



Design Studio for GENESIS

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

New Features and Enhancements

Version 18.0

May 2019

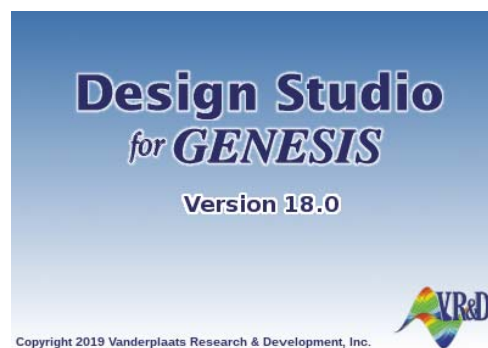
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1 Introduction

This document describes the enhancements and new features added in Design Studio for *GENESIS* 18.0.

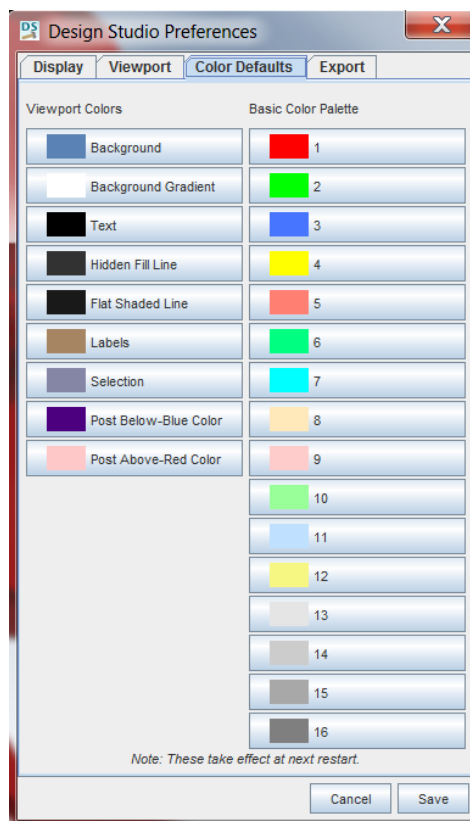
Enhancement Summary

- *GENESIS* 18.0 Compatibility
- Color Mesh on top of Topology Isosurface
- Create Beam Elements Representing PSOLID Lattice
- Optional Final-Frame Pause in Animations
- Improved Shaded Feature Style for Topology Isosurface
- Improved Element/Grid Selection on Topology Isosurface
- Increase Number of Basic Colors to 16
- New Filled-in Shape Domain Display Style
- Auto-fix Bad RBE3 Elements
- Options to Show/Hide and Reorder X-Y Plot Curves
- Import PBUSH Force Results
- Improved Drawing Performance for Labels
- Create Synthetic Result from PBEAM/PBEAML Property Field
- Better Arrow Display for DAREA Loading



2 General Enhancements

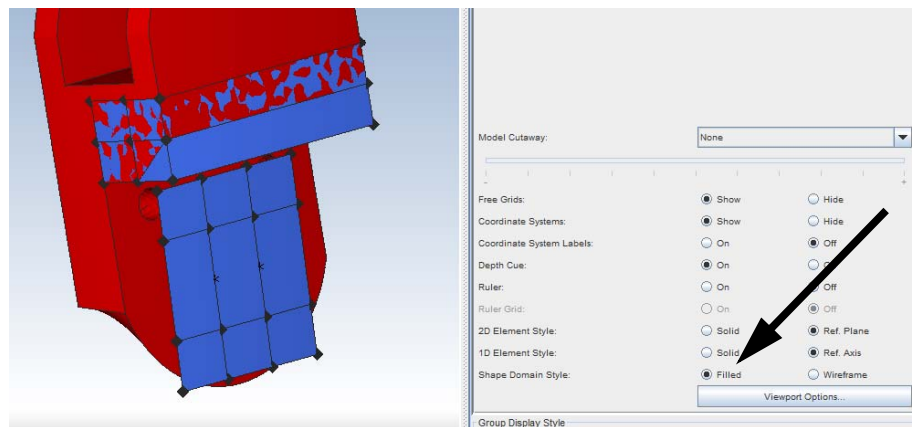
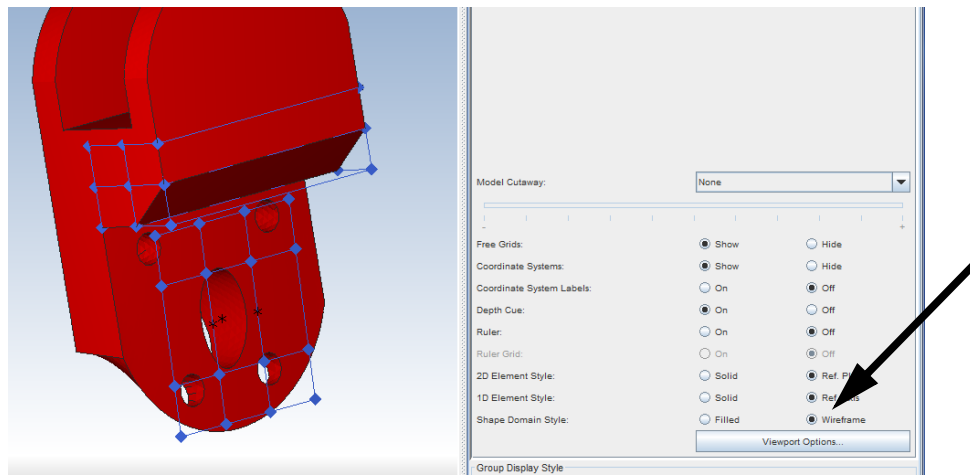
1. *GENESIS* 18.0 Compatibility. Design Studio has been enhanced to handle all of the new capabilities of *GENESIS* 18.0. New features in *GENESIS* 18.0 include: New overhang topology constraints for additive manufacturing, Fluid pressure response for acoustics, Homogenized lattice option for solid elements, CORD3R/CORD4R input, Nodal thickness on shell elements, Torsional stiffness on rod elements, Rigid option for bush property.
2. Increase Number of Basic Colors to 16. The basic color palette used to color groups in the Viewport Window has been expanded from 8 to 16 colors. All can be customized in the Preferences dialog..



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

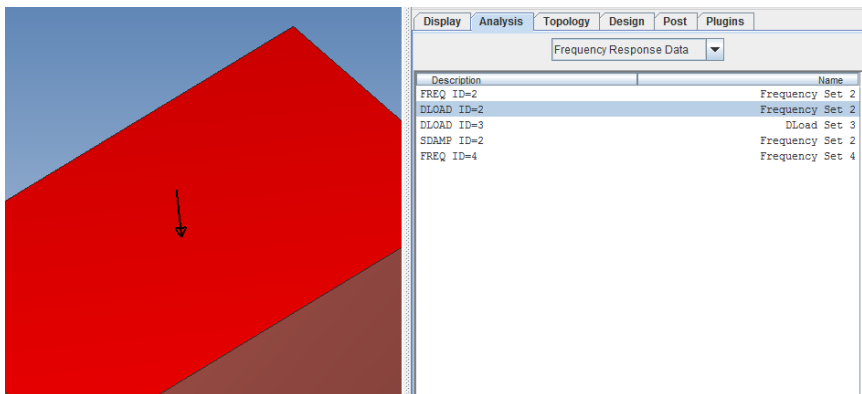
3 Display Enhancements

1. New Filled-in Shape Domain Display Style. Shape domains have a new option draw them with a filled-in style. This can help to easily identify “holes” in a mesh of shape domains which would otherwise be difficult to detect.

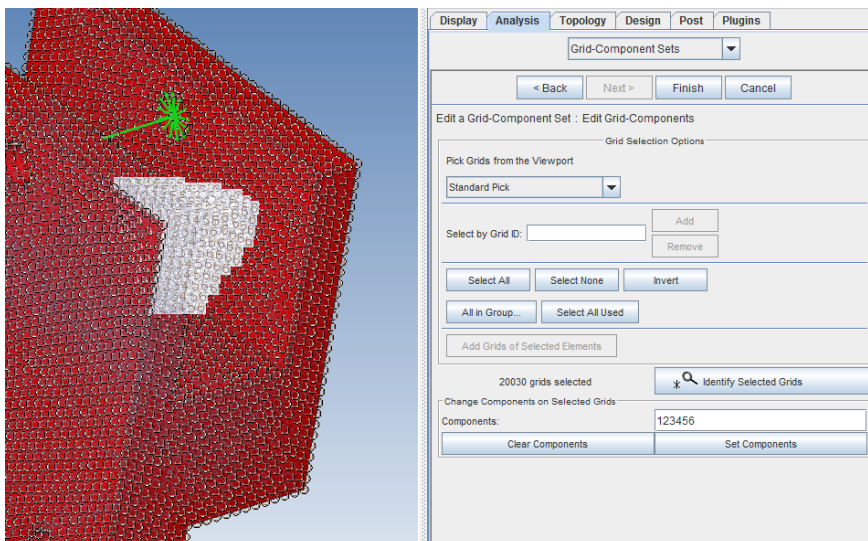


New Features

2. Better Arrow Display for DAREA Loading. Now arrows drawn to represent DAREA dynamic loading use the sign of the DAREA value to set the direction. This can help to show the relative phases of multiple DAREAs. Note, however, that DPHASE and/or DELAY data can also change the relative phases of dynamic loads, and these are not represented in the display.

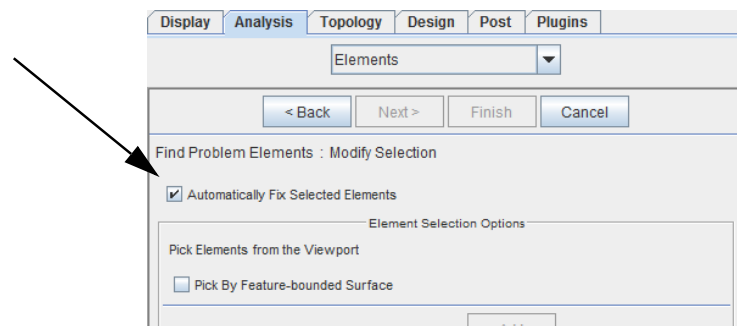
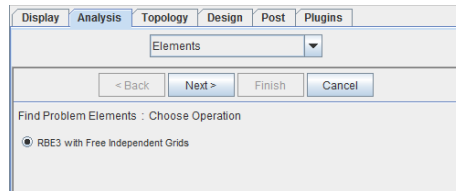


3. Improved Drawing Performance for Labels. Improvements have been made to the drawing performance of label symbols. This helps in many instances where there are a large number of symbols, such as in the generation of large Grid-Component sets.



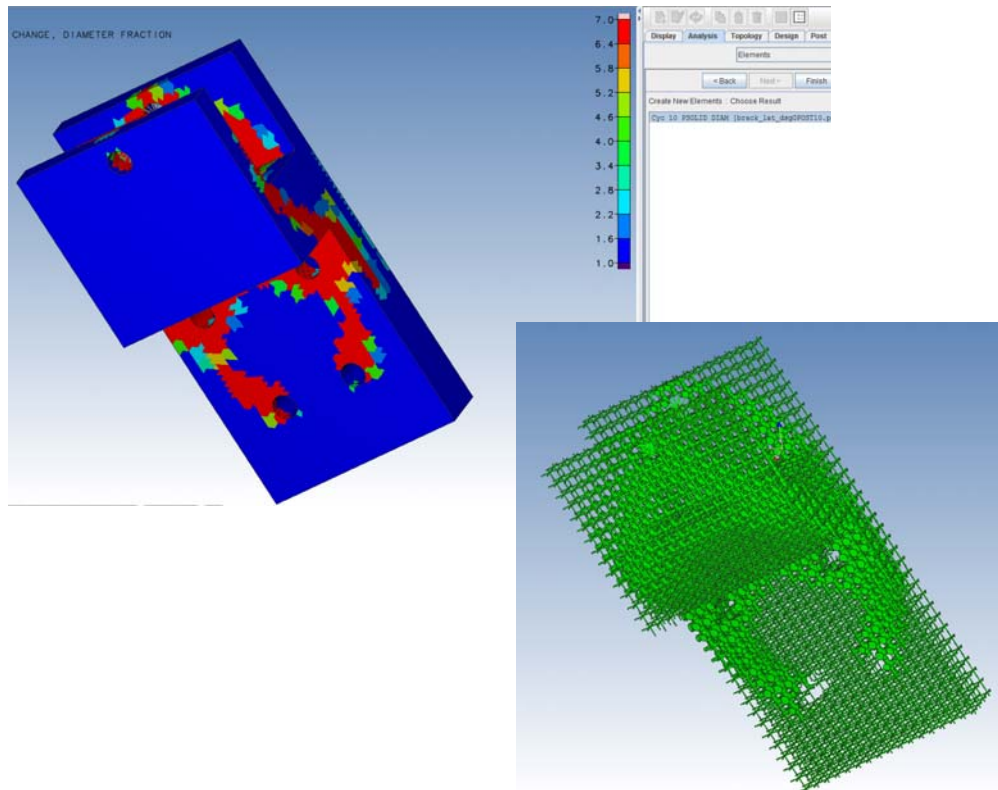
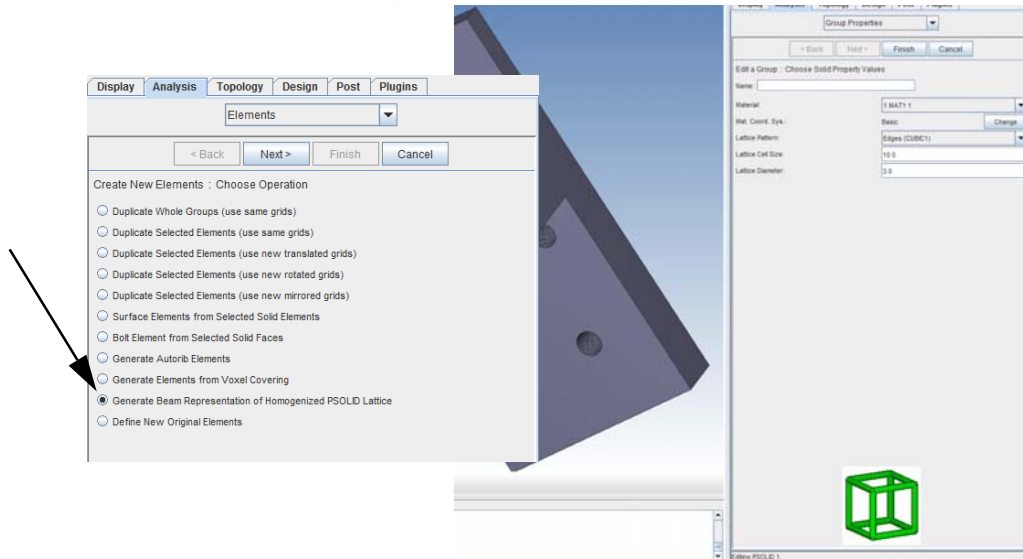
4 Analysis Preprocessing Enhancements

1. Auto-fix Bad RBE3 Elements. The quick trail in the Elements category to find problem elements has a new option to automatically fix RBE3 elements that have independent grids which are not connected to any other elements. The automatic fix for RBE3 removes the free independent grids from the selected elements.



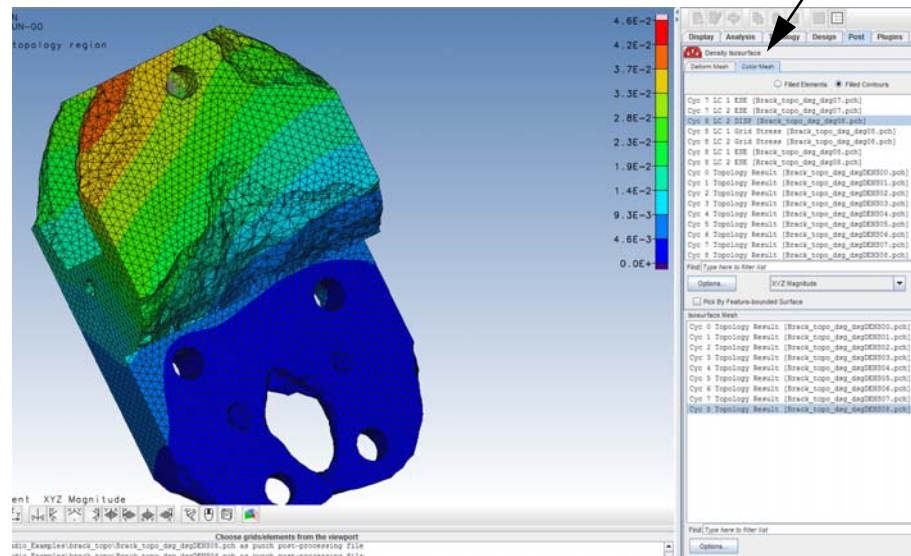
New Features

2. Create Beam Elements Representing PSOLID Lattice. In *GENESIS* 18.0, there is a new option to model solid elements using a homogenized lattice pattern. The dimensions of the lattice bars can be designed with sizing or topometry. To aid in visualizing the results of this type of design, there is a new option in the Create Elements trail to create beam elements to represent the lattice pattern of a homogenized solid. Whole lattice cells can be kept, or the beams can be trimmed to the surface of the solid. There is an option to use optimization results to set the diameters of the beams, or the current value on the PSOLID can be used.



5 Postprocessing Enhancements

1. Color Mesh on top of Topology Isosurface. Previously, only a Deform Mesh result could be displayed on an isosurface result. Now the upper panel in the Topology Isosurface function has tabs to enable selection of result sets for either or both of Deform Mesh and Color Mesh displays.



New Features

2. Improved Shaded Feature Style for Topology Isosurface. Previously, the Shaded Feature view style reverted to Flat Shaded whenever a topology isosurface result was displayed. Now, the Shaded Feature style is preserved for the portion of the model not cut by the isosurface. The cut surface retains the element outlines to improve visibility of this surface. The Smooth Shaded style remains available to remove all element outlines.



Flat Shaded

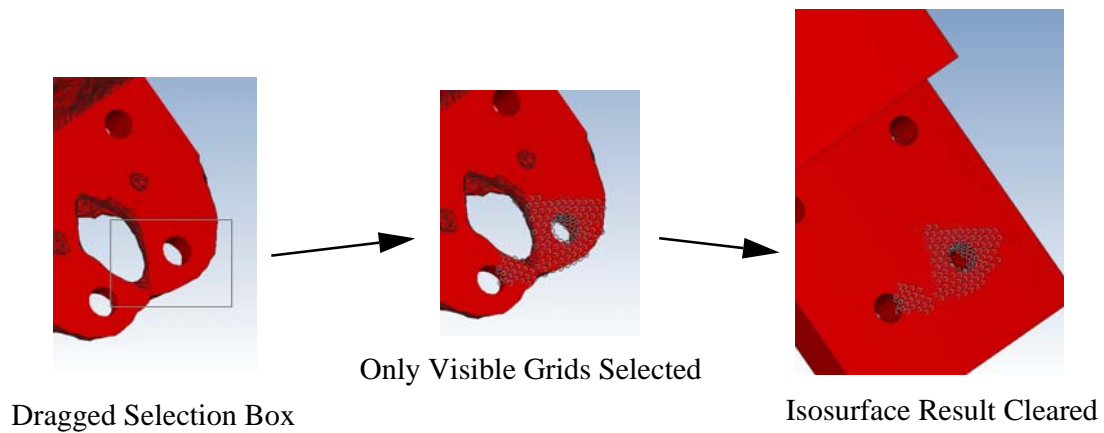


Smooth Shaded



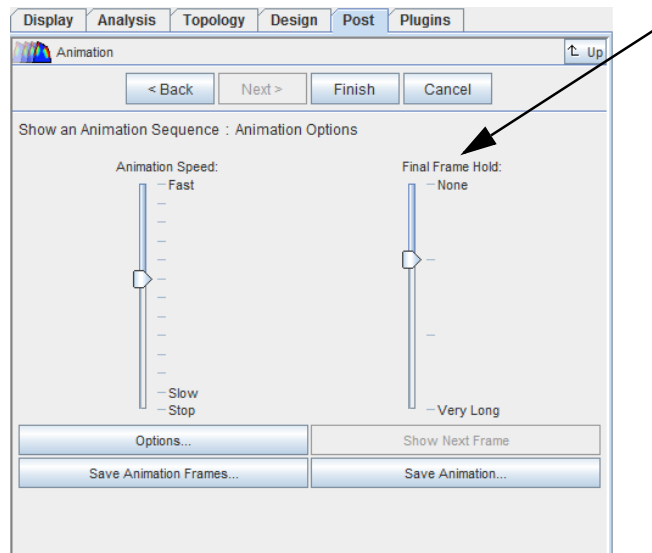
Shaded Feature

- Improved Element/Grid Selection on Topology Isosurface. Previously, grid or element selection ignored the isosurface display, and could result in invisible (cut away by the isosurface) grids or elements being selected. Now, grid and element selection respects the isosurface display, and only selects visible grids/elements.

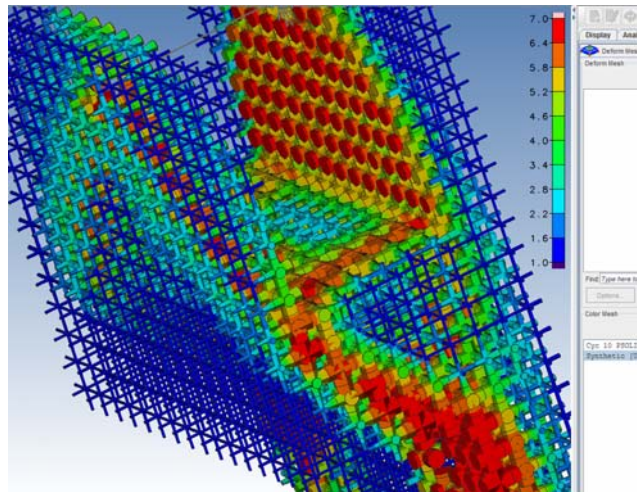
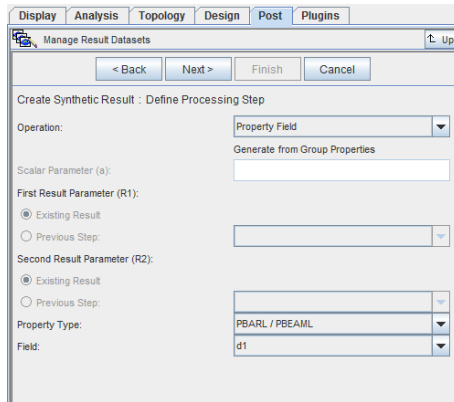


New Features

4. Optional Final-Frame Pause in Animations. A new control in the Animation trail allows the final frame of an animation to display for a longer time than the other frames. This makes it appear that the animation pauses at then end before restarting. The Final Frame Hold slider control sets the relative length of this pause. The actual length of the pause will vary depending on the animation speed. If the animation is saved, the animated gif file will include the same speed and final frame hold in use at the moment of saving.

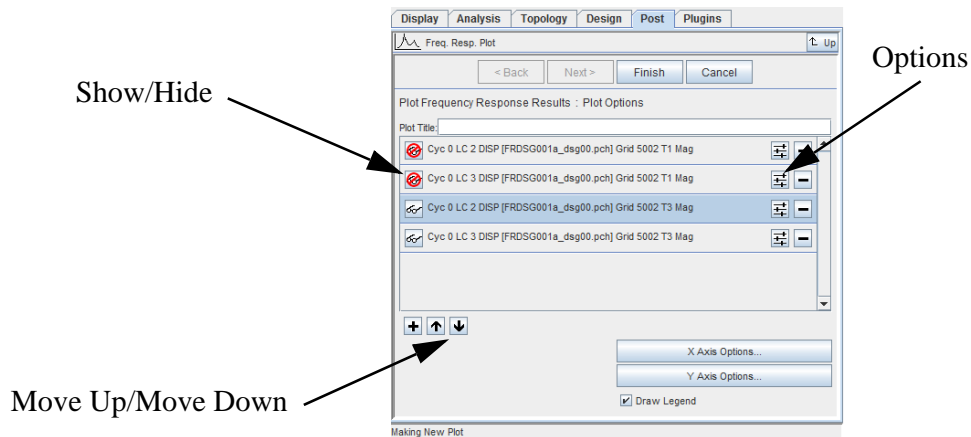


5. Create Synthetic Result from PBEAM/PBEAML Property Field. Beam element properties have been added to the operation of creating a synthetic result step from a property field. Only properties from the first section will be used. This enables the ability to easily color beam elements according to their dimensions.



New Features



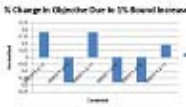
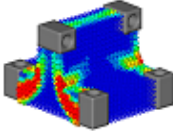
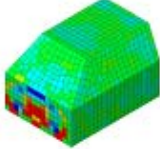
- Options to Show/Hide and Reorder X-Y Plot Curves. Now curve lists in the Freq. Resp. Plot, Path XY Plot and Design History Plot functions have toggle buttons to control visibility of each curve. The icon in the button shows the current status of the curve. Additionally, there are buttons to control the order the curves are listed in the legend. Note that the options button remains, but now shows an icon instead of the “Options...” text.



- Import PBUSH Force Results. Now bush element force results will be imported from punch/output2 files for use as Color Mesh results.

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
TPDSG040.dat	Designing an Additive-Manufactured Plate with Overhang Constraints	<ul style="list-style-type: none"> • 2D plate • Minimizing mass • Overhang Constraint 	
TPDSG041.dat	Designing an Additive-Manufactured Structure with Overhang Constraints	<ul style="list-style-type: none"> • 3D component • Minimizing mass • Overhang Constraint 	
SZDSG012.dat	Sizing Optimization with Optimal Sensitivity	<ul style="list-style-type: none"> • Using optimal sensitivities to understand the impact of changes in constraint bound on the objective function 	
TMDSG015.dat	Topometry Optimization - 3D-Printed Lattice Optimization	<ul style="list-style-type: none"> • Topometry and sizing of diameters of beam in lattice • Post-processing lattices 	
FRDSG013.dat	Acoustic Optimization of Coupled Fluid/Structure Model	<ul style="list-style-type: none"> • Minimize the fluid pressure • Topometry and sizing of the chamber thickness • Beta method 	

7 Compatibility with Previous Versions

1. Design Studio database files (*.dsg) written with version 17.0 or earlier are compatible with version 18.0. However, database files written with version 18.0 are not compatible with previous versions.