Using Geometry Groups for Thermal Modeling

You can create TMG entities in two ways: based on geometry, or based on elements. The advantage of using *geometry-based* TMG entities is that they are associative (they remain valid when you change the model's geometry) whereas *element-based* TMG entities are not.

Use geometry groups to create geometry-based TMG entities. A geometry group is a permanent group containing geometry applicable to the TMG entity. The geometry must be meshed with appropriate elements. If you include sections in a geometry group, the sections must be meshed using the section meshing technique. During TMG solution, the solver applies the TMG entity to elements associated with the geometry group.

To define geometry-based TMG entities:

1. Create a group containing the geometry for the TMG entity you are creating. Include geometry of the order or orders (edge, surface or volume) appropriate to the TMG entity you are creating.

2. Create the TMG entity; *Use Group* to select the geometry group you just created.

3. With the *Use Group* option, (or other selection technique) mesh the geometry with elements appropriate to the entity you are defining. Elements must be created using *Free Meshing* or *Mapped Meshing* techniques.

Steps 3 can be performed at any time.

See Also

- **Understanding Free Meshing**
- **Using Mapped Meshing**

How it Works

When you create a TMG entity using a geometry group, the entity becomes an attribute of the geometry and is thus embedded in the history tree. The part dimensions may be modified at any time. During the solve, TMG uses the elements associated with the geometry in the group for the analysis.

Once you have associated geometry groups to TMG entities you may change the group names but not their labels. TMG keeps track of the groups through their labels.

Tips and Tricks

- For geometry-based thermal modeling, edges, surfaces and volumes are supported; vertices are not. In other words, you can use this technique for TMG entities meshed with beams, shells or solid elements, but not with lumped mass elements.

- Meshing after geometry groups are created allows you to take advantage of the *Use Group* selection technique when defining the mesh.

- With TMG thermal models originating before Master Series 6 it is safer to leave the *Process geometry entities in groups* option (in the *Solver Control* form) deselected. A

group may contain superfluous geometry. Such a modeling error would have had no effect in Master Series 5, but in Master Series 6 or later, elements associated with this superfluous geometry would skew results without warning.

- You can easily use surface coated elements in conjunction with geometry-based TMG entities. Include both orders of geometry in the geometry group (for example, a surface and its edges). Apply the TMG entity to the group, and define both orders of elements based on the same group (see *How TMG Uses Elements and Nodes*).
