Using Groups & Layers in Femap

IN THIS WEBINAR:

• Similarities and differences between groups and layers
• Methods of organizing a model using groups and layers
• The use of groups and layers in postprocessing

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Structural Design and Analysis (Structures.Aero)

**Structural Analysis**

- Team of stress engineers that help our clients design lightweight and load efficient structures.
- We service aerospace companies and other industries that require high level analysis.
- Specialty in composites and lightweight structures
- Tools used include hand analysis, HyperSizer, Femap, NX Nastran, Fibersim, NX, Solid Edge, Simcenter 3D, LS Dyna, and LMS.

**Software Sales and Support**

- Value added reseller providing software, training, and support for products we use on a daily basis.
- Support Femap, NX Nastran, Simcenter 3D, Fibersim, Solid Edge, and HyperSizer.
Groups and Layers Topics

• Similarities and Differences

• Organizing a model using groups and layers

• Using Groups and Layers for Postprocessing
Groups and Layers – Key Similarities

– Control from the Model info Tree or Group / Layer Manager
  • Visibility – set view settings to multiple, all, or single groups or layers
  • Create new groups or layers
  • Renumber, delete, rename groups or layers

– Display:
  • All, Single, Multiple
  • In addition, groups have the option of displaying only the Active Group.

– Graphical Selection
  • Graphical selection (Picking entities off the screen with the cursor, box, circle, or polygon) is limited to the entities in displayed layers and groups.
  • Note that clicking the “Select All” button in the entity display dialog is NOT graphical selection. Regardless of what is displayed, Select All does exactly what the name implies!
Groups and Layers – Key Differences

− Entity assignment:
  • Groups −
    − Entities are assigned by rules such as entity ID, or the entities relationship to another entity such as elements on a surface or nodes on elements.
    − Entities can be assigned to multiple groups (as many as needed)
    − The option to add to the active group, no group, or a selected group.
    − Multiple groups can be combined to form a new group.
    − Groups have some automatic generation tools which will be discussed.
    − Reference Groups (Group of groups)
  • Layers −
    − Can be automatically created when importing STEP or Parasolid geometry files.
    − Entities can be assigned to only one layer.
    − New entities are added to the active layer.
    − Option to use the “No Pick” layer to prevent Graphical Selection. Again, Select All is NOT graphical selection.
Groups and Layers – Visibility Control

• The visibility for both Groups and Layers can be manipulated using the model info tree.
Groups and Layers – Visibility Control

• Right Mouse Clicking on the Groups or Layers heading brings up a context menu with control options.
Groups and Layers – Visibility Control

• View Visibility – Ctrl-Q
  – The Group and Layer tabs can be used to set visibility options for each.
Groups and Layers

- The Layer and Group Managers can be used to create new groups or layers, update titles, Renumber, and Delete Groups and Layers.
- The functions in the Layer Manager and Group Manager can also be carried out using the context menus found in the Model Info Tree.
Using Layers – Organizing the Model

• Layers can be created when importing STEP or Parasolid geometry files.
  – If the components in the assembly were named before saving the geometry file, the new layers will carry the component name.
    • Layer 1 will always be named Default Layer. Start the Layer increment at 2 to have all imported layers named after the assembly parts.
  – File – Import – Geometry…

![Image of Solid Model Read Options and model with selected layer]
Using Layers – Organizing the Model

• Once created Layers can be used to segregate portions of the model when creating the finite element model.
  – Any new entities when using layers will be added to the active layer. The active layer is noted by the dark blue layer title in the tree.
  – Entities can be moved from layer to layer using the Modify – Layer commands from the pull down menu.
  – When using layers, care must be taken to ensure the proper layer is active to keep the model organizing.
Layers

- Any number of layers can be visible.
Using Groups – Creating and Populating Groups

• Groups can be created by using the Group – Create / Manage command.

• However, it’s easy to use the context menu in the model tree and select New.
  – Right mouse click anywhere in the groups list and select New from the menu.
  – The new group can be titled or the group name will default to “untitled”.

[Image: Model tree showing Group menu and New Group window]
Groups – Creating and Populating Groups

• Groups can be populated by any of the available rules in the Group menu and graphically selecting entities on the display.
  – Entity ID – e.g. Group – Solid – ID
  – Relationship to another entity:
    • Group – Solid – Using Curve
    • Group – Element – Using Node (on Surface, In Solid…)

• Entities which can be grouped:
  – Geometry: Points, curves, surfaces, solids
  – Finite element entities: nodes, elements, layups, properties, materials, loads, constraints
Groups – Creating and Populating Groups

• Groups can be created / generated using the Group – Operations – Generate commands.
  – The generate commands are an excellent way to organize the model to prepare for postprocessing.
Groups – Creating and Populating Groups

• Groups created using the Group – Operations – Generate Solids command.
Groups – Creating and Populating Groups

• Reference Groups – Sometimes called Group of Groups
  – A reference group is a group that references or links one or more groups
  – Reference groups are updated when the groups referenced change.
  – The reference groups dialog defines which groups are referenced.
  – The symbol in the tree changes to indicate a reference group.
Groups – Automatically Adding to the Active Group

- Entities can be added to the active group, a selected group, or no group as they are created in the model.
  - If the active group is displayed, and the automatic add to active group is not set, then entities will not appear on the screen as they are created.
- Active: New entities are added to the active group.
- None: New entities are not added to any groups.
- Select: New entities are added to the group selected from the available groups in the model regardless of which group is active.
Groups – Automatically Adding to the Active Group

- Curve created but not added to the active group. Automatic Add to Active not set.
Groups – Automatically Adding to the Active Group

- Automatic Add set to Active
Groups – Some Automatic Generation Methods

• Commonly used to quickly organize a model.
  – Generate Solids – Generates single or multiple groups of the selected solids. Option to include mesh, loads, constraints, regions.
  – Generate Material or property – Generates a single or multiple groups of elements which reference the selected material or properties selected.
  – Generate Elem Type – Generates single or multiple groups of selected element types
  – Generate With Output – Creates a group based on output data.
Groups – Some Automatic Generation Methods

- Group – Operations – Generate Solids

Upper and Lower Skin Selected  Create Multiple Groups Including Mesh…  New Groups Created
Groups – Some Automatic Generation Methods

• Model showing new groups only.
Groups – Some Automatic Generation Methods

• Groups can be populated by layers
  – Group – Operations – Generate Entities on Layer: Creates a new group of the entities on the selected layers.
  – Optional: Select entities currently on the layer or update the group if the layer changes.
Groups – Some Automatic Generation Methods

- Groups can also be moved to layers.
Groups – Some Automatic Generation Methods

- Entities on the groups moved to the new Layer
Groups – Automatically Add New Entities to Groups

• Group – Operations – Generate Solids
  – Include Mesh, Loads, Constraints… is selected although no mesh exists. This still sets the rule to include the mesh in the appropriate group when mesh is created.
Groups – Automatically Add New Entities to Groups

• Groups Created

Group 1

Group 2

Group 3
Groups – Automatically Add New Entities to Groups

• Evaluate Groups - Mesh added to groups because of the original rule of including mesh.
Groups – Group Commands in the Model Tree

• Other commands involving groups which are available from the model tree.
• Right Mouse Click on a group name.
  – New: Creates a new group
  – Copy: Creates a copy of the selected group
  – Add Related Entities: Adds entities related to the entities on the selected group. (e.g. adds nodes, properties, materials, loads, and constraints for elements in the group)
  – Automatic Add: NOTE… This sets the Group – Operations – Automatic Add to Select. When using this option all new entities will be added to the selected group.
Groups – Group Commands in the Model Tree

• Right Mouse Click on a group name.
  – Show Full Model
  – Show Active Group: Shows only the active group
  – Show Multiple Groups: Shows a selection of groups simultaneously.
  – Activate: Activates the selected group. (Double clicking on a group will also activate the group.)
  – Delete: Deletes the group but not the entities on the group.
  – Renumber: Renumbers the selected group(s)
  – Referenced Groups: Selects groups to reference
  – Export Neutral: Exports a neutral file of the entities on the group. It’s a good idea to use the Add Related Entities command prior to exporting a neutral file of a group.
Groups – Group Commands in the Model Tree

• Right click on a group visibility checkbox.
  – Show Selected Groups Only: Select multiple groups using the shift or ctrl keys and this option only shows those groups.
  – Show Selected Groups: Similar to the previous selection
  – Hide Selected groups: Hides the selection
  – Clear Selected groups: Clears the selected groups from the groups displayed
  – Show All Groups and Clear All Groups: Shows or clears all groups in the model from the displayed groups.
Groups – Using Groups in PostProcessing

- Groups or Layers can be used to limit the entity display for the purpose of showing results clearly.
- Groups can be created based on output criteria.
  - Select the output set
  - Set the criteria for the selection.
Groups – Using Groups in PostProcessing

• Entities placed in group based on output criteria.
Groups – Using Groups in PostProcessing

• Groups can also be used to limit the results display when using the PostProcessing Toolbox.
  – Option to show on:
    • Full Model / Visible Groups
    • Active Group
    • Any selected Group
Groups – Using Groups in PostProcessing

Full Model

Active Group

Selected Group
Questions?

For questions on the material covered today, please contact **Russ Hilley**.

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