
RAVEN Documentation

Release 2.0

Convergent Manufacturing Technologies Inc.

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CONTENTS

1	Installation	1
2	Generating Data	3
2.1	Virtual Material Data	3
2.2	Thermal Profile Data	4
3	Importing Data	7
3.1	Importing a Workspace	7
3.2	Importing Raw Data	7
4	Creating/Editing Cure Cycles	9
4.1	Default Cycles	9
4.2	Sharing Cycles	9
4.3	Copying Cycles	9
4.4	Using Saved Cycles	10
4.5	Custom Cycles	10
4.6	Cycles From Data	10
4.7	Editing Cycles	10
5	Using the Cycle Editor	11
5.1	Overview	11
5.2	Editor Modes	11
5.3	Segment-Based Cycles	12
5.4	Tabular Cycles	13
5.5	Options	14
6	Creating/Editing Plots	17
6.1	Creating a Plot	17
6.2	Editing a Plot	17
6.3	Adding Series	18
6.4	Editing Series	18
6.5	Viewing Data on Plots	19
7	Smoothing/Thinning Data	21
7.1	Smoothing Data	21
7.2	Thinning Data	22
8	Querying Data	23
8.1	Single-Result Queries	23
8.2	Multi-Result Queries	24

9	Printing	25
9.1	Printing Plots	25
9.2	Page Setup	25
10	Process Maps	27
10.1	Isothermal Maps	27
10.2	Dynamic Maps	28
10.3	Material Property Maps	28
11	Menu Commands	31
11.1	File Menu	31
11.2	Edit Menu	31
11.3	Data Menu	31
11.4	Plots Menu	32
11.5	Tools Menu	32
11.6	Options Menu	32
11.7	Window Menu	33
11.8	Help Menu	33
12	Toolbar Commands	35
13	Program Preferences	37
14	Common Controls	39
14.1	Item Selection Dialog	39
14.2	Source Breadcrumb	39
14.3	Checked Listbox Filter	39
15	License Agreement	41

Installation

Before installing RAVEN, ensure any previous versions have been un-installed first.

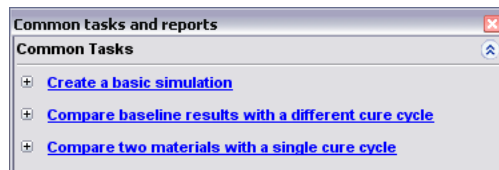
Run the installation program. This will create a program folder called Convergent, with a sub-folder called RAVEN. This folder can be accessed via the Start menu under Programs. The folder contains shortcuts to the program and Uninstall program.


The program can be uninstalled by either running the Uninstall program from the RAVEN group, or using the Add/Remove Programs dialog in the Windows Control Panel.

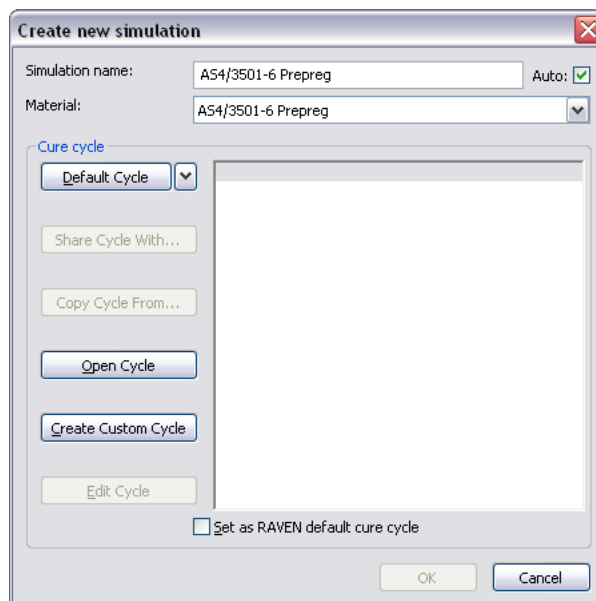
Generating Data

2.1 Virtual Material Data

Virtual material data represents the property development of an isolated piece of a material, given a certain temperature history. To create a virtual material simulation; click the first task, **Create a basic simulation** on the Common tasks and reports window. If the window is not visible, select **Show Feedback Window** from the Window menu.



This task is very similar to selecting “New simulation” from the Data menu, or clicking the  **New simulation** button on the main toolbar, except they don’t automatically thin the simulation results. Many actions in RAVEN are accessible in several different ways. You will be presented with the **Create new simulation** dialog.




Select a material from the drop-down box, and enter a name for the simulation (or just leave the automatically generated name intact). Now a cure cycle must be defined for the simulation. Click on **Default Cycle** to load the default cycle, which will be shown graphically in the dialog. If the material has a default MRCC (Manufacturer’s Recommended Cure Cycle) defined, it will be used. If not, the default RAVEN cycle will be used. See [Creating/Editing Cure Cycles](#) for more information about cure cycles. Click **OK** to process the simulation. After a few seconds a default plot will

appear with a both a Temperature vs Time and Degree of Cure vs Time series for the new simulation.

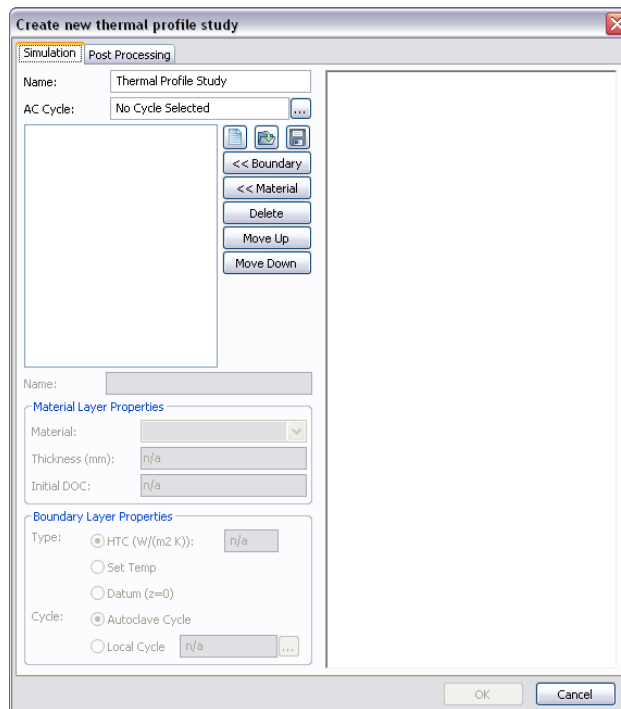
2.2 Thermal Profile Data

Thermal profile data represents the property development and thermal history of a stack of material layers subjected to one (or many) thermal cycles throughout the material stack.

To create a thermal profile simulation; click the fourth task, **Create a thermal profile simulation** on the Common tasks and reports window. If the window is not visible, select **Show Feedback Window** from the Window menu.




Although it's possible to create a stand-alone thermal profile simulation (using the  **New simulation** button), using the thermal profile task automates several very common post-processing and plotting operations.

You will be presented with the **Create new thermal profile study** dialog.



2.2.1 Simulation Tab

At the top of the tab, a name can be assigned to the study. Next, the autoclave (AC) cycle name is displayed, along with a ... button which is used to assign the main cycle for the simulation. Unless otherwise specified using a local cycle, all boundaries will use the autoclave cycle.

Since thermal profile simulation stacks can become quite complex, it is possible to save and open stacks to disk. This is accomplished using the  **Save Stack** and  **Open Stack** buttons (as well as one for  **Reset Stack**).

A thermal profile stack is made up of a combination of “boundary” and “material” layers. A **boundary layer** defines a location where heat transfer is controlled by a cure cycle, either with a given HTC, or a set temp (which forces the temperature at that point to follow the cycle exactly). A **material layer** has a defined material, thickness, and initial degree-of-cure (DOC). A stack can also have a single boundary layer set as the **datum**, which sets $z=0$ at that location. If no datum layer is defined, $z=0$ is located at the bottom of the stack.

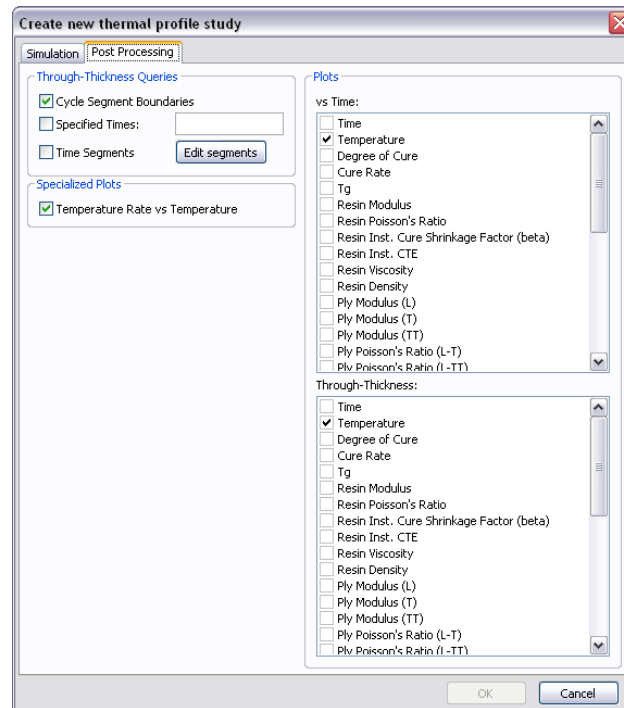
To insert a layer, click either the **<< Boundary** or **<< Material** button, depending on the layer type desired. A text entry for the layer will be inserted in the list to the left of the buttons, and a visual representation of the layer will

appear on the right. The **Delete**, **Move Up**, and **Move Down** buttons can be used to manipulate layers in the stack.

Only materials with the models necessary for a thermal profile simulation will be available when selecting the material for a material layer. When the selected material is changed, the initial DOC will update to reflect the suggested value for the new material.

2.2.2 Post Processing Tab

This tab controls both the post processing actions performed on the simulation results, as well as the automatically generated/updated plots for the thermal profile task.



In many cases, viewing the through-thickness distribution of a property at specific times is beneficial when performing a thermal profile study. By default, the simulation results are queried at the start/end of the autoclave cure cycle segments. Additional query values (times) can be defined as either a list of **Specified Times**, or using start/end/step **Time Segments**.

Both Temperature vs Time and Temperature Through-Thickness are plotted by default. If different plot types are desired, the variables of interest can be checked/unchecked in the corresponding lists. Depending on the materials used in the thermal profile simulation, some of the values selected may not result in plots (since not all materials output every property).

In addition, a specialized **Temperature Rate vs Temperature** plot can be toggled.

Importing Data

3.1 Importing a Workspace

Importing an existing RAVEN workspace (.rws) file will add the contents of that workspace to the existing RAVEN workspace.

3.2 Importing Raw Data

Importing raw data in the form of a comma-separated value file (.csv) or tab-delimited text file (.txt) will create a new data object containing the imported data. A single plot will also be created, with the second data column plotted versus the first data column.

The file to be imported can include any number of columns/rows of data. The last non-numerical line in the file before the data begins is used to label the data columns (and must have as many entries as there are data columns).

3.2.1 Unit Systems

Currently RAVEN doesn't associate units or data types with imported data. Therefore, all imported data is plotted using the actual imported numeric values, and no unit conversion is performed (even if the RAVEN unit system is changed).

Imported coordinates (as described below) *are* given types, since there is no question that they represent distance. If coordinates are detected when raw data is imported, a prompt will appear asking which units the coordinates are stored in. Since the length scale of interest for RAVEN work is often rather small; when plotting in SI, all coordinates are converted to millimeters.

If a cycle is made using imported data, the unit system can be selected during cycle creation.

3.2.2 Coordinates

For the purpose of queries, it may be useful to define coordinates for the data columns. Coordinates are defined by adding up to three (one for each of X, Y, Z) additional lines to the data file, prior to the column header line. Each coordinate line must start by defining the coordinate being defined, using one of the labels "xcoord", "ycoord", or "zcoord". Next, a list of coordinates corresponding to the data columns is required. No coordinate value is given for the first column (which usually represents 'time'). Coordinate values can be empty for any of the data columns.

Example of acceptable CSV data file (the 'AC Temp' and 'AC Pressure' columns have no coordinates):

```
xcoord, , , 1.0, 1.0, 1.0
zcoord, , , 0.0, 0.5, 1.0
Time, AC Temp, AC Pressure, Temp 1, Temp 2, Temp 3
0.0, 20.0, 101.3, 20.0, 20.0, 20.0
1.0, 24.0, 101.3, 24.0, 22.0, 21.0
2.0, 28.0, 101.3, 28.0, 24.0, 22.0
3.0, 32.0, 101.3, 32.0, 26.0, 23.0
4.0, 36.0, 101.3, 36.0, 28.0, 24.0
```

3.2.3 Thinning/Smoothing

Once data has been imported, depending on the amount of data, a prompt may appear suggesting the data be thinned (to improve performance while working with the data). There are two thinning methods provided. Data thinning can be applied/removed at any time.

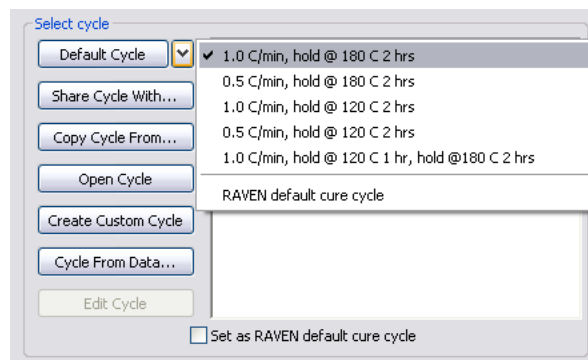
3.2.4 Updating Imported Data

There is currently no way to update/replace imported data in the workspace. It is very important to make sure your raw data is correct before beginning to work with it in RAVEN, as if you need to re-import the data, you will have to re-do all the analyses.

Creating/Editing Cure Cycles

4.1 Default Cycles

Selecting **Default Cycle** may provide a different cure cycle, depending on the conditions at the time it's clicked. If the material (or materials, for a Thermal Profile Simulation) in use don't have any MRCC cycles defined, the default RAVEN cure cycle will be used. If MRCC cycles are defined, the default MRCC for the current material (or first material, in a Thermal Profile Simulation) will be used.



To force the use of a specific MRCC cure cycle, or the RAVEN default cure cycle, click on the down-arrow next to the **Default Cycle** button to get a list of MRCC cycles currently available.

Be careful when changing materials after selecting a default cure cycle, as the cycle will not change to reflect the default cure cycle for the new material.

4.2 Sharing Cycles

Selecting **Share Cycle With...** will display a list of all cure cycles currently in use in RAVEN (as well as which simulation is using the cure cycle). Select a cure cycle and click **OK**. The shared cure cycle can now be edited while modifying any simulations which share the cure cycle, and all simulations using it will update as needed.

4.3 Copying Cycles

Selecting **Copy Cycle From...** will display a list of all cure cycles currently in use in RAVEN (as well as which simulation is using the cure cycle). Select a cure cycle and click **OK**. The copied cure cycle is in no way connected to the source cure cycle, and edits made will only affect the current simulation.

4.4 Using Saved Cycles

Selecting **Open Cycle** will display a file selection dialog, where you can select either a RAVEN cycle file (.rcf), Legacy COMPRO cycle file (.cyc) or Comma-Separated Value file (.csv).

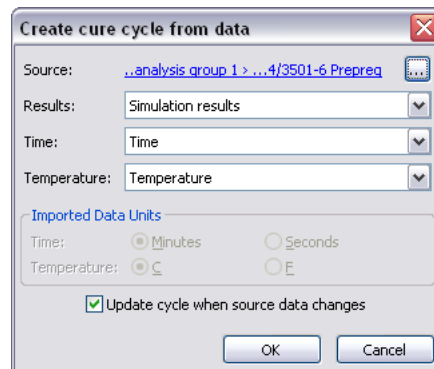
4.5 Custom Cycles

Selecting **Create Custom Cycle** will display the Cure Cycle Editor with an empty cure cycle. See *Using the Cycle Editor* for more information on editing cure cycles.

4.6 Cycles From Data

Creating a cure cycle from data already in RAVEN can be used to quickly predict the property development of a material given imported experimental thermal history.

The **Cycle From Data...** button is only available if valid data to create a cure cycle is present in RAVEN. Clicking this button brings up a dialog where you can select the source simulation, results entry, as well as which data columns to use for the time and temperature of the cure cycle.



If the results selected for the source data are imported results, it will be possible to specify the time and temperature units of the source data.

By default, cure cycles created from data will update if any changes are made to the source data used to create them. You can disable this by unchecking **Update cycle when source data changes**.

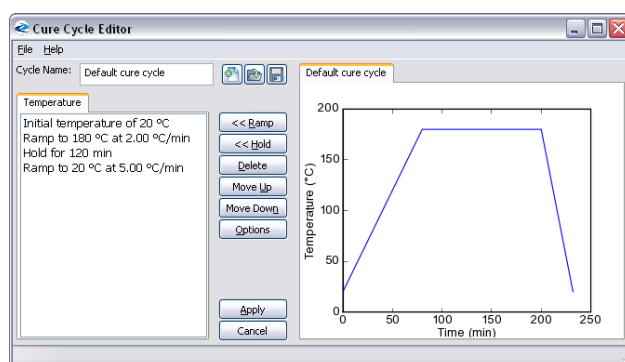
4.7 Editing Cycles

Selecting **Edit Cycle** will display the cycle editing dialog. See *Using the Cycle Editor* for more information.

Using the Cycle Editor

5.1 Overview

The cycle editor is used to create and manipulate cycles for use with RAVEN.



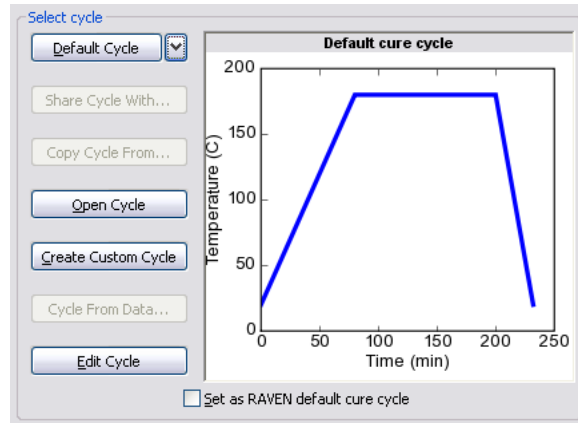
There are three types of cycles supported by the cycle editor; **Simple**, **Advanced**, and **Tabular**.

- Simple cycles are segment-based (meaning they're made up of ramps and holds), and only have a temperature history.
- Advanced cycles are also segment-based, but in addition to temperature history, allow for pressure and vacuum history. Unlike simple cycles, they also support lead/lag control.
- Tabular cycles don't use segments, and instead use a precise time/temperature/pressure/vacuum history. Tabular cycles don't allow for lead/lag control.

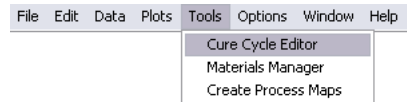
5.2 Editor Modes

The editor can be used in two different modes.

The first mode (single-cycle mode) involves clicking on one of the buttons on the **Create/Edit run** dialog, such as **Open Cycle**, **Create Custom Cycle**, or **Edit Cycle**. This launches a single-cycle editor, used to define the cycle for a single run. Clicking **Ok** in this editor accepts the current cycle.

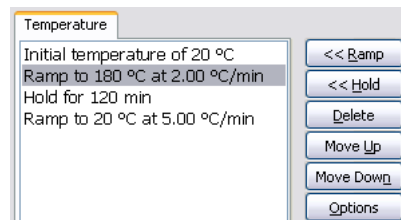


The other mode (multi-cycle mode) is accessed from the **Tools menu**. The cycle editor launched in this manner is used to modify all the cycles currently being used in RAVEN. Clicking **Apply** in this editor re-calculates simulations using the current cycle in RAVEN.



5.3 Segment-Based Cycles

There are three types of segments in a segment-based cycle. There ramp and hold segments, as well as a single initial value segment. Initial segments can't be manually inserted, so one is automatically created when you insert a ramp or hold segment to an empty cycle.



5.3.1 Adding/Removing Segments

Ramps and holds are inserted by selecting an existing segment in the cycle (if any exist), and clicking the **<< Ramp** or **<< Hold** button. The new segment will be inserted after the selected segment, and the new segment will be selected.

Segments can be selected either by clicking in the segment list on the left, or clicking on the visual display of the cycle on the right.

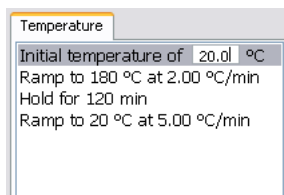
To delete a segment, select the segment and click **Delete**.

Segments can be moved up and down in the list by selecting the segment, and clicking the **Move Up** or **Move Down** button.

5.3.2 Editing Segments

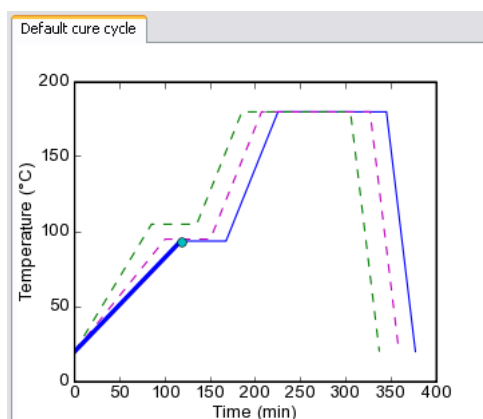
Segments can be edited in two ways; direct text entry, or curve dragging.

To enter specific values for a segment, double-click the segment in the list. Editable values will become text boxes, where you can enter new values for ramp rates, target temperatures, etc. To accept the changes, press enter or click elsewhere on the segment list.



You can also alter segments by clicking and dragging the plotted curve of the cycle. The values adjusted depend on what type of segment is selected, and where on the curve you click. The possible combinations, and the adjustments allowed are:

- Initial - Adjust the initial value
- Ramp (mid-line) - Adjust the ramp rate
- Ramp (end point) - Adjust the ramp rate and target value
- Hold (mid-line) - Adjust the target value of the previous segment
- Hold (end point) - Adjust the hold time



When modifying segments by dragging, a **solid blue** line displays the cycle based on the cursor position, a **dashed green** line displays the original cycle, and a **dashed pink** line displays what the cycle will snap to if the mouse button is released. The cycle will snap to values which can be defined in the options dialog, as well as to the original values for the segments being adjusted.

5.4 Tabular Cycles

Currently, the only way to enable tabular cycle mode is to load a legacy COMPRO CYC file stored in tabular format, or load data from a CSV file.

For CSV files, the importer treats any line where the first comma-separated value is a float as a data line, and expects data in the order: time, temperature, pressure, vacuum. Time and temperature are necessary, whereas pressure and vacuum are optional.

5.4.1 Adding/Removing Points

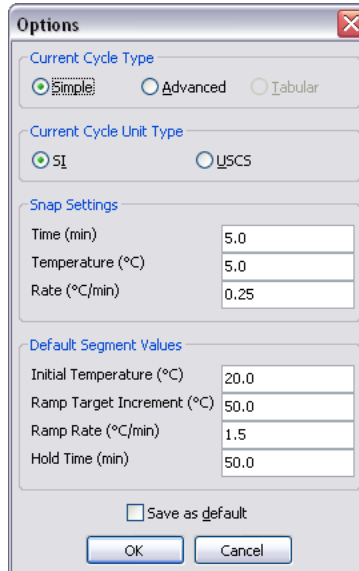
Data points cannot be added or removed in tabular mode.

5.4.2 Editing Points

To edit a data point, double-click the cell in the data grid. Clicking points on the plotted curve will highlight the corresponding cell in the data grid. Dragging of data points is not supported in tabular mode.

5.5 Options

The options dialog is used to adjust various parameters in the cycle editor. The dialog can be accessed by clicking the **Options** button in the editor window.



5.5.1 Current Cycle Type

When editing a simple or advanced cycle, it is possible to switch between the two modes. Tabular mode can only be enabled by opening a saved tabular cycle. When in tabular mode, switching to simple or advanced mode is done by resetting the cycle (from the file menu, or clicking the **Reset Cycle** button), or by opening a saved simple/advanced cycle.

When using multi-cycle mode, this setting applies to the *current cycle*.

5.5.2 Current Cycle Unit Type

This selects the unit system used to display/edit the cycle. This will not affect the units used to display results in RAVEN.

When using multi-cycle mode, this setting applies to the *current cycle*.

5.5.3 Snap Settings

These values determine the snap values used when dragging curves in segment-based cycles.

When using multi-cycle mode, this setting applies *all active cycles*.

5.5.4 Default Segment Values

These values are used when inserting new segments in segment-based cycles. **Initial Temperature**, **Ramp Rate**, and **Hold Time** define the default values for segments which require said parameters. The **Ramp Target Increment** defines how far above the current segment's end value the default target for an inserted ramp will be.

When using multi-cycle mode, this setting applies *all active cycles*.

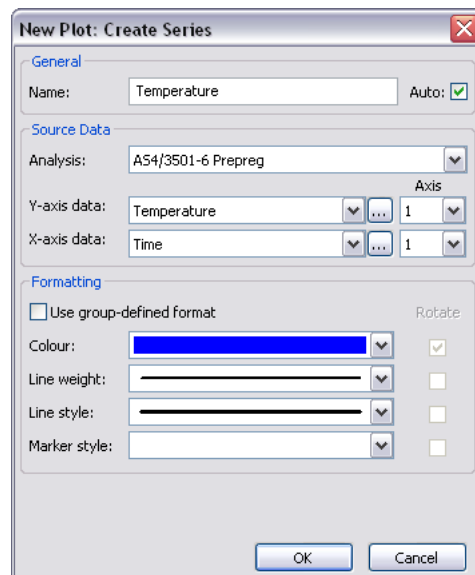
Checking the **Save as default** checkbox and clicking okay will save the snap settings and default segment values to the RAVEN configuration file for future sessions.

Creating/Editing Plots

6.1 Creating a Plot

Plots are the primary means of visualizing data in RAVEN.

To create a plot, click the  **New plot** button on the toolbar.



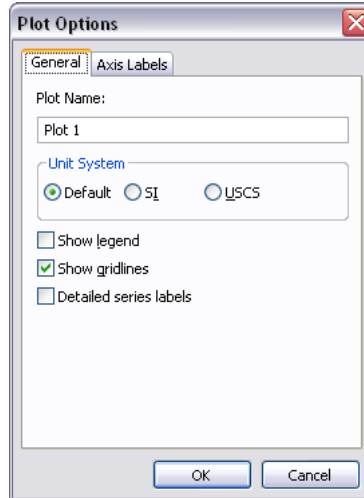
Everything necessary to create a plot with a single series (usually Temperature vs Time) will be set by default. The name of the initial series, as well as the source analysis and data columns can be adjusted. The format of the series is also editable.

To create a plot with multiple series, click the ... button beside either the Y-axis data or X-axis data. This will allow the selection of several data columns, and a series will be created for each selected column versus the single opposing data column.

When multiple data columns are selected, checking the “rotate” checkboxes for axes or formatting will increment the checked selection for each series created. If the checkboxes are not selected, every series will be created on the same axis, or with the same formatting options.

6.2 Editing a Plot

To edit a plot, double-click the plot item in the plot tree. The **Plot Options** dialog will be shown.



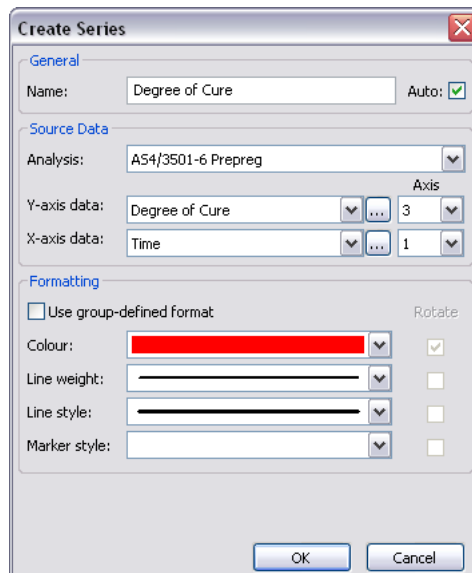
This dialog allows you to adjust various attributes of a plot, including the name, legend, gridlines, and automatic series label types.

All plots are created with the **Default** unit system, which means they will use whichever unit system RAVEN is currently set to use. If a plot is manually set to either **SI** or **USCS**, it will display using that unit system, regardless of the system RAVEN is set to use.

The **Axis Labels** tab allows you to override the automatically generated names for the various axes on a plot.

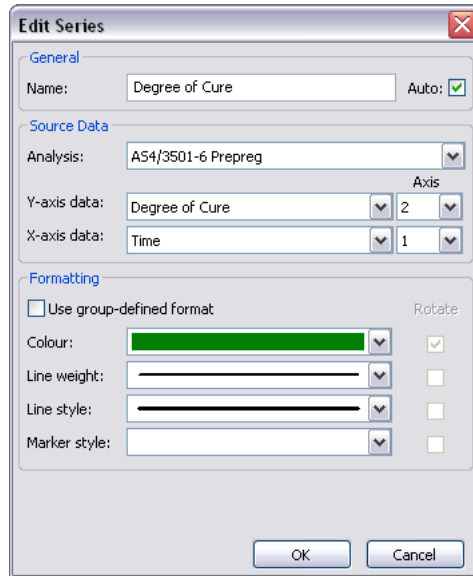
6.3 Adding Series

To add a series, right-click on a plot frame and select **New Series...**. The **Create Series** dialog will be shown, which is nearly the same as the dialog used to create a plot.



6.4 Editing Series

To edit a series, double-click the curve on the plot itself. This will display the **Edit Series** dialog.



This dialog is very similar to the dialog used when creating plots/series, except without the ability to manipulate multiple series at once.

6.5 Viewing Data on Plots

Plots can be interacted with in a variety of ways. The main toolbar has several icons to ease navigation on plots.

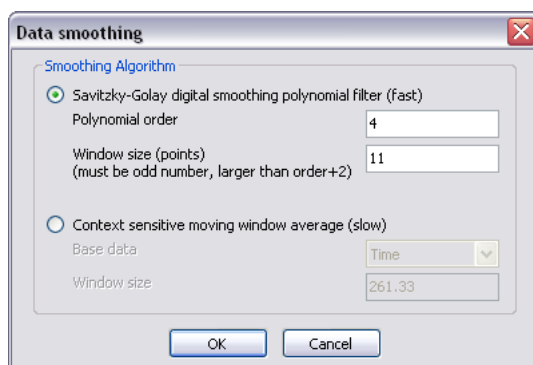
Button	Function
Select Tool	Selecting plot items (spacebar)
Pan Tool	Pan around the plot (p)
Zoom window	Zoom the plot using a bounding box (z)
Probe tool	Used to extract data values at a specific point on a series
Zoom Extents	Zoom to the extents of the data (x)
Zoom in	Zoom the current plot in (+)
Zoom out	Zoom the current plot out (-)

In addition, various plot components (such as the axes and labels) can be manipulated by double-clicking or right-clicking on them.

Smoothing/Thinning Data

7.1 Smoothing Data

At the moment, RAVEN implements two data smoothing routines. One routine uses an averaging window that has a specified data-point width, and the other routine is context sensitive and averages over a specified data width.



7.1.1 Savitzky-Golay digital smoothing polynomial filter

The first algorithm is a Savitzky-Golay digital smoothing filter¹. This is also called a least-squares filter², or a Digital Smoothing Polynomial filter³. Essentially the filter fits a polynomial of order n to all the data within a window of width w for each data point. Due to the formulation, w must be an odd number, and larger than $n+2$. At the two “ends” of the data, data is mirrored to satisfy the data window for the algorithm. Details of the algorithm can be found in Numerical Recipes⁴. The algorithm is quite fast as it assumes equally spaced data and uses linear algebra to perform the least-squares fitting.

7.1.2 Context-sensitive moving window average

The second algorithm operates in the same space as the data. This requires that the base data be monotonic: either increasing or decreasing with no duplicates. The base data can be any data column that satisfies this requirement. The smoothing window is then specified in terms of this data column. For example, if “Time” is specified as the base data, the window might be “10 s”. If temperature is the base data, the window might be “2 C”. The smoothing algorithm

¹Savitzky, A., and Golay, M.J.E., 1964, “Smoothing and Differentiation of Data by Simplified Least Squares Procedures”, Analytical Chemistry, V. 36, pp. 1627-1639.

²Hamming, R.W., 1983, Digital Filters, 2nd Ed., Prentice-Hall.

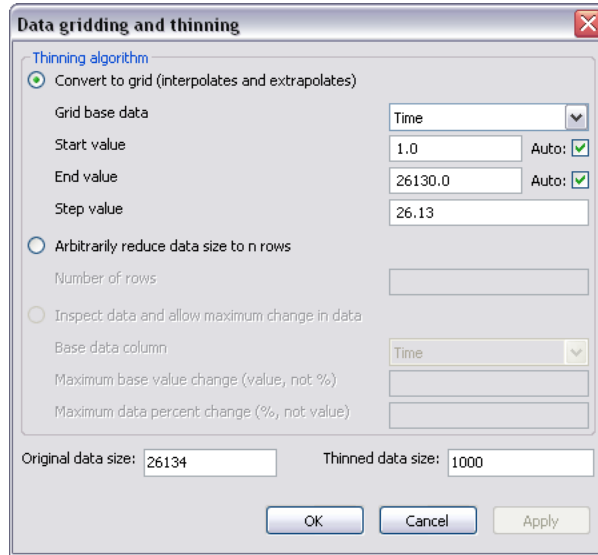
³Ziegler, H., 1981, “Properties of Digital Smoothing Polynomial (DISPO) Filters”, Applied Spectroscopy, V. 35, pp. 88-92.

⁴Press, W.H., Teukolsky, S.A., Vetterling, W.T., Flannery, B.P., 2007, Numerical Recipes: The Art of Scientific Computing, 3rd Ed., Cambridge University Press

then takes the mean of the data across the data window for each data point. The algorithm preserves the number of data points in the data set. As such, the beginning and ends of the data are less averaged than the middle due to the averaging window being clipped. This algorithm is quite a bit slower than the Savitzky-Golay algorithm.

7.2 Thinning Data

Thinning data is generally used on larger data sets, in order to improve plotting performance. There are three thinning methods currently available in RAVEN; Convert to Grid, Arbitrary Row Reduction, and Maximum Delta.



7.2.1 Convert to Grid

The Convert to Grid thinning method interpolates and extrapolates the data to obtain values at fixed step intervals over a given range. The data column used as the basis for the stepping must be monotonically increasing, and only valid columns are shown in the dialog. The data extents for the selected base column are shown and used as the default range (but can be adjusted if needed). The default step value will result in 1001 data points.

7.2.2 Arbitrary Row Reduction

Arbitrary Row Reduction thinning does no interpolation or extrapolation, and simply extracts evenly spaced data rows over the full data range to obtain the total number of rows specified. For instance, if the original data is made of 1000 rows, and the specified target is 500 rows, the thinning data will contain every second data row.


7.2.3 Maximum Delta

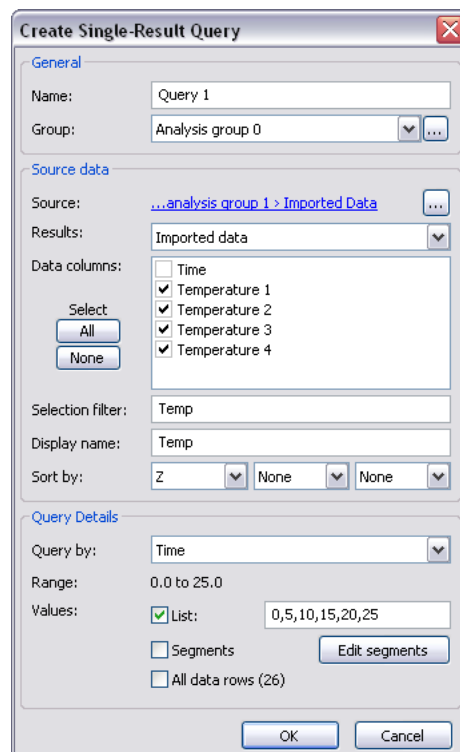
The Maximum Delta thinning method is not currently implemented.

Querying Data

8.1 Single-Result Queries

Single-result queries extract data across a selection of columns in a single result entry for a selection of values in a given column. These queries are well-suited to querying imported data made up of multiple columns of the same variable at different locations, in order to obtain curves of that variable over a length or through a thickness.

To create a single-result query, click the  **New query** button, and select **Single-Result Query**. If the button is not visible, you will have to enable Expert Mode, as queries are only available in Expert Mode.



After naming the query and selecting the data source, the query parameters must be defined. The data rows to be included in the query can be manually selected, fully selected/unselected with the **All** and **None** buttons, or filtered by entering text in the **Selection filter**. If a valid regular expression is detected in the filter box, it will be used to select items. Otherwise, all items with the entered string somewhere in their name will be selected (case-insensitive).


The **Display name** is optional, and may affect automatic series names when plotting the query results (depending on series naming settings). If valid coordinates exist in the source results, the query results can be sorted by up to three

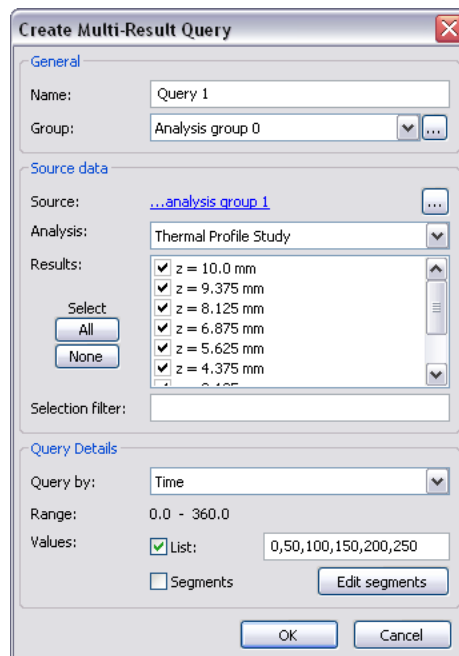
coordinate values, as selected using the **Sort by** drop-downs.

Query Details allows selection of the column to query by (usually 'Time'), and provides three means of defining the values at which to query. The data range of the selected column is shown for reference.

8.2 Multi-Result Queries

Multi-result queries extract data across all columns for a selection of results entries for a selection of values in a given column. These queries are well-suited to querying thermal profile simulation data made up of multi-variable results, each having different coordinates.

To create a multi-result query, click the  **New query** button, and select **Multi-Result Query**. If the button is not visible, you will have to enable Expert Mode, as queries are only available in Expert Mode.



Unlike single-result queries, multi-result queries require you to select a number of analysis points from a given set of results. The **Query Details** are defined in the same manner for both query types. Refer to *Single-Result Queries* for more information.

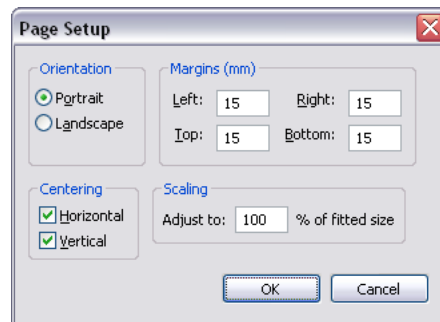
Printing

9.1 Printing Plots

To print a plot, select the plot item in the Plot Tree, and select **Print current plot...** from the **File** menu. The layout of the plot can be adjusted (*Page Setup*), and previewed by selecting **Print preview (current plot)...** from the **File** menu.

9.2 Page Setup

To setup the page layout for printing, select **Page Setup...** from the **File** menu.

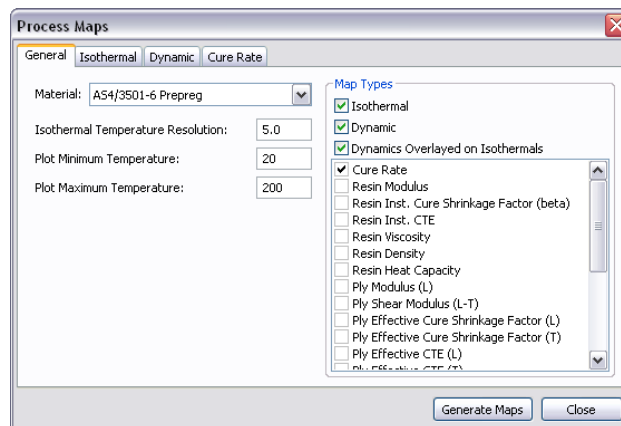


This dialog allows adjustments to the paper orientation, margins, centering, and overall plot scaling. By default, all printed plots are scaled to fit the page (within the margins and maintaining the original aspect ratio). A scale value of 100% maintains this size, while higher/lower values result in a zoomed plot image.

Process Maps

Process maps are complex plots used to describe both how a given material state (in Degree of Cure vs Temperature space) can be reached, as well as the material properties at that given state.

The Process Maps dialog allows creation of a set of process maps for a material. There are three basic map types available; isothermal, dynamic and material property maps. All process maps are plotted in Degree of Cure vs Temperature space.



The general tab of the process map dialog controls global map settings, as well as which maps will be generated. All maps will be generated for the material selected here. Isothermal process maps are generated by querying across multiple isothermal virtual material runs. The **Isothermal Temperature Resolution** value determined can be used to increase the data density of isothermal process maps. For consistency, all process maps will have their temperature axes ranges set to the values defined in the **Plot Minimum/Maximum Temperature** entries. The degree of cure axes ranges are automatically set from 0 to 1.

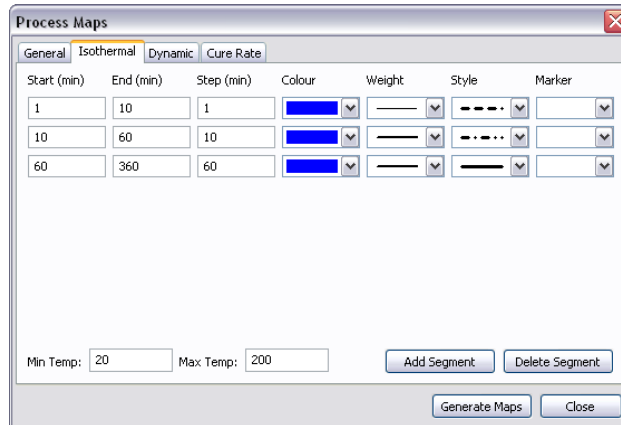
Selecting the **Isothermal** and **Dynamic** checkboxes will create tabs to further define those map types. Selecting **Dynamics Overlayed on Isothermals** will create combined versions of any/all isothermal and dynamic maps generated. Depending on the material selected, several material properties will be available for map creation. Checking the corresponding checkbox will create a tab for additional map details.

10.1 Isothermal Maps

Isothermal maps are made up of curves of constant time. Generally there will be several sets of curves for different time ranges. For example: curves from 1min to 10min (1min increments), curves from 10min to 60min (10min increments), and curves from 60min to 360min (60min increments). Since the cure rates of most materials slow as they approach full cure, this approach is used to space out the time contours as cure progresses.

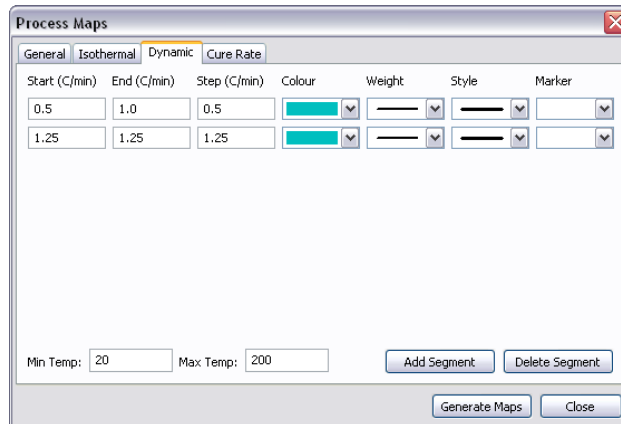
Each individual map tab has a minimum and maximum temperature value, which defaults to the plot mini-

mum/maximum on the general tab. These values can be used to calculate map data outside the plotted range, which may be necessary for some materials.



10.2 Dynamic Maps

Dynamic maps are made up of curves starting with different initial degrees of cure, and heating at a constant rate over the temperature range of interest. Unlike isothermal maps, each rate value defined in a segment will result in an entire plot (not just a set of curves on a single plot). The example shown below would generate a dynamic process map at 0.5 C/min, 1.0 C/min, and 1.25 C/min.



10.3 Material Property Maps

Material property maps show contours of constant property values over the range of interest. The values used for these maps can vary widely by material, and some trial and error may be required to obtain meaningful map values.

Process Maps

General Isothermal Dynamic Cure Rate

Start (1/s)	End (1/s)	Step (1/s)	Colour	Weight	Style	Marker
1e-4	1e-3	1e-4	Green	1	Dashed	
1e-5	1e-4	1e-5	Green	1	Solid	
1e-6	1e-5	1e-6	Green	1	Solid	

Min Temp: 20 Max Temp: 200

Add Segment Delete Segment

Generate Maps Close

Menu Commands

File Edit Data Plots Tools Options Window Help

RAVEN has several standard menus for basic program interaction.

11.1 File Menu

Menu Item	Action
New	Create a new workspace (all existing simulations and plots will be lost) (Ctrl-N)
Open...	Open an existing workspace... (Ctrl-O)
Save	Save the current workspace (Ctrl-S)
Save As...	Save the current workspace as a new file...
Close	Close the current workspace
Import...	Import a workspace or CSV file
Page setup...	Adjust the page setup for printing...
Print preview (current plot)	Preview the print output
Print current plot...	Print this plot... (Ctrl-P)
Exit	Exit RAVEN

The File menu also contains a list of all recently opened workspaces.

11.2 Edit Menu

Menu Item	Action
Cut	Cut the currently selected item (Ctrl-X)
Copy	Copy the currently selected item (Ctrl-C)
Paste	Paste the item currently on the clipboard (Ctrl-V)

11.3 Data Menu

Menu Item	Action
New simulation...	Add new simulation...
Edit simulation...	Edit simulation...
Delete simulation...	Delete simulation...

In addition; when using Expert Mode, the following options are available:

Menu Item	Action
New master analysis group...	Add new master analysis group...
Edit master analysis group...	Edit master analysis group...
Delete master analysis group...	Delete master analysis group...
New analysis group...	Add new analysis group...
Edit analysis group...	Edit analysis group...
Delete analysis group...	Delete analysis group...
New query...	Add new query...
Edit query...	Edit query...
Delete query...	Delete query...
Create custom data...	Create a custom data column...
Smooth results...	Smooth results...
Thin results...	Thin results...

11.4 Plots Menu

Menu Item	Action
New plot...	Add new plot...
Edit plot...	Edit plot...
Delete plot...	Delete plot...
New series...	Add new series...
Edit series...	Edit series...
Delete series...	Delete series...

In addition; when using Expert Mode, the following options are available:

Menu Item	Action
New master plot group...	Add new master plot group...
Edit master plot group...	Edit master plot group...
Delete master plot group...	Delete master plot group...
New series group...	Add new series group...
Edit series group...	Edit series group...
Delete series group...	Delete series group...

11.5 Tools Menu

Menu Item	Action
Cycle Editor	Activate the Cycle Editor
Materials Manager	Activate the Materials Manager
Create Process Maps	Create a new process map study

11.6 Options Menu

Menu Item	Action
Preferences...	Set the program preferences
Expert Mode	Toggle expert mode

11.7 Window Menu

Menu Item	Action
Show Feedback Window	Show the feedback window

This menu also contains standard options to arrange and switch between all available plot windows.

11.8 Help Menu

Menu Item	Action
Help topics...	View the RAVEN help
Tip of the day...	View the RAVEN tips
Update license key...	Enter a new license key
License Agreement...	View the RAVEN license agreement
Check for Updates	Check to see if an updated version of RAVEN is available
About...	Additional information about RAVEN

Toolbar Commands

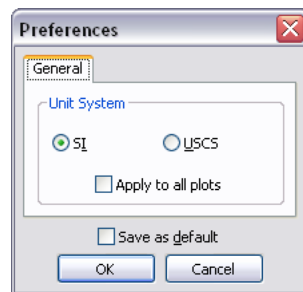


The main toolbar allows for creation of new runs, opening existing files, and manipulating plots. The actions available on the toolbar include:

Button	Function
New	Create a new workspace
Open	Open an existing workspace
Import	Import an existing file...
Save	Save the current workspace
Cut	Cut
Copy	Copy
Paste	Paste
New simulation	Add a new simulation
New query	Add a new query
New plot	Add a new plot
Select Tool	Selecting plot items (spacebar)
Pan Tool	Pan around the plot (p)
Zoom window	Zoom the plot using a bounding box (z)
Probe tool	Used to extract data values at a specific point on a series
Zoom Extents	Zoom to the extents of the data (x)
Zoom in	Zoom the current plot in (+)
Zoom out	Zoom the current plot out (-)

Program Preferences

Selecting **Preferences...** from the **Options** menu will display the **Preferences** dialog.

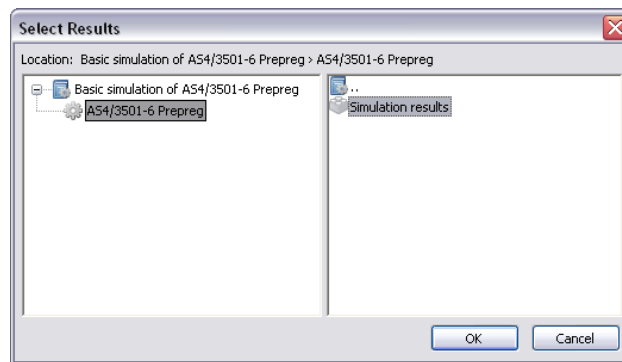


Setting the unit system will affect all plots set to use the default unit system. If the **Apply to all plots** checkbox is checked, all existing plots will be changed to use the default unit system. In addition, if the **Save as default** checkbox is checked, this unit setting will be saved for future RAVEN sessions.

Common Controls

14.1 Item Selection Dialog

The item selection dialog is used to select a variety of items in RAVEN. It is most often invoked by clicking on a *Source Breadcrumb* link (or the corresponding ... button).



The left side of the dialog displays the tree in which the required item exists. The right side of the dialog displays the contents of the currently selected collection. When a valid selection has been made, the **OK** button will become active. If the correct item type appears to be selected, but the **OK** button is greyed out, the selected item is an invalid selection, as it will cause a circular data reference if used for the intended operation.

14.2 Source Breadcrumb

A source breadcrumb is a link describing the location of the currently selected item. Hovering the mouse cursor over the link (or the ... button) will provide a full-length location description. Clicking the link will allow selection of a new source using an *Item Selection Dialog*.



14.3 Checked Listbox Filter

A checked listbox filter allows quick selection of items within a checked listbox using simple string matching. If a valid regular expression is detected in the filter box, it will be used to select items. Otherwise, all items with the entered string somewhere in their name will be selected (case-insensitive).

Y-axis data:

Select

All

None

Column Filter:

resin

X-axis data:

Time

Axis

3

Rotate axes

Time

Temperature

Degree of Cure

Cure Rate

Resin Modulus

Resin Poisson's Ratio

Resin Inst. Cure Shrinkage Factor

Resin Inst. CTF

1

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