Restarting the Solution

On occasion, you may perform a series of analyses using the same geometry and mesh. If you start a new analysis each time, the solver has to repeat much of the same calculation. In order to minimize solution time and salvage as much previously calculated data as possible, use the *Restart* option on the Solver Control form. Pick *Restart Control* on the *Solver Control* form to access the Restart Control form.

[Locate the icon.](#)

There are a number of reasons for which you may want to restart a solution. You can start a transient analysis from a steady state analysis. You may want to make some changes in the solver options because of convergence problems. You may want to run the same model with some changes to the boundary conditions. The analysis may have crashed, or you may have stopped the analysis for one reason or another.

You can make some modifications to your model and still perform a restart using a previous analysis. You can add or remove boundary conditions, change boundary condition parameters and solver controls. You cannot change the geometry or the mesh.

Using Restart for a New Transient Analysis

By default, an new TMG transient run starts with all temperature values for thermal elements equal to zero (regardless of the model unit system). This can give misleading results at the first few output times in the transient analysis.

The best way to avoid this problem is to first perform a steady state analysis on the model before running the transient analysis. You can then use the results of the steady state analysis as the starting conditions for for the transient analysis by performing a Restart.

Before running a steady state analysis on your transient model, you must make a few modifications to the model. A recommended way to do this is to create a new FE Study for the steady state analysis. Specify a different Run Directory for the Steady State study. In the new study, copy any time varying boundary conditions and change them to Constant, using a value appropriate to the conditions at the transient analysis start time. An alternate method is to use the Steady State Analysis Parameters form to globally specify how TMG should handle transient boundary conditions. See *Steady State Analysis Parameters* for details.

To run the steady state analysis set the Solver Controls for a steady state analysis and launch the solver. When the analysis is complete, load the results and inspect the temperatures to make sure they are valid as a starting point for the transient analysis.

Before running the transient analysis, use Manage FE Model to set the transient study as current. Make sure the Run Directory for the transient study is different from the steady state Run Directory. On the *Solver Control* form, select the *Restart* option and specify the previous (steady state) run directory on the Restart Control form. Adjust the other solver controls for transient analysis and launch the solver.

Using Restart to Build on a Previous Transient Analysis

You can extend the results of a previous analysis (or recalculate results for a certain segment of a previous analysis) by performing a Restart with a different *Start* and *End* time. TMG will use initial temperatures that match results closest to the specified start time.

The TMG solver uses the data in the following files for a restart:

```
tmggeom.dat
MODLF
VUFF
INPF
```

Type of Analysis

Select the task that will be executed when you pick *Solve*. All generated files will be written to the current run directory specified on the *TMG Study Setup* form (see *Working with FE Studies*).

Reuse Previous Model, Update Boundary Conditions

If you select *Reuse Previous Model, Update Boundary Conditions*, the finite difference model constructed during a previous TMG run will be reloaded for solution. You may change the boundary conditions on the model (Temperature, Heat Load, and Heat Flux B.C's). To select a model from a particular run, specify the appropriate run directory in *TMG Study Setup*.

Existing temperature results will be used as initial temperatures for the run, unless you have specified *Initial Temperatures* boundary conditions. None of the TMG modules are executed to compute new data; therefore, any changes that you have made to the model, except for boundary conditions, are ignored. If you had defined *Model Simplification* entities in the original run, the reduced model will be loaded.

You can use this option to rerun large models without rebuilding them. You can redefine any of the *Solver Control* options and parameters. If a model did not converge, you can use this option to "restart" the solution with new settings.

The previous model is loaded from MODLF (M = 0); the files VUFF, MODLF, TEMPF and tmggeom.dat are preserved. *Model Simplification* is carried out on the reloaded model prior to solving it.

Specify Restart

If you have not changed the geometry or the mesh of your model you may be able to reuse some previously calculated data to speed up the analysis.

Depending on the type of modification you made on the model, TMG will have to recalculate some data types. The following list details which modifications affect each data types.

- Conduction, Capacitances and Fluid Flow

  Select the *Calculate* option if you have changed the conductivity, specific heat, density, physical property or fluid properties of at least one material in your model.

- Thermal Couplings

  Select the *Calculate* option if you have modified one of the thermal coupling parameters: type, coefficient or subdivision value or if you have modified the primary or secondary element selection.

- Convection

  Select the *Calculate* option if you have modified any parameters of your convecting couplings or if you use coupling to Ambient and have changed some of the Ambient proprieties.

- Black Body View Factors

  Select the *Calculate* option if you have modified the *Error Criterion* or the *Subdivision Level* used to perform the shadowing checks or if you have modified other options or element selections on one of your *Radiation Requests*.

  You must recalculate *Black Body View Factors* if you have modified the number of *Calculation Points* of either an *Orbit/Attitude Modeling* or *Diurnal Solar Heating* entity and have a *Radiation Request* for the Illuminated Elements.

- Radiative Conductances

  Select the *Calculate* option if you have modified the emissivity of one of your materials. You must also recalculate *Radiative Conductances* if you have to recalculate the *Black Body View Factors*.

- Solar, Orbital View Factors

  Three types of entities require Solar and Orbital View Factors: *Diurnal Solar Heating, Radiative Heating* and *Orbit/Attitude Modeling.*

  Solar and Orbital View Factors are geometry dependent, they must be recalculated if the position of the source or of the selected elements changed. However, you can change the solar flux or the albedo values without having to recalculate Solar and Orbital View Factors.

  Be aware that most of the options of *Diurnal Solar Heating* and *Orbit/ Attitude Modeling* will modify the source or the model position.

  For *Diurnal Solar Heating,* you can modify the Solar Flux and the Atmospheric Attenuation And Other Effects values under *Diurnal Solar Heating - Solar Data* without recalculating Solar and Orbital View Factors but you cannot change the day of the analysis since this will modify the source position.

  For *Orbit/Attitude Modeling* you can change the Albedo, IR Flux, Dark Side IR Flux and Solar Flux on the *Planet & Sun Characteristics* form.

  Solar and Orbital View Factors should be recalculated if you have modified the *Element Selection* or the *Shadowing Checks* option on either the *Diurnal Solar Heating, Radiative Heating* or *Orbit/Attitude*

Modeling forms.

- Solar, Orbital Heat Fluxes

  Select the *Calculate* option if you have modified the solar spectrum
  properties of one of your materials or if you have modified the source
  fluxes (see above). You must also recalculate Solar, Orbital Heat Fluxes
  if you have to recalculate the Solar, Orbital View Factors.

The data is loaded from files VUFF and MODLF in the run directory specified on the
TMG Study Setup form. If you do not request calculation of a particular data type, those
entries in the model will be ignored.

The only instance where you would select both *Reuse* and *Calculate* for the same data
type, is if you are building and solving a thermal model in segments, using *Element
Deactivation*. Be careful that you do not *Reuse* and *Calculate* the same conductances,
or the model will be incorrect.

The M parameter option is for diehards. Refer to the TMG Reference Manual, Card 2a.

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