier are compatible with version 17.0. However, database files written with version 17.0 are not compatible with previous versions.