



Design Studio for Genesis

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

New Features and Enhancements

Version 11.0

November 2009

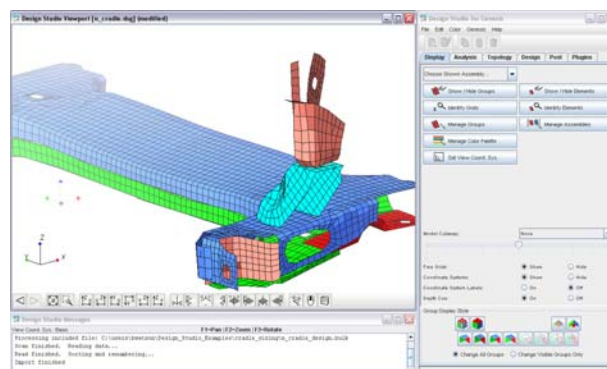
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1 Introduction

This document describes the enhancements and new features available in Design Studio for Genesis 11.0.

Enhancement Summary

- Interface to all new features of Genesis 11.0
- New user interface configuration to reduce mouse travel
- New mouse-button view control options
- Enhanced domain list find filter
- Model cutaway view
- Improved flat shaded viewstyle
- Create and edit frequency response data
- Create mirror copies of elements or domains
- Bias factors for nonuniform mesh generation
- Option to automatically create new domain group when creating domains
- Generate perturbations normal to surfaces or edges
- Show topology region on top of isosurface display
- Animate sequences of isosurface plots
- Color displacements by the component normal to the surface
- Displacement component coloring now uses the general coordinate system
- Option to query element results by group
- Option to import newly created post-processing files after running Genesis
- Improved 64-bit version to allow very large post-processing result sets
- Option to adjust y-axis range on design history plots

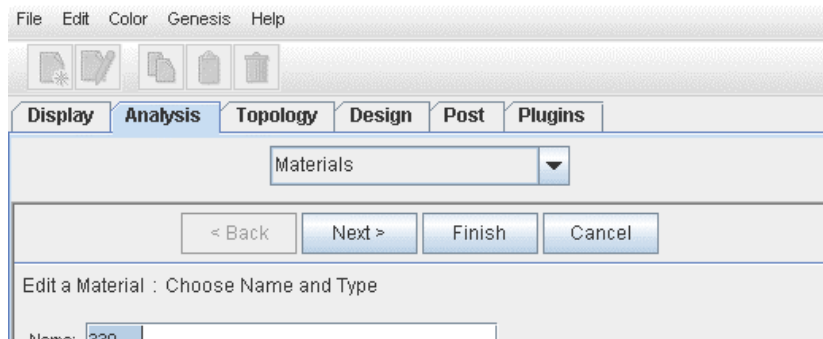


2 General Enhancements

1. New Edit Menu and Edit Menu Toolbar. The Edit Menu has been redesigned to have **New *item*** and **Modify *item*** actions to create or modify items in the current category. Previously, these actions were only available as buttons at the bottom of the screen. In the Edit Menu, they now have keyboard shortcuts associated to them. In addition, there is now an optional Edit Menu Toolbar at the top of the screen that contains buttons for the Edit Menu New, Modify, Copy, Paste and Delete actions. The intention is to reduce the mouse travel required by putting the most commonly used interface elements close together at the top of the window.



2. New Trail Buttons Position. The Trail Buttons were previously at the bottom of the main window. Now, they have been moved to the top (they can optionally be returned to the bottom through the user preferences dialog). The intention for the new default position is to reduce required mouse movement to navigate through the trails.



3. **New Mouse Button View Control Options.** Previously, only the middle mouse button was used for view control, and the mouse could only control one of the pan, zoom or rotate functions at a time. Now, the middle button can be used in conjunction with modifier keys or other mouse buttons to control all three view control functions.

If Middle Mouse Button Mode = Rotate is selected, then:

B2 = rotate
 Ctrl + B2 = pan
 Shift + B2 = zoom
 B2 + B1 = zoom
 B2 + B3 = pan

If Middle Mouse Button Mode = Pan is selected, then:

B2 = pan
 B2 + B1 = rotate
 B2 + B1 - B1 (press and hold B2 then press and release B1) = zoom
 B2 + B3 = rotate
 B2 + B3 - B3 (press and hold B2 then press and release B3) = zoom

In any Middle Mouse Button Mode:

Ctrl + Alt + B1 = rotate
 Ctrl + Alt + B2 = pan
 Ctrl + Alt + B3 = zoom

Note: In the standard right-handed configuration, B1 = left mouse button, B2 = middle mouse button and B3 = right mouse button. Some operating systems let the user swap the functions of the left and right mouse buttons.

View control using mouse movement in conjunction with pressing the F1, F2 or F3 keys remains available.

4. **New `not` Operator in Find Filters.** The Find filters for all selection lists now allow the word **not** to be used as a boolean not operator. Examples

```
not mat8 and id:1000-1999
```

in a Material Find filter will list all materials with ids between 1000 and 1999 except those that are type MAT8.

```
pshell not sizing:
```

in a Group Find filter will list all undesigned PSHELL groups (note the implicit “and” operator between “pshell” and “not sizing:”).

New Features

5. Special Domain Find Filters for Domain Selection Lists. Domain selection lists have new custom test operators available. Domain Find filters can use all the capabilities of regular Find filters, plus the following special test operators:

group:match

This test will be true if *match* occurs anywhere in the domain's group's name or description. The text matching is case-insensitive. If *match* contains spaces, then it must be surrounded by double-quotes (").

groupid:num

This test will be true if the domain's group id number is equal to *num*.

groupid:num1-num2

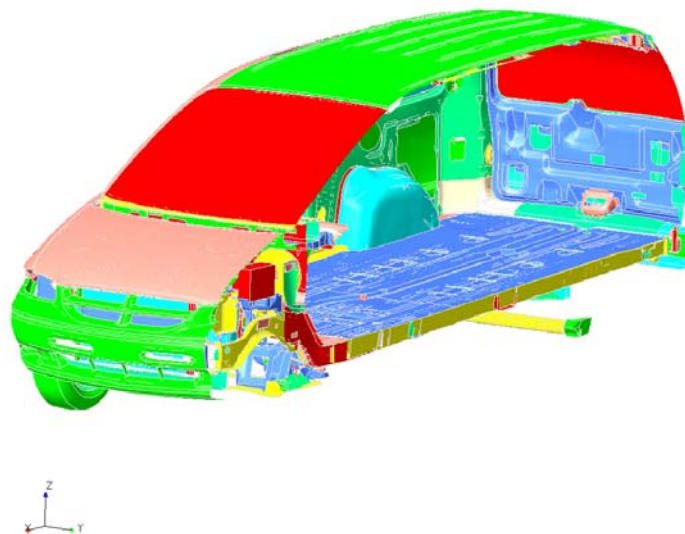
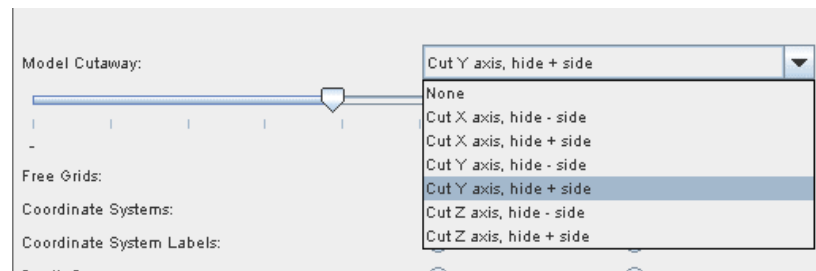
This test will be true if the domain's group id number is anywhere in the range *num1* to *num2*.

empty:

This test will be true if the domain does not have any grids (other than corner grids) in its interior grid list.

3 Display Enhancements

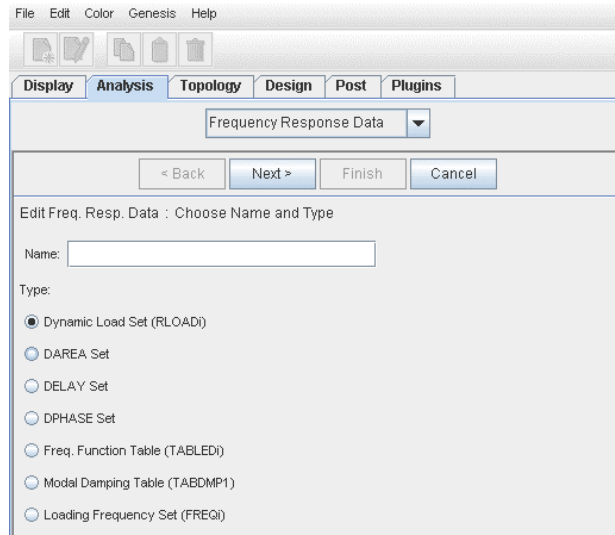
1. New Model Cutaway View. There is a new option to display only the portion of the model remaining on one side of a cutting plane. The cutting plane is normal to the x, y or z axis of the current view coordinate system. The portion displayed can be on the positive side or the negative side of the cutting plane. The location of the cutting plane along its normal axis can be adjusted using a slider control.



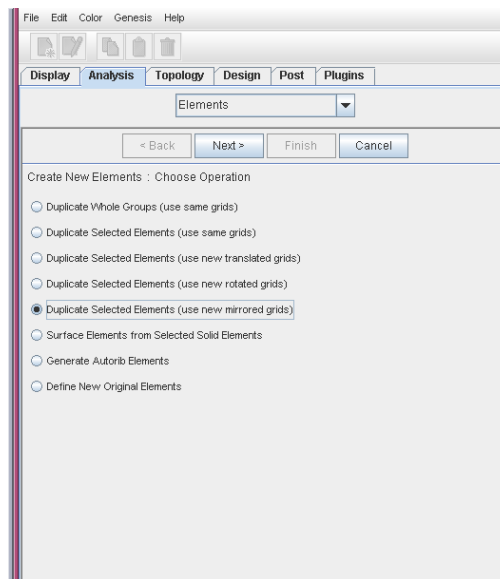
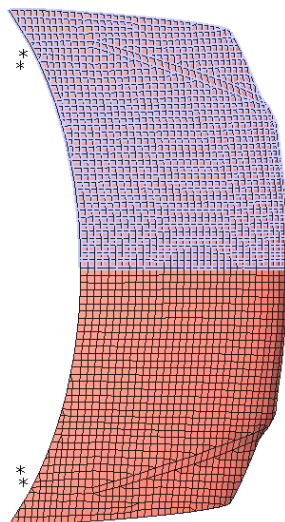
2. New Custom View Coordinate System. There is a new option to create a quick custom view coordinate system by choosing three grids. The x axis of the V.C.S. will be normal to the plane of the three grids, and the z axis of the V.C.S. will be along the line of the first two grids. This is a particularly convenient when you desire to quickly adjust the cutting plane of the new model cutaway view.
3. The lighting and normal vectors used for the flat shaded viewstyle display have been adjusted to provide an improved picture of the model.

4 New Analysis Preprocessing

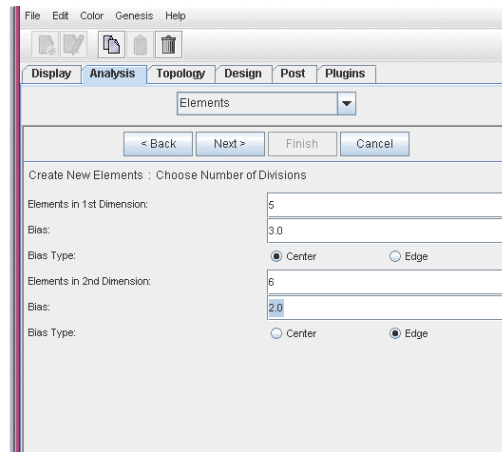
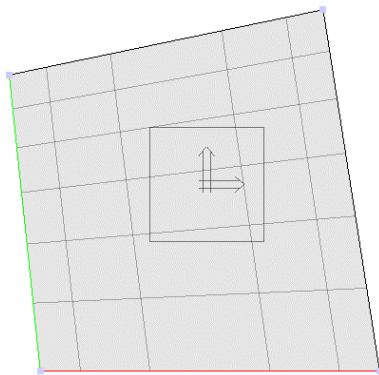
1. Frequency Response Data. Now loading data for frequency response loadcases can be created and modified in Design Studio. Genesis input data RLOAD1/RLOAD2/RLOAD3, DAREA, DELAY, DPHASE, TABLED1/TABLED2/TABLED3/TABLED4, TABDMP1 and FREQ/FREQ1/FREQ2 are supported.



2. Element Mirror Copy. Now elements can be copied across a mirror plane.



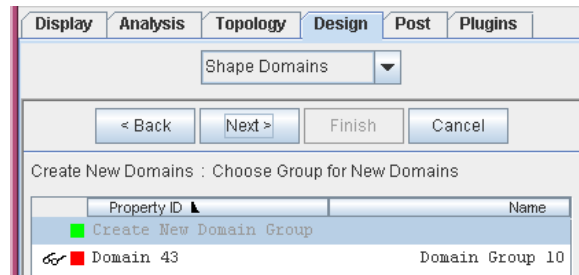
3. Bias Option for Mesh Generation. There is a new bias control for splitting a mesh area when creating new elements. There is an option for center bias or edge bias. The bias value is used as the ratio of the middle element size to the edge element size for center bias, or the first element size to the last element size for edge bias. In both cases, a bias value of 1.0 means uniform spacing.



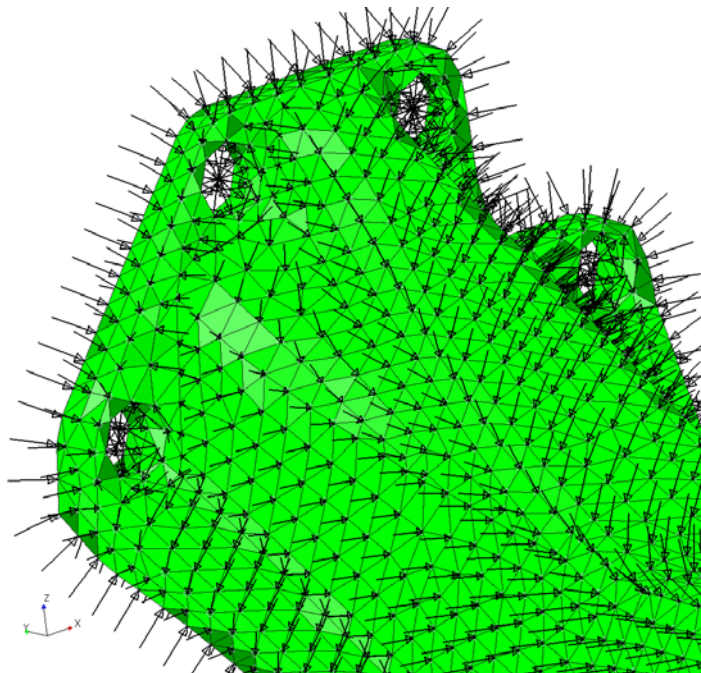
4. New CWELD Element. Design Studio supports the new CWELD element and the corresponding PWELD property.

5 New Design Preprocessing

1. Domain Category Enhancements. The domain category has received similar enhancements to the Element category: Domains can be copied across a mirror plane. The split option in the quick new domain trail has bias options for non-uniform subdivisions. This is particularly useful to create smaller transition domains surrounding a central primary domain. In addition, the domain trail has additional enhancements. There is now an option to automatically create a new domain group to contain newly created domains. There is a user-settable tolerance to control whether a new quick domain will use an existing grid or create a new control grid. The default tolerance has been changed, and should be suitable for most users.



2. New Shape Perturbation Generation Options. Design Studio offers new options to generate perturbations for a raw shape morphing set. The perturbations directions can now be automatically generated as normal to surfaces or shell edges.



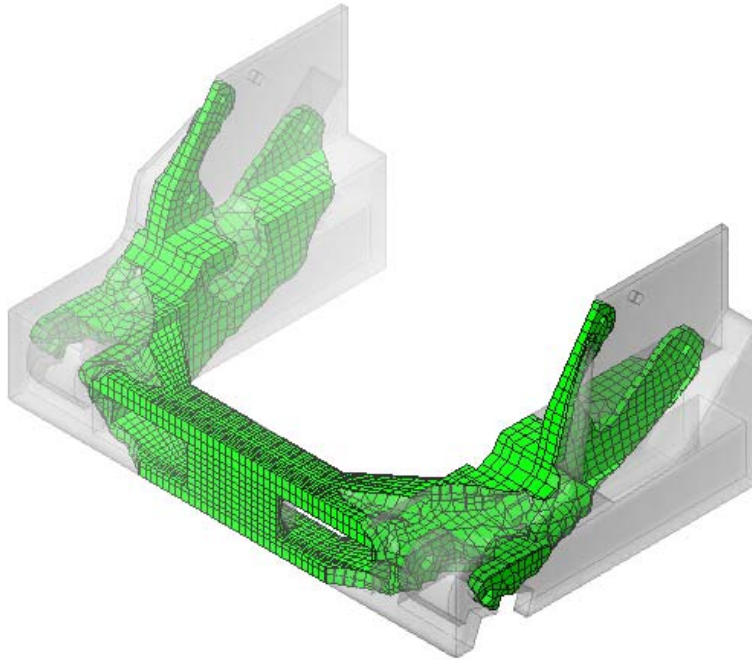
3. Shape Morphing Set Attributes. Design Studio supports all the new Genesis DSHAPE attributes, including the freeform option.

The screenshot shows a dialog box titled "Edit Shape Morphing Set : Choose Name and Type". It contains the following fields and options:

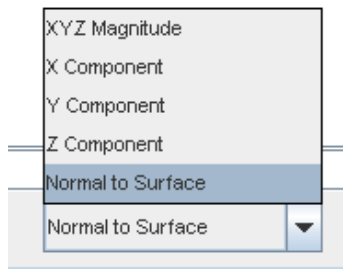
- Name:** A text input field containing "Morphing Set 1".
- Type:** Two radio button options: "Domain Morphing Set" (unselected) and "Raw Morphing Set" (selected).
- Design Variable:** A dropdown menu showing "New Variable [-1.0, 1.0]".
- Freeform:** Two radio button options: "Yes" (selected) and "No" (unselected).
- Freeform Level:** A dropdown menu showing "Split Only Control Perts.". The text is light blue, indicating it is a tooltip or disabled state.
- Maximum Perturbation:** An empty text input field.

6 New Postprocessing Capabilities

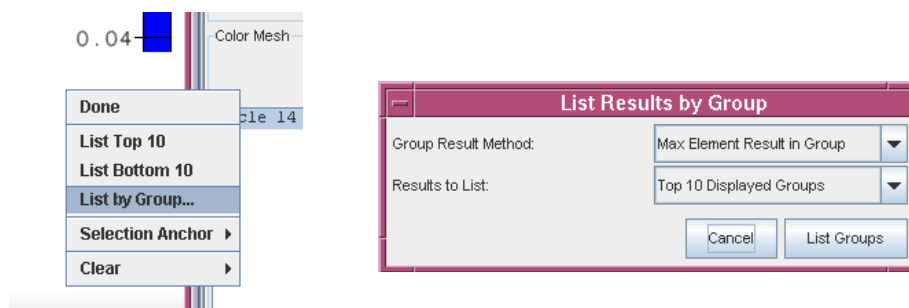
1. Topology Isosurface Options. Now there is an option to draw the topology region translucently on top of the isosurface display. This allows you to easily see the topology results relative to the design space. There is now an option in the animation trail to animate a sequence of isosurface results. This allows you to see the optimization history using isosurfaces.



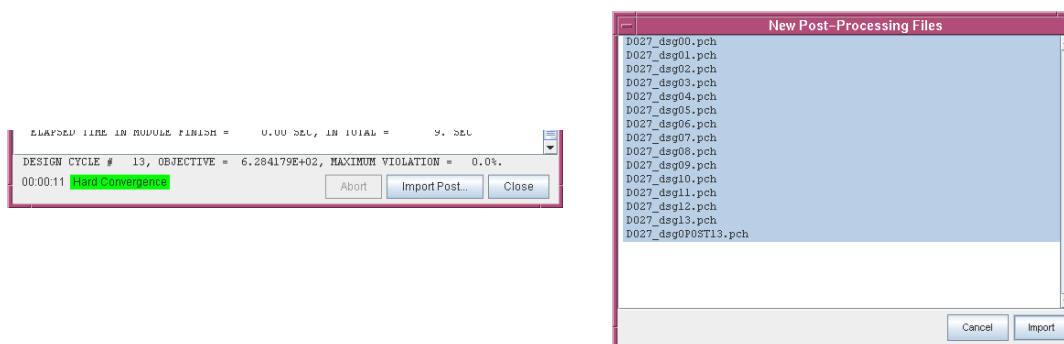
2. Color Mesh Displacement Enhancements. Now when displaying Color Mesh results of displacements, the components are with respect to the general coordinate system. You should still use the default of `POSTOUTPUT=BASIC`. Design Studio will do the necessary calculations to convert to each grid's output system. Also, there is an additional component option that calculates the displacement component normal to solid or shell surfaces. This is particularly useful for visualization of shape optimization of solid elements.



- Element Result Query. Now there is a option to query Color Mesh element results to give group result information. The group result value can be set as the maximum element's result, the minimum element's result or the sum of all the elements' results. The Color Mesh popup (right-click) menu has a new option "List by Group..." which will bring up a dialog to select the group result options.

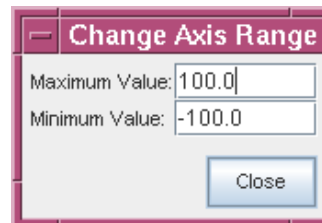
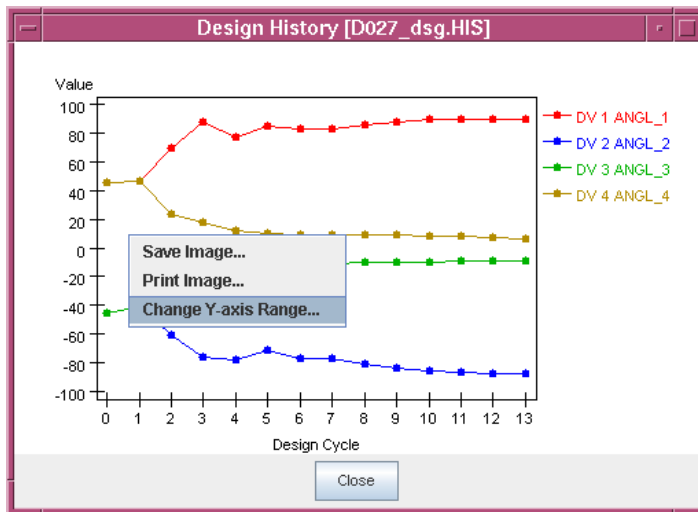


- Sizing Post-Processing File. Design Studio fully supports sizing and topometry optimization results visualization using the new SIZING = POST Genesis option. Design Studio lists each property field as a separate result set, clearly labeling the sets with the property type and field name.
- Improved 64-bit Support. Now the 64-bit version of Design Studio enables the use of huge amounts of post-processing data. Previously, Design Studio had a limitation of 8GB of result data, but now the only limit is the amount of memory on the system.
- Simplified Post Result Import. Now, after running Genesis from within Design Studio, the Console window has a button that allows you to easily import all of the newly created post-processing files.



New Features

7. History Plot Enhancement. Now the design history plot has a facility to change the range for the y axis. The history plot popup (right-click) menu now has an option “Change Y-axis Range...” that allows you to set to minimum and maximum value to be displayed on the axis. The y axis scale will change so that your desired values fit in the range, but note that the range may be enlarged to provide nicer tick labels. Therefore, the provided minimum and maximum values may not be exactly the minimum and maximum labeled values.



8. OUTPUT2 Import Enhancement. Now binary OUTPUT2 format post-processing files are generally portable to other systems. OUTPUT2 files written by Genesis on any supported operating system can be imported by Design Studio running on any supported operating system (be sure to use a binary file transfer if copying files between Unix/Linux servers and Windows workstations).

7 Compatibility with Design Studio for Genesis Version 10.1

Design Studio database files (*.dsg) written with version 10.1 are compatible with version 11.0. However, database files written with version 11.0 are not compatible with previous versions.