Design Studio for Genesis

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

New Features and Enhancements

Versions 14.0

December 2014

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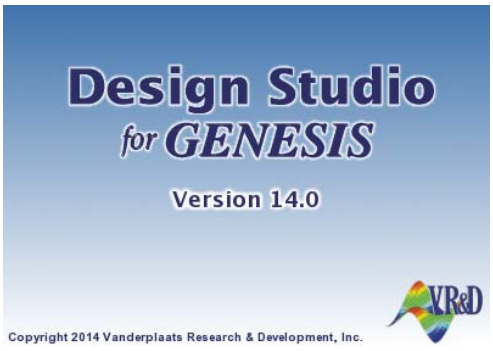
1 Introduction

This document describes the enhancements and new features added in Design Studio for Genesis 14.0.

Enhancement Summary

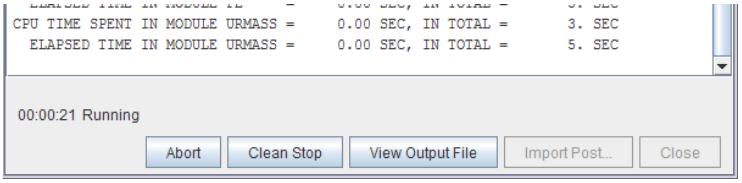
- *GENESIS* 14.0 Compatibility
- New “Clean Stop” Button
- New Sortable Lists
- New Model Cutaway Interface
- New 2D Drawing Style Option
- New Annotation Tags
- New Exploded View
- New Load Definition Option
- Element Editing Enhancements
- New Color Mesh Tags
- Synthetic Results
- New Design History Plot Options



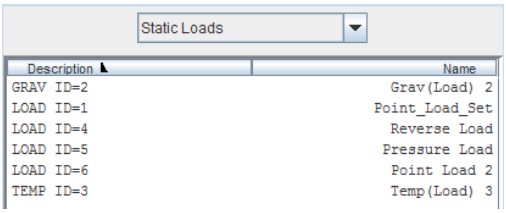
2 General Enhancements

1. *GENESIS* 14.0 Compatibility. Design Studio has been enhanced to handle all of the new capabilities of *GENESIS* 14.0. New features in *GENESIS* 14.0 include: CPYRA element; topology maximum member size; new topology fabrication constraints; topology design for anisotropic materials; stick/slip option on CGLUE.

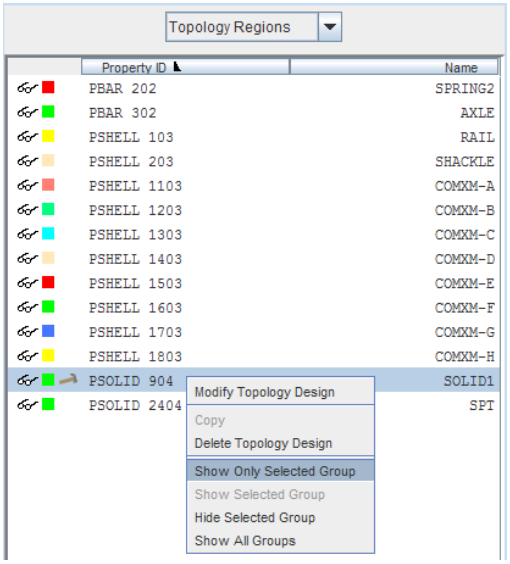
2. New “Clean Stop” Button. The Genesis Console has a new “Clean Stop” button. This button differs from “Abort” in that it instructs *GENESIS* to stop after completing the current design cycle and to consider the current cycle as the last one. This avoids having left-over scratch files and also causes *GENESIS* to print result for the current cycle even if the options settings specify Last for First and Last.



3. New Sortable Lists. Now category item lists are sortable by description or name. Clicking on the heading will sort by that column. Clicking again will reverse the sort. A third click will return the list to natural (unsorted) order.

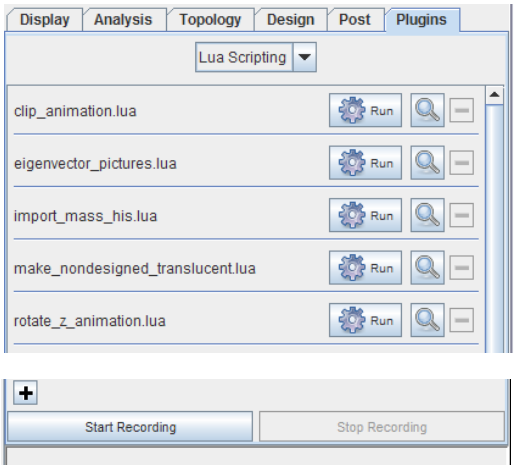


4. New List Right-click Menu. All category item lists now have a context (right-click) menu for the Modify, Copy and Delete Edit menu items. In addition, all group lists now include a right-click menu with options to show and hide groups.



5. New Selection Options. A new button in the element selection interface allows the selection of all elements connected to currently selected grids. In addition, a new button in the grid selection interface allows the selection of all grids connecting all currently selected elements

6. Lua Script Recordings. Users can now easily create lua scripts of any actions using the recording feature built into the lua scripting plugin. The “Start Recording” button will cause the plugin to remember all user actions up to the time the “Stop Recording” button is pressed. At that time, a lua script dialog with the recorded actions will appear.



7. Grid Distance. When printing the distance between two grids from the “Identify Grids” panel, Design Studio now also includes the coordinate change along each basic system axis. That is, in addition to the true distance, it also prints the delta-x, delta-y and delta-z values

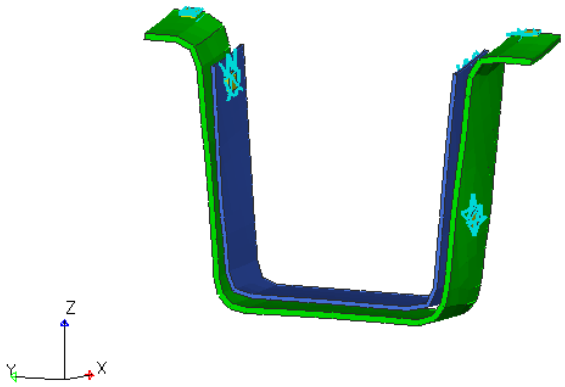
8. Mass/Volume Summary. The model summary printout now also includes the total model mass, volume, and center of gravity. Note that masses/volumes calculated by Design Studio are based only on the analysis data. *GENESIS* modifies the analysis data as specified by any design data before any calculations, so it may output different values.

9. New Examples. There are three new step-by-step example problems in the Design Studio Examples manual that illustrate new capabilities of Genesis.

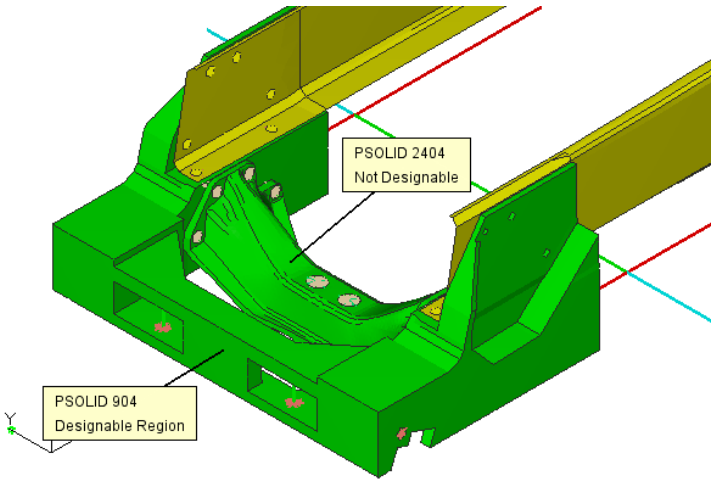
3 Display Enhancements

1. New Model Cutaway Interface. The Model Cutaway interface has been revised and enhanced to include two cutting planes. The drop-down menu now only needs to specify the axis to cut. The slider bar has been changed to show a range, with the model being cut away on both ends of the range. Either end of the range can be dragged to move the position of the corresponding cutting plane.

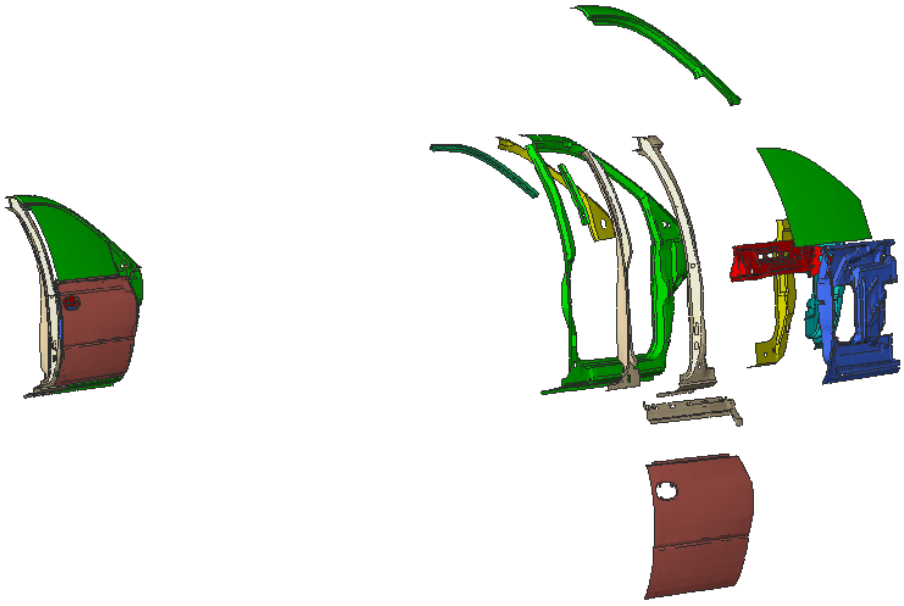
2. New 2D Drawing Style Option. There is a new option in the Display Tab to render 2D (QUAD and TRIA) elements as planar or as solid (using the thickness from the corresponding properties). Rendering as solid can help reveal unintended clashes or point out z0 and or orientation mistakes for composite elements.



3. New Annotation Tags. To help with the creation of reports, Design Studio now allows the creation of Tags to annotate grids, elements or groups. There are controls to adjust the colors and text drawing styles, and the position can be changed by simply dragging the tag in the viewport.



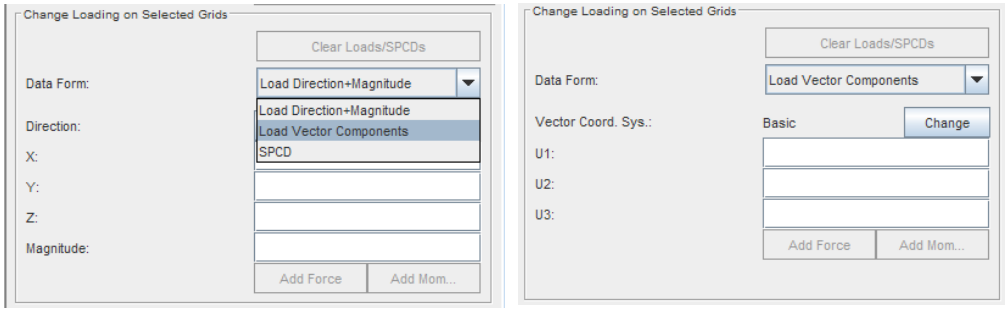
4. New Exploded View. The Viewport Options... page of the Display Tab now includes a slide bar to move groups away from each other until they are completely disjoint. This can help, for example, to see interior groups or when trying to select elements on coincident surfaces shared by two groups.



5. Shaded Feature View Style. The Shaded Feature view style now uses a flat shading algorithm by default. Previously, this view style used a smooth shading algorithm. There is a new option in the preferences to change the shading mode back to the old algorithm.

4 Analysis Preprocessing Enhancements

1. New Load Definition Option. Now force and moment loads can be created by specifying the component values in any coordinate system. This allows, for example, easily creating many radial concentrated loads around a ring by using an appropriate cylindrical coordinate system.



2. Element Editing Enhancements. Now there is the ability to set (or reset) the z-offset of 2D elements. Now the theta reference direction of 2D elements can be set by vector components in addition to coordinate systems. Now the list of dependent grids of RBE2 elements and the list of independent grids of RBE3 elements may be edited.

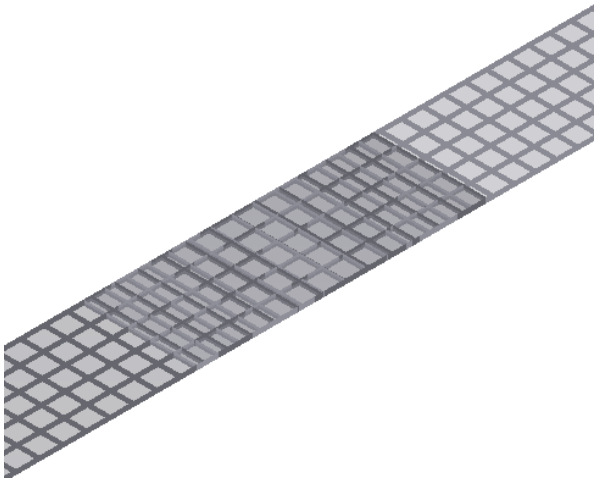
3. Group Properties Category Enhancements. Now group names can be edited from the Analysis->Group Properties trail. Now new groups for property-less elements (CONM2, CELAS2/CMASS2/CDAMP2, PLOTEL, RBE) can be created from the Analysis->Group Properties trail.

4. Element Mass/Volume Enhancements. Now when Design Studio prints the mass and volume of an element selection, it includes the minimum mass/volume of any element, the maximum mass/volume of any element and the average value.

5. New Grid Creation Option. A new option allows the creation of a new grid at the center of the arc that passes through three chosen grids.

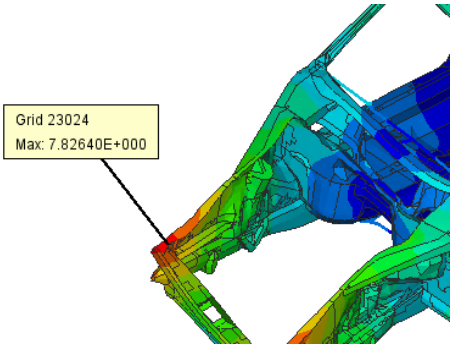
6. Convenient Grid Deletion. Now there is a option to automatically delete grids that become free when deleting elements.

7. Surface Pair Editing. Now the two surfaces in a surface pair (CGLUE or BCPAIR) are draw with highlighting that makes one lighter and one darker to make it easier to distinguish the surfaces.

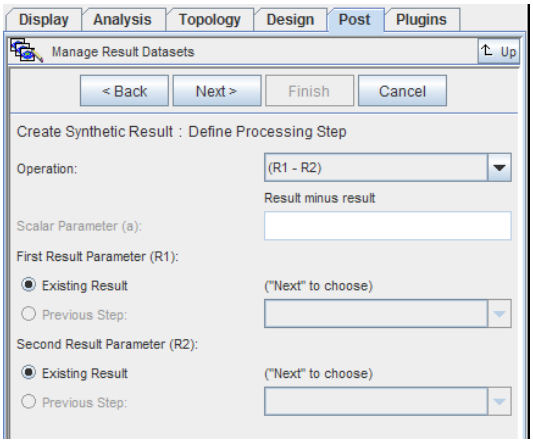


5 Postprocessing Enhancements

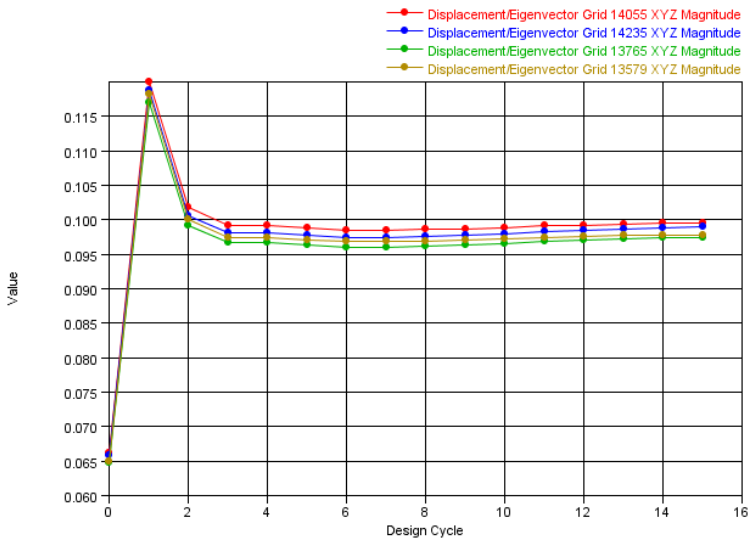
1. New Color Mesh Tags. To help with the creation of reports, Design Studio now allows the creation of Tags to point out the grid/element where the maximum/minimum color result occurs. There are controls to adjust the colors and text drawing styles, and the position can be changed by simply dragging the tag in the viewport.



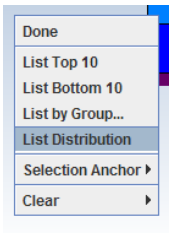
2. Synthetic Results. Now users can perform unlimited sequences of operations on existing result sets to create new result sets.



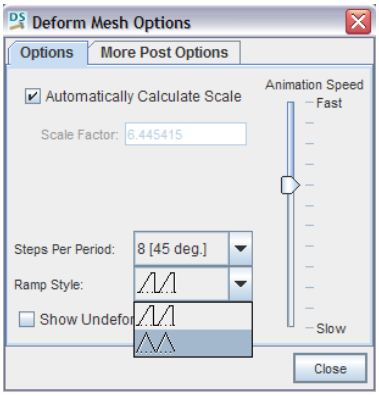
3. New Design History Plot Options.The design history plot module has been greatly enhanced. Now design histories of any grid or element results can be plotted. In addition, design histories from different history files can be plotted on the same chart for easy comparison.



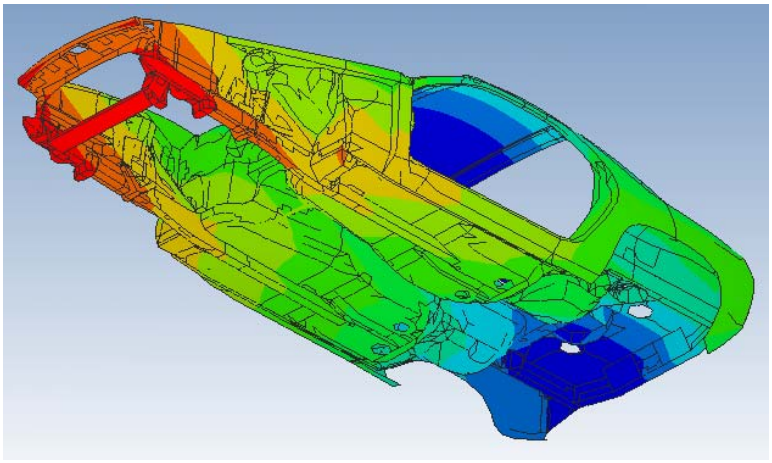
4. ColorMesh Distribution Printout. The viewport right-click menu for Color Mesh results contains a new option to print the result distribution. When selected, Design Studio will print a table listing the number of grids or elements with values within each range bracket of the color bar. The distribution printout will include a mini-histogram of the distribution of results.



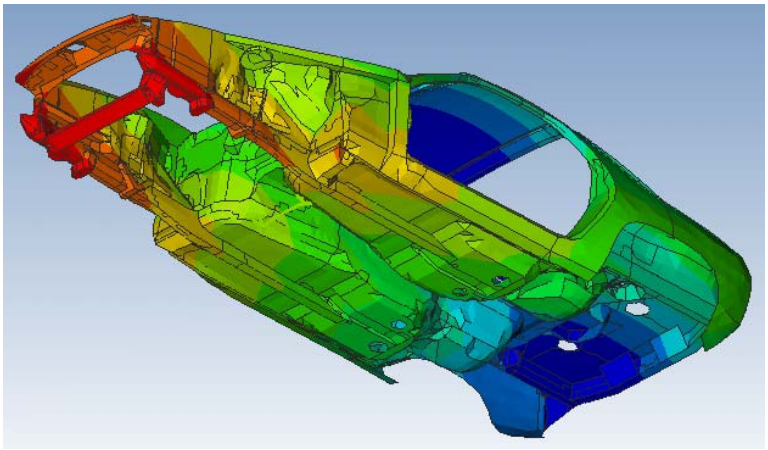
5. Alternate Ramp Animation Option. The Deform Mesh ramp animation of displacement or eigenvectors smoothly increases the scale factor from 0 to the maximum, before jumping directly back to 0. A new option allows the scale factor to smoothly increase to the maximum, and then smoothly decrease back down to 0.



6. Color Mesh Lighting Enhancement. Now Color Mesh results are drawn with light source shading. This helps to reveal depth and highlight features of the model.

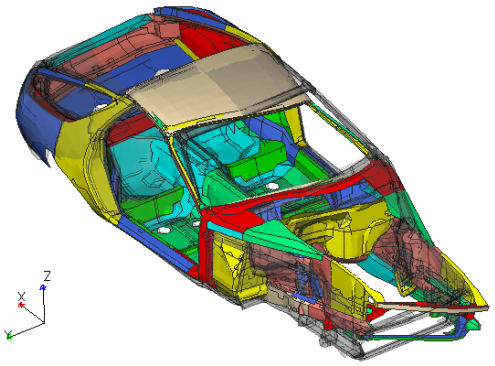


Previous Color Mesh Rendering (no lighting)



New Color Mesh Rendering (with lighting)

7. Undeformed Ghost View. There is now an option to draw the underformed model as a grey translucent “ghost” during Deform Mesh results. This reference image can help to show the deformation patterns.



8. Shape Morphing Set Preview. The default scaling for shape morphing set preview results sets is changed to use the bounds of the associated design variable. Previously, the default scaling was always 1.0. The new default more accurately protrays the allowable shape changes.

9. Result Description Enhancement. Now the result description for eignevector results includes the frequency of the mode.

6 Compatibility with Previous Versions

1. Design Studio database files (*.dsg) written with version 13.1 or earlier are compatible with version 14.0. However, database files written with version 14.0 are not compatible with previous versions.