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Working with Tables

For many TMG modeling entities, you can define parameters which have a functional dependence on some other parameter. For example, a boundary condition can be defined as time varying, or a heat transfer coefficient could vary with temperature. You define this functional dependence on the *Tabular Data* form either before or after applying it to a TMG entity. Different TMG entities can reference the same table.

Creating a Data Table

Create a table in one of two ways:

- On the TMG entity create form, pick *Create Table*. The *Tabular Data* form appears immediately with dependant and independent variables as defined on the TMG entity create form.

- On the icon panel, pick *Table Manager*. The software prompts you to choose a dependant variable and independent variable; the *Tabular Data* form appears.

Specifying Tabular Data

Define the relationship between the dependant and independent variables either by specifying individual data points or by defining a functional relationship.
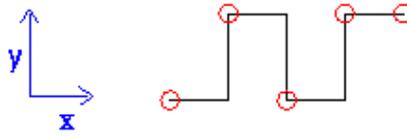
Data Points

You can create *Data Points* two ways:

- Create points in the *Tabular Data* form. Manually enter data points and record them into the data table. The variables are expressed in *dynamic units*.

- *Import from a file...* This command brings the *Tabular Data - Import* form and prompts you to enter the name of the file containing the values. Tables must have a title or "block name" within the file and immediately before the table they describe. Block names **must** begin in the first column with an alphabetic A-Z or a-z character and can be up to 80 characters in length. The file format reads X and Y values separated by white space (spaces, tabs, etc...) with one pair per line. Data pairs are separated with a hard return. Data pairs need not start in the first column. A single data file can contain any number of tables but each table must have its own "block name" and be in the correct format. Comment lines can be used anywhere in the file but must have a "$" in the first column. The data file can be created and opened with any text editor.

When you toggle the *Linear interpolation* option ON, the graph presents straight lines between each data point.
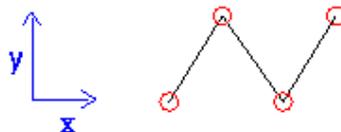
When you toggle the *Constant Over Interval* option ON, the data represents a series of steps. The Y_n value remains constant from X_n to X_{n+1}; therefore, the last two data pairs must have the same Y value. The diagram below shows the behavior of this curve.

Functional Relationship

You can also record data points using a function which describes the curve. The dependant variable Y is calculated at regular intervals from a minimum to a maximum value of X. The compute button automatically determines the values of Y and records them into the data table.

Using Table Multipliers

Some TMG entitles allow you to specify a *Table Multiplier* on the *[Entity] Create* form. In addition to the obvious application of applying a correction factor to the values in a table, *Table Multiplier* can also be useful when modeling a system which cycles on and off, impacting several boundary conditions.

To model this impact, create a table graphing these ON/OFF events (with a value of zero or one) versus time. When creating a boundary condition that references this table, use the boundary condition value as the multiplier, and use the *Constant over interval* option for the table. The table ensures that the boundary condition will be applied at the appropriate time only.

By creating multiple boundary conditions that reference this table, you can model a number of simultaneous events. Using the same table for all the simultaneous events makes it easy to adjust the timing of the whole system.

Time Varying Boundary Conditions

If a time varying boundary condition is periodic, you need only define the data for a single cycle. If the boundary condition finish time is less than the transient simulation finish time, the boundary condition cycle will repeat. For example, if your transient simulation start time is $t=0$ and the finish time is $t=120$ and you have defined a time varying heat load boundary condition from a time of $t=0$ to $t=20$ then the heat load at time $t=21$ will be the value interpolated from the table at the time $t=1$. In this example, the heat load boundary condition will repeat six times before the end of the transient simulation.

This simplifies the definition of periodic boundary conditions since the data for only a single period needs to be entered. If you do not want the boundary condition to be periodic then define a value at the transient simulation finish time.