

Initial Conditions

For steady state analysis, the initial temperatures are used to launch the iterative solution process. The initial temperatures that you specify will not affect the final results, but can greatly influence solution time. By starting the iterative solve with a good guess as to the final element temperatures, you can dramatically reduce the number of iterations required to reach convergence, particularly for large, non-linear models.

For a transient analysis, initial conditions are usually specified since they represent element temperatures at time zero. This is the state from which the model evolves. Thus, results will differ depending on initial conditions, especially those obtained near the beginning of the analysis.

In addition to the Initial Conditions form, which sets temperatures for the whole model, you can also define temperatures for specific groups of elements by creating an *Initial Temperature* entity. Initial Temperature entities will only have an effect with the *Auto Determine* or *Specify a Uniform Value* options. They will be ignored when used in conjunction with the *Start From Results in File* or *Start From Results in Directory* options. For details on defining initial temperature boundary conditions, see the heading "Other Boundary Conditions" in the article *Creating Boundary Conditions*.

Element Temperatures and the TEMPF File

During a TMG run, the solver generates a file named TEMPF that contains temperature values for each element in the thermal model. If the TEMPF file comes from a transient analysis, it contains temperature results for each Results Output time. Some settings for Initial Conditions use element temperatures in the TEMPF file created by a previous TMG analysis to define initial values for the current analysis.

The TEMPF file used in this way must **not** be stored in the current *Run Directory* unless you are performing a *Restart*. This is because the solver overwrites any existing TEMPF file in the run directory when a new analysis starts.

Initial conditions can be derived from the TEMPF file from a previous analysis only if the geometry of the previous analysis is identical to that of the current analysis. The boundary conditions and the mesh can differ. If you use a TEMP file from a previous analysis performed with a different mesh, the TEMPF values will be interpolated to define initial temperatures for the current mesh.

When you perform a Restart on a model with Initial Conditions defined that are different from those defined in the TEMPF file in the specified Restart directory, the defined Initial Conditions will take precedence.

Initial Conditions Options

Auto Determine

This is the default option.

For a new analysis, TMG uses a uniform temperature of zero degrees **in the units of the model** except for elements that have been defined as an *Initial Temperature* entity.

(See *Creating Boundary Conditions*)

For a restart, TMG checks if a TEMPF file exists in the specified Restart directory and uses it to define initial temperature distribution (except for elements included in an *Initial Temperature* entity). If you are restarting a transient analysis and the TEMPF file contains transient results, the results closest to the specified *Start Time* are used.

Specify a uniform value

With *Specify a uniform value*, TMG applies the specified constant temperature (*in the units of the model*) throughout the model except for groups of elements for which *Initial Temperature* boundary conditions are defined.

Start from results in other directory

Start from results in other directory uses the TEMPF file of a previous analysis to define initial temperature distribution. An error message appears if a file named TEMPF does not exist in the specified directory. **Do not** select your current *Run Directory* when using this options; the file TEMPF would be overwritten and not used.

With this option, since the initial temperature distribution is specified for the whole model, *Initial Temperature* entities are ignored.

If you do a restart using the *Start from results in other directory* option, the TEMPF file in the specified directory will be used to initialize the temperature distribution. If a TEMPF file exists in the specified Restart directory, it will be ignored. TMG still needs solution files in the specified Restart directory to restart the analysis. If the Run Directory is empty, the *Restart* will stop.

Read from a TEMPF format file

This option is the same as the *Start from results in selected directory* except that you select a specific file rather than a directory. The file must be written in the TEMPF format. If the file is in the current *Run Directory* and is **not** named TEMPF it will be read to initialize the temperature and it will not be deleted. *Initial Temperature* entities defined in the model are ignored.

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