

## Defining TMG Entities

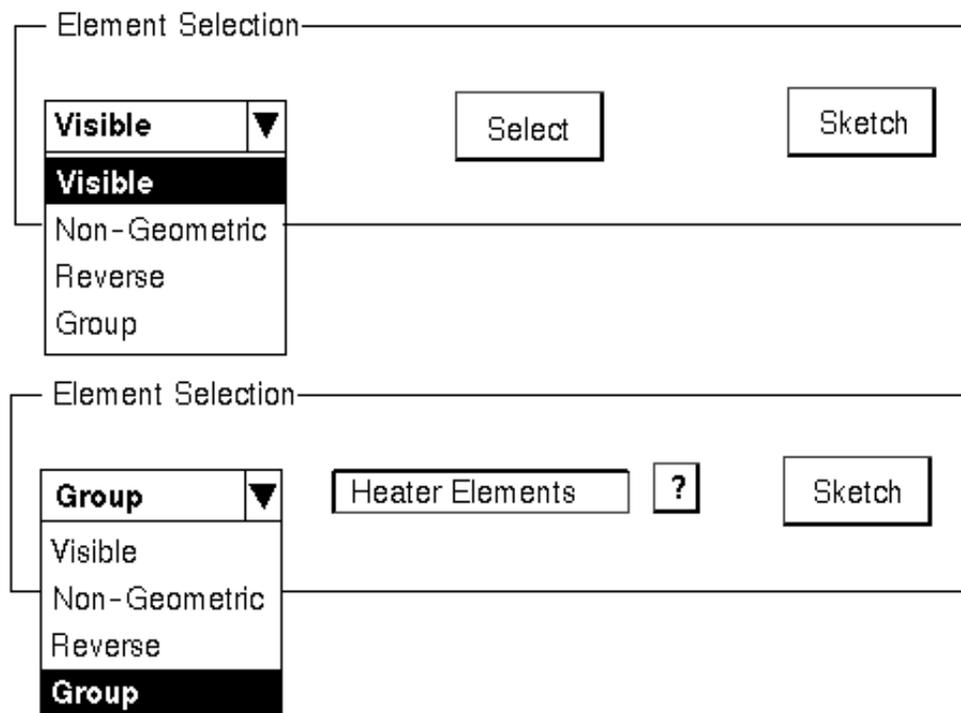
A TMG entity defines specific boundary conditions or analytical processes and relates them to specific elements in the FE model. It is stored in the FE Model as a named dataset and can be copied, modified or deleted. TMG provides a wide variety of entity types for different applications (for example, Thermal Couplings, Boundary Conditions, Radiation Requests) but all entities are created using an *[Entity] - Create* form (The actual name of the form always corresponds to the entity type you are creating, for example, "Thermal Coupling - Create").

You can use either the TMG icon panel or the Model Manager to create entities. From the icon panel you can create almost any entity type; just select the appropriate icon. From the Model Manager, you can create any entity type by selecting the Create button, then selecting the desired entity type. In either case, a form appears for defining the thermal modeling options and applying them to a specific part of the FE model.

### The *[Entity] - Create* Form

Depending on the type of entity, different options are available. You can modify your choices as many times as you want as long as the form is open. Before you close the form, use the *Sketch* button to display the elements or geometry that will be affected by the entity.

Most *[Entity] - Create* forms include a similar element selection panel that allows you to define which part of your model will be affected by the entity. You can apply the entity to *Visible* elements, *Groups* (either element groups or geometry groups), *Non-geometric* entities (a TMG entity type), or *Reverse sides* (another TMG entity type). If you select *Visible*, hit the *Select* button and pick the elements from the Graphics region. If you select one of the other options, a "?" button appears; pick this button to display a list of the corresponding entities or groups in the model.



## Selection Options

Following is a more detailed explanation of the four selection options:

### Visible

With the *Visible* option, you select elements using the standard I-DEAS selection tools. Elements selected in this way will be "locked" in the model file: you will not be allowed to delete them until you have first deleted the TMG entity that refers to them.

Many entities allow selection of Free Faces of 3-D solid elements, or Free Edges of 2-D thin shell elements. Free Faces are analogous 2-D thin shell elements; Free Edges are analogous to 1-D beam elements.

You can also use the Selection Filter to ease element or free face/edge selection.

### Group

With the *Group* option, you select from a list of groups containing either elements or geometry (including sections when the sections are meshed using section meshing). The contents of the group are not resolved until the model is solved. Moreover, the selected groups are not locked in the model file. This allows you to

change the elements or geometry in a group after you have set up the TMG entity.

This can be a useful functionality, but necessitates a certain degree of caution. For example, if you delete a group which is referenced by a TMG entity, you will get an error the next time you open the affected Entity form; or at run time. Even if you recreate a group with the same name the error will occur, since TMG references only the group label number, not its name. If, after deleting a group, you then create a different group for a different purpose which happens to pick up the old number, then the TMG entity will end up pointing to this (incorrect) group instead.

Before deleting a group, first determine which TMG entities reference this group by using the *Referencing Entities* icon (as explained below). If the group must be deleted, redefine the TMG entity by selecting a valid group.

If you use geometry groups, see the article *Using Geometry Groups for Thermal Modeling*.

Free faces and Free Edges cannot be grouped. However, you can select a geometry group containing geometry related to Free Faces or Free Edges.

### **Non-Geometric**

The *Non-Geometric* option allows you to select any non-geometric elements that you have created (see *Creating Non-Geometric Elements*).

### **Reverse Sides**

The *Reverse Sides* option allows you select any *Reverse Sides* radiation entities that you have defined (see *Front and Reverse Element Sides*).

## **Defining Entities on Sections**

You can apply TMG entities to a section mesh on a surface. Section meshing is a powerful tool for model idealization, important for thermal modeling. See [Understanding Section Meshing](#) for a general discussion on section meshing. Since the section mesh is associative to the section, you can modify the geometry and the boundary condition will be preserved though the mesh update.

To apply TMG entities to a section mesh, create a section from the surfaces of interest, and place the section in a group. You can repeat this to place additional sections in the group. Use section meshing to create a 2-D mesh on the section, then select the group containing the section from the [Entity] Create form.

## **Selecting Elements for Radiation Entities**

Radiation entities (*Radiation Requests, Orbit and Attitude Modeling, Diurnal Solar Heating, Radiative Heating and Radiation Switches*) are created by selecting *Visible* elements or *Groups* only.

These selection panels have twin drop down menus that allow you to specify that the entity will be applied to the *Front of* or the *Reverse of* selected elements. (If you apply an entity using *Reverse of*, you must also create corresponding reverse side properties on these elements. Alternatively, create a *Reverse Side* entity for these elements. See the article *Front and Reverse Element Sides*.)

Free face selection is possible only when selecting *Front of* elements. Free edge selection is not supported for radiation entities.

Element Set

Front of Visible Select Sketch

Reverse of None

## Referencing Entities

If, after the fact, you need to determine which entities have been created using a specific group or specific elements or nodes, use the *Referencing Entities* icon. This can be useful when you need to modify or delete a group or when you are trying to analyze an existing model. Select the icon, then set up the options on the form to display a selection list containing the specific group of interest, or the *Select* (element) button. Select the item of interest, then pick the View button to open a window that displays a list of all the entities that were created using the selected group (or Tabular Data entity).

## About Text Entities

You can use text entities to insert instructions into your model that change the behavior of the solver. Text entities work by inserting parameter names and values that the solver interprets as instructions. These parameters may activate or deactivate a feature of the solver, or instruct it to treat certain data types differently than it normally would. Create a text entity as follows:

1. Open the Model Manager.

2. Click the *Create* button.

3. Select *Text Entity*.

When the *Create Text Entity* form appears, enter a name for the entity, the card number associated with the parameter, and the name of the parameter together with a value.

For example, if you wanted to set the LOCALDAMP parameter to a value of 0.2, you would enter a Name of your choosing, "9" as the Card Number, and "LOCALDAMP 0.2" into the Text Input field.

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