



PI BatchView User Guide

Version 3.1.4

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Table of Contents

| | |
|--|-----------|
| Chapter 1 Introduction | 1 |
| What's New in this Version..... | 1 |
| PI Batch Terminology..... | 2 |
| Installing and Upgrading PI BatchView | 3 |
| Conventions Used in this Guide..... | 3 |
| Part I PI BatchView Client Tools | 5 |
| Chapter 2 Use PI BatchView QuickSearch | 7 |
| Search Parameters | 7 |
| Set PI Server Connections | 8 |
| Results Table | 8 |
| Search Button..... | 8 |
| Clear Button | 8 |
| Advanced Search | 8 |
| QuickSearch Options Dialog Box..... | 10 |
| About Button..... | 11 |
| Close Button..... | 11 |
| Chapter 3 View Batches in Microsoft Excel | 13 |
| Search Page..... | 14 |
| Settings Page | 15 |
| Chapter 4 View Batches in PI ProcessBook | 19 |
| Batch Group Architecture | 20 |
| Create and Edit a Batch Group | 20 |
| Batch Definition Dialog Box..... | 21 |
| Edit PI ProcessBook Displays..... | 51 |
| Save PI ProcessBook Displays..... | 52 |
| Relative and Absolute Times | 52 |
| Limit Sets..... | 53 |
| Run Time Usage of PI ProcessBook Symbols..... | 59 |
| Updates | 76 |
| Understand PI BatchView Error Indicators..... | 77 |
| PI BatchView Preferences | 78 |
| Chapter 5 Use the PI BatchView Programming Interfaces | 81 |
| Integrate PI BatchView into Applications with ActiveX Controls | 81 |
| Customize the Batch Group Symbol in PI ProcessBook | 81 |

| | |
|--|------------|
| Part II Common Features of PI BatchView Tools | 83 |
| Chapter 6 Set Search Parameters | 85 |
| Selection Component | 85 |
| PI Servers Component | 87 |
| Time Range Component | 88 |
| Attributes Component | 89 |
| Duration Component | 93 |
| Filter Component | 94 |
| Advanced Searches | 97 |
| Time and Interval Strings | 98 |
| Chapter 7 Work with Results | 103 |
| Result Items | 103 |
| Result Columns | 103 |
| Hierarchy | 104 |
| Markers and Colors | 104 |
| Select Items in the Results Table | 105 |
| Attribute Columns | 105 |
| Status Columns | 106 |
| Data Columns | 107 |
| Column Manipulation | 107 |
| Configure Results | 110 |
| Chapter 8 Use Custom Names | 121 |
| Examples | 121 |
| Use Custom Name Sets | 123 |
| Custom Names Settings | 124 |
| Create and Edit Custom Names Sets | 125 |
| Part III Appendixes | 127 |
| Appendix A Install PI BatchView | 129 |
| System Requirements | 129 |
| Setup Kit | 130 |
| Uninstalling and Repairing PI BatchView | 132 |
| Appendix B Upgrade From a Previous Version | 133 |
| View Batch Subsystem Batches | 133 |
| ActiveX Controls for Searching Batches | 133 |
| Batch Trend Conversion | 133 |
| Microsoft Excel Add-In | 134 |
| Appendix C Microsoft Excel Functions | 137 |
| PIBVSearch | 137 |
| PIBVBatchSearchMasks | 141 |
| PIBVUnitBatchSearchMasks | 141 |

| | |
|---|------------|
| PIBVSubBatchSearchMasks..... | 142 |
| PIBVxxxDuration | 143 |
| PIBVxxxFilter Functions | 144 |
| Appendix D Custom Names Terms..... | 147 |
| General..... | 147 |
| PIBatch Terms..... | 148 |
| PIUnitBatch Terms | 148 |
| PISubBatch Terms | 149 |
| Search Parameter Terms | 149 |
| Results Table Columns | 150 |
| Appendix E Technical Support and Resources | 151 |
| Index | 155 |

Chapter 1

Introduction

PI BatchView™ is a set of tools for viewing live and historical batch data in PI ProcessBook® displays, Microsoft® Excel® spreadsheets, the PI BatchView QuickSearch application, and other applications that support Microsoft ActiveX® controls.

The PI BatchView components are:

| Component | Description |
|----------------------------------|---|
| Batch symbols for PI ProcessBook | A tool for displaying batch data in PI ProcessBook displays. You can display Batch Trends, a Gantt chart, a Results Table, a run-time Search, and the Batch Group. With these tools you can run simple and complex queries for batches, compare multiple batches, build trends of relevant data from these batches, perform cycle-time analyses, align your batch data, and refine your search in the sub-batches to perform detailed troubleshooting and process analysis. |
| Microsoft Excel add-in | A set of dialog boxes and functions that let you incorporate batch data in your spreadsheets. When used in conjunction with PI DataLink, you can view the process data from your batches. |
| PI BatchView QuickSearch | Allows simple or complex searches for batches without the need to set up a display or a spreadsheet. |
| PI BatchView ActiveX controls | Tools for searching and displaying batches in customized applications or Web pages. These controls are the foundation for the searches in all the other components. You can incorporate them into programs that you design for users who have PI BatchView installed on their computers. These include all of the search controls as well as the Results Table. |

With PI BatchView you can view batch information stored in the PI Server databases. Version 3.1 leverages the batch data in the Batch Database associated with equipment in the PI Module Database™ in PI Server version 3.3 SR1 and greater. It still provides access to your existing data in the Batch Subsystem and is backward compatible with your existing PI ProcessBook displays and Microsoft Excel spreadsheets.

What's New in this Version

PI BatchView 3.1 introduces several new features:

- New Microsoft Excel add-in with full support for the PI Batch Database, including PIBatches and PISubBatches (requires Microsoft Excel XP or later).
- Custom naming of PI Batch™ terms.
- Integration with PI ProcessTemplates version 1.3.0.4 and later (as limit sets).
- Ability to create Gantt charts and Trends showing only PISubBatch data.

- Ability to show trace data outside the time range of the PIUnitBatch.
- New column types for the Results Table.
- The Unit Attribute of the search can now consume PI ProcessBook's Module Context.
- Several performance improvements, including significant improvements to search speed.
- Type Library enhancements to the Batch symbols for PI ProcessBook for the VBA programmer.

PI Batch Terminology

This user guide refers to various batch items generically as batches. However, there are specific types of batches stored on the PI Server.

The following terms are from the Batch Database (BDB). All batches in the BDB have start and end time properties as well as a PI Server property.

PIBatch: A PIBatch relates to the actual material that is produced. A PIBatch may contain any number of PIUnitBatches that ran in parallel or series. A PIBatch has these properties:

- Batch ID
- Product
- Recipe

A PIBatch also contains a collection of PIProperties. PIProperties are named values that may contain any number of data types.

PIUnitBatch: A PIUnitBatch runs within a specific piece of equipment called a PIUnit. This PIUnit is a PIModule that is defined in the PI Module Database on the PI Server. In a PIUnit, exactly one PIUnitBatch can be running at a given time. A PIUnitBatch has these properties:

- Batch ID
- Product
- ProcedureName
- Unit

The PIUnitBatch is the replacement for the Batch Subsystem "Batch" entity. If the Batch Subsystem migration steps are taken for a particular Unit in the Batch Subsystem, the Unit's Batches are interpreted as PIUnitBatches.

PISubBatch: A PISubBatch must have a PIUnitBatch as an ultimate parent. PISubBatches can have child PISubBatches. This allows for hierarchies of batch items beneath a PIUnitBatch. For example, you may have distinct types of sub-batches below your PIUnitBatch called Operations, and the child sub-batches of Operations might be called Phases. The Operation and Phase designations are stored in the Heading.

- **Name:** The name of the sub-batch. For example, you might call the sub-batch representing the heating up of a reaction "Heat".
- **Heading:** This is the PIHeading optionally assigned to the sub-batch. An S88-based (ANSI/ISA S88: Batch Control - Part I Models and Terminology) PIHeadingSet might

contain the PIHeadings Operation, Phase, and Step. In this hierarchy, Operation sub-batches are children of PIUnitBatches, Phase sub-batches are children of Operations, and Step sub-batches are children of Phases.

For information on the similarities and differences between the Batch Subsystem (BSS) and the Batch Database (BDB), see *Batch Database Support of the PI Batch Subsystem* found on the OSIsoft® Technical Support Web site, <http://techsupport.osisoft.com>.

Installing and Upgrading PI BatchView

See *Installing PI BatchView* (page 129) for system requirements and details on installing PI BatchView.

Upgrading from a previous version of PI BatchView is designed to be as seamless as possible. Because of the advances in storing batches on the PI Server, however, the client tools for viewing batch data are improved and behaviors have changed. For details, see *Upgrading From a Previous Version* (page 133).

Conventions Used in this Guide

| Convention | Usage | Example |
|----------------|--|---|
| <i>Italic</i> | Placeholders | The limit's name is "Copy of <i>name</i> " (where <i>name</i> is the limit name). |
| | References to other publications | For details on this syntax, see the <i>PI Server Applications User Guide</i> . |
| Monospace font | Files, directories, and paths | To verify setup, browse to the PIPC\Batch folder (typically at C:\Program Files\PIPC\Batch). |
| | Code syntax and examples | PIBVBatchSearchMasks (Batch ID, Product, Recipe) |
| Bold | Interface components, including: <ul style="list-style-type: none"> ▪ Menu items ▪ Buttons ▪ Dialog boxes and their elements (such as text boxes, areas, and pages) | To perform a batch search, choose PI > Batch Search... To revert to the default Custom Names set, click Restore Default . |

PI BatchView Client Tools

The next chapters of this manual describe how to use each of the PI BatchView tools:

- The PI BatchView QuickSearch Utility
- Microsoft Excel Add-In
- PI BatchView for PI ProcessBook
- Programming Interfaces (Search and Results Controls and Customizing the Batch Group Symbol in PI ProcessBook)

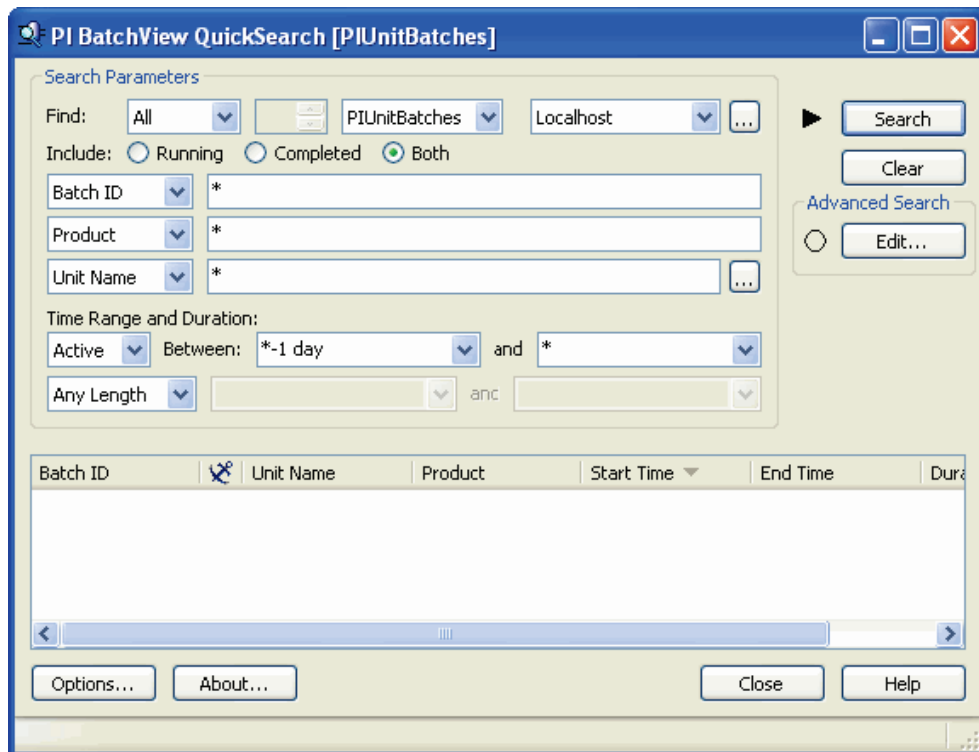
For information on setting search parameters and viewing results, features common to all of the PI BatchView tools, see *Common Features of PI BatchView Tools* (page 83).

Chapter 2

Use PI BatchView QuickSearch

The PI BatchView QuickSearch utility lets you run searches quickly and easily. You can search for batch items without having to create a PI ProcessBook BatchGroup or a Microsoft Excel Batch Query. PI BatchView QuickSearch contains a full set of searching tools, a basic display of search results and various options.

To start PI BatchView QuickSearch, choose from the Windows **Start** menu, **Programs > PI System > PI BatchView QuickSearch**. The following dialog box appears:




Search Parameters

In the **Search Parameters** area at the top of the dialog box, you specify parameters to constrain your search for batches. Click **Search** to run the search. The resulting batches appear in the Results Table in the bottom of the dialog box. For details, see *Common Features of PI BatchView Tools* (page 83).

To access additional search parameters, click **Edit** in the **Advanced Search** area. For details, see *Advanced Search* (page 8).

Set PI Server Connections

To add or edit a PI Server reference, click the ellipsis button  next to the Server drop-down list to open the **PI Connection Manager** dialog box. Any server you add is immediately available for searching.

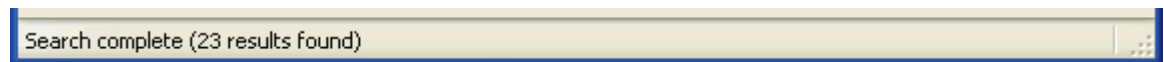
Results Table

The Results Table shows the batches resulting from a search. For details, see *Working with Results* (page 103).

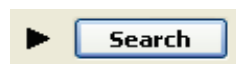
Search Button

The **Search** button performs a search. If any server specified in the search requires a username and password, a **PI Server Login** dialog box prompts you for your login information.

The search status appears in the status bar. When the search completes, the number of items found appears.



When PI BatchView QuickSearch opens or when the search criteria change, a triangle appears next to the **Search** button. Click **Search** to run the batch query and remove the triangle.



Clear Button

The **Clear** button clears all search parameters and returns them to their defaults. The defaults are those that return the maximum number of searches for the last day. The **Clear** button does not clear any result items from the Results Table.

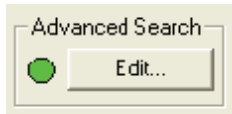
Advanced Search

You can construct more complex queries using the Advanced Search option. For example, you could set up a query to find all the PIUnitBatches that have a PISubBatch named "Heat" in which temperature exceeded 100 degrees Celsius for more than two minutes.

To open the **Advanced Search** dialog box, click **Edit...** in the **Advanced Search** area.

The search parameters that are common to the main search dialog box and the **Advanced Search** dialog box are kept synchronized. For example, the Unit Name field is updated in the Search Parameters if you edit it in the Advanced Search. Similarly, if you change this field in the **Search Parameters** area of the main search dialog box, this field is updated in the **Advanced Search** dialog box.

When you make any modifications to Advanced Search parameters that are not present in the Search Parameters, a green dot appears in the **Advanced Search** area:

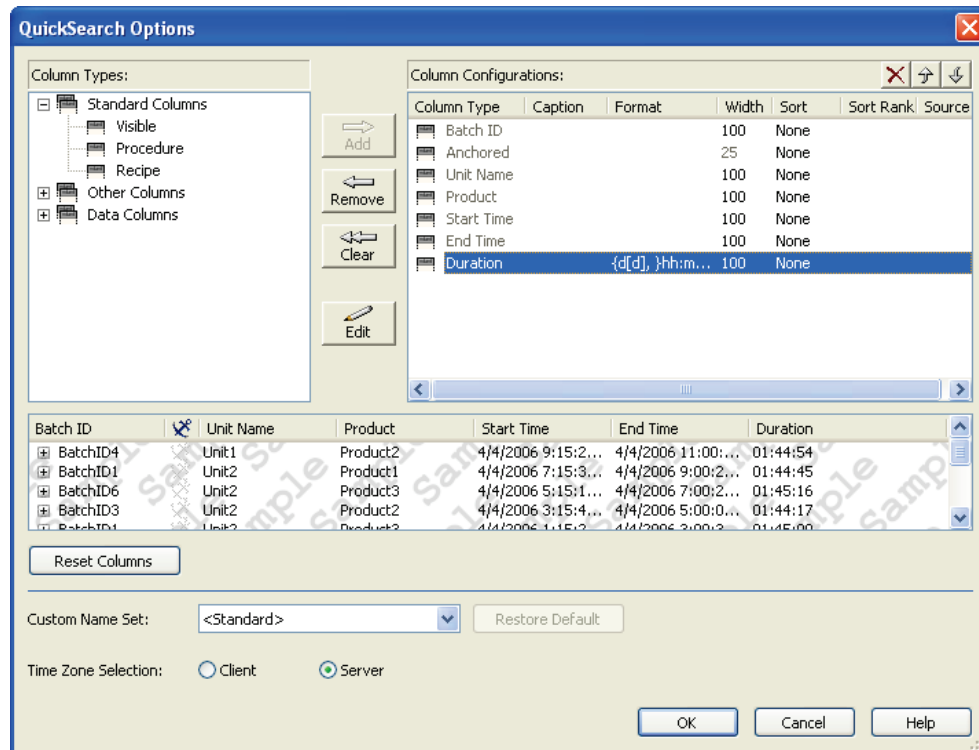


For details on Advanced Search parameters, see *Advanced Searches* (page 97).

When you define advanced search criteria, PI BatchView QuickSearch preserves the advanced state as much as possible. If the criteria are interpreted as not advanced, the advanced state is lost. For example, if the criteria defines a PIUnitBatch search with default criteria except for the PIBatch Recipe attribute containing a mask of RQ425*, the criteria are considered to be advanced. If you then change the Batch Type to PIBatches, the Recipe attribute mask is preserved and displayed in the Recipe attribute field. At this point the criteria are no longer in an advanced state because the PIUnitBatch criteria are at their default values.

QuickSearch Options Dialog Box

In the **QuickSearch Options** dialog box, you can configure the columns of the Results Table, select a Custom Names set, and select a time zone. To open the **QuickSearch Options** dialog box, click **Options** in the **PI BatchView QuickSearch** dialog box.



Use the top area of this dialog box to configure the Results Table columns. For details, see *Configuring Results* (page 110). A sample Results Table appears in the lower half of the dialog box. If the Results Table in the **PI BatchView QuickSearch** dialog box contains items when you open the **QuickSearch Options** dialog box, this sample Results Table contains the same items.

If you move columns in the Results Table and later want to restore the original column order, click **Reset Columns**.

To configure a Custom Names set for PI BatchView QuickSearch, select the desired Custom Names Set from a PI Server in the **Custom Name Set** drop-down list. To change back to the default Custom Names Set, click **Restore Default**. See *Using Custom Names* (page 121) for more details.

You can interpret and display times according to either the PI Server time zone or the client time zone. If both the server and the client are in the same time zone, this is not important. When you are looking at data from several servers in different time zones, however, you may want to define the time zone to display with your data. The **Time Zone Selection** determines what time zone QuickSearch uses. The client time zone is the time zone for the local computer. The server time zone is the time zone for the PI Server. This setting affects both how the TimeFrom and TimeTo are interpreted for the search criteria and how the Results Table displays batch times.

Click **OK** to return to the **PI BatchView QuickSearch** dialog box.

About Button

Click **About** to start the **About PI BatchView** dialog box, which shows version and build information, a list of PI BatchView files and their versions, a copyright notice, and a link to the OSIsoft support Web site. Click **Copy To Clipboard** to copy the title, version information, file list, and copyright notice to the clipboard.

If PI BatchView is a demo version, a timeout date also appears. The search functions correctly up to but not including the timeout day that appears.

Close Button

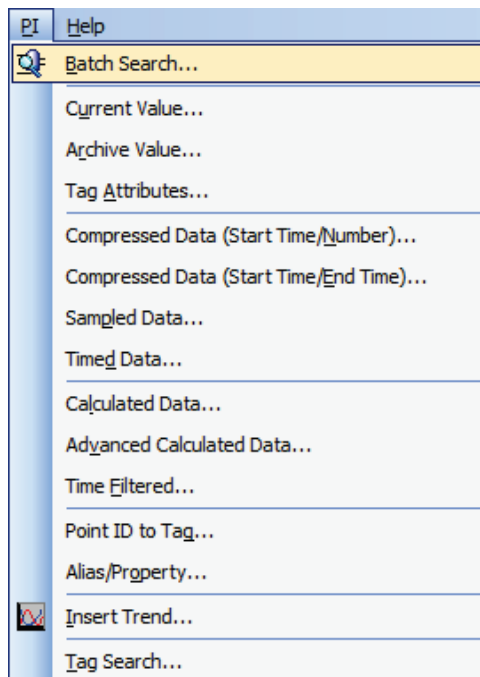
Click **Close** to shut down PI BatchView QuickSearch. When you close this application, it preserves the current search criteria. When you restart it, the same appearance, window size, and search parameters appear. The Results Table contains only those items that you previously anchored.

Chapter 3

View Batches in Microsoft Excel

The PI BatchView for Microsoft Excel add-in adds support for retrieving batch data from the PI Server.

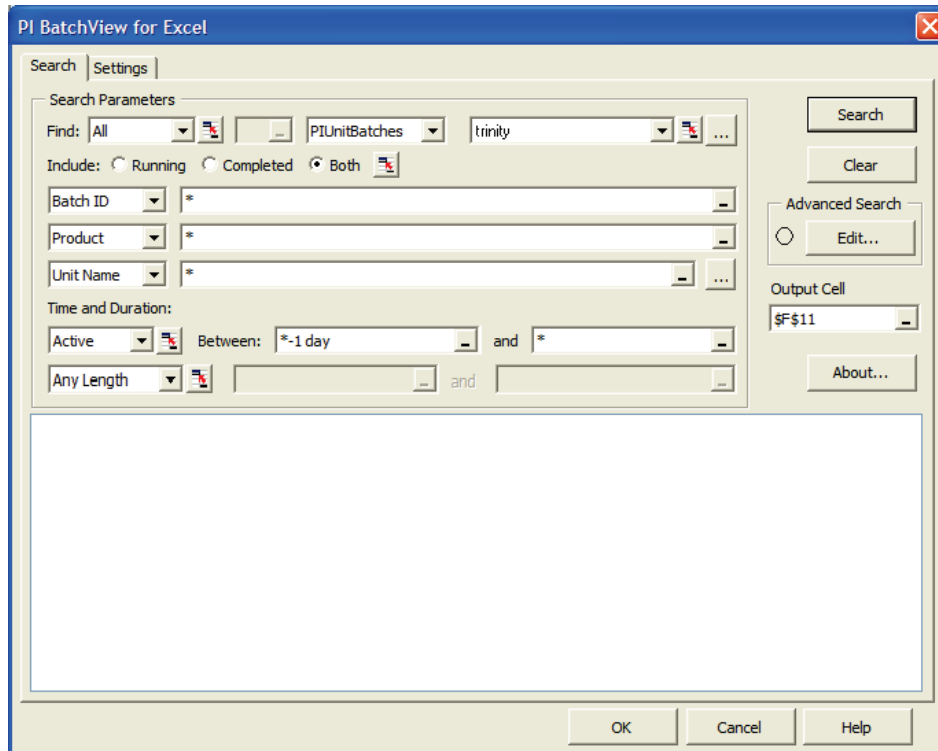
Once you install PI BatchView, a new menu item, **PI > Batch Search...**, is available in Microsoft Excel. This opens the **PI BatchView for Excel** dialog box.



You can view Batch-related functions using Microsoft Excel's **Insert Function** dialog box. For details, see Microsoft Excel Functions.

To perform a batch search, choose **PI > Batch Search...** The **PI BatchView for Excel** dialog box appears.

The batch search is similar to searching in PI ProcessBook or PI BatchView Quick Search, with a few differences.



Search Page

On the **Search** page, configure the batch search and click **Search** to run a search. For details on configuring search parameters, see *Setting Search Parameters* (page 85).

Click **OK** to insert a function that displays the search results in the Microsoft Excel spreadsheet starting at the output cell. The columns are sized so that the current results fit the cells.

To discard all changes to the search configuration, click **Cancel**. The search, including its results list if any, reverts to its previous configuration. Nothing appears in the spreadsheet.


To clear any input in the Search page or the **Advanced Search** dialog box, click **Clear**.

To specify more search criteria in the **Advanced Search** dialog box, click **Edit**. For details on configuring advanced searches, see *Advanced Searches* (page 97).



Cell References

Most search parameters properties accept cell references as well as a text string. When a cell reference is accepted, the input box looks like this:



Some search parameters are not specified in a text box, but are option buttons or drop-down lists. In these cases, to make a cell reference, click the toggle button  next to the box. When the toggle button is depressed, the text input box appears.

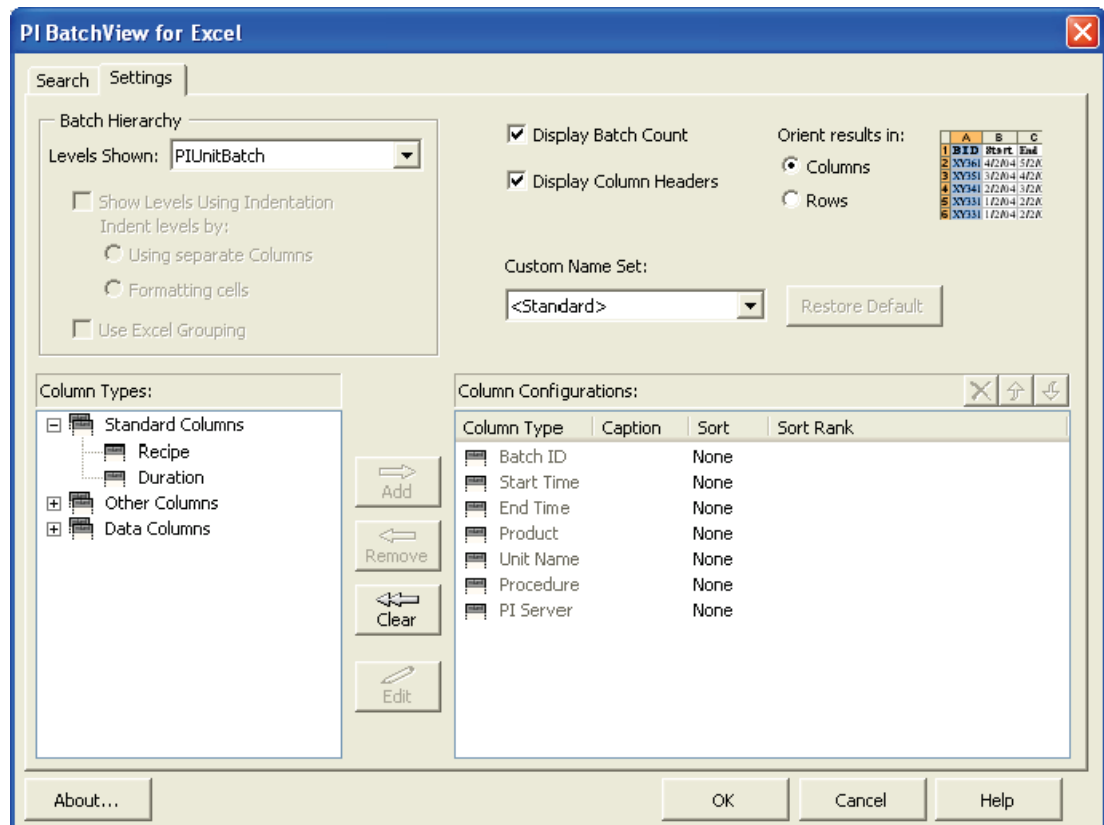
To enter a cell reference into an input box, do one of the following:

- Click in the box where you want to enter the cell reference, then click the cell you want in the spreadsheet. The reference for the cell you clicked appears in the input box.
- Enter a cell reference directly in the box.
- Click the cell reference button . The dialog box temporarily disappears. Click the cell you want to use, then click the cell select button . The reference for the cell you clicked appears in the input box.

Search type definitions—PIBatches and PIUnitBatches—do not accept cell references.

Settings Page

On the **Settings** Page, you choose what information to display in Microsoft Excel, and how to display it.



Batch Hierarchy

In the **Batch Hierarchy** area you can configure how to display the hierarchy of batches in Microsoft Excel. The first option is how many batch levels to retrieve. If you search for a PIBatch, you can retrieve just the PIBatch level, the PIBatch level and PIUnitBatch level, or up to three PISubBatch levels down from the PIUnitBatch. This also applies to a PIUnitBatch search. If you search for sub-levels, you can indent levels and use the Microsoft Excel grouping feature.

There are two ways to indent PISubBatch results. Select **Using separate Columns** to make each PIBatch, PIUnitBatch, and each level of PISubBatch appear in its own column. For example:

| | A | B | C | D |
|---|-------------------|------------|------------|------------|
| 1 | PIUnitBatch Count | 8 | | |
| 2 | Batch ID | PISubBatch | PISubBatch | Start Time |
| 3 | ABC9234 | | | 23-Nov-04 |
| 4 | | Phase1 | | 23-Nov-04 |
| 5 | | Phase2 | | 23-Nov-04 |

Select **Formatting cells** to make each PIBatch, PIUnitBatch, and each level of PISubBatch appear in the same column, indented by level. For example:

| | A | B | C |
|---|-------------------|--------------------|-----------|
| 1 | PIUnitBatch Count | 7 | |
| 2 | Batch ID | Start Time | End Time |
| 3 | ABC9234 | 23-Nov-04 15:57:10 | 23-Nov-04 |
| 4 | Phase1 | 23-Nov-04 15:57:10 | 23-Nov-04 |
| 5 | Phase2 | 23-Nov-04 15:58:10 | 23-Nov-04 |

The Microsoft Excel grouping feature allows you to expand a PIUnitBatch to see all of its PISubBatches, and expand a PISubBatch to see its PISubBatches. Using grouping without indentation looks like this:

| | A | B | C | D |
|----|-------------------|--------------------|--------------------|---------|
| 1 | PIUnitBatch Count | 7 | | |
| 2 | Batch ID | Start Time | End Time | Product |
| 3 | XYZ25 | 21-Nov-05 11:21:42 | 21-Nov-05 11:29:42 | Blue |
| 4 | ABC9234 | 21-Nov-05 11:21:42 | 21-Nov-05 11:27:42 | Yellow |
| 5 | Phase1 | 21-Nov-05 11:21:42 | 21-Nov-05 11:22:42 | Yellow |
| 6 | Phase2 | 21-Nov-05 11:22:42 | 21-Nov-05 11:23:42 | Yellow |
| 7 | Phase3 | 21-Nov-05 11:23:42 | 21-Nov-05 11:24:42 | Yellow |
| 8 | Phase4 | 21-Nov-05 11:24:42 | 21-Nov-05 11:25:42 | Yellow |
| 9 | Phase5 | 21-Nov-05 11:25:42 | 21-Nov-05 11:26:42 | Yellow |
| 10 | Phase6 | 21-Nov-05 11:26:42 | 21-Nov-05 11:27:42 | Yellow |
| 11 | XYZ25 | 21-Nov-05 11:16:12 | 21-Nov-05 11:20:42 | Orange |
| 12 | ABC1 | 21-Nov-05 11:14:42 | 21-Nov-05 11:20:42 | Blue |

Click the plus and minus symbols to expand and collapse the batch hierarchy.

Display Batch Count

When this box is selected, the top row displays the number of PIUnitBatches in a PIUnitBatch search, or the number of PIBatches in a PIBatch search.

Display Column Headers

If this box is selected, the headers for the displayed data appear.

Results Orientation

You can display results in rows or columns. If you select **Columns**, each column contains one piece of information about the batch (such as Batch ID, Start Time, End Time, and so on). The dialog box shows a preview of the selected result orientation next to the options.

Custom Names Set

Custom Names sets in PI ProcessBook are defined at the Batch Group level. This way, each Batch Group can have a different Custom Names set than another, even in the same display.

To configure a Custom Names set for a Batch Group, select a Custom Names Set from a PI Server in the **Custom Names Set** drop-down list. To revert to the default Custom Names set, click **Restore Default**. For details, see *Using Custom Names* (page 121).

Once you select a set in the Batch Definition dialog box and click **OK**, the Batch Group in the display updates.

Column Configuration

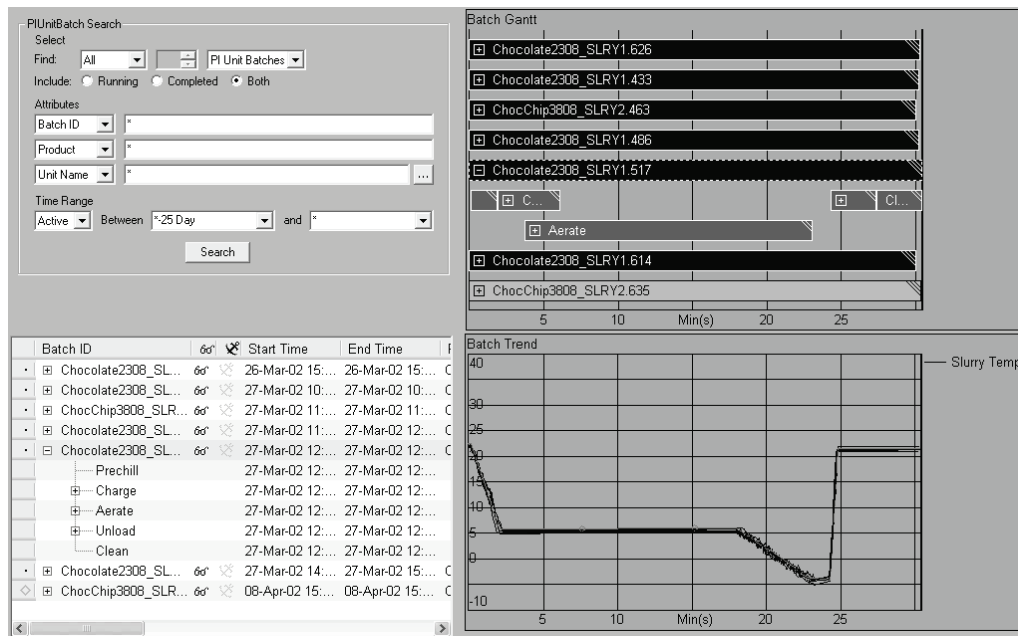
In the **Column Configuration** area, you can configure the columns to display as well as the sort order and sort direction. For details, see *Configuring Results* (page 110).

Chapter 4

View Batches in PI ProcessBook

PI BatchView's tools for PI ProcessBook display historical and live batch information in PI ProcessBook. You can monitor running batches against completed batches, compare process variables across batches, and perform cycle-time analysis.

PI BatchView for PI ProcessBook includes the Batch Search, Results Table, Gantt Chart, and Batch Trend symbols. These symbols exist within an invisible PI ProcessBook symbol called a Batch Group.



The Batch Group symbol provides the infrastructure for the Batch symbols to share data and coordinate their behavior. All of the symbols coordinated by the Batch Group symbol show the same batch results. For example, they would include the same list of PIUnitBatches. A display can have multiple Batch Groups.

You can select one or more of the symbols to show within each Batch Group. For example, you may want to see the Batch Search and Results Table symbols, or only the Batch Trend. Or, using aliases, you can compare the same tag in different sub-batches.

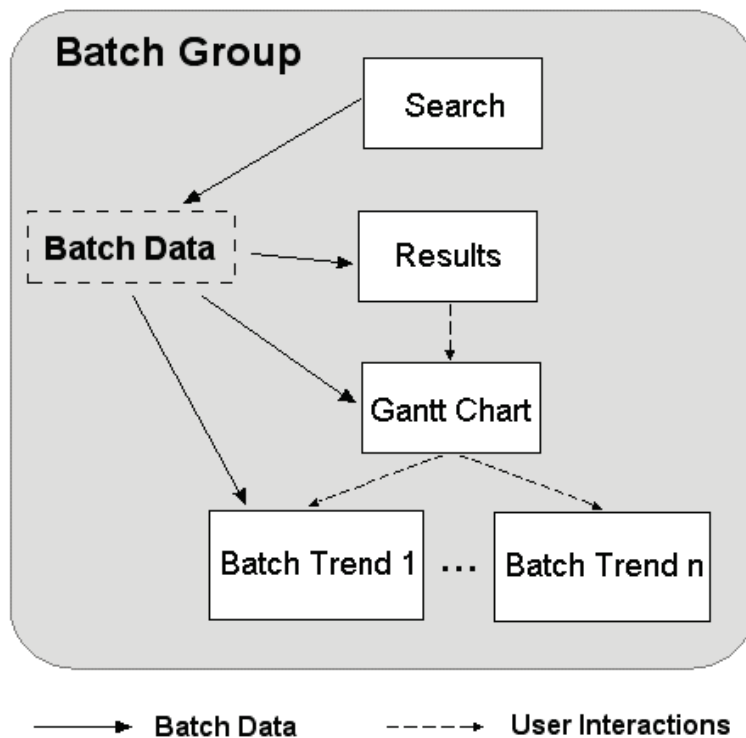
You can link multiple Batch Trends to the Batch Group to show aliases in separate trends.

Batch Group Architecture

Batches resulting from a search are stored in the Batch Group symbol. These batches are provided to the Results Table, Gantt Chart, and Batch Trend. Whenever a new search is run or the results update in real time, the Batch Group's list of batches updates and the other symbols shown with this Batch Group also update with the new batch list.


The following figure shows how batch information is shared among the PI BatchView components within a Batch Group. User interactions on one symbol can affect the information in another symbol. Changes to the Results Table affect the Gantt Chart and changes to the Gantt Chart affect the Batch Trends.

For example, any sorting done in the Results symbol affects the order of the batches in the Gantt Chart. Any aligning of batches in the Gantt Chart affects the alignment of the traces in the Batch Trends.




Create and Edit a Batch Group

To create a new Batch Group symbol on a PI ProcessBook display:

1. In a PI ProcessBook display window, click the **Batch Group** button , or choose **Draw > Batch Group**.
2. Drag the pointer in the display window to produce a rectangle. Your Batch symbols will appear in this rectangle.

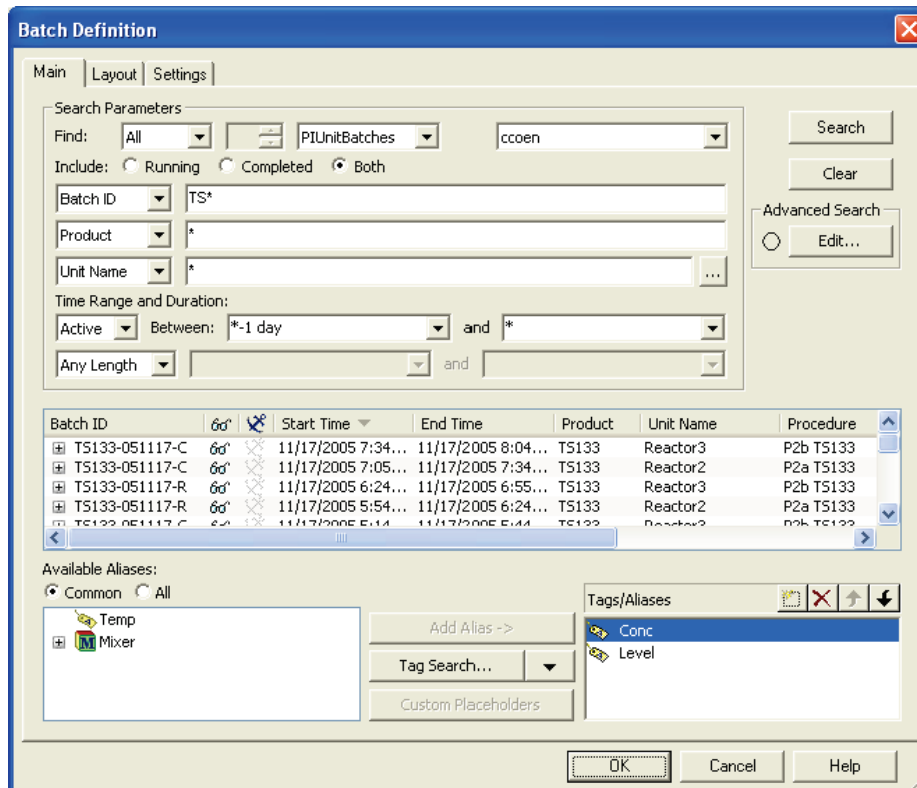
3. In the **Batch Definition** dialog box that appears, perform a search, and configure the layout and settings as described in *Batch Definition Dialog Box* (page 21).
4. Click **OK** to display the Batch Group symbol in your PI ProcessBook display.

To edit an existing display in PI ProcessBook:

1. Click the **Build mode** button .
2. Double-click one of the symbols in the Batch Group you want to edit.
3. In the **Batch Definition** dialog box that appears, perform a search, and configure the layout and settings as described in *Batch Definition Dialog Box* (page 21).
4. Click **OK** to update the Batch Group symbol in your PI ProcessBook display.

Batch Definition Dialog Box

The **Batch Definition** dialog box appears when you create or edit a Batch Group symbol. In this dialog box you can choose the batch data you want to view along with the aliases, tags, or data sets for the data associated with the batches. Also, you can choose which symbols appear in your display and configure those symbols using each symbol's definition dialog box.



Batch Definition Dialog Box, Main Tab

Search Parameters

To show batches in a PI ProcessBook display, you must first run a search for batches (a batch query). The Main tab presents the most commonly used search parameters for a batch search. This dialog box includes the Selection, Servers, Attributes, Time Range, and Duration components. For details on these search components, see *Setting Search Parameters* (page 85).

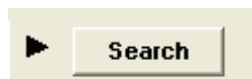
Changes you make to the search parameters in the **Batch Definition** dialog box affect the display. These changes are also saved with the display.

Note: Any changes you make to the search parameters in Run mode within the PI ProcessBook Display are not saved with the display. To make permanent changes to the search parameters in the display in Run mode, you must modify the search parameters using the **Batch Definition** dialog box.

Search Button

The **Search** button runs a batch query based on the search parameters specified. The results appear in the Results Table in the middle of the dialog box.

When you change a search parameter, a triangle appears next to the **Search** button indicating that the search parameters have changed and no longer correspond to the results in the Results Table. Click **Search** to run the Batch Query and remove the triangle.



The **Clear** button clears all search parameters and returns them to their defaults. The defaults are those that return the maximum number of searches for the last day. The **Clear** button does not clear any result items from the Results Table.

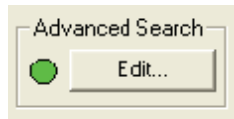
Advanced Search

You can construct more complex queries using the Advanced Search option. For example, you could set up a query to find all the PIUnitBatches that have a PISubBatch named "Heat" in which temperature exceeded 100 degrees Celsius for more than two minutes.

To open the **Advanced Search** dialog box, click **Edit...** in the **Advanced Search** area.

The search parameters that are common to the main search dialog box and the **Advanced Search** dialog box are kept synchronized. For example, the Unit Name field is updated in the Search Parameters if you edit it in the Advanced Search. Similarly, if you change this field in the **Search Parameters** area of the main search dialog box, this field is updated in the **Advanced Search** dialog box.

When you make any modifications to Advanced Search parameters that are not present in the Search Parameters, a green dot appears in the **Advanced Search** area:




For details on Advanced Search parameters, see *Advanced Searches* (page 97).

View Search Results in the Results Table

In the Main tab of the **Batch Definition** dialog box, the results from the Batch Search are posted in the Results Table. This Results Table behaves the same way as the Results Table in a PI ProcessBook display.

For details on the Results Table, see *Working with Results* (page 103).

When you click **Search**, PI BatchView removes all the items from the previous search, except anchored items, before displaying the results of the current search. To prevent a batch from being removed, click the item's anchor icon . For details on anchors, see *Status Columns* (page 106).

Note: Any changes you make to the Results within the PI ProcessBook Display in Run mode are not saved with the display. To permanently change the Display's Results Table, use the *Configure Results Dialog Box* (page 29).

Available Aliases

The Available Aliases list provides a list of PIAliases. To plot a trace of an alias in a trend, drag the alias from this list and drop it in the Tags/Aliases list, double click the alias, or select the alias and click **Add Alias**. To move all the aliases in a sub-module at once, select the sub-module and click **Add Alias** or drag the sub-module to the Tags/Aliases list.

The **Available Aliases** list modes are:

- **Common:** Lists PIAliases that are common to all of the PIUnits involved in the batches in the Results Table. This is the intersection set of all the PIUnits' PIAliases.
- **All:** Lists all of the PIAliases in the PIUnits involved in the batches in the Results Table. This is the union set of all the PIUnits' PIAliases.

If the Results Table contains PIUnitBatches, it uses each PIUnitBatch's PIUnit to find the PIAliases. If the Results Table contains PIBatches, then it uses the PIUnit of each PIUnitBatch of each PIBatch to find the PIAliases. This list updates each time the Results Table in the Batch Definition dialog box updates.





PIAliases in sub-modules of the PIUnit also appear in this list. They appear as modules with child PIAliases.

This list is empty when the Results Table is empty or, in the Common Aliases mode, when there are no common PIAliases among all the PIUnits involved in the batches.

Tags/Aliases

Tags, aliases, and data sets listed here are plotted as traces in the Batch Trend symbol(s).

The item types in this list are:

| Icon | Description |
|---|---------------|
|  | PIAlias |
|  | PIPoint (tag) |
| DS | Data set |
|  | Limit set |
|  | Unknown |

When an alias belongs to a sub-module of a unit, it appears with the sub-modules separated by the pipe character (|). For example, the alias Impeller Speed in a Sensor sub-module within the Mixer sub-module of the unit appears as:

Mixer\Sensors|Impeller Speed

To add a tag to this list, enter the tag name or click **Tag Search...** to find the tag.

You can add an absolute or relative reference to a tag. An absolute reference to a tag contains a reference to the PI Server (for example, \\myserver\sinusoid) and shows the tag's value for each PIUnitBatch displayed. If the tag is renamed on the server, the tag reference in the Batch Group automatically retrieves the same tag. A relative tag reference does not contain any reference to the PI Server (for example, sinusoid). In this case, the PI Server from each PIUnitBatch determines which tag to retrieve data from. If this tag is renamed on the server, you must redefine the tag reference in the Batch Group.

To move an alias from the **Available Aliases** list to the **Tags/Aliases** list, do one of the following:

- Drag the alias to the **Tags/Aliases** list.
- Select the alias and click **Add Alias**.
- Double-click the alias.


To move all the aliases in a sub-module at once, do one of the following:

- Select the sub-module and click **Add Alias**.
- Drag the sub-module to the **Tags/Aliases** list.

To add a data set, click  and choose **ODBC...**, then select from the existing data sets or configure a new one. Click **Custom Placeholders** to configure placeholders within a data set.

To add a limit set, click  and choose **Limit Set...**, then select from the existing limit sets or configure a new one. For more details, see *Limit Sets* (page 53).

To remove an item from the **Tags/Aliases** list, select the item to remove, then do one of the following:

- Press **Delete** on the keyboard.
- Click the Delete button .

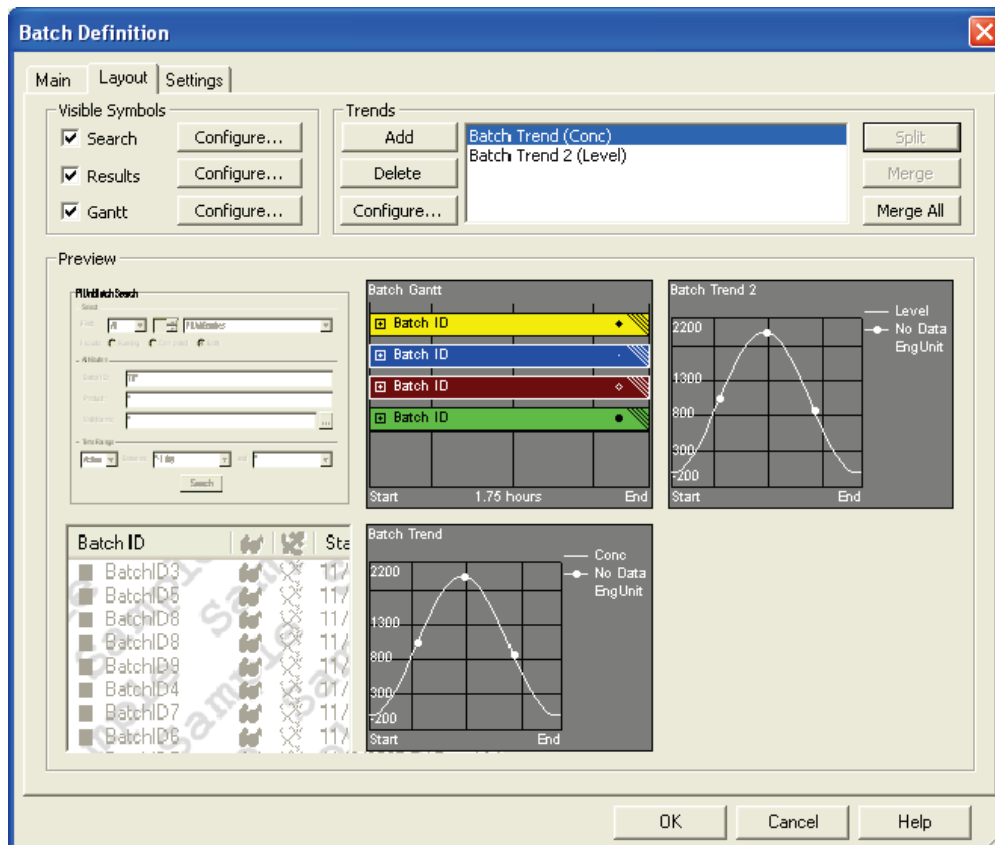
- If it is an alias, drag it back to the **Available Aliases** list.

If you have more than one Batch Trend in a Batch Group and you add another alias to the list, that alias is added to the first Batch Trend. You can move data sources among trends on the Layout tab of the Batch Definition dialog box.

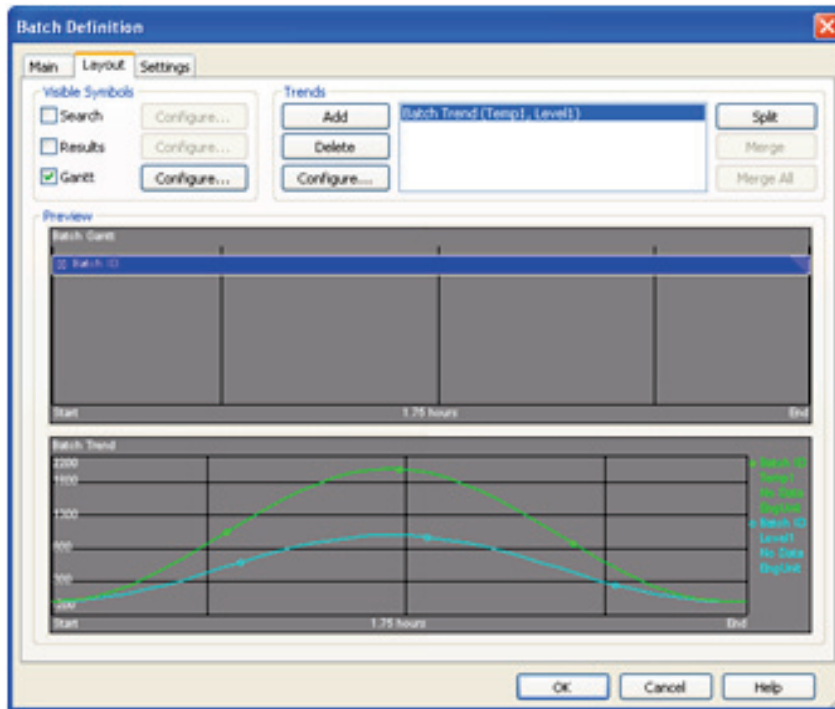
Batch Definition Dialog Box, Layout Tab

The **Layout** tab of the **Batch Definition** dialog box provides options to show or hide symbols, and change the settings for individual symbols within the Batch Group.

Layout Tab - Classic Color



Layout Tab - Tag/Alias



Visible Symbols

The check boxes indicate whether a symbol will appear within the Batch Group. You can view any combination of the four symbols. The **Preview** area reflects these settings.

To configure the Search, Results, and Gantt symbols, click the **Configure** button for the desired symbol, or click the symbol in the **Preview** area.

By default, the layout includes a Gantt chart and a single Trend. You can add, remove, configure, split, and merge Batch Trends in the **Trends** area of the dialog box.

To change which symbols appear by default in new Batch Groups, in PI ProcessBook choose **Tools > Preferences > PI Batch View**, and make changes as desired in the dialog box.

Trends

The Trend symbol shows each Batch Trend's title, and the aliases, tags, and data sets plotted. The **Trends** area includes these buttons:

- **Add:** Add a new Batch Trend to the Batch Group. Click **Configure...** to select the data to plot.
- **Delete:** Delete the selected Batch Trend from the Batch Group.
- **Configure:** Open the *Configure Trend dialog box* (page 32) for the selected Batch Trend.

- **Split:** Split the data sources of the selected Batch Trend into individual Batch Trends each displaying one data source. This button is available only when tags or aliases are selected.
- **Merge:** Merge the selected Batch Trends into one Batch Trend that displays the all the data sources of the selected Batch Trends. This button is available only when multiple trends are selected.
- **Merge All:** Consolidate all data sources on existing Batch Trends in the Batch Group into a single Batch Trend showing all the data sources. For example, if there are four trends, each showing a single alias, and one trend showing two data sets, clicking **Merge All** moves all four aliases and two data sets into a single trend, removing the other unused trends. This button is available only when multiple trends are selected.

Preview

The **Preview** area shows which symbols are visible and how the symbols are configured. The symbols positions in the preview do not precisely match their positions within the display. The preview does not include actual PI Server data.

Click a symbol in the Preview to open the Configuration dialog box for that symbol.

Configure Search Dialog Box

The **Configure Search** dialog box configures the Search symbol that appears in the display. To open this dialog box, click the **Layout** tab in the **Batch Definition** dialog box. Then click **Configure** next to the **Search** check box.

In the **Search Components on Display** area, you select which portions of the search are visible in the display. The defaults are **Batch ID**, **Product**, and **Unit Name**. The attributes are those available in the drop-down lists on the **Main** tab of the **Batch Definition** dialog box.

The lower area is a preview of how the Search symbol appears in the display.

Configure Search

Search Components on Display

Select Batch ID Time Range
 PI Servers Product Duration
 Unit Name Filter

PIUnitBatch Search

Select
Find: All PIUnitBatches

Include: Running Completed Both

Attributes
Batch ID: *
Product: *
Unit Name: *

Time Range
Active Between: *-1 day and *

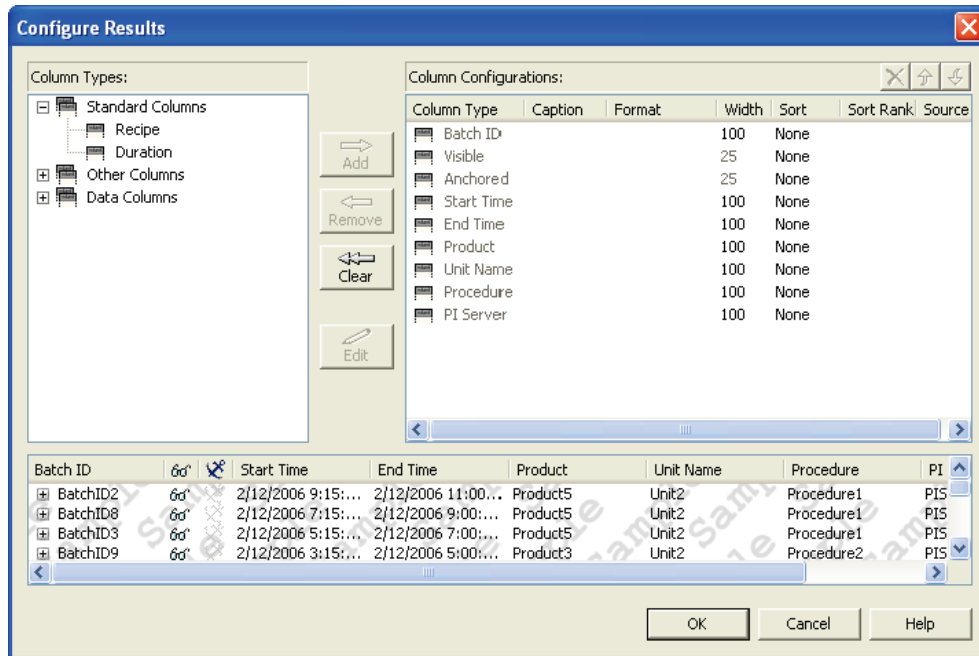
Duration
Any Length and

Filter
For Period: and

Configure Results Dialog Box

The **Configure Results** dialog box configures the Results Table of the Batch Group in the display. Here you define which columns appear in the Results Table and set their properties. Settings include which columns appear, the column order, column width, and table sorting.

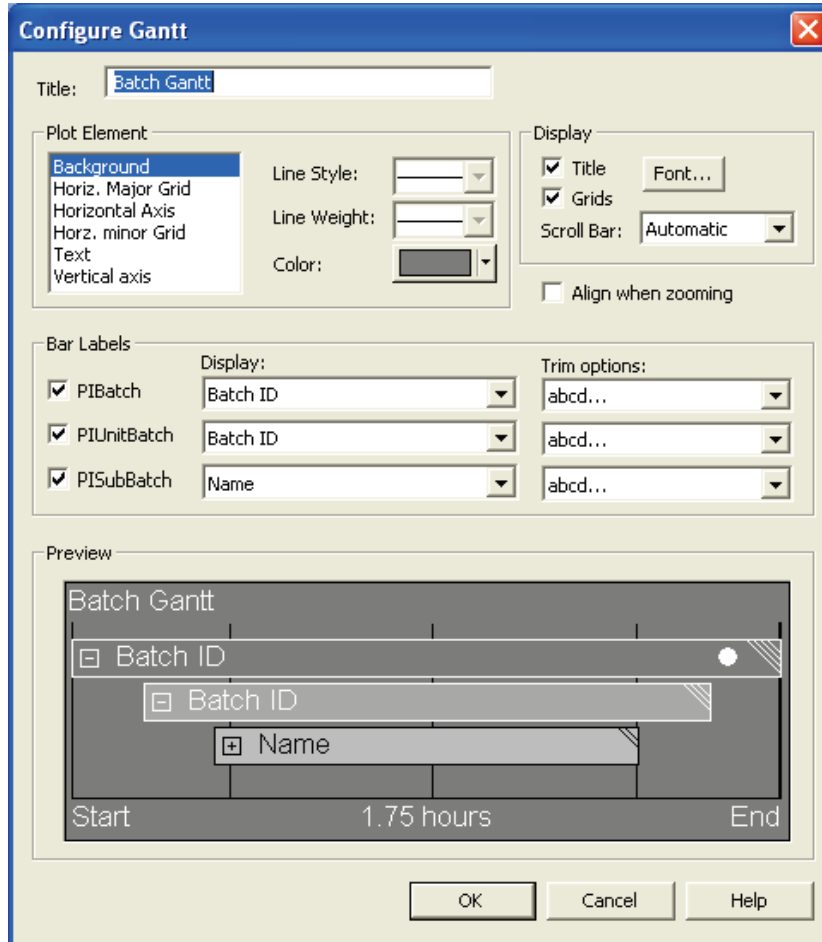
To open this dialog box, click the **Layout** tab in the **Batch Definition** dialog box, then click **Configure** next to the **Results** check box.



For details on using this dialog box, see *Configuring Results* (page 110).

Configure Gantt Dialog Box

The **Configure Gantt** dialog box configures the Gantt Chart of the Batch Group. To open this dialog box, click the **Layout** tab in the **Batch Definition** dialog box, then click **Configure** next to the **Gantt** check box.



Title

The **Title** box sets the title that appears in the upper-left corner of the Gantt Chart.

Plot Element

Set the **Background**, **Line Style**, **Line Weight**, and **Color** of elements such as gridlines and text of the Batch Trend.

Click to select an element in the **Plot Elements** list and then use the drop-down lists to adjust its setting.

Display

Use the **Title** and **Grids** check boxes to show or hide the Gantt chart's title and grid lines.

Click **Font...** to set the font for all text on the Gantt chart including the Gantt bar labels. The font size affects the Gantt bar size and thus how many fit in one screen.

The **Scroll Bar** drop-down list affects the behavior when the number of Gantt bars exceeds the available space. The options are:

- **Automatic:** The scroll bar appears when necessary.
- **Off:** The scroll bar never appears.
- **On:** The scroll bar always appears.

Align when Zooming

By default, when you zoom on the Gantt Chart in relative time mode, you select like items from other batches and zoom to those items. If you want to align these items you can do so after you zoom or, when **Align when Zooming** is checked, the resulting items from a zoom align to their start times.

This option only affects a Gantt Chart shown in relative time mode. This option is ignored in absolute time mode. This option also affects the behavior of the **Align and Zoom** dialog box.

Bar Labels

Use the **Bar Labels** area to display and hide bar labels, and control what information to display. The options are:

| Bar Label | Options | Notes |
|------------------|---|---|
| PIBatch | Batch ID Batch ID - Product Product Recipe | |
| PIUnitBatch | Batch ID Batch ID - Product Batch ID - Unit Name Procedure Product Product - Unit Name Unit Name with Unit Heading Unit Name | The Unit Name with Unit Heading option shows the PIUnit's PIHeading where the PIUnitBatch ran. |
| PISubBatch | Name Name - PIUnitBatch Batch ID Name - PIUnitBatch Product Name - PIUnitBatch Unit Name Name with Heading | The Name with Heading option shows the PISubBatch's PI Heading. |

Use the **Trim options** to shorten a label if it does not fit in the bars displayed. You can trim the label's end (**abcd...**), middle (**abc...xyz**) or beginning (**...wxyz**).

Preview

The Gantt chart in the **Preview** area shows an approximated preview based on the dialog box settings.

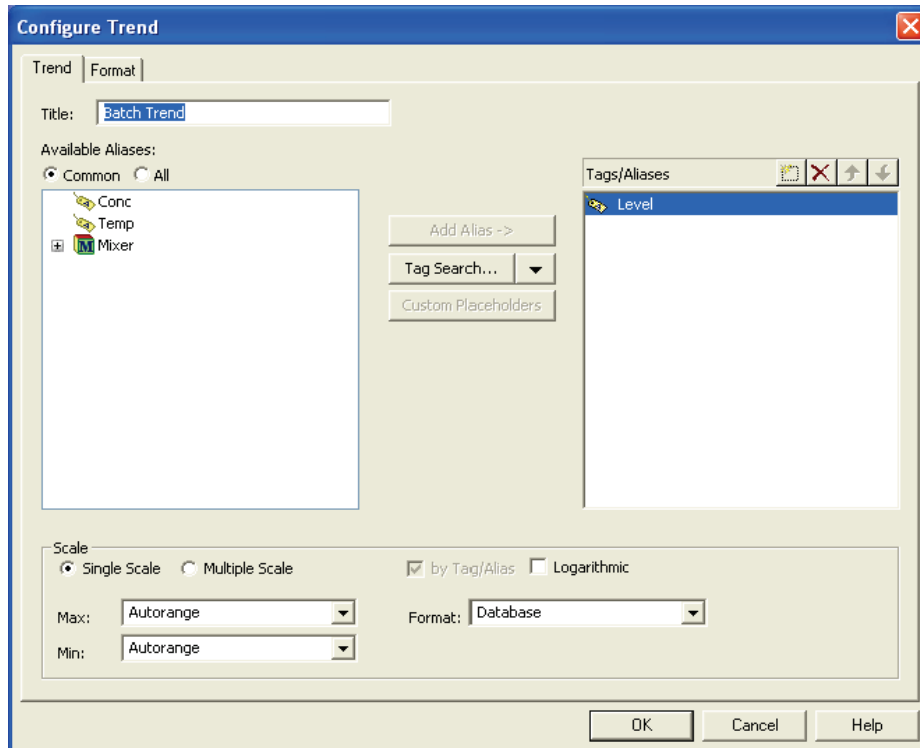
There is no marker visible on th Gantt bar for the Tag/Alias color scheme.

Configure Trend Dialog Box

You configure each Batch Trend in the Batch Group independently using the **Configure Trend** dialog box. This dialog box has a Trend tab and a Format tab.

To open this dialog box, click the **Layout** tab in the **Batch Definition** dialog box. Then select the trend you want to configure and click **Configure** in the **Trends** area.

Trend Tab



TITLE

The **Title** box sets the title that appears in the upper-left corner of the Batch Trend.

AVAILABLE ALIASES

The Available Aliases list provides a list of PIAliases. To plot a trace of an alias in a trend, drag the alias from this list and drop it in the Tags/Aliases list, double click the alias, or select the alias and click **Add Alias**. To move all the aliases in a sub-module at once, select the sub-module and click **Add Alias** or drag the sub-module to the Tags/Aliases list.

The **Available Aliases** list modes are:

- **Common**: Lists PIAliases that are common to all of the PIUnits involved in the batches in the Results Table. This is the intersection set of all the PIUnits' PIAliases.
- **All**: Lists all of the PIAliases in the PIUnits involved in the batches in the Results Table. This is the union set of all the PIUnits' PIAliases.

If the Results Table contains PIUnitBatches, it uses each PIUnitBatch's PIUnit to find the PIAliases. If the Results Table contains PIBatches, then it uses the PIUnit of each PIUnitBatch of each PIBatch to find the PIAliases. This list updates each time the Results Table in the Batch Definition dialog box updates.





PIAliases in sub-modules of the PIUnit also appear in this list. They appear as modules with child PIAliases.

This list is empty when the Results Table is empty or, in the Common Aliases mode, when there are no common PIAliases among all the PIUnits involved in the batches.

TAGS/ALIASES

Tags, aliases, and data sets listed here are plotted as traces in the Batch Trend symbol(s).

The item types in this list are:

| Icon | Description |
|---|---------------|
|  | PIAlias |
|  | PIPoint (tag) |
| DS | Data set |
|  | Limit set |
|  | Unknown |

When an alias belongs to a sub-module of a unit, it appears with the sub-modules separated by the pipe character (|). For example, the alias Impeller Speed in a Sensor sub-module within the Mixer sub-module of the unit appears as:

Mixer\Sensors|Impeller Speed

To add a tag to this list, enter the tag name or click **Tag Search...** to find the tag.

You can add an absolute or relative reference to a tag. An absolute reference to a tag contains a reference to the PI Server (for example, \\myserver\sinusoid) and shows the tag's value for each PIUnitBatch displayed. If the tag is renamed on the server, the tag reference in the Batch Group automatically retrieves the same tag. A relative tag reference does not contain any reference to the PI Server (for example, sinusoid). In this case, the PI Server from each PIUnitBatch determines which tag to retrieve data from. If this tag is renamed on the server, you must redefine the tag reference in the Batch Group.

To move an alias from the **Available Aliases** list to the **Tags/Aliases** list, do one of the following:

- Drag the alias to the **Tags/Aliases** list.
- Select the alias and click **Add Alias**.
- Double-click the alias.


To move all the aliases in a sub-module at once, do one of the following:

- Select the sub-module and click **Add Alias**.
- Drag the sub-module to the **Tags/Aliases** list.

To add a data set, click  and choose **ODBC...**, then select from the existing data sets or configure a new one. Click **Custom Placeholders** to configure placeholders within a data set.

To add a limit set, click  and choose **Limit Set...**, then select from the existing limit sets or configure a new one. For more details, see *Limit Sets* (page 53).

To remove an item from the **Tags/Aliases** list, select the item to remove, then do one of the following:

- Press **Delete** on the keyboard.
- Click the Delete button .
- If it is an alias, drag it back to the **Available Aliases** list.

If you have more than one Batch Trend in a Batch Group and you add another alias to the list, that alias is added to the first Batch Trend. You can move data sources among trends on the Layout tab of the Batch Definition dialog box.

SCALE

The **Scale** area of this dialog box is nearly identical to the **Scale** area of PI ProcessBook's **Define Trend** dialog box. The only difference is that the Batch Trend has a **by Tag/Alias** check box.

You can set the Batch Trend's vertical axis to **Single Scale** or **Multiple Scale**. Single Scale sets the scale of the vertical axis to accommodate all of the data into one scale. The Multiple Scale's behavior setting depends on whether **by Tag/Alias** is checked:

- When **by Tag/Alias** is checked (the default), each tag, alias, or data set in the Batch Trend has a separate scale. For example, if two batches are retrieved and two aliases are plotted on this trend, there are two vertical scales, one for each alias.
- When **by Tag/Alias** is not checked, each trace in the Batch Trend has a separate scale. For example, if two batches are retrieved and two aliases are plotted on this trend, there are four vertical scales, one for each trace appearing on the trend.

Scales can be either linear or logarithmic. In **Single Scale** mode, the setting applies to all data in the trend. In **Multiple Scale** mode, you can individually choose whether each scale is linear or logarithmic. The logarithmic setting is not available for digital tags.

Note: If you select **Multiple Scales**, you can use logarithmic and non-logarithmic scales for traces in the same trend. In this case, the minor gridlines associated with a logarithmic plot may confuse the plot. To turn off the minor gridlines: in the **Configure Trend** dialog box click the **Format Tab**, then in the **Plot Element** area choose **Vert. minor Grid**.

Use the **Max** and **Min** boxes to specify minimum and maximum vertical values for the plot. If **Max** is less than **Min**, the vertical scale flips, counting from top to bottom. You can either choose these from a list or enter the value manually. The settings are:

| Setting | Min | Max |
|---------------------------------------|--|---|
| Autorange (default setting) | The trend appears with the vertical scale starting at the closest available major axis. If the minimum is Autorange and the maximum is not, the scale starts at the lowest data value in the trace (not on a major axis) and ends on the closest major axis. | The trend appears with the vertical scale ending at the closest available major axis. If the maximum is Autorange and the minimum is not, the plot starts on the minimum value and ends on the largest trace value (neither min nor max are on a major axis). |
| Database | The tag's Zero attribute specifies the minimum plot value. If the Zero value is less than or equal to 0, the minimum is re-interpreted as Autorange. | The tag's Zero + Span attributes specify the maximum plot value. If the Zero + Span is less than or equal to 0, the maximum is replaced with Autorange. |
| Manual entry | The value you enter sets the first value on the vertical axis. Values less than or equal to 0 are not accepted. | The value you enter sets the vertical scale maximum. Values less than or equal to 0 are not accepted. |

The **Format** setting specifies how the vertical scale appears. You can choose a setting from the drop-down list or manually enter settings. Formatting options are:

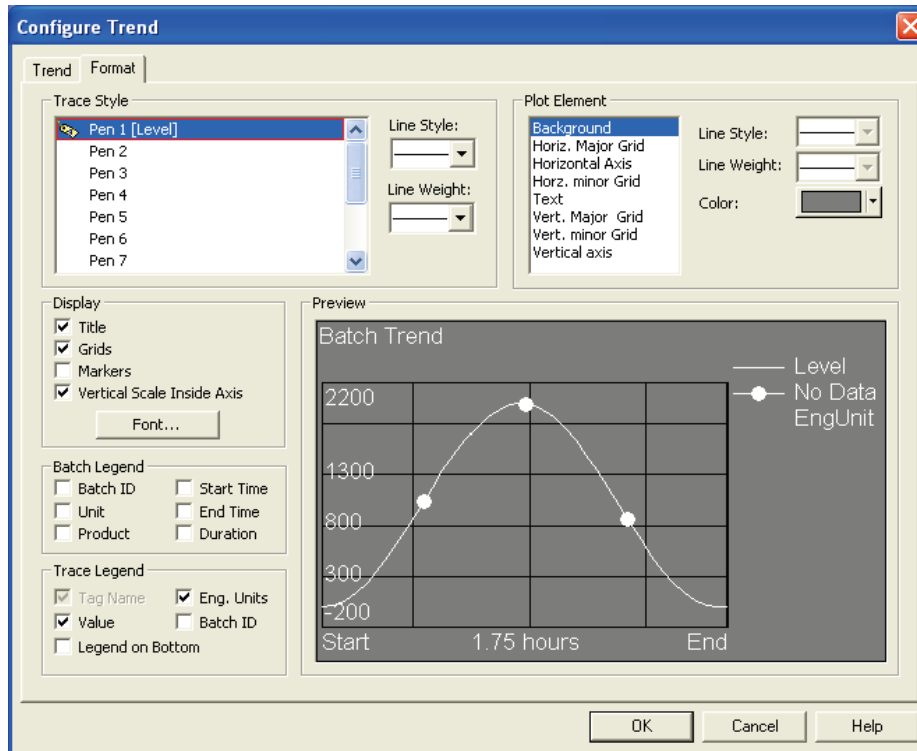
| Format | Example output for the value -1502.637 |
|------------|--|
| #,##0 | -1503 |
| #,##0.00 | -1,502.64 |
| (#,##0) | (1,503) |
| (#,##0.00) | (1,502.64) |
| 0 | -1503 |
| 0% | -150264% |
| 0.00 | -1502.64 |
| 0.00% | -150263.70% |

| Format | Description |
|-------------------|---|
| Database | Reads the tag's digits attribute and displays the vertical axis values in standard format. If the length of the number exceeds the digits value, scientific notation is used. |
| General | The number appears with standard formatting, except for numbers with more than 15 digits. In this case, scientific notation is used. The program logic uses 1.0e+15 and 1.0e-15 as the maximum and minimum for standard formatting. |
| Scientific | Scientific notation is used for all values. There is no change to the scientific format used for trends. It appears in the format: 0.00E+00. |
| Manual entry | You can manually enter a value format, such as 0.0000% |

Format Tab for Batch Color Schemes

The appearance of this tab depends on whether you select a **Batch color scheme** (page 46) or the **Tag/Alias color scheme** (page 48).

This is the **Format** tab for a batch color scheme.



TRACE STYLE FOR BATCH COLOR SCHEMES

Set **Line Style** and **Line Weight** for the trace of each of the aliases, tags, and data sets on the Batch Trend.

The solid line style can use heavier line weights. Dashed lines have the standard line weight only.

The trace appears in the color of the text in the preview, but it is the color of the batch on the display.

The Batch color schemes typically have different line styles for each alias. The Tag/Alias color scheme typically has solid line styles and different colors for each alias. The pen line style and line weight do not change when you switch between the color schemes on the **Settings** tab. You must use this **Trace Style** setting to select a different pen style and weight.

PLOT ELEMENT

Set the **Background**, **Line Style**, **Line Weight**, and **Color** of elements such as gridlines and text of the Batch Trend.

Click to select an element in the **Plot Elements** list and then use the drop-down lists to adjust its setting.

DISPLAY

Select which elements to display on the Batch Trend.

You can show or hide the **Title**, **Grids**, and **Markers**. When **Markers** is checked, each value that is plotted in the trend has a marker. When **Markers** is not checked, three markers are placed on the trend.

Vertical Scale Inside Axis determines whether the numbers for the vertical axis scale are inside or outside the vertical axis.

Click **Font** to set the font for the Batch Trend. This font setting applies to all text on the Batch Trend.

BATCH LEGEND

Set the attributes to display for each PIUnitBatch in the Batch Trend. The available attributes are: **Batch ID**, **Unit**, **Product**, **Start Time**, **End Time**, and **Duration**. The Batch Legend appears at the bottom of the Batch Trend.

The Batch Legend information does not appear by default. You must select the elements that you want to display.

You can see the same information that is in the batch legend in a more interactive way in the *Results Table* (page 103).

This Batch legend lists the Tag/Alias names, in the color assigned to the batch.

TRACE LEGEND - BATCH COLOR SCHEMES

The Trace Legend displays information about each trace in the Batch Trend. The options are:

- **Tag Name:** When checked, the name of the alias, tag, or data set appears as specified in the *Tags/Aliases* (page 24) list. The trace's line style appears next to the **Tag Name** on the Trace Legend.
- **Value:** When checked, the values of all the running batches for each tag, alias and data set appear in the legend. The value shown is for the current time.
- **Eng. Units:** When checked, the engineering units—which come from the tag attribute **EngUnits** defined on the PI Server—appear for each tag and alias.
- **Batch ID:** When checked, the Batch ID appears for the running batches only.
- **Legend on Bottom:** When checked, the Trace Legend appears below the trend area. When unchecked, the Trace Legend appears in the upper right corner of the Batch Trend.

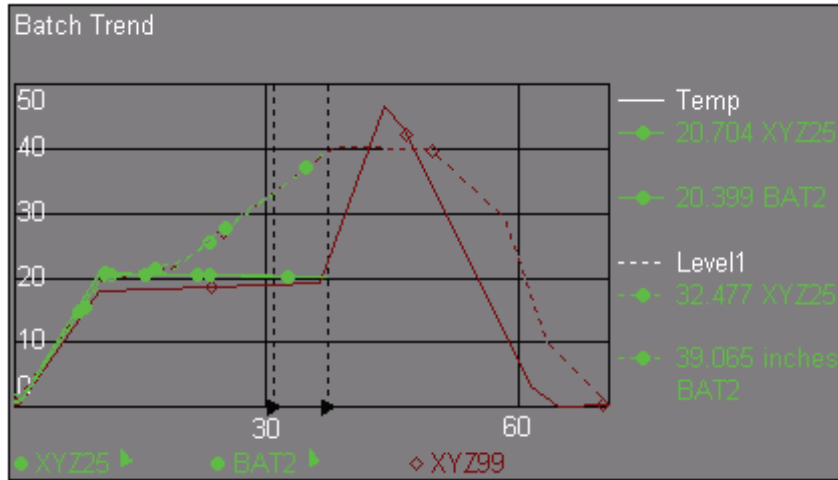
If **Value**, **Eng. Units**, or **Batch ID** is checked, then **Tag Name** is automatically checked.

The trace legend layout depends on the *color scheme* (page 46) you select.

The trace legend for the Batch Trend of a *batch color scheme* (page 46) shows the Tag/Alias name and the trace line style in the text color.

The trace legend of a Batch Trend of a *batch color scheme* (page 46) shows running PIUnitBatch records only.

This example shows the trace legend layout used for all batch color schemes.



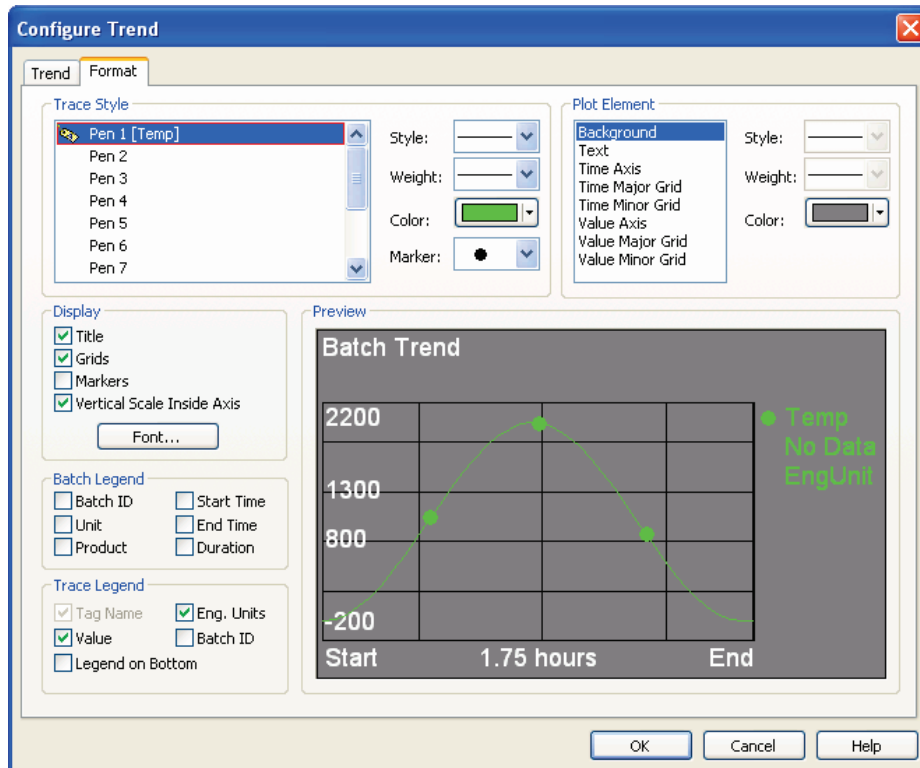
PREVIEW

The preview pane shows how your formatting settings will appear on the Batch Trend.

Format Tab for the Tag/Alias Color Scheme

The appearance of this tab depends on whether you select a **Batch color scheme** (page 46) or the **Tag/Alias color scheme** (page 48).

This is a **Format** tab for a Tag/Alias color scheme.



TRACE STYLE FOR THE TAG/ALIAS COLOR SCHEME

Set **Line Style**, **Line Weight**, **Color**, and **Marker** for the trace of each of the aliases, tags, and data sets on the Batch Trend.

The solid line style can use heavier line weights. Dashed lines have the standard line weight only.

Only pens that have an assigned Tag/Alias appear in the preview.

The Batch color schemes typically have different line styles for each alias. The Tag/Alias color scheme typically has solid line styles and different colors for each alias. The pen line style and line weight do not change when you switch between the color schemes on the **Settings** tab. You must use this **Trace Style** setting to select a different pen style and weight.

PLOT ELEMENT

Set the **Background**, **Line Style**, **Line Weight**, and **Color** of elements such as gridlines and text of the Batch Trend.

Click to select an element in the **Plot Elements** list and then use the drop-down lists to adjust its setting.

DISPLAY

Select which elements to display on the Batch Trend.

You can show or hide the **Title**, **Grids**, and **Markers**. When **Markers** is checked, each value that is plotted in the trend has a marker. When **Markers** is not checked, three markers are placed on the trend.

Vertical Scale Inside Axis determines whether the numbers for the vertical axis scale are inside or outside the vertical axis.

Click **Font** to set the font for the Batch Trend. This font setting applies to all text on the Batch Trend.

BATCH LEGEND

Set the attributes to display for each PIUnitBatch in the Batch Trend. The available attributes are: **Batch ID**, **Unit**, **Product**, **Start Time**, **End Time**, and **Duration**. The Batch Legend appears at the bottom of the Batch Trend.

The Batch Legend information does not appear by default. You must select the elements that you want to display.

You can see the same information that is in the batch legend in a more interactive way in the *Results Table* (page 103).

This Batch legend lists the Tag/Alias names, in the color assigned to the batch.

TRACE LEGEND FOR THE TAG/ALIAS COLOR SCHEME

The Trace Legend displays information about each trace in the Batch Trend. The options are:

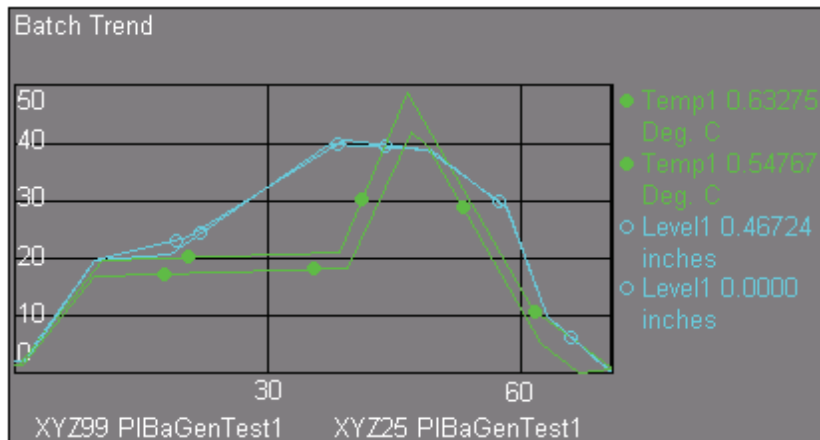
- **Tag Name:** When checked, the name of the alias, tag, or data set appears as specified in the *Tags/Aliases* (page 24) list. The trace's line style appears next to the **Tag Name** on the Trace Legend.
- **Value:** When checked, the values for each tag, alias and data set appear in the legend. The value shown is for the batch end time or the current time.
- **Eng. Units:** When checked, the engineering units—which come from the tag attribute **EngUnits** defined on the PI Server—appear for each tag and alias.
- **Batch ID:** When checked, the Batch ID appears for all batches.
- **Legend on Bottom:** When checked, the Trace Legend appears below the trend area. When unchecked, the Trace Legend appears in the upper right corner of the Batch Trend.

If **Value**, **Eng. Units**, or **Batch ID** is checked, then **Tag Name** is automatically checked.

The trace legend layout depends on the *color scheme* (page 46) you select.

The trace legend for the Batch Trend of a *Tag/Alias color scheme* (page 48) has the format Marker, BatchID, Tag Name, Value, Engineering Units.

The following example shows the trace legend layout used for the Tag/Alias scheme.



PREVIEW

The preview pane shows how your formatting settings will appear on the Batch Trend.

Batch Definition Dialog Box, Settings Tab

From the Settings tab of the **Batch Definition** dialog box you can set time, color, and other options that affect the Batch Group.

Plot Time

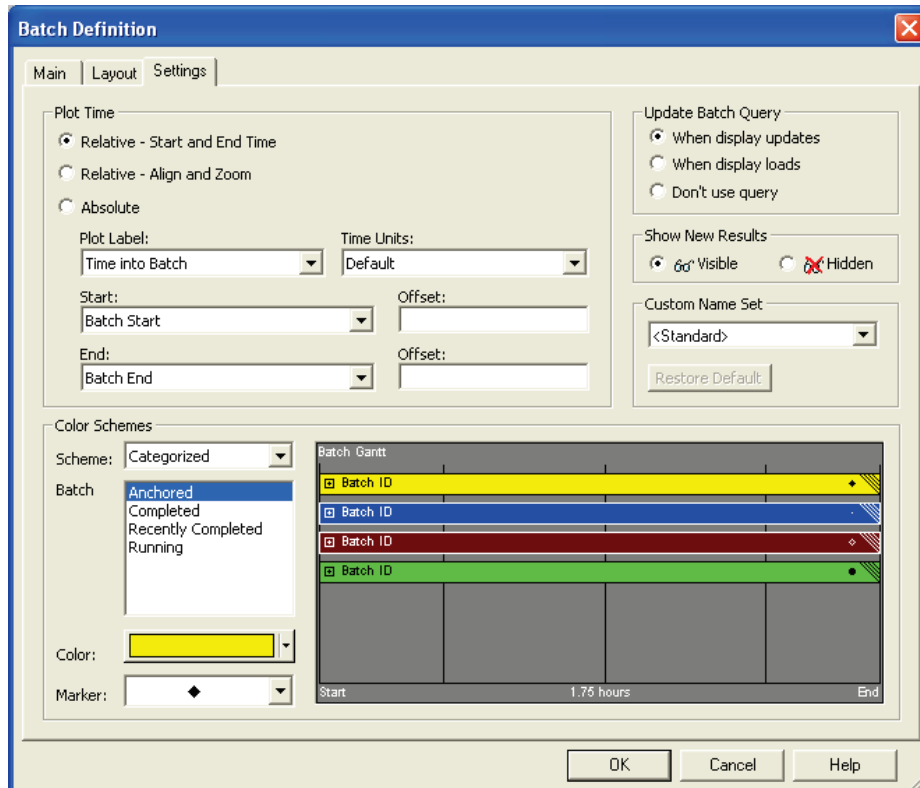
Plot Time affects the data displayed on the Gantt Chart and the Batch Trend. The Results Table, however, is unaffected by this setting and shows all batch items that the search retrieves.

Note: Batch Trends created with BatchView 2.1 and configured to work with phases and steps must be reconfigured to use the current PISubBatch persistence model.

The following sections describe the Plot Time options.

Relative - Start and End Time

In this mode, you select relative time for plotting the batch data in the Batch Group. In relative time mode, the batches in the Gantt Chart and Batch Trend are aligned based on their start times. This is the default time mode.



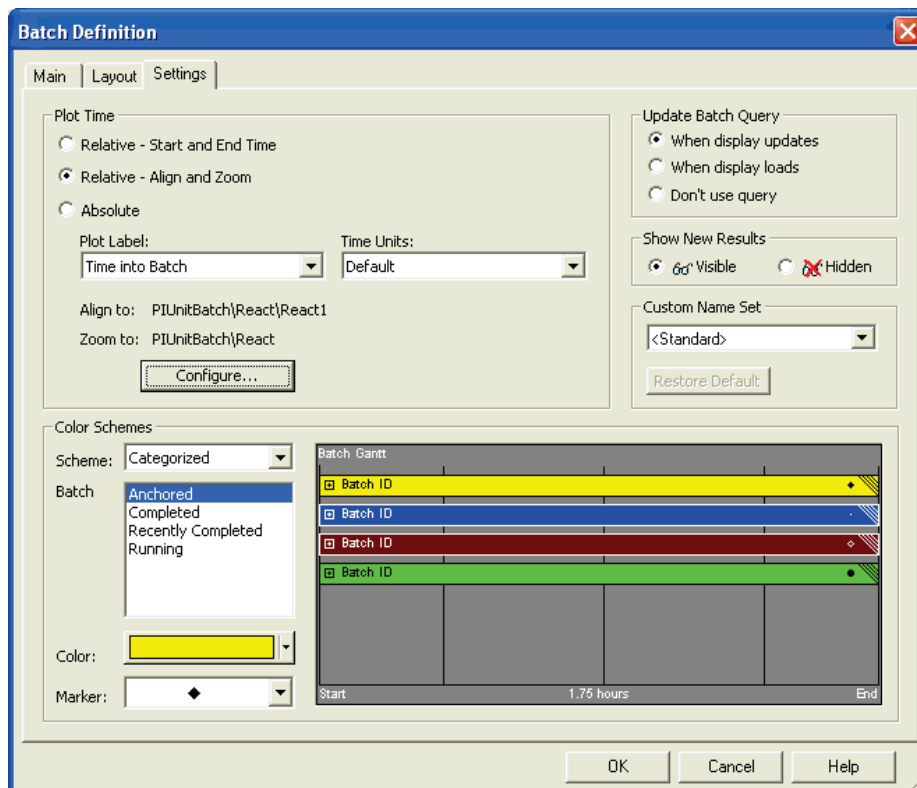
In relative time mode, you can plot from the Batch Start or Batch End time plus an offset, to the Batch Start or Batch End time plus an offset. For example, to see batch data from 10 minutes after the batch start to the batch end, select **Batch Start** under Start and add an offset of +10 minutes, and select **Batch End** under End.

Relative - Align and Zoom

In this mode, you can align to the start of a batch item other than the parent batch item's start time, as well as zoom into the batch hierarchy to view, such as just one PISubBatch. You can set the align and zoom settings in the same way as you would align and zoom on a Gantt Chart at run time.

When you choose **Relative - Align and Zoom**, you use a Gantt chart to select alignment and zoom for the Batch Group. You must first run a batch search on the Main tab to view batches in the Gantt chart.

In the following example, the **Align to** and **Zoom to** labels indicate the current settings.



The **Align to** and **Zoom to** fields show a string indicating the path from the top level batch item returned in the batch search to the Aligned item and the items you have zoomed to. If available, the item heading appears. To change these settings in the Align and Zoom dialog box, click **Configure...**

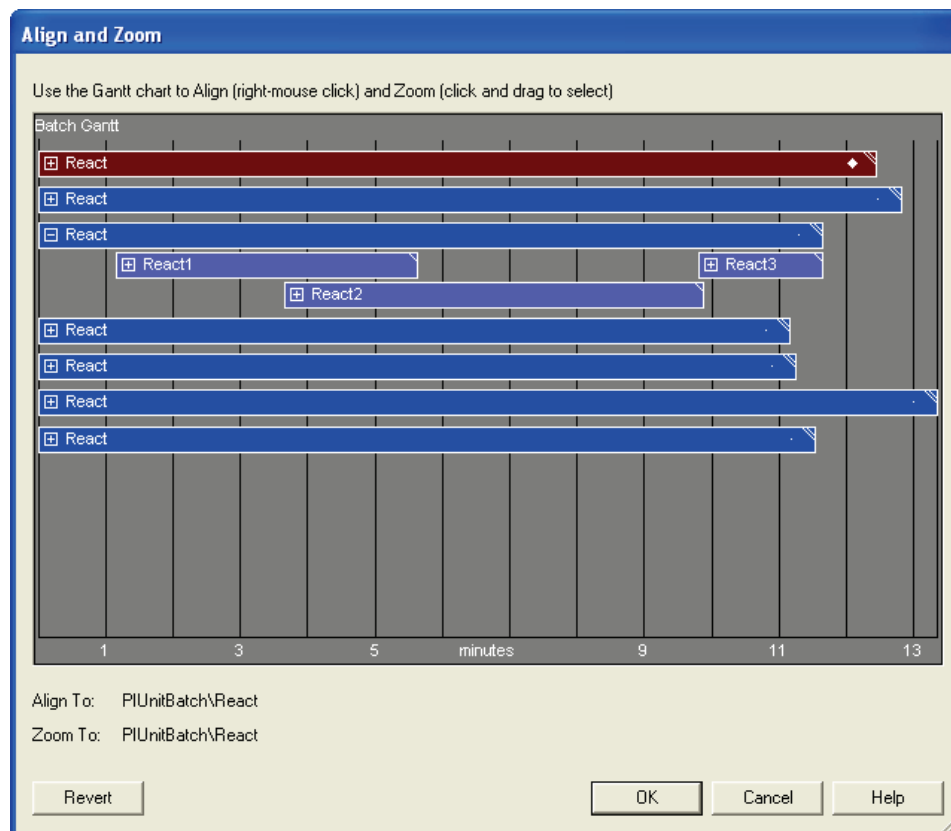
If there is more than one item of the same name at the level in the batch hierarchy, the instance of the item appears as a number in parenthesis. In the previous figure, the alignment is to a **React1** PISubBatch that is a **React** PISubBatch's child, which is in turn the PIUnitBatch's child. The Zoom setting shows a Zoom to the **React** PISubBatch. When you zoom to more than one Gantt bar, a list of the batch items you zoomed to appears, separated by semicolons. When you zoom to an item that has other items on the same level (siblings) with the same name, the instance of that item is indicated in parentheses. For example, if two **React1** PiSubBatches are below the **React** PISubBatches and you zoom or align to the second one, the path appears as **PIUnitBatch\React\React1(2)**. Whereas if you zoom or

align to the first, the path appears as **PIUnitBatch\React\React1**. If a PIBatch is at the top level, the PIUnitBatch level appears by the name of the PIUnit.

ALIGN AND ZOOM DIALOG BOX

You can use this Gantt Chart just as you would the Gantt Chart within the display to choose your alignment and zoom options. To align, right-click the Gantt bar of the batch item you want to align to and choose the **Align** menu item. To zoom, drag your pointer around the batch items you want to zoom to. This Gantt chart obeys the preference for Align when zooming in the **Preferences** dialog box. Click **Revert** to reset the Gantt chart to the saved view. See *Gantt Chart* (page 63) for more information.

In following example, a PIUnitBatch search is zoomed and aligned to a first-level PISubBatch named React.



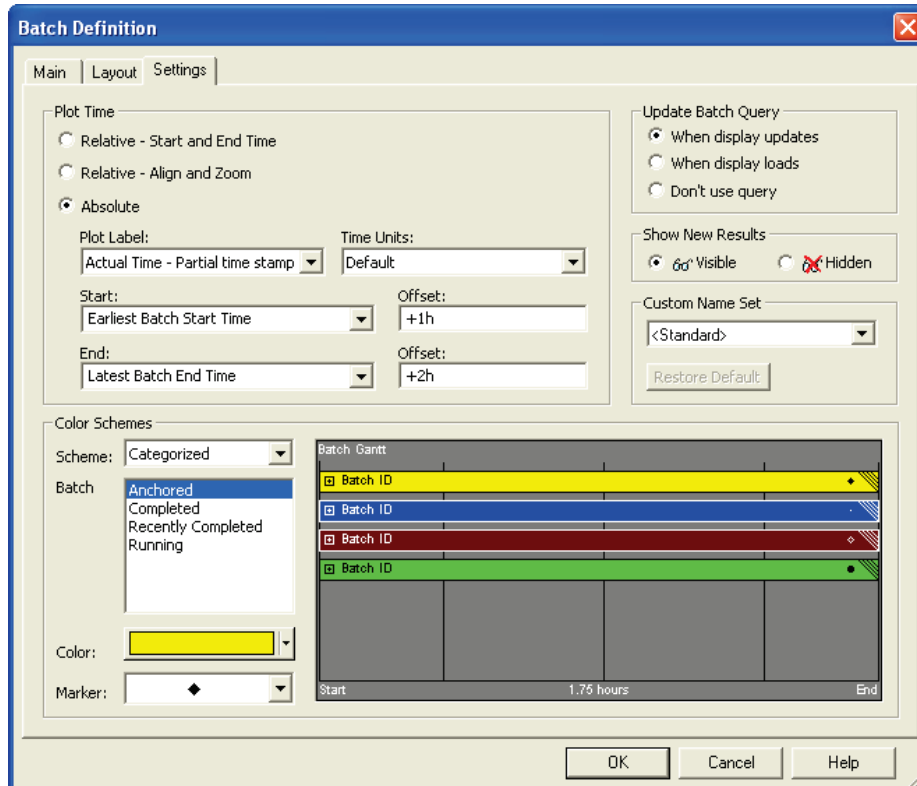
On the **Align and Zoom** dialog box, the right-click menu on the Gantt chart is the same as that at run time. However, the Batch Search functionality is disabled here.

When you view this Batch Group within the display, you can choose **Show Parent Level** from the right-click menu to view the level above the current view, up to the level of the search (PIBatches or PIUnitBatches).

Note: When zooming on a Gantt chart where the search is for PIBatches, the zoom must be a unique PIUnit. Therefore the string displayed includes the name of that PIUnit. For example, **PIBatch\Reactor1\Heating\Heat 1** where the PIUnit name is **Reactor1**.

Absolute

In Absolute time mode, you can plot from the earliest batch start time or latest batch end time to the latest batch end time or earliest batch start time. In this mode, the batches in the Gantt Chart and Batch Trend appear at the actual times they occurred. You can also offset both of the plotted start and end times. For example, to see data from 1 hour after the earliest batch start to 2 hours after the earliest batch start, choose earliest batch start time with an offset of +1h for the Start time and earliest batch start time with an offset of +2h for the End time.



Plot Labels and Time Units

The **Plot Label** and **Time Unit** boxes apply to all time modes, with the exceptions noted below. The **Plot Label** box specifies how the Gantt Chart and Batch Trend's time axes are labeled. The options are:

- **Actual Time: Full Time Stamp:** Shows the actual time of the batch. The full date and time is displayed for the start and end of the Gantt chart and Batch Trend.
- **Actual Time: Partial Time Stamp:** Shows the actual time of the batch. Only the hours, minutes and seconds are shown. The full timestamp for the end of the plot appears in the upper-right-hand corner of the Gantt chart and the Batch Trend. This is the default option for Absolute time mode.
- **Time into Batch:** Displays the time since the beginning of the batch. The start of each batch has a time of zero. This is the default option for Relative time mode. This option is not available in Absolute time mode.

- **Time into Plot:** The left-hand side of the plot is set to zero and time increases to the right. This is useful if you use an offset or are not concerned about the actual start of the batch. For example, after zooming in on the Gantt Chart or Batch Trend the time is zero. This option is not available in Absolute time mode.

When you use relative time mode and choose to show the actual time (either full or partial), consider the following circumstances:

- If there is **one running batch**, this batch sets the start time of the plots. The plot's end time is calculated by adding the duration of the longest batch shown to the plot's start time.
- If there are **two or more running batches**, the running batch with the earliest start time controls the start time of the plots. The plot's end time is calculated by adding the duration of the longest batch shown to the plot's start time.
- If there are **no running batches**, the plot time appears as the absolute time of the most recently completed batch, but as soon as a running batch starts, it picks up the running batch's time as the single running batch case.

The **Time Units** drop-down list specifies the time axis units. The default setting lets the Batch Group choose the most appropriate time unit to show. You can also select a specific time unit to show. The specific time unit is shown except when the total plot time is less than one unit of that specific time. For example, if you choose hours and the time plotted is 4 hours, the scale is in hours. But if you zoom into a portion of the trend that is only a few minutes long, the trend chooses minutes. To use fixed time units that do not change as you zoom in, choose the options ending with **fixed**. For example, **Hours - fixed** shows hours as the time unit even when you zoom in on the trend down to the level of seconds.

Color Schemes

Set the color scheme, color, and marker for the **Results Table**, **Batch Gantt** chart, and **Batch Trend** to represent each Batch Group. The effect on each batch display type depends on the whether the color scheme is a *Batch Color scheme* (page 46) or the *Tag/Alias color scheme* (page 50). A batch color scheme defines a color and marker that is used for all symbols. The Tag/Alias color scheme defines the color and marker differently for each symbol.

Select the color scheme on this **Settings** tab and refine the selections on the corresponding configure tabs, *Configure Results* (page 29), *Configure Gantt* (page 30), *Configure Trend* (page 32).

Batch Color Schemes

The batch color schemes are *Categorized* (page 46) (the default), *Classic* (page 47), *Anchored Classic* (page 47).

CATEGORIZED COLOR SCHEME

Each batch type has an assigned color and marker. Batch types are:

- **Anchored:** Any batches that are anchored in the Results Table. Anchored batches stay in the Results Table during future searches, even if they do not meet the search criteria.
- **Completed:** Batches that have completed and do not fall into the other categories.

- **Recently Completed:** The completed batch with the most recent end time.
- **Running:** Batches that are currently in progress. If a Running batch is anchored, it appears in the Anchored batch color and marker.

When a running batch completes, its color and marker change to the Recently Completed batch color and marker. The batch that was previously the Recently Completed changes to the Completed batch color and marker.

On the Batch Trend, the traces are drawn first with completed batches on the bottom layer, then recently completed, then anchored batches, and finally running batches. This places running batches on top for the best visibility.

Markers for the Completed batches are set by default to the smallest marker possible.

CLASSIC COLOR SCHEME

Each batch retrieved has its own color, marker, and (for the Batch Trend) line style. The first batch shown in the Results Table has the first color, the second batch has the second, and so on. The maximum is 12 configurable colors. Batches beyond the 12th batch cycle through the colors again.

ANCHORED CLASSIC COLOR SCHEME

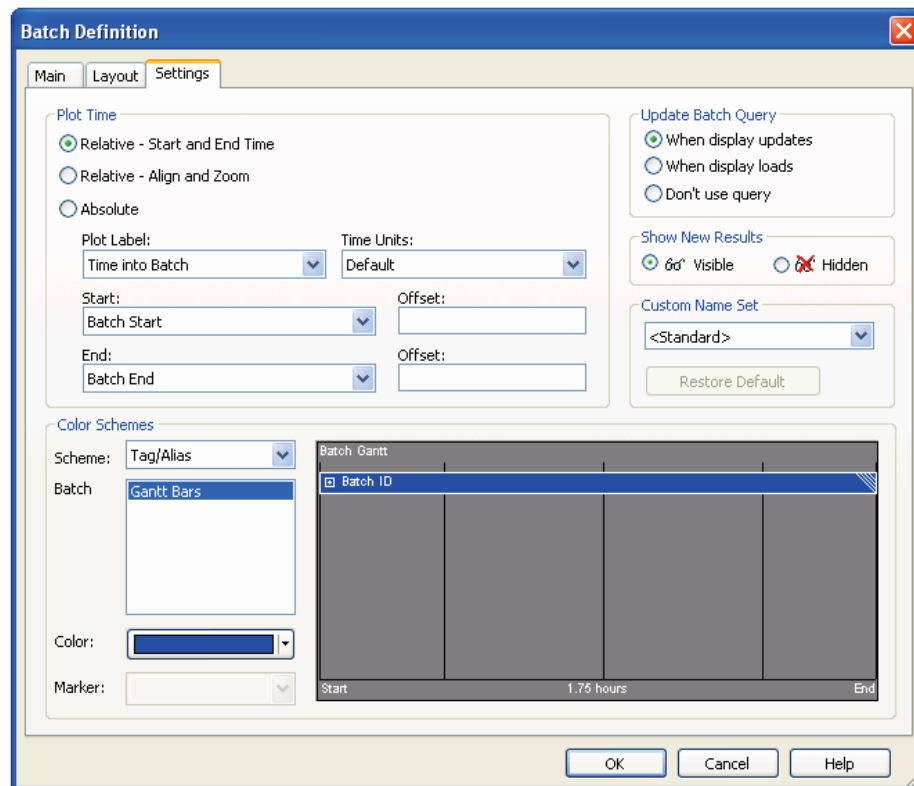
The Anchored Classic color scheme is the same as Classic, except that the color of each Anchored batch remains constant while the colors of the other batches cycle.

Tag/Alias Color Scheme

The Tag/Alias color scheme identifies a trace on a Batch Trend by color and marker. The default color and marker assigned for each Tag/Alias follow the same pattern as for the Classic color scheme.

All of the bars on a Gantt that uses the Tag/Alias color scheme are the same color. The **Marker** list box is disabled.

The Results Table for a Tag/Alias color scheme does not have a color or a marker. The **Color** and **Marker** list boxes are disabled.



Marker Type and Color

You can adjust the colors and markers that appear for each batch or batch type in each.

For the **Categorized** color scheme, select the batch type to modify the color and marker.

For the **Classic** color scheme, select the batch to modify the color and marker.

For the **Anchored Classic** color scheme, select either the Anchored or the specific batch to change the color.

For the **Classic** and **Anchored Classic** color schemes, there are 12 colors and markers. If there are more than 12 batches, the colors cycle starts over at the 13th color.

For the **Tag/Alias** color scheme you can select the color for the Gantt bars.

Tag/Alias Color Scheme vs. Batch Color Schemes Example

Batch color schemes assign a color for each batch and distinguish the aliases by line style. The Tag/Alias color scheme assigns colors differently for each symbol. The trend has a different color for each tag alias; all Gantt bars get the same color; the results table rows are not assigned a color.

For example, a Batch Group is defined to query the temperature and level of 2 PIUnitBatches. The BatchIDs are XYZ25 and XYZ99. Temp1 is the alias for the temperature. Level1 is the alias for the level.

In the classic color scheme:

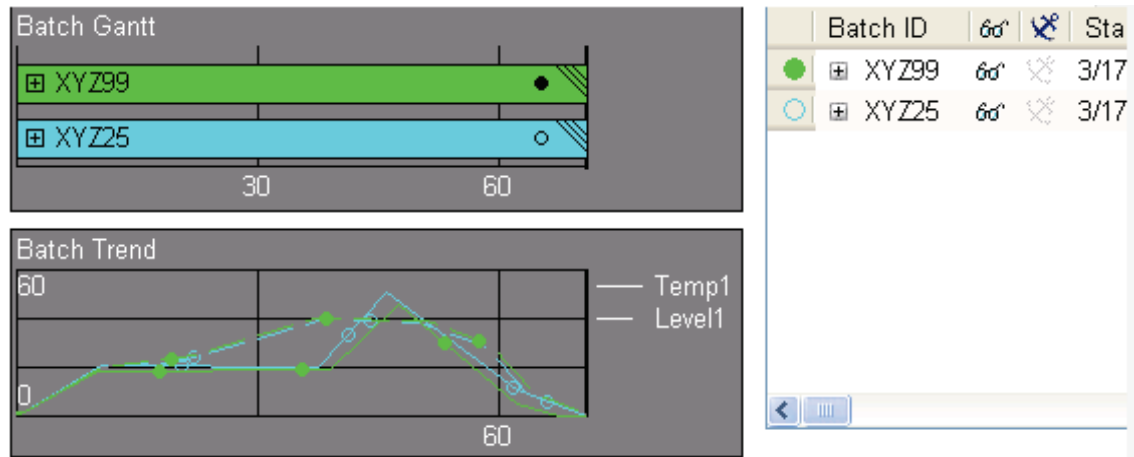
- XYZ25 is green on the trace, Gantt, and results table.
- XYZ99 is light blue on the trace, Gantt, and results table.
- Temp1 is solid line.
- Level1 is a dashed line.

In the Tag/Alias color scheme:

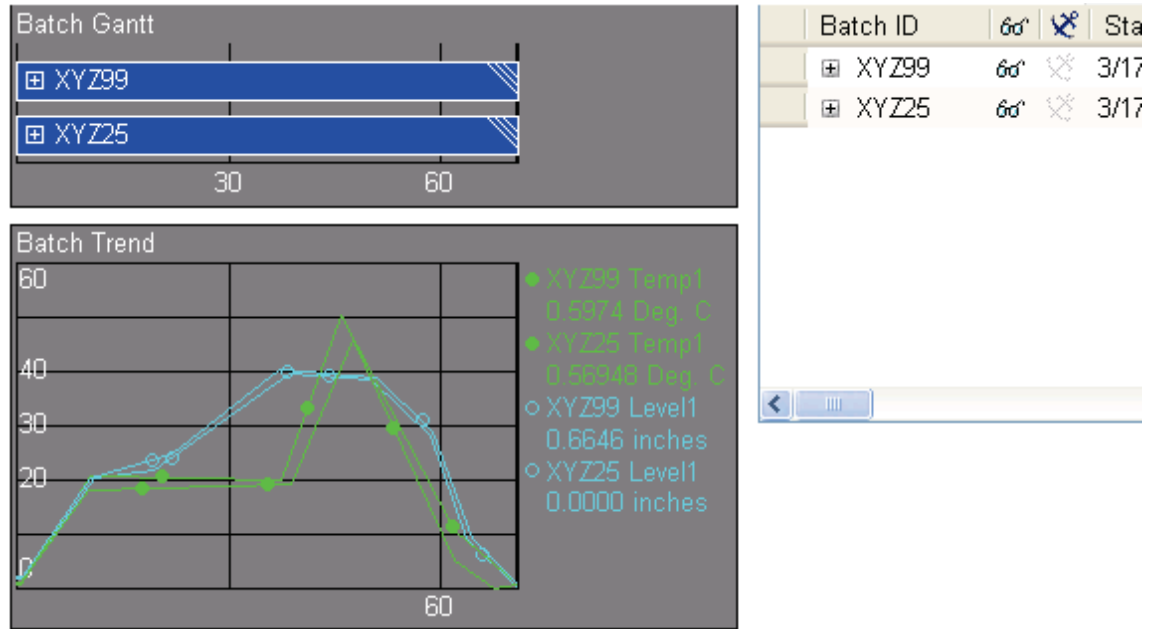
- The trace is green for Temp1 of both PIUnitBatches
- The trace is light blue for Level1 of both PIUnitBatches
- Both bars are a single color, blue, on the Gantt.

The following figures illustrate these differences.

Classic Color Scheme



Tag/Alias Color Scheme



Update Batch Query

The following options determine when the display uses the Batch Query to update batch data.

- **When display updates:** With each update of data on the display, the Batch Query parameters determine whether to add any new batches and remove any old batches from the batches displayed.
- **When display loads:** Each time the display loads, the Batch Query updates.
- **Don't use query:** The display does not use the Batch Query to retrieve batches from the PI Server. Only anchored batches appear.

Show New Results

This setting determines the visible state of the batches whenever new items are added to the batch results either when a new query is run or new items are retrieved from the server as the display updates.

| Icon | Status | Description |
|------|---------|--|
| | Visible | New batches are set to visible when added to the results. This is the default setting. |
| | Hidden | New batches are set to hidden when added to the results. This setting is most useful in combination with the Results Table in the display. When set to hidden, only the batches you select appear in the Gantt Chart and Batch Trend. This is useful for viewing selected batch data from a query that returns many batches. |

Custom Names Set

Custom Names sets in PI ProcessBook are defined at the Batch Group level. This way, each Batch Group can have a different Custom Names set than another, even in the same display.

To configure a Custom Names set for a Batch Group, select a Custom Names Set from a PI Server in the **Custom Names Set** drop-down list. To revert to the default Custom Names set, click **Restore Default**. For details, see *Using Custom Names* (page 121).

Once you select a set in the Batch Definition dialog box and click **OK**, the Batch Group in the display updates.

Edit PI ProcessBook Displays

In Build mode, you can double-click any symbol in a Batch Group to open the **Batch Definition** dialog box for that Batch Group.

Move and Resize Symbols

You can move and resize individual symbols within the Batch Group on the display. The symbols within a Batch Group do not need to remain side-by-side as they are drawn by default.

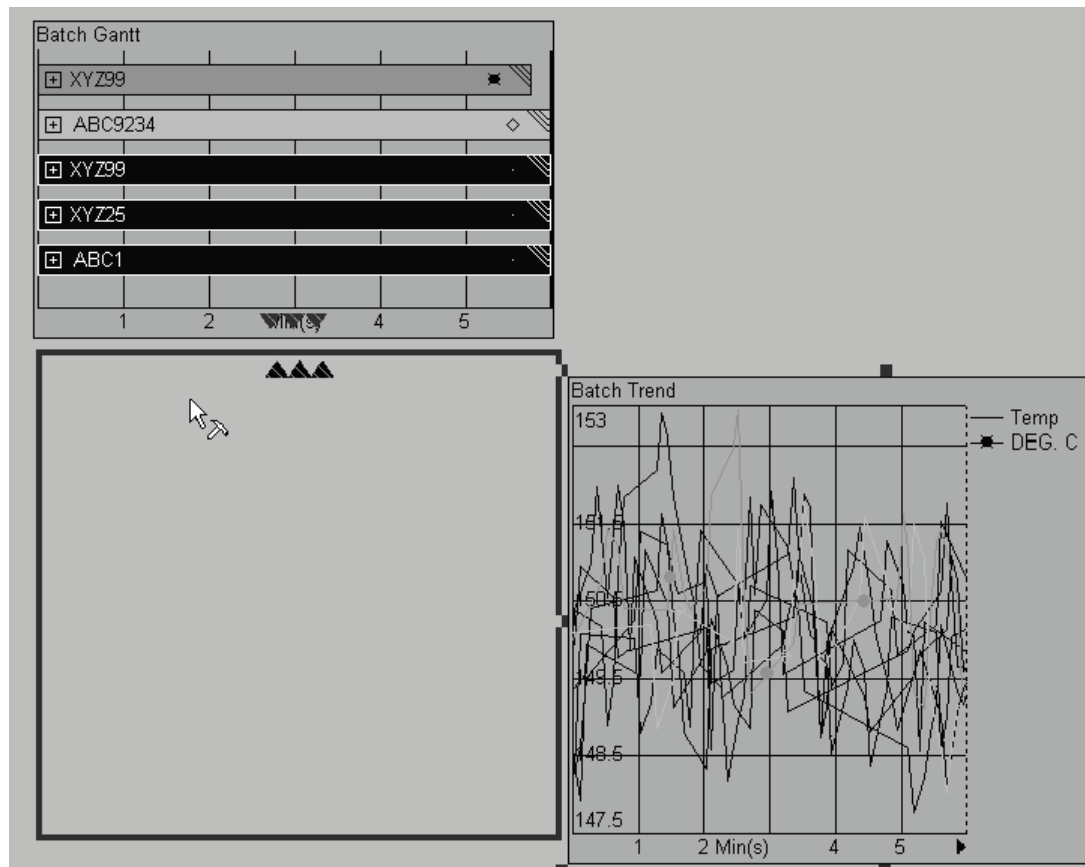
When you click any symbol within a Batch Group, you select the entire Batch Group. Once the entire Batch Group is selected you can move it around as a group of symbols.

To move or resize an individual symbol within the Batch Group, select the entire Batch Group and then click the symbol you want to move.

Synchronize Time Scale on Gantt and Trend

By default, the Gantt Chart and the Batch Trends are drawn on the display so that the time scales are exactly aligned. If you edit the display, for example by resizing the Gantt Chart, you can resynchronize the time scales of the Gantt Chart and any Batch Trends that are in the same batch group. You can also synchronize additional Batch Trends by aligning them with other Batch Trends that are synchronized to the Gantt Chart. In addition, you can synchronize multiple Batch Trends to each other without a Gantt present. To do this:

1. Drag either the Gantt Chart or Batch Trend toward the other.
2. As the left edges of the two symbols come in proximity, the symbols snap together as shown by the outline of the symbol being dragged. Alignment is indicated by three arrows in each symbol pointing to the other symbol's arrows.



3. Release the mouse to drop the symbol back onto the display. The time scales of these two symbols are now synchronized.
4. Rest your mouse over a symbol to see the symbols that its time scale is synchronized with.

Save PI ProcessBook Displays

When you save a PI ProcessBook display containing Batch symbols, only changes made in Build mode are saved. This is consistent with the behavior of other PI ProcessBook symbols such as the Trend.

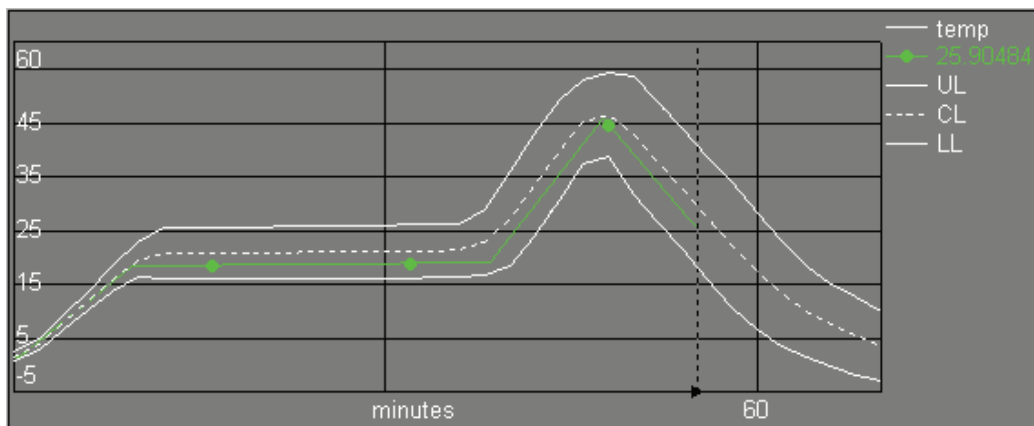
Relative and Absolute Times

The Gantt chart and Batch Trend can show the data in absolute or relative time. In absolute time, all data on these plots appear at the actual time they occurred. In relative time, the data can appear relative to the start of a particular PIBatch, PIUnitBatch. The batch data can also be shown relative to PISubBatches using the alignment features of the Gantt Chart.

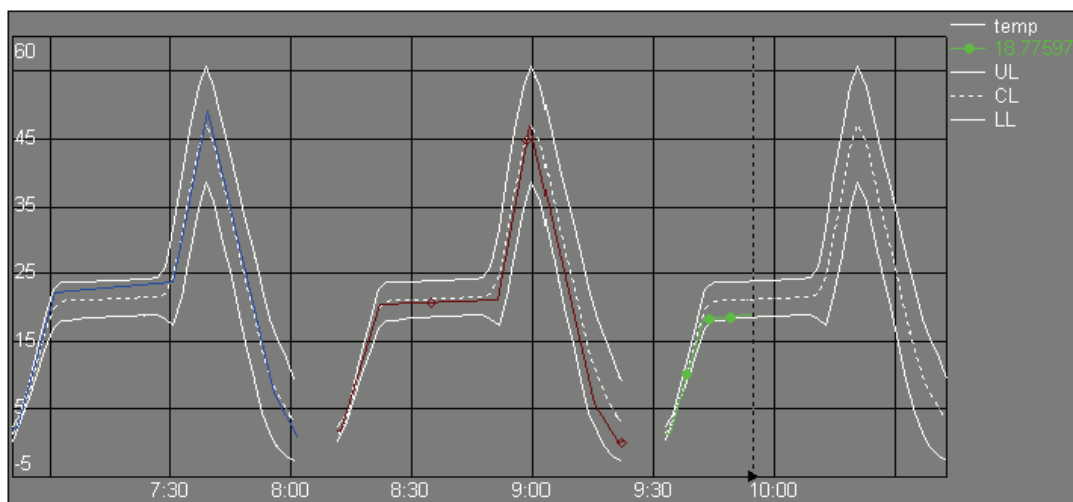
Limit Sets

A limit set is a user-defined group of limits (similar to tags/traces) that you can apply to a trend symbol in the same way you can add tags. Limits have their own rendering styles (color, line width, line style, and markers) independent of the Batch Group's Color Scheme. Unlike regular traces, which are drawn once per batch, the limits are rendered only one time and show their entire data, including "future time" when the plot's time scale is **Relative**. If the plot's time scale is **Absolute**, the limits are drawn once per batch. The following figures show examples of Relative and Absolute time scale.

PI BatchView supports the data sets created by PI ProcessTemplates as the data source for the limit sets. In the following figures, there are four traces: UL (Upper Limit), CL (Center Line), LL (Lower Limit), and Temp (the running batch's temperature). The current value appears in the trace legend under each trace, except for limits. Each trace represents a PI tag on the Batch Trend symbol. In the following figure, the limit set traces appear as follows: UL: white; CL: dashed white; LL: white; and Temp: green.



Batch Trend in Relative Time Mode



Batch Trend in Absolute Time Mode

PI ProcessTemplates

PI ProcessTemplates is a separate product from PI BatchView. With PI ProcessTemplates you can create a data set for a process variable that is averaged across many batches. In the figure **Batch Trend in Relative Time Mode** shown in *Limit Sets* (page 53), the temperature at each minute during the batch was averaged across a number of batches to give the center line (average) and the upper and lower limits (2 sigma greater than and less than the average). With this information, you can observe your process variable and compare current process behavior to historical averages. Process Template data are stored on the PI Server, allowing access across your organization.

PI BatchView supports the PI ProcessTemplates data set as a data source. The PI ProcessTemplates Add-In to PI ProcessBook must be loaded to use the Limit Sets feature.

PI BatchView supports only those Process Templates created for full PIUnitBatches. Templates based on particular PISubBatches are not supported in this version.

When using a limit set, it is better to query for the PIUnitBatches of a single PIUnit. This is because the limit set is based on a Process Template constructed for a process variable on a single PIUnit.

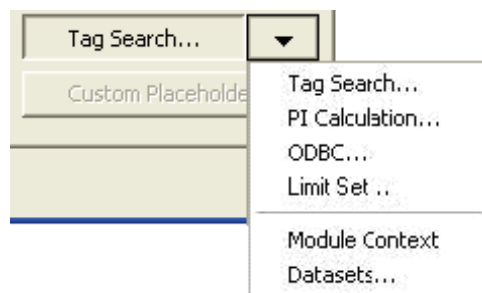
Once the limit data are retrieved, they are not retrieved again until the trend is reverted (or any other action that causes a data refresh, such as editing, loading, or undo). To force an update to a limit set in a Batch Group, click the Revert Time Ranges button.

See the PI ProcessTemplates documentation for details.

Configure Limit Sets

You can open the **Configure Limit Set** dialog box from any dialog box that has a tag list box (such as the **Batch Definition** and **Configure Trend** dialog boxes). Starting the **Configure Limit Set** dialog box from within PI ProcessBooks run mode, such as from the **Tags/Aliases in Trend** dialog box, only affects the run-time display of the Batch Group symbol and does not save the settings with the display. You can add, delete, and update limit sets only in the **Configure Limit Set** dialog box that is opened from the **Batch Definition** dialog box.

The **Limit Set...** and **Datasets...** menu items are generated by add-ins loaded into PI ProcessBook.



In the Batch Group, each Trend supports one or more limit sets. More than one limit set may be needed on the same trend when more than one alias is plotted on the same trend. A limit set is needed for each alias.

You can create or modify limit sets by choosing the source of the data, the number of limits in the set, and how the limits are to be rendered. The names of the limit sets must be unique within the Batch Group symbol. The length of the name is not restricted. The limit names must be unique within the limit set.

To import limit sets from one Batch Group symbol to another Batch Group symbol within a display click **Import** in the **Configure Limit Set** dialog box.

There is no maximum number of limit sets or limits that can be created within a limit set.

The limits retrieve data from the Data Source based on the start time of the first batch processed. If no PIUnitBatch objects are in the batch group at the time the trend is reverted (or initialized), the trend waits for a PIUnitBatch to start in order to determine a start time of the limit's data.

Effect of Plot Time Scale


When the plot time scale is **Relative**, the Batch Trend displays the limit set once, regardless of the number of batches retrieved. When the plot time scale is **Absolute**, then the limit set is drawn once for each batch.

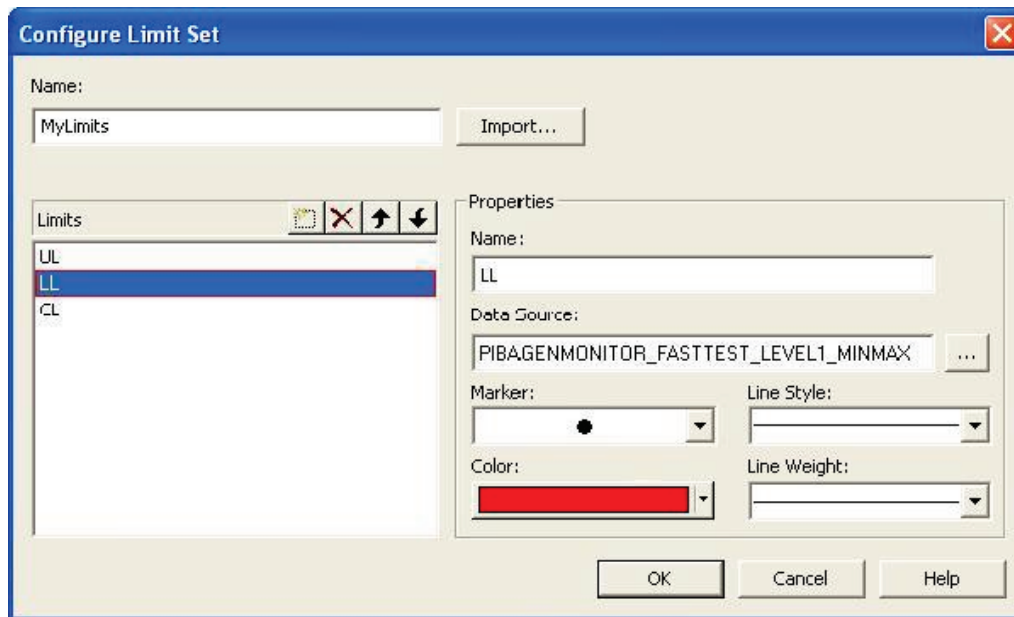
Limit Set Traces

In the Batch Trend, limit set traces are not selectable traces. Also, the legend does not display values of the limit set traces.

The limits from Process Templates appear in future time. This means that the entire limit is drawn regardless of the current time. This makes it easier to see how the running batch should look.

Add a New Limit Set


To add a new limit set: In the **Batch Definition** dialog box, click  next to the **Tag Search...** button and choose **Limit Set...** In the **Configure Limit Set** dialog box that appears, enter the limit set name. Each limit set name must be unique within the BatchGroup symbol. This field is automatically populated with Set_n where n starts with 1 and is guaranteed to be unique when the dialog box opens to create a new limit set. For example, **Set1**.

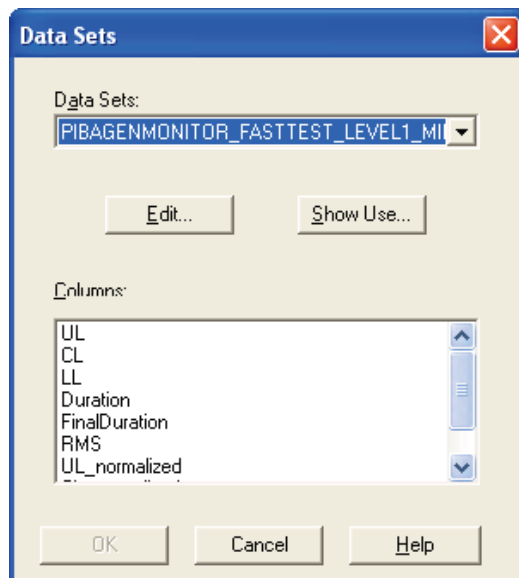


For complete details on the Configure Limit Set dialog box properties, see *Configure Limit Set Dialog Box* (page 58).

Add a New Limit

To add a new limit:

1. In the **Configure Limit Set** dialog box, click . The **Data Sets** dialog box appears. It lists the available data sources that limits can choose.



2. Select a Data Set and the column(s) to add. If you select multiple columns, a limit is created for each column.

3. Click **OK**. Each column is added as a limit.

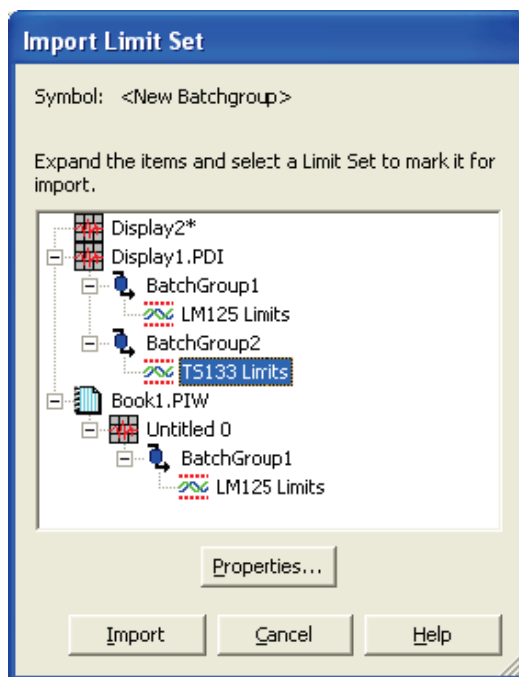
Each limit name must be unique within the limit set.

See the PI ProcessBook help file for general information on how to use the **Data Sets** dialog box.

Import Limits from a Limit Set

To import limits from a limit set: In the **Configure Limit Set** dialog box, click **Import**. The **Import Limit Set** dialog box that appears shows all open Display windows and ProcessBooks (.piw files). Expand the ProcessBook item to see a list of open Displays associated with the ProcessBook. Opened link entries of type **Display** are listed separately from the ProcessBook since they are not part of the ProcessBook.

Expand the Display item to see a list of Batch Group symbols on the current display. Expand the Batch Group item to see a list of limit sets saved on the symbol. To select an available limit set click its name. Click **Import** to add all of the limits from the selected limit set to the current limit set. Only the open display windows in PI ProcessBook appear in this tree view.







The **Import Limit Set** dialog box shows the limit sets in a tree view. Use the + and - buttons next to each item to expand and collapse the tree. Select the name of the limit set and click **Import** to add all of the limits from the selected limit set to the current limit set. You can import only one limit set at a time.

To view a limit set before adding it, double-click the limit set, or select it and click **Properties**. A read-only **Configure Limit Set** dialog box appears with the limit set attributes.

If the imported limit's name already exists in the limit set, then its name is "Copy of *name*" (where *name* is the limit name). If more than one copy exists, then its name is "Copy *n* of *name*" (where *n* is a duplicate's number).

IMPORT LIMIT SET TREE ICONS


Each branch in the tree control has an icon that describes it:

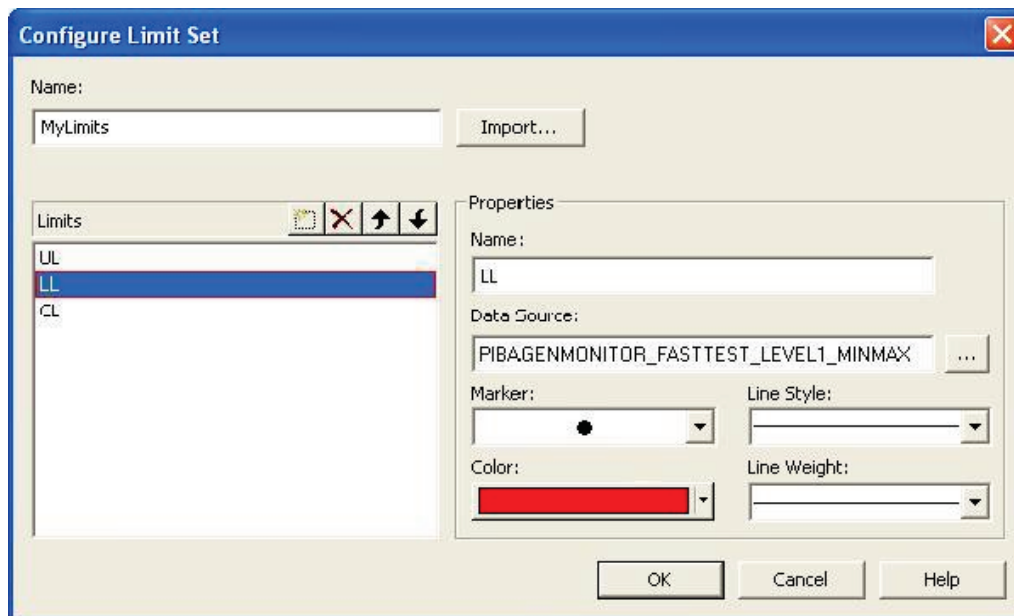
| Icon | Description |
|---|-----------------------------------|
|  | ProcessBook (.piw) window |
|  | Display (.pdi) window |
|  | Batch Group object in the Display |
|  | Limit set within the Batch Group |

Edit a Limit Set

You can edit an existing limit set from the Main tab of the **Batch Definition** dialog box or the **Configure Trend** dialog box. To do this, double-click the limit set in the *Tags/Aliases* (page 24) list or select the limit set and choose **Limit Sets...** from the **Tag Search** drop-down list.





Configure Limit Set Dialog Box

You can add, modify or delete a limit set in the **Configure Limit Set** dialog box. To open this dialog box from the **Batch Definition** and **Configure Trend** dialog boxes, click  and choose **Limit Set...**




In the **Name** text box, enter a limit set name that is unique within the Batch Group. Click **Import...** to transfer the selected limit set from another Batch Group to this one. See Import Limit Set Dialog Box Controls for more details.

Limit Buttons

-  Creates a new limit and opens the **Data Sets** dialog box, where you can *add a limit* (page 56).
-  Removes the selected limit from the limit set
-  Moves the selected limit up, changing the limit trace order on the Batch Trend
-  Moves the selected limit down, changing the limit trace order on the Batch Trend

Properties

The settings in the **Properties** area of the **Configure Limit Set** dialog box are:

- **Name:** The limit name, which must be a unique name within the limit set. You can change the limit name here.
- **Data Source:** The PI ProcessTemplates data set from which limit data is retrieved. Enter the data source name, or click  to open the **Data Sets** dialog box and select a data source.
- **Marker:** A list of graphic symbols for the limit trace.
- **Color:** The color of the limit trace drawn on the display.
- **Line Style:** The type of line drawn for the limit trace (such as Solid, Dash, Dash Dot).
- **Line Weight:** The thickness of the line drawn for the limit trace.

Note: You can use wide line weights only with the solid line style. This option is disabled when the line style is not solid.

Limit Set and Limit Naming

Some restrictions on the naming conventions affect the limit set name and limit name. The limit set and limit names use the same constraints that the PI Server uses for tag names with one exception: the period character (.) is not allowed. The constraints are:

- The first character must be alphanumeric (letters and numbers only).
- The following characters are not allowed:

* ' ? ; { } [] | \ ` " .

Run Time Usage of PI ProcessBook Symbols

Batch Group

While the Batch Group symbol has no visible component, it provides the infrastructure for the four Batch symbols to share data and coordinate their behavior. All of the symbols

coordinated by the Batch Group symbol show the same batch results (for example, the same list of PIUnitBatches). A display can have multiple Batch Groups.

Batch Search

Every Batch Group must complete a search for batches to display the batches and their associated data. To change the batch search parameters directly from the display, include the Batch Search symbol.

For details on search functionality see *Setting Search Parameters* (page 85).

Restrict Parameters for Run Time Usage

You can configure the Search Symbol using the *Configure Search Dialog Box* (page 28).

You can configure the Batch Search to show only the search parameters that you want to allow display users access to.

For example, a Quality Assurance worker may need to enter only the Batch ID to retrieve information about a particular batch. In this case, you would configure the Batch Search to show only the Batch ID field.

The Search symbol in the display shows the search parameters used in the Batch Query in the **Batch Definition** dialog box. These parameters appear only for those portions of the Search Symbol that are visible in the display.

For the parts that do not appear in the Batch Search symbol, you can set values at design time. Thus you can set up displays that are meaningful in the context you want to use them in while keeping the display simple.

For example, perhaps the Quality Assurance worker needs to enter only the Batch ID for an analysis. While the Batch ID is the only element on this display, it might be useful to specify a time range or mask to search for only certain units. In these cases, you can specify the time range or unit search mask at design time in the **Batch Definition** dialog box. When the QA worker enters the Batch ID, the time range or unit search mask parameters are used to query for batches in addition to the Batch ID.

You can make some or all of the search components visible at run time. If you make portions of the search visible at run time, then users see the query parameters you set in the **Batch Definition** dialog box as their defaults.

For example, if the Time Range is visible on the display and you set the search for the last 8 hours (*-8h to *), then these values also appear as defaults on the display. The user can then change the time range. On the other hand, if the Time Range is not visible on the display and you set it to the last 8 hours, then the query always uses the time range of the last 8 hours.

When portions of the search are visible at run time and you change the search parameters, you must click **Search** to perform the new search and populate the other batch components. To indicate that a change was made and the search button has not been clicked, the button is highlighted and a triangle appears next to it. The **Search** button is also highlighted if you make changes by invoking the search control and performing a new search that differs from the search you would perform using the search parameters specified on the display.

At design time you can choose attributes such as Batch ID and Unit when you search for a PIUnitBatch. If you display these attributes in a display they are no longer drop-down lists but instead appear as fixed labels.

Interactions

To search using the edited parameters, edit the fields of the Search Symbol and click **Search**. The Batch Group then uses this search to show the retrieved batches and update the batches in real time.

Similar to the **Batch Definition** dialog box, when any field on the Batch Search is edited, the **Search** button is highlighted to indicate that it must be clicked to display the new search parameters in the batch query.

Running a new search replaces all the batches that are not anchored in the Batch Results Table.

Note: Any changes you make to the search parameters in Run mode within the ProcessBook Display are not saved with the display. To permanently change the search parameters in the Display in Run mode, use the **Batch Definition** dialog box to modify the search parameters.

Advanced Search Dialog Box

You can also invoke the Search to change the batches retrieved in your display. To do this, right-click on any of the visible components (Batch Search, Results Table, Gantt Chart or Batch Trend) and choose **Batch Search...** In the **Advanced Search** dialog box that appears, the search parameters are preset to the search specified in the **Batch Definition** dialog box and modified to include any changes from in-display search components. Clicking **Search** queries the PI Server(s) for batches and returns the results to the display, and any search components present on the display are updated with the search parameters.

For details on using the **Advanced Search** dialog box, see *Advanced Searches* (page 97).

Module Context

A Batch Group's search can use the display's Module Context. For example, if there are two areas in your plant—Area 1 and Area 2—that have identical process equipment, you can create a single display and then switch between Area 1 and Area 2 by clicking their Modules in the Module Context docked window. The Batch Group symbol uses the Area 1 and Area 2 Modules within its Unit Name search attribute to specify units within Area 1 or Area 2 only.

For configuration details, see *Module Context* (page 91).

For detail on using Module Context in PI ProcessBook, see the PI ProcessBook Help.

Results Table

The Results Table shows the batches returned from the search along with a configurable set of properties of the batches. For example, if the search returns PIUnitBatches, you can view

properties of the PIUnitBatches such as start and end times, the name of the unit in which the batch ran, the product made, and so on.

In the Results Table, you can also anchor batches so that if you change the Batch Search, they remain in the table. You can show or hide each batch in the table in the Gantt chart and Batch Trends.

Whether or not a Results Table Symbol appears in the display, each Batch Group contains one Results Table Symbol to coordinate the batch data among the Batch Group symbols.

For details on all of the features of the Results Table, see *Working with Results* (page 103).

Configuration

Configure the Results Table using the *Configure Results Dialog Box* (page 29).

Appearance

The Results Table shows a hierarchical grid of the batch data within the Batch Group. Column headers indicate the information about the batch. Row headers show a color and a marker, corresponding to the colors and markers on the Gantt Chart and Batch Trend.

Interactions

Interactions with the Results Group affect searches and the display of batch information on the Gantt Chart and Batch Trend.

Note: Any changes you make to the Results Table in Run mode within the ProcessBook Display are not saved with the display. To permanently change anchored items, sort order, column order, and so on, modify the Results Table using the *Configure Results Dialog Box* (page 29).

Selecting a Batch


When you select a batch on the Results Table, Gantt Chart, or Batch Trend symbols, the same batch is highlighted on all the other of these components in the display.

Sort Batches

The Results Table sort order controls the sort order for batches in the Results Table and Gantt Chart. That is, when you sort the batches in the Results Table, the order shown in the Gantt chart also changes. Colors associated with each batch are maintained when you sort the batches.



Click a column header to change the sort order of the batches in the Batch Group.

Anchor Batches

Click a batch's anchor icon  to lock that batch in the display. This changes the batch color to the anchored color when using the Categorized or Anchored Classic color schemes.

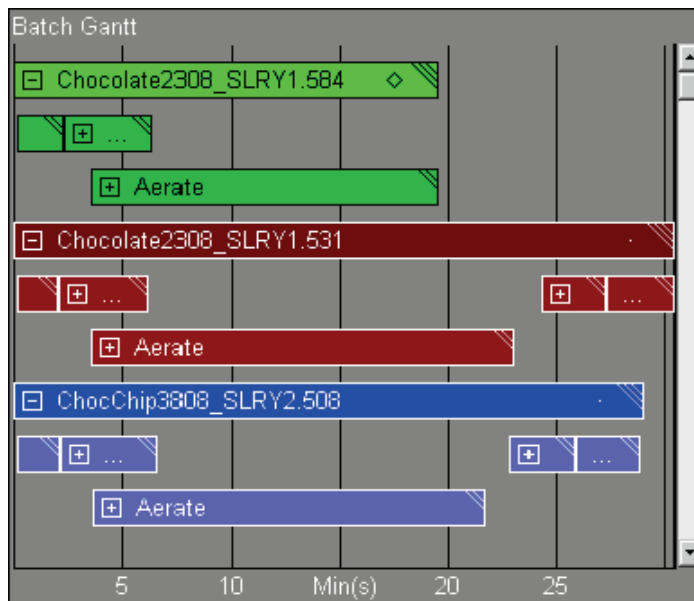
If your search updates over time, anchored batches do not disappear from the results even when they do not satisfy the query parameters.

Make a Batch Visible or Hidden

Click a batch's visible/hidden icon / to switch its visible property. Visible batches appear in the Gantt Chart and Batch Trend, while hidden items do not.

Gantt Chart

A Gantt chart is an easy way to look at your overall batch process and study batch cycle times. The PIUnitBatches viewed on the Gantt chart are coupled with the Batch Trend, providing a means for correlating batch events with process data. You can use the Gantt Chart to line up profiles of process data such as a reactor's temperatures during a heat cycle.



Configuration

Configure the Gantt Symbol using the *Configure Gantt Dialog Box* (page 30).

Appearance

The chart shown in *Gantt Chart* (page 63) contains three PIUnitBatches. The scrollbar on the right indicates there are more batches below. In this example, each PIUnitBatch is expanded to show the level of PISubBatches belonging to the PIUnitBatches. Colors on the Gantt chart correspond with the colors on the Batch Trend and are set in the **Batch Definition** dialog box.

Plus and Minus Signs

A plus or minus sign on a Gantt bar indicates that the batch the Gantt bar represents has child batches. Click the plus or minus sign to expand or collapse the Gantt bar hierarchy. For example, clicking the plus on a PIUnitBatch expands the PIUnitBatch Gantt bar to show the PISubBatches that are children of the PIUnitBatch.

Label






Each Gantt bar has a label. By default, the label is the Batch ID for PIBatches and PIUnitBatches and it is the Name of the PISubBatch for PISubBatches. Labels that are too long to fit inside the bar are trimmed according to the setting in the *Configure Gantt Dialog Box* (page 30).

Markers

Markers drawn in the right of each Gantt bar correspond to the markers of the traces in the Batch Trend.

Level in Batch Hierarchy





Diagonal stripes in the corner of the Gantt bar indicate the *absolute* level of a Gantt bar. The stripes differentiate PIBatches, PIUnitBatches and three levels of PISubBatches. The stripe indicators are:

| Gantt bar | Number of Stripes | Batch item |
|---|-------------------|-----------------------------------|
|  | 4 | PIBatch |
|  | 3 | PIUnitBatch |
|  | 2 | PISubBatch |
|  | 1 | PISubBatch, second level |
|  | 0 | PISubBatch, third level and below |

Shading indicates the *relative* level of the Gantt bar. The base color for each batch is set in the **Batch Definition** dialog box. The top level bar in the Gantt Chart is the base color. A parent bar's child bars have different shades of the same base color. The shading increases as the number of levels from the parent increases. Light colors get darker and dark colors get lighter. There are four levels of shading. Any bars below the fourth level display the fourth-level color.

Gantt Bar Start and End Time

The ends of a Gantt bar indicate the position of the Start/End time along the time axis. The indicators are:

| Gantt bar | Start/End Time Position Indicator |
|---|--|
|  | Start Time |
|  | Start Time Outside Gantt Time Range |
|  | End Time |
|  | End Time Outside Gantt Time Range |

The shape of the bar end indicates the position of the Start/End time along the time axis. A closed bar indicates that the Gantt symbol includes the actual Start/End time for the Gantt bar. A bump out on either end of the bar indicates that the Start/End time for that bar is not shown because it is outside the time range of the Gantt symbol.

Gantt Bar Size

The font size of the Gantt bar labels affects the height of the Gantt bars. This is the same font as the title and time scale on the Gantt Chart. You can set the font in the *Configure Gantt Dialog Box* (page 30).

Interactions

ToolTips

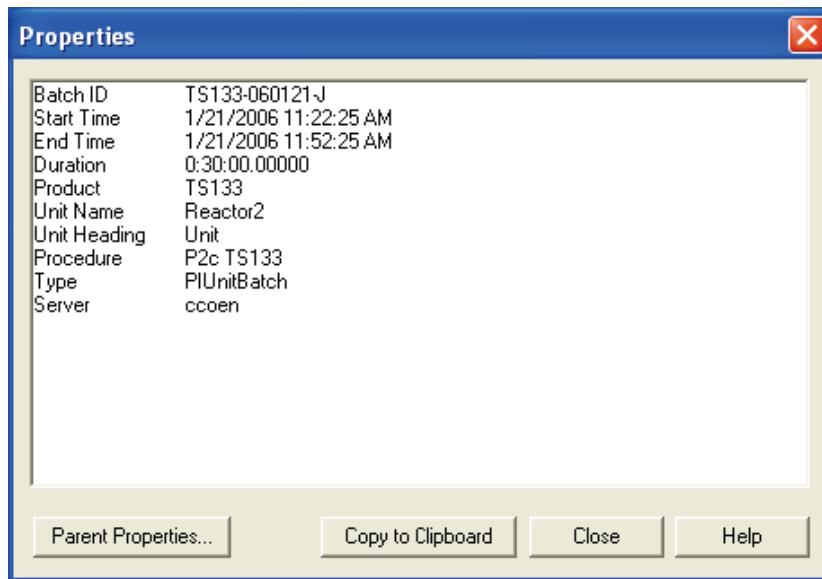
Rest the pointer on a Gantt bar to show a ToolTip. The ToolTip provides information about the batch, including the Gantt bar label, start and end times, and duration.

Selecting a Batch

When you select a batch on the Results Table, Gantt Chart, or Batch Trend symbols, the same batch is highlighted on all the other of these components in the display.

Properties Dialog Box

To see more information on a particular batch, right-click its Gantt bar and choose **Properties...** The dialog box that appears shows the relevant properties depending on whether a PIBatch, PIUnitBatch, or PISubBatch is selected. You can copy these properties in tab-delimited form to the clipboard so that you can paste them into another application.



Properties dialog box for a PIUnitBatch

Maximize

Double-click the Gantt Chart to maximize it to the size of your display. Double-click again to reduce to the original size in the display.

Gantt Cursors

In the same way that you can draw a Trend Cursor on a regular Trend symbol, you can draw Gantt Cursors on the Gantt Chart and Batch Trend symbols.

When you draw a cursor on the Gantt Chart, a Trend Cursor also appear on all Batch Trends within the Batch Group.

If the Gantt Chart is too small you cannot draw a cursor. You can make the Gantt Chart larger in Build mode, or maximize the Gantt Chart and then draw the cursor.

Similarly, if you draw a Gantt Cursor and it does not appear on your Batch Trend, it is likely the Trend Cursor will not fit in the Trend. You may be able to see the Trend Cursor by maximizing your Batch Trend or decreasing the number of batches or data sources displayed in the Batch Trend.

Gantt Chart Right-Click Menu

When you right-click a Gantt Chart without clicking on a Gantt bar, the menu items are:

- **Unalign**: Returns Gantt chart and associated Batch Trends to unaligned state.
- **Batch Search...**: Opens the **PI BatchView Search** (Advanced Search) dialog box. The search parameters are preset to the search specified in the **Batch Definition** dialog box and modified to include any changes from in-display search components. Click **Search** to query the PI Server(s) for batches and return the results to the display. Any search

components present on the display are updated with the parameters of the search. For details on the **Advanced Search** dialog box, see *Advanced Searches* (page 97).

- **Revert:** Reverts the Gantt chart and thus any Batch Trend(s) to the view based on the Results Table and the settings within the definition dialog boxes.

Gantt Bars Right-Click Menu

In addition to the items from the Gantt chart shortcut menu, these items are also available when you right-click a Gantt bar:

- **Expand...and Collapse...:** Choices are to expand or collapse "this item", "this item (all levels)", and "every *label*", where *label* is the Gantt bar label. For details, see *Expanding and Collapsing Multiple Bars* (page 69).
- **Show parent level:** Shows the level above the current top level. For example, if PIUnitBatches are the top level displayed, selecting this shows the PIBatches that are parents of the PIUnitBatches. If two sibling PIUnitBatches were present initially, the parent PIBatch appears above both sibling PIUnitBatches. Alignments are preserved when using Show parent level.
- **Align to every *item*:** Aligns to every Gantt bar matching the selected Gantt bar. The possibilities are:

- **Align to every PIBatch:** This appears when the PIBatch is the top level.
- **Align to every PIUnit Unit:** Where *PIUnit* is the full path to the PIUnit where the PIUnitBatch ran. This appears when PIUnitBatch is not the top level. For example, **every PIBatch\PIBaGenFastTest Unit**.
- **Align to every PIUnitBatch:** This appears when PIUnitBatch is the top level.
- **Align to every PISubBatch Heading:** Where *PISubBatch* is the path to the PISubBatch, including the PISubBatch name, and *Heading* is the PIHeading of the PISubBatch. This appears every time you align to a PISubBatch. For example:

In a PIUnitBatch search: **Align to every PIUnitBatch\mySubBatch1\mySubBatch2 Operation**

In a PIBatch search: **Align to every PIBatch\myUnit\mySubBatch1\mySubBatch2 Operation**

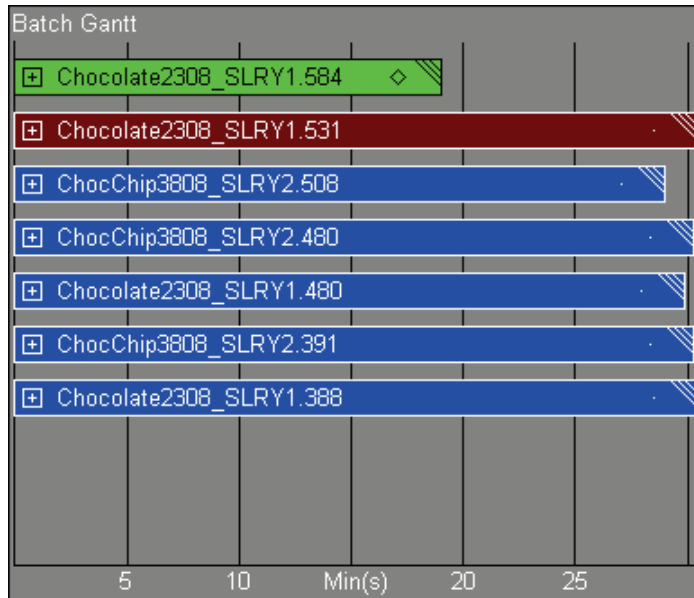
This option aligns all the batches of like name and level. If there are no batches that match, nothing aligns within that batch.

For more details on aligning, see *Aligning Gantt Bars* (page 73).

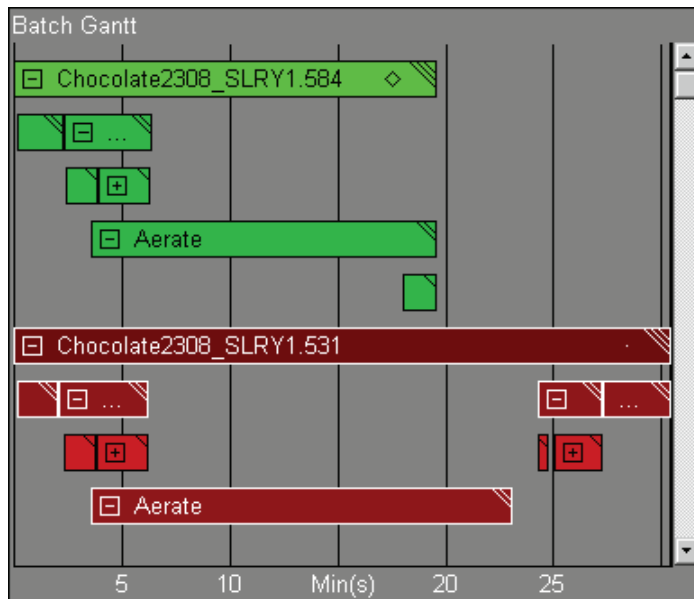
- **Properties...:** Shows the Properties Dialog Box containing all the properties of the PIBatch, PIUnitBatch or PISubBatch.

Navigation

You can zoom in or out to the level of the process you want to view in the Gantt chart. You can expand or collapse the Gantt bars to see the lower-level batch processes. You can also choose to show or hide the parent batch processes of the ones you are viewing.



If you expanded the batches in the above Gantt Chart, you would see something like this:



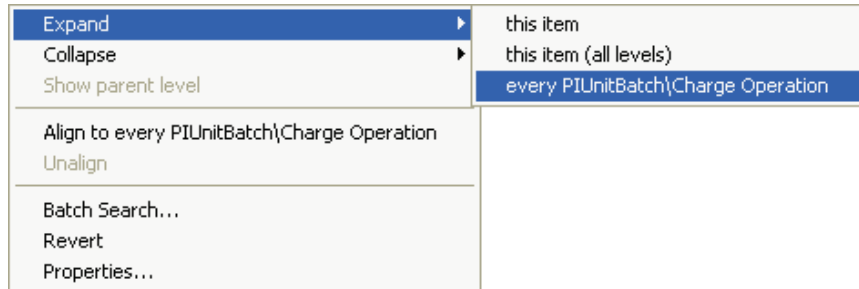
Bars occupying concurrent times appear on the minimum number of lines possible. In the green Aerate sub-batch (with two diagonal stripes), there are several other sub-batches that overlap the Aerate sub-batch's time range. These Gantt Bars appear on separate lines.

Plus and Minus Signs

Use plus and minus signs to expand and collapse details of the batch processes, just as you would open and close branches of a tree view. A plus sign appears on a bar indicates that there are children of the bar that you can view.

Expanding and Collapsing Multiple Bars

In addition to the plus and minus signs, there are three ways to expand or collapse multiple bars. To do this, right-click a Gantt bar and choose an option from the following menu:



The options are:

- **this item**: Expands all the items one level below the selected bar. This is the same as clicking the Gantt bar's plus sign.
- **this item (all levels)**: Opens the selected item and all of its child items.
- **every item**: Expands every item similar to the Gantt bar you have clicked. The text in this option depends on the selected item's Batch type:
 - **every PIBatch**: This appears when the PIBatch is the top level.
 - **every PIUnit Unit**: Where *PIUnit* is the full path to the PIUnit where the PIUnitBatch ran. This appears when PIUnitBatch is not the top level. For example, **every PIBatch\PIBaGenFastTest Unit**.
 - **every PIUnitBatch**: This appears when PIUnitBatch is the top level.
 - **every PISubBatch Heading**: Where *PISubBatch* is the path to the PISubBatch, including the PISubBatch name, and *Heading* is the PIHeading of the PISubBatch. This appears every time you expand a PISubBatch. For example:

In a PIUnitBatch search: **every PIUnitBatch\mySubBatch1\mySubBatch2 Operation**

In a PIBatch search: **every PIBatch\myUnit\mySubBatch1\mySubBatch2 Operation**

This option opens all the batches of like name and level. If there are no batches that match, nothing expands within that batch. If there are multiple items within a batch that match the name of the item you want to expand, they all expand.

For example, if you right-click and choose **every Heat Operation** for a PISubBatch named Heat and one of the other retrieved batches does not contain an Operation

named Heat, all the other Heat Operations except that one batch expand. Similarly, if a batch has two Operations named Heat, then both expand.

The **Collapse** menu item has the same choices as the **Expand** menu item and functions the same, except that the Gantt bars collapse.

Zooming

In Run mode, you can zoom in on sections of the Gantt chart to limit the view of the batches. Zooming on the Gantt chart is different than on a standard PI ProcessBook trend or on the Batch Trend: in the Gantt chart the zoom depends on the item you select.

The zoom behavior on the Gantt chart also depends on whether the data appears in Absolute or Relative time. In Absolute time mode, you zoom to the items you selected. In Relative time mode, you zoom to the context of the items you selected.

ZOOMING IN ABSOLUTE TIME

Zooming on the Gantt Chart in absolute time mode is similar to zooming on a trend. With the zoom you can change the time range that appears by picking certain Gantt bars to view. To do this, drag a rectangle around the Gantt bars you want to zoom in on. The Gantt Chart redraws to show only the Gantt bars you selected. The Gantt Chart's start and end times are determined by the Gantt bars you zoomed in on.

Any zooming on the Gantt Chart also affects all Batch Trends in the group. These Batch Trends have the same start and end time as the Gantt Chart.

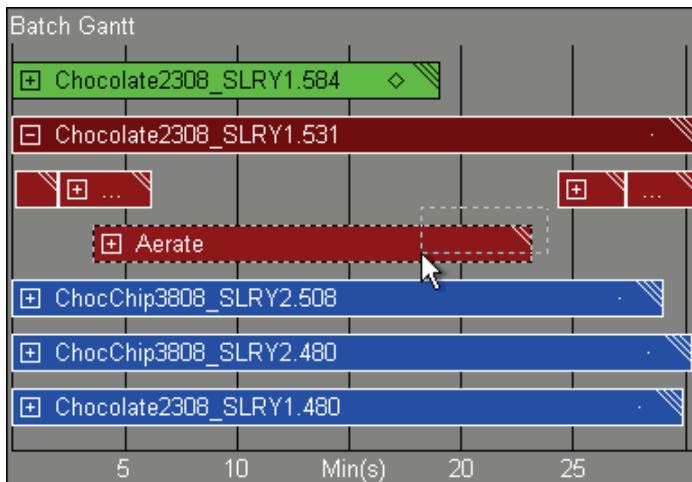
Click **Revert Time Range** to revert to the time range set by the definition dialog box at build time.

ZOOMING IN RELATIVE TIME

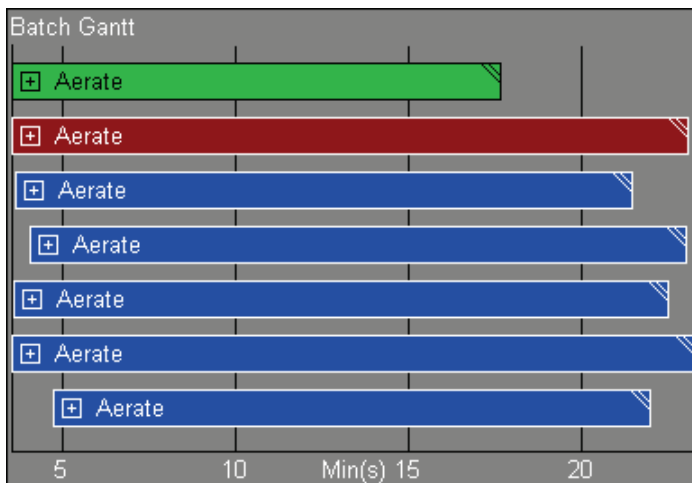
When you zoom in Relative time, you:

- Change the context of the top level shown
- Change the breadth of the sibling batches displayed

For example, in the following illustration, a box is drawn around the Aerate PISubBatch. This PISubBatch is selected and the view zooms to every Aerate PISubBatch that is a child of the PIUnitBatches at the top level of the Gantt Chart:



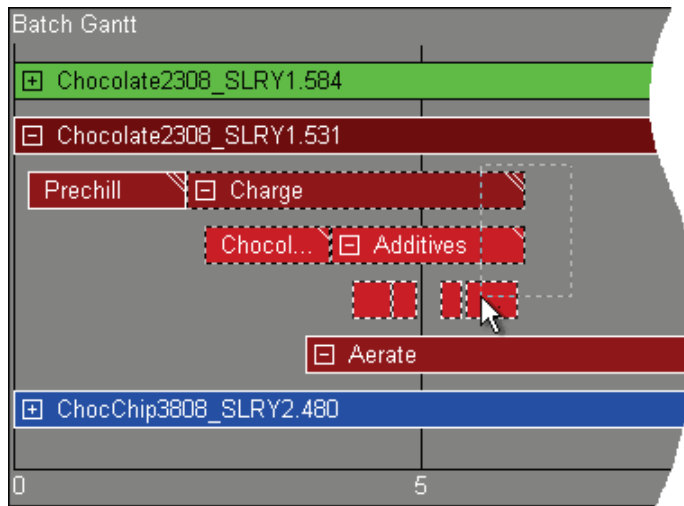
The results are shown below. This zoom effectively changes the context of the Gantt Chart and Batch Trends in the Batch Group from PIUnitBatches to the Aerate PISubBatches.



The default zoom behavior does not align the resulting new top-level batches. But you can change this behavior to zoom and align in a single step for each Batch Group using the **Configure Gantt Definition** dialog box. In the above example, if the Zoom with Align setting were set to true, the Aerate PISubBatches would be aligned by their start times.

Note: Zooming with align is equivalent to zooming and then aligning; thus there are two steps to undo the action: un-align and un-zoom.

You can zoom in on multiple Gantt bars to change the context to that set of Gantt bars, as shown in the following figure. All bars that you select for zooming are highlighted as you drag the mouse pointer across them.



As the figure illustrates, if you drag your pointer to select a first-level PISubBatch and continue to drag the pointer to select the second-level PISubBatch, all of the items on the second level are selected.

Discontinuous selections are not permitted when zooming.

ZOOMING ON THE GANTT CHART AFFECTS THE BATCH TREND

When zooming on the Gantt chart, traces on the trend are shown continuously for each trace. Gaps in traces are only shown between PIUnitBatches.

When you perform a zoom operation on a Gantt Chart, it affects all of the Batch Trends associated with the Gantt Chart. Zooming on Batch Trends, however, does not affect the Gantt Chart.

ZOOMING ON PISUBBATCHES

When you zoom in on a PISubBatch, corresponding PISubBatches in the other PIUnitBatches are also zoomed in on. Corresponding PISubBatches are chosen based on the Name, PIHeading, and instance of the PISubBatch.

For example, if there are multiple instances of Heat in the PIUnitBatch from which you zoomed and you zoom on the n th instance of a Heat Operation, then the Gantt chart zooms in on the n th instance of the Heat Operation PISubBatch in each of the PIUnitBatches.

ZOOMING ON PIUNITBATCHES

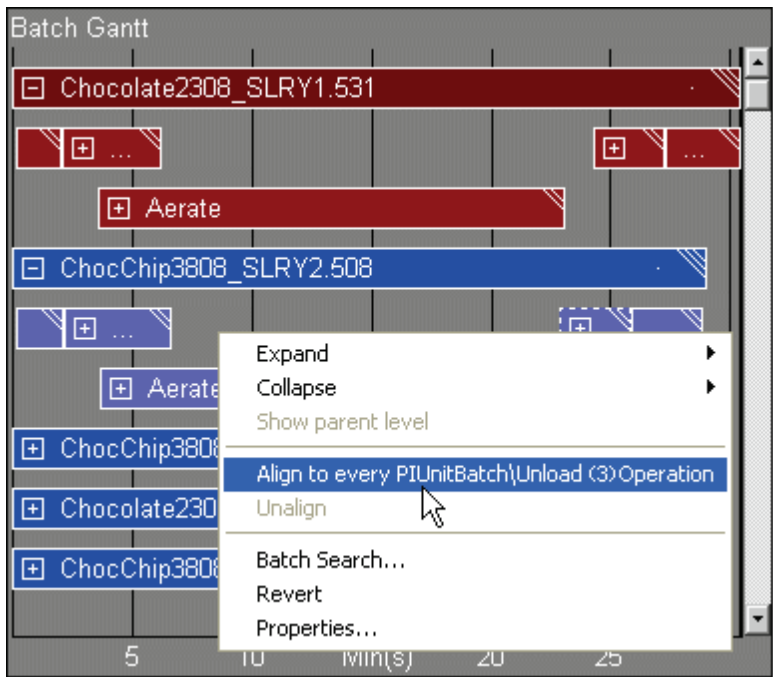
When PIBatches are the top-level batch displayed on the Gantt chart, you can zoom in on PIUnitBatches. When you zoom in on a PIUnitBatch, the corresponding PIUnitBatches are chosen if they ran in the same PIUnit. Zooming in on a PIUnitBatch selects that PIUnitBatch and all other PIUnitBatches within your PIBatches that were run within the same PIUnit.

When multiple PIUnitBatches that were run in the zoomed PIUnit are found within a PIBatch, all of them appear. When you zoom without aligning, PIUnitBatches appear relative to the start of their parent PIBatch. If you zoom and align, all of the PIUnitBatches that were zoomed are aligned.

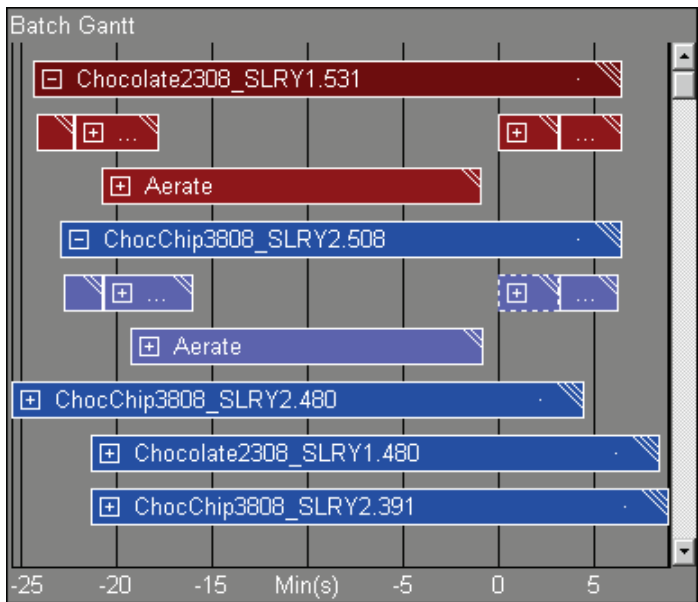
Aligning Gantt Bars

Aligning the Gantt bars is useful for aligning data in the Batch Trend and analyzing cycle-time.

You can select one batch item and align this item across all the other batches. The following two figures illustrate how to align the batch data based on a batch in the Gantt chart. In the first, the user right-clicks the Unload PISubBatch of the PIUnitBatch to see the Align menu:

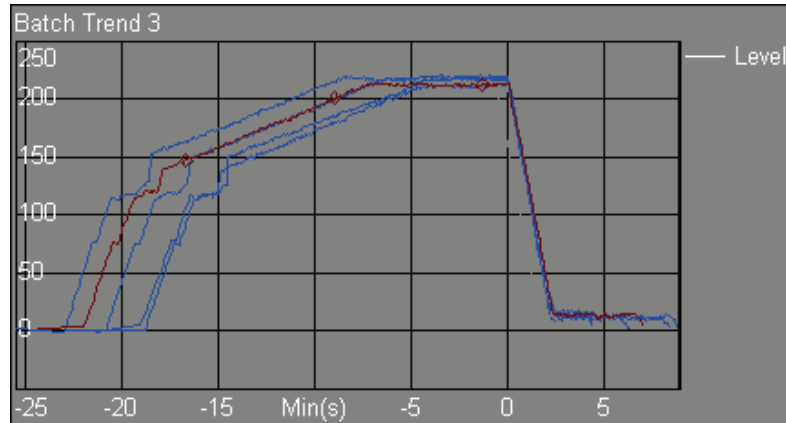


The result is the Gantt bars align to the operation and the relative time is based on the operation start:



When you align the Gantt bars, you also align the corresponding data in the Batch Trend. The following figure shows the Batch Trend that is aligned as a result of the actions in the previous two figures.

The time axis of the Gantt chart and any trends are set to zero at the point of alignment. That is, time is now relative to the point of alignment:

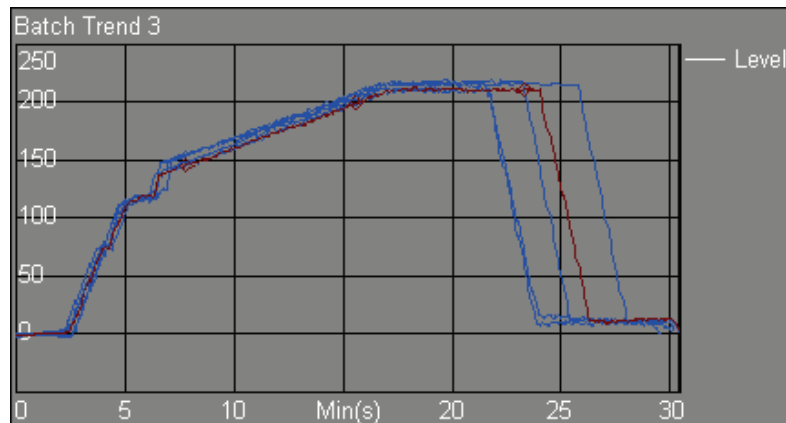


If you choose a PISubBatch and select this option, the chart searches for PISubBatches with the same Name and PIHeading. If you choose a PIUnitBatch and select this option, the chart searches for PIUnitBatches that ran in the same PIUnit.

Batch Trend

The Batch Trend displays data from PIPoints, PIAliases, or data sets for the time ranges based on the PIUnitBatches retrieved in the Batch Group. Each Batch Group can have one or more Batch Trends. Each Batch Trend can have one or more data sources.

The traces plotted in the Batch Trend are coupled with the PIUnitBatches shown in the Gantt Chart. This provides a means for correlating batch events with process data. You can use the Gantt Chart for aligning batches to line up profiles of process data such as a reactor's temperatures during a heat cycle.



Continuous data is plotted for each PIUnitBatch in the Batch Group. When you search for PIBatches, the Batch Trend shows the data during times when the PIUnitBatches were active. During times within a PIBatch when there is no active PIUnitBatch, the trend shows a gap in the trace.

If a PIAlias is not found for a PIUnit, no trace appears for the PIUnitBatches that ran in that PIUnit for that particular PIAlias.

Configuration

Configure the BatchTrend Symbol using the *Configure Trend Dialog Box* (page 32).

Appearance

There can be one or more data sources in a Batch Trend. Because the trace colors indicate different batches rather than data sources, line style—not color—indicates different data sources.

One or more Batch Trends may exist within a Batch Group. You can synchronize the time axes of these Batch Trends with each other and the Gantt Chart. See *Synchronizing Time Scale on Gantt and Trend* (page 51) for details. By default, newly created Batch Group symbols synchronize the time axes of the Gantt Chart and all Batch Trends.

Many options for the legend on the Batch Trend are available. For details, see *Configure Trend Dialog Box* (page 32).

Interactions

ToolTips

To see a ToolTip with the time, value, alias, and Batch ID from the PIUnitBatch, rest your pointer over a trace.

Select a Batch

When you select a batch on the Results Table, Gantt Chart, or Batch Trend symbols, the same batch is highlighted on all the other of these components in the display.

Maximize

Double-click the Batch Trend to maximize it to the size of your display. Double-click again to return to the display.

Trend Cursors

In the same way that you can draw a Trend Cursor on a regular Trend symbol, you can draw Trend Cursors on the Gantt Chart and Batch Trend symbols.

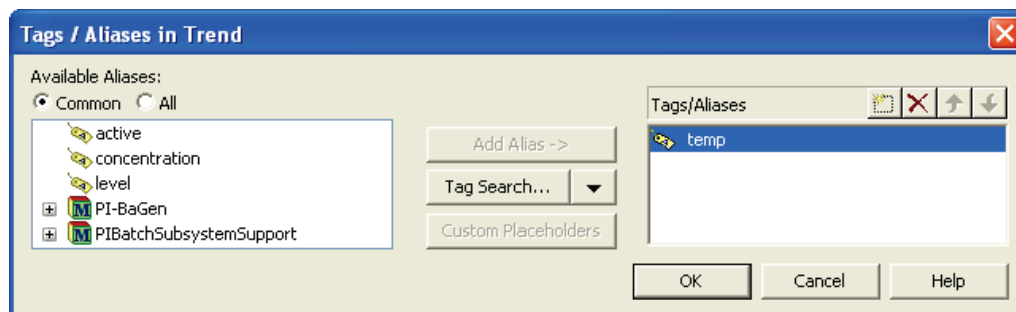
Trend Cursors drawn on a Batch Trend only appear on that Batch Trend. If the Batch Trend is too small, you cannot draw a Trend Cursor. You can either make the Batch Trend larger in Build mode, or maximize the Batch Trend and then draw the Trend Cursor. You may also

need to decrease the number of batches or data sources displayed in the Batch Trend to draw a Trend Cursor.

Shortcut Menu

When you right-click a Batch Trend, the menu that appears has the following options:

- **Batch Search:** Opens the **PI BatchView Search** (Advanced Search) dialog box. The search parameters are preset to the search specified in the **Batch Definition** dialog box and include any changes from in-display search components. Click **Search** to query the PI Server(s) for batches and return the results to the display. Any search components on the display are updated. For details on the **Advanced Search** dialog box, see *Advanced Searches* (page 97).
- **Revert:** Removes all scrolling and zooming and returns the trend to the original time range either based on the Gantt chart if present in the Batch Group or the settings in the definition dialog boxes.
- **Tags/Aliases in Trend...:** Opens the **Tags/Aliases in Trend** dialog box. For details on the options in this dialog box, see *Batch Definition Dialog Box, Main Tab* (page 22). Any change you make with this dialog box persists in run time only and does not persist when you save the display.



Aligning Traces

To align traces in the Batch Trend, use the Gantt Chart align features. Alignments made to batches in the Gantt Chart also align the traces in the Batch Trend. For details, see *Aligning Gantt Bars* (page 73).

Updates

The Batch Group updates its batch data in two ways: it updates the results from the query and it updates any changes to batches that appear.

The Batch Group can automatically update the batches in its results list when a new batch starts. The default Batch Group behavior is to update each time PI ProcessBook updates. You can also set the Batch Query to update only when the display loads. Alternatively, you can turn off the Batch Query. These options are available in the *Batch Definition Dialog Box, Settings Tab* (page 41).

Updates are made continuously to batches shown on the display. For example, batches that are in progress display new child batch objects as they are created. Edits to running or completed batches are also updated on your display.

By default, PI ProcessBook updates every 5 seconds. If your Batch Query takes a significant portion of the update time, the update occurs less frequently. This management helps to update the display with reasonable frequency while allowing users to interact with the display.

Understand PI BatchView Error Indicators

When you open a display containing a Batch Group or a 2.1 version Batch Trend that has Anchored batches or Fixed batches (from a version 2.1 Batch Trend) that are not found, the Batches Not Found dialog box appears.

The dialog box shows attributes of the batches not found. If these batches have been permanently removed from the PI server you may want to remove them from the display to avoid seeing this dialog box each time you open the display. To remove an Anchored or Fixed batch from the display, check the box to the left of the batch. Click **OK** to close the dialog box and remove the checked batches from the display.

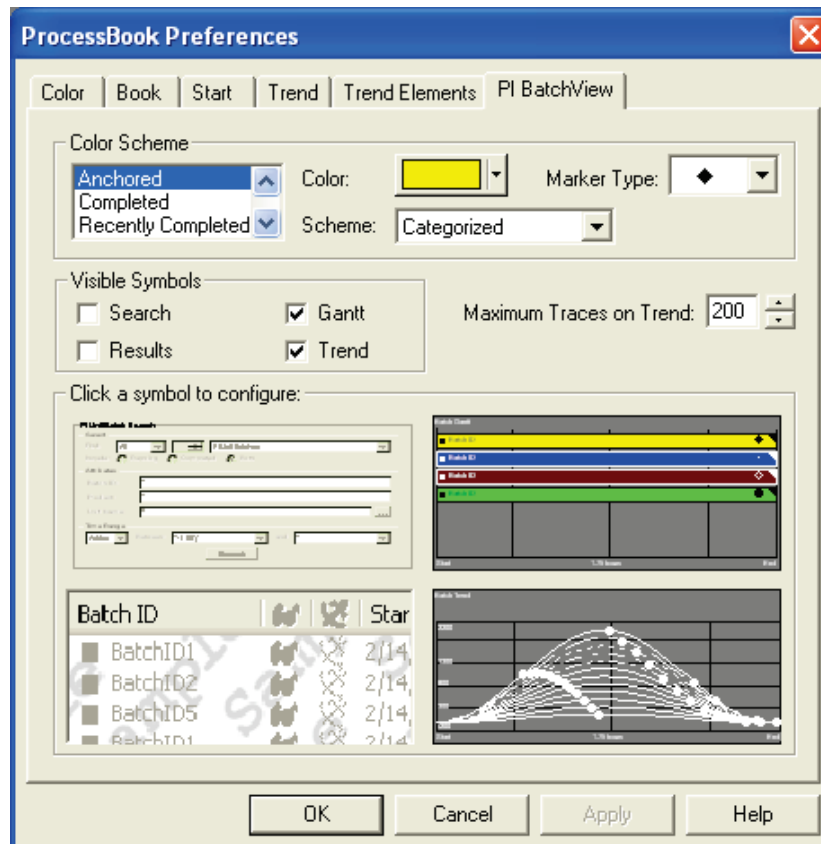
To load the display without deleting any batches, leave the boxes unchecked and click **OK**.

PI BatchView Preferences

When you create a new Batch Group symbol, it obtains many of its settings from the PI BatchView Preferences in PI ProcessBook. These preferences are applied to new Batch Group symbols but—with one exception—do not apply to Batch Group symbols that were previously created. You can change these preferences in the **ProcessBook Preferences** dialog box.

The **Maximum Traces on a Trend** setting applies to new and existing Batch Groups.

To access these settings, choose **Tools > Preferences**. In the **ProcessBook Preferences** dialog box that appears, click the **PI BatchView** tab.



The PI BatchView tab includes settings for color scheme and symbol configuration.

Color Scheme

The **Color Scheme** area determines the default color scheme as well as the colors and marker types for that scheme used in a new *Batch Group* (page 59) symbol. Once you create a Batch Group, these preferences are not reapplied.

The scheme selected is the preference for a new Batch Group. To change to color and marker preferences within a scheme, select that scheme and then edit the color and marker for each trace.

Note: The Color drop-down list does not close until you select a color or click outside the box.

Visible Symbols

Indicate which symbols you want to appear in your displays by default.

Maximum Traces

For better performance, it is useful to limit the number of traces on the *Batch Trend* (page 74). The default is 200 but the maximum is 500. The amount of data shown in 500 traces within one trend requires a significant amount of time to retrieve from the PI Archive. At some point, adding extra traces to the trend either does not add any more information about the process or makes a complex trend even more difficult to interpret. Thus, this setting can prevent expensive and often unnecessary archive retrieval.

Tip: If you want to use a significantly large number of traces in order to find outliers, you can use the *Filter Expression* (page 95) of the Batch Search parameters to filter out most of the "normal" traces.

Using the default of 200, if there is one alias, you can show 200 batches. If there are two aliases, you can show 100 batches, and so on. If there are more than 200 traces to show, all batches for the first alias appear first. Then all batches for the second alias appear until there are no more batches to show.

Exceeding the 200 trace limit may lead to unexpected updating behavior. New batches do not appear if there are over 200 batches to draw. For example, a new running batch cannot be added unless an old one is removed. A warning icon appears on the Batch Trend when it reaches this limit.

Symbol Configuration

This area determines the initial settings that appear in the definition dialog box of a new Batch Group symbol for each of the four Batch Group component symbols. Click the picture of each symbol to open a preferences dialog box for that symbol.

Use the **Batch Search Preferences** dialog box to configure the default appearance of the Search symbol in a new *Batch Group* (page 59). It behaves exactly like the *Configure Search Dialog Box* (page 28).

Use the **Batch Results Preferences** dialog box to configure the default appearance of the Results Table symbol in a new *Batch Group* (page 59). It behaves exactly like the *Configure Results Dialog Box* (page 29).

Use the **Batch Gantt Preferences** dialog box to configure the default format of the *Gantt Chart* (page 63) in a new Batch Group. It is organized differently than the *Configure Gantt Dialog Box* (page 30) but behaves identically and contains the same elements.

Use the **Batch Trend Preferences** dialog box to configure the default format of each *Batch Trend* (page 74) in a new Batch Group. It appears and behaves almost exactly as the **Format** tab of the *Configure Trend Dialog Box* (page 32).

Preferences for scale and plot time are not currently available.

Chapter 5

Use the PI BatchView Programming Interfaces

PI BatchView provides these programming interfaces:

- ActiveX controls
- PI ProcessBook Programming Interface

Programmatic access is designed mainly for VB and VBA, especially VBA within PI ProcessBook and Microsoft Excel. Other languages that provide access to COM, such as C/C+, can also access the libraries.

For details on the programming tools, see the online programming help file `PIBatchViewProgramming.chm`. In a typical installation, this file is located at `InstallPath\PIPC\HELP\`. For example, `C:\Program Files\PIPC\HELP`.

Integrate PI BatchView into Applications with ActiveX Controls

PI BatchView contains several libraries of COM components that provide programmatic access to its searching capabilities. These libraries include several Search and Results (ActiveX) controls that provide user interface elements to the underlying criteria and search components.

Customize the Batch Group Symbol in PI ProcessBook

You can automate the Batch Group symbol in PI ProcessBook. For details, see the online programming help file `PIBatchViewProgramming.chm`.

Part II

Common Features of PI BatchView Tools

The following sections describe how to use the features that are common to all PI BatchView tools:

- Setting Search Parameters
- The Results Table
- Custom Names Sets

Chapter 6

Set Search Parameters

When used together, the search parameter components provide for a flexible and powerful search query. The components are:

| Component Name | Description |
|----------------------|---|
| Selection Component | Specifies the number and type of batches to return |
| PI Servers Component | Specifies which PI Servers to search from |
| Time Range Component | Specifies the time range to limit the search to |
| Attributes Component | Specifies masks for batch attributes |
| Duration Component | Specifies the batch duration range |
| Filter Component | Specifies a filter expression to test archived data |

Selection Component

The **Select** area specifies the number of results to return, the type of batches, and whether or not they have completed.



Selection Mode



Use this drop-down to limit the number of items returned by the search. The options are:

- **All:** The search returns all results that it finds.
- **The First:** The search results are limited to the first (least recent) items of all those found; that is, those items with the oldest start times. The **Count** parameter specifies the number of items to return.
- **The Last:** The search results are limited to the last (most recent) items of all those found; that is, those items with the most recent start times. The **Count** parameter specifies the number of items to return.

Count



This up/down box specifies the maximum number of batches the search can return.

The actual number of results returned depends on the Selection Mode parameter. For example, if the Count is 20 and the Selection Mode is **The Last**, then the search returns the most recent 20 items (based on their start time). If the Select Mode is **All** then the Count parameter is irrelevant and the up/down box is disabled.

The Count parameter ranges from 1 to 999.

You can change the value of the up/down box in any of the following ways:

- Enter a number in the box
- Press the up and down buttons in the box to increment and decrement the count by 1.
- Press the Up and Down keys on the keyboard to increment and decrement the count by 1.

Holding the buttons and keys described here continuously increases or decreases the count and after a few seconds it accelerates. Thus, you can reach larger numbers more quickly.

Batch Type



This drop-down list specifies the type of batches that the search returns. The options are:

- **PIBatch**: The PI Batch Database PIBatch entity.
- **PIUnitBatch**: The PI Batch Database PIUnitBatch entity.

The search returns only batches of the type that this parameter specifies, regardless of any other parameters that are set.

Include

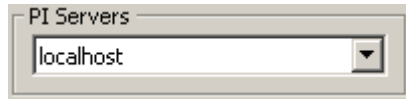


The **Include** parameter specifies which batches to return, based on whether or not they have completed. The options are:

- **Running**: Return only running batches. These are items that do not yet have an end time defined.
- **Completed**: Return only completed batches. These are items that have an end time.
- **Both**: Return both running and completed batches.

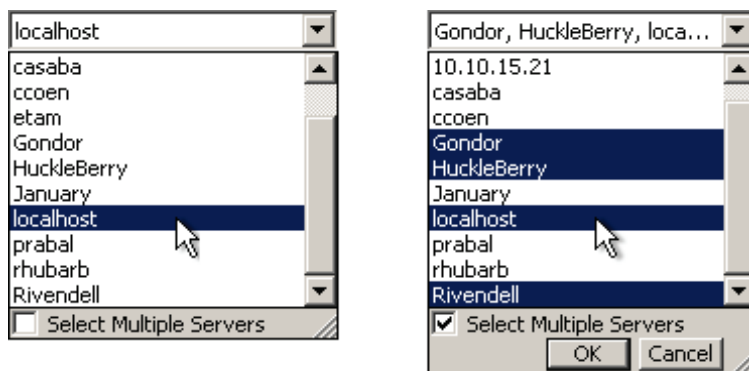
PI Servers Component

The **PI Servers** box specifies the PI Servers to search.



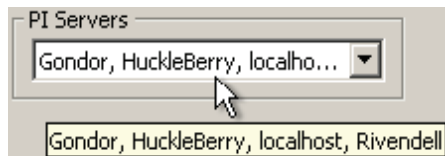
The PI Servers available are those defined on the local computer by the PI SDK and shown in the PI SDK **Connections** dialog box.

Click a server to select it, or to select multiple servers, click the **Select Multiple Servers** check box and select multiple servers.



You can also select servers by pressing the Up and Down keys and the space bar.

When multiple servers are selected, they appear in the box separated by commas. If all the server names do not fit in the box, an ellipsis (...) truncates the list. Rest the pointer over the box to see a ToolTip showing the complete list.



If a PI Server name appears with brackets ([]) around it, the server is missing. This happens if the PI SDK has removed the server definition or the Server's component was populated on another computer that defines different servers.

For example, a user places the PI Servers component in a PI ProcessBook display, adds the server `Huckleberry`, and saves the display. If a user opens that display in PI ProcessBook on a different computer where `Huckleberry` is not defined, the component contains `Huckleberry`, but only to preserve the integrity of the display. In the PI Servers box, the missing server appears as `[Huckleberry] - Missing`.

If you deselect a missing server in the list, it no longer appears in the drop-down list. To restore it, use the PI ProcessBook **Connections** dialog box to add the server.

Performing a search against a missing server yields zero results for that server.

Time Range Component

The **Time Range** component specifies a search's beginning and end times.

Activity State

The activity state options are:

- **Started:** Each batch start time must be within the time range specified.
- **Active:** Each batch must be active at some time during the time range specified. It may start before or end after the time range specified.
- **Entirely:** Each batch must start and end entirely within the time range specified.
- **Ended:** Each batch end time must be within the time range specified.

The time range boundaries are inclusive so that if a particular time of the batch is the same as one of the time parameters then it is considered to be within the range.

Time From and Time To

The **Between** and **and** boxes are the *TimeFrom* and *TimeTo* parameters. They specify the time range that the search is bound by.

The Activity State parameter specifies whether or not an item is considered to be within this range.

The drop-down lists contain basic time entries, including *, *-1 Minute, *-1 Hour, *-8 Hours, *-1 Day, and *-7 Days. You can also enter other values. For details on valid values, see *PI Time and Relative Time* (page 98). All Windows formats (in the format of the locale setting) are also valid.

Times can be relative to each other. This means that *TimeFrom* can be an interval that is added to *TimeTo*, or vice-versa. For example, if *TimeFrom* = "21-Oct-03 17:30" and *TimeTo* = "+ 30 minutes" *TimeTo* is equivalent to "21-Oct-03 18:00". If *TimeFrom* = "-8 h" and *TimeTo* = "*-1 d" *TimeFrom* is equivalent to "*-1d - 8h".

If both *TimeFrom* and *TimeTo* are intervals, then *TimeFrom* is considered relative to the current time.

The order of *TimeFrom* and *TimeTo* makes no difference to the way the search is done. Results are ordered by start time descending.

Attributes Component

The Attributes component specifies the attributes of each item to test for a match with a text mask.

The following sections describe the Selection component parameters.

Attribute Selection

This drop-down lists the attributes that are available for masking. The attributes available for each batch type are:

| PIBatch | PIUnitBatch | PISubBatch |
|-------------|--------------|------------|
| Batch ID | Batch ID | Name |
| Product | Product | Heading |
| Recipe Name | Unit Name | |
| | Procedure | |
| | Unit Heading | |

Each of these is a text attribute that can be compared with a *Mask List* (page 90) to test for inclusion in the returned results list.

The maximum number of visible Attribute Selection drop-down lists is determined by the number of available attributes of the batch type that the component pertains to. For example, if an Attribute component pertains to PISubBatches, then it can display a maximum of two Attribute Selections. See *Advanced Searches* (page 97) for more details.

A single Attribute only contains attributes that are not already displayed in other visible Attributes. For example, if three PIUnitBatch Attributes are visible and the first two are set to **Batch ID** and **Product**, then the third has a choice between the remaining PIUnitBatch attributes: **Unit Name**, **Unit Heading** and **Procedure**.

In Excel, a Unit Name module path can be specified without the server. If no server is specified in the module path, the unit specified is searched for on all servers specified in the PI Servers component. To specify a module path without the server, the first character must be a "\". For example:

```
\Plant\Line1\Reactor
```

Mask List

Each *Attribute Selection* (page 89) parameter is coupled with a Mask List parameter. A mask is a string that is compared with the value of a specific attribute in each batch.

You can enter multiple masks, separated by commas. The relationship between these masks is logical OR. For example, the mask list:

A screenshot of a search parameter field. On the left, there is a dropdown menu labeled 'Batch ID' with a downward arrow. To its right is a text input field containing the string 'XYZ123, JKL780, ABC000'.

returns batches whose Batch ID property is "XYZ123", "XYZ789", or "ABC000".

The mask list elements may contain the * and ? wildcard characters. The * matches zero or more characters in a string and the ? matches any single character. For example, the mask list:

A screenshot of a search parameter field. On the left, there is a dropdown menu labeled 'Batch ID' with a downward arrow. To its right is a text input field containing the string 'XYZ12?, JK*, *??6'.

could return batches with Batch IDs like XYZ123, XYZ127, XYZ12A, JKL789, JKSS010816, ABC006, and A16.

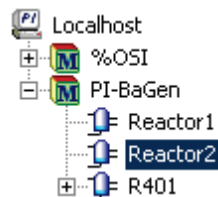
If you change the Attribute Selection (for example, from **Batch ID** to **Unit Heading**) then the contents of the mask list do not change, but instead are applied to the new attribute.

Unit Names

A screenshot of a search parameter field. On the left, there is a dropdown menu labeled 'Unit Name' with a downward arrow. To its right is a text input field containing the character '*'. To the right of the input field is a small square button with three dots inside.

Use the **Unit Name** parameter to specify PIUnits as well as unit masks. If you specify one or more PIUnits, the search is performed for those PIUnits as well as any unit masks that are specified.

Use the entire PI Module Database path (including the PI Server name) to specify a PIUnit. For example:




The full path for the selected unit Reactor2 is

```
\\Localhost\PI-BaGen\Reactor2\
```

where `Localhost` is the PI Server where Reactor2 is defined. Wildcard characters do not apply to module paths.

Tip: To optimize the batch search speed, use specific units. Searching with a specific unit or a list of specific units is faster than searching with a unit mask.

Module Context

When used in ProcessBook, masks in the mask list can be PIModule context-aware. A context-aware mask has the form of `%ModuleContext%` and can be entered directly into the mask list. Alternatively, click  in the Unit Name Mask Selection Dialog Box to insert this mask.

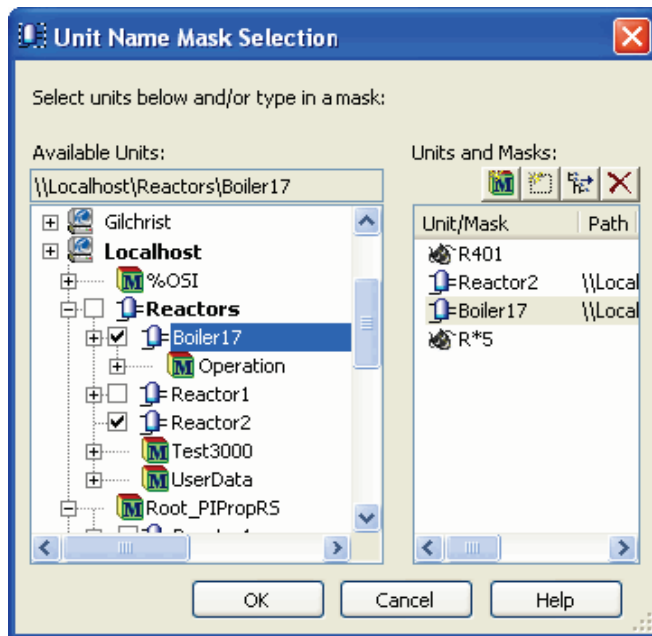
The batch search uses a module context-aware mask by retrieving the current PI ProcessBook module context and applying it to the mask. It uses simple text replacement to replace the `%ModuleContext%` with the full path of the PIUnit in context.

When used by itself, the context-aware mask is useful for switching the PI ProcessBook context between actual PIUnits. In cases where the PIUnit is a child of a PI ProcessBook context, you can append the context-aware mask with the appropriate path. For example, for a context of `\\localhost\Plant\Line1`, `%ModuleContext%\Reactor` becomes `\\localhost\Plant\Line1\Reactor`.

If a PI ProcessBook context causes the mask to resolve to a PIModule instead of a PIUnit, the search produces no results for that mask.

Unit Name Mask Selection Dialog Box

You can enter a module path directly into the Mask List text box. For most modules, this can be tedious. Click the ellipsis button (...) next to the mask text box to open the **Unit Name Mask Selection** dialog box. In this dialog box you can define unit masks and select units from the PI Module Database to include in the Unit Name List.



All of the items in the Unit Name list appear in this dialog box. If you specify a unit and its path does not exist, it does not appear. The unit is removed from the list after you click **OK** and remains if you click **Cancel**.

Available Units

The left side of the **Unit Name Mask Selection** dialog box shows a module tree that lists all PIModules and PIUnits. Using this tree you can easily locate and select units, and create masks. When you highlight an item in the tree, its full path appears in the text box above the tree. You cannot edit this path. To copy the path to the clipboard, select it and press **Ctrl+C**.

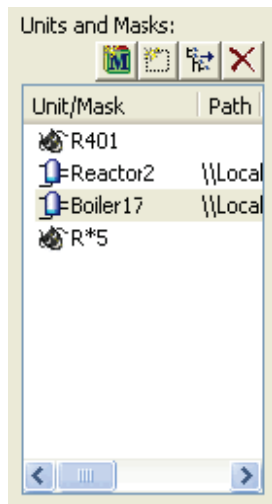
A unit that is checked in the tree is hidden if its parent item is not expanded. To assist in locating a hidden unit, its parents in the tree appear in bold typeface.






When a unit in the list is highlighted, the corresponding unit in the tree is also highlighted, and vice-versa. Thus, you can easily find a unit in one view by highlighting a unit in the other. If one has scrolled out of view, it comes back into view if you highlight the other. If a unit in the list is highlighted and that unit in the tree is hidden, all of its parents expand to unhide it.

If possible, the full path of each unit in the list appears; otherwise it is shortened for display purposes. Rest the pointer over the item to display a ToolTip showing the full path.

Units and Unit Masks







The list on the right side of the **Unit Name Mask Selection** dialog box shows current units and unit masks. The icons for units and unit masks are:

| Icon | Description |
|---|----------------|
|  | Unit mask |
|  | Unit |
|  | Module context |

The list has a Unit/Mask and Path column, which shows the full path for units. Thus, you can distinguish units of the same name by their path in the tree.

You can edit the list in several ways:

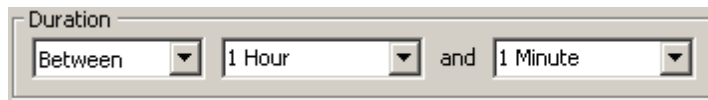
- Click  to create a blank entry below the last item. Enter a new mask.
- Double-click an existing mask to edit it.
- Select a PIUnit or PIModule from the Module tree on the left side of the dialog box and click  to create a new mask with the same name as the selected tree item.
- Select an item and click  to remove it from the list box, or press **Delete** on the keyboard.
- To add or remove a PIUnit, check or uncheck its box in the tree.

 =Reactor1

- Within PI ProcessBook, click  to add a PI ProcessBook module context mask.

Duration Component

In the Duration component, you can specify the range of batch durations for the search.



The component specifies the duration of only the batch type it pertains to. This is useful for situations where, for example, a search query is configured to return PIUnitBatches where a particular PISubBatch of each item is longer than a particular duration. In this case, the duration of the item being returned is not of concern but the duration of its sub-items. See *Advanced Searches* (page 97) for more details.

The following sections describe the Duration component parameters.

Duration State



In this box, specify the comparison state of the duration of each batch. The options are:

- **Any Length:** Each batch can be of any duration. When this is selected the Duration Period boxes are unavailable, since no comparison is needed.
- **Shorter Than:** Each batch must be shorter than or equal to the duration specified in the first Duration Period box. The second Duration Period box is unavailable for this option because it does not apply.
- **Between:** The duration of each batch must be within the range specified in the Duration Periods boxes. The periods can be in ascending or descending order, or can be the same to specify an exact duration.
- **Longer Than:** Each batch must be longer than or equal to the duration specified in the first Duration Period box. The second Duration Period box is unavailable for this option because it does not apply.

Duration Periods

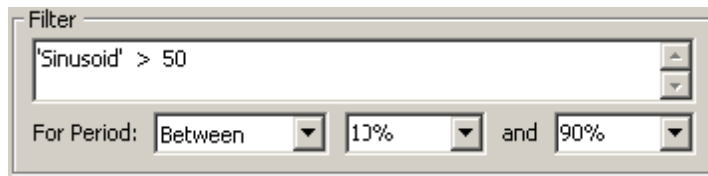


Use the Duration Period boxes to specify a search's duration range. Depending on the Duration State parameter value, one or both of the boxes may be disabled.

The Duration Period boxes include basic time entries in their drop-down lists, including 1 Minute, 1 Hour, 4 Hours, 8 Hours and 1 Day. You can also enter other values in the boxes. The first Duration Period does not need to be smaller than the second; the order does not affect how the search is run or results are returned.

Filter Component

If the filter expression evaluates to TRUE for the specified period for a particular batch, then the search returns that batch.



The search also tests the expression against the period for which the expression was true. This period is cumulative over the item's time range. For example, if the expression was true for 2 minutes at the beginning and then 5 minutes somewhere in the middle, the cumulative time that the expression was true is 7 minutes.

The component specifies the filter for archived values between the start and end times of a batch type. This is useful when, for example, a search query is configured to return PIUnitBatches where the archived value of "Sinusoid" during a particular PISubBatch of each item is less than 50. See *Advanced Searches* (page 97) for more details.

Filter Expression



In the Filter Expression text box, you can enter an expression in the PI Performance Equation syntax format. For details on this syntax, see the section on Performance Equations Subsystems in the *PI Server Applications User Guide*.

You can specify PI tags in single quotes (') (for example, 'Sinusoid'). PIAliases are not part of the native syntax but you can use them in the filter expression with single quotes (for example, 'Temp'). The filter expression attempts to evaluate aliases before it evaluates PI tags.

Aliases are available only in PIModules (including Modules that are designated as PIUnits). If the filter expression component pertains to a PIUnitBatch or PISubBatch, you can use aliases from the unit. The syntax is the same as that of tags, enclosed in single quotes.

Note: PIAliases have priority over PI tags. If a PIModule (or PIUnit) contains an alias that is the same name as a PI tag, the alias takes priority; otherwise the tag is used. In this case, if all the units of the PIBatches found except one contain a particular alias, then the expression on the one is inconsistent because its value comes from the tag, rather than from the desired (yet non-existent) alias.

Aliases are not supported for expressions of Filter components that pertain to PI Batch Database PIBatch items.

Filter State



Use this box to specify the comparison state of the period for which the *Filter Expression* (page 95) is true. The options are:

- **Any Time:** The expression must be true at any time during the batch's time range. This applies even if the expression was true for only 1 second or for the whole time. Both *Filter Periods* (page 96) are unavailable for this option because they do not apply.
- **Less Than:** The expression must be true for a period less than or equal to the value of the first Filter Period parameter. This allows the expression to be false for the whole of the batch's time range. The second Filter Period parameter is unavailable for this option because it does not apply.
- **Between:** The expression must be true for a period greater than or equal to the lower boundary and less than or equal to the upper boundary of the range specified by the Filter Period parameters.
- **Greater Than:** The expression must be true for a period greater than or equal to the value of the first Filter Period parameter. This allows the expression to be true for the whole of the batch's time range. The second Filter Period parameter is unavailable for this option because it does not apply.
- **Always:** The expression must be true for the whole of the batch's time range.
- **Absolute:** The times used to evaluate the filter expression are defined within the expression itself. You can specify the batch's start and end time within the expression using the **ST** and **ET** buttons. For example, to retrieve only batches where the average temperature is greater than 100, use the expression:

```
tagavg('temperature', '[S]', '[E]') > 100
```

The **ST** button inserts the string [S], a placeholder for the batch start time. The **ET** button inserts the string [E], a placeholder for the batch end time.

Filter Periods



Use the Filter Period boxes to specify the range of the periods to which the *Filter Expression* (page 95) test is bound. One or both of the boxes may be disabled, depending on the value of the *Filter State* (page 95) parameter. Batches are returned only if the Filter Expression parameter evaluates to true for a period during this range (in conjunction with the Filter State parameter).

The Filter Period drop-down lists contain basic period entries, including 1%, 10%, 50%, 90%, and 99%. You can also enter other values in the boxes if needed. A percentage value specifies a percentage of the batch's duration. For example, if a Filter component for PISubBatches specifies 20% for the first Filter Period, then that is equivalent to 12 seconds for a 1-minute PISubBatch, 11 minutes for a 55-minute PISubBatch, and so on.

Although the drop-down lists contain only percentage values, you can also enter static time periods in either box. For example, "90 Seconds", "3 Minutes", and "2.3 Hours" all specify actual time periods for the range.

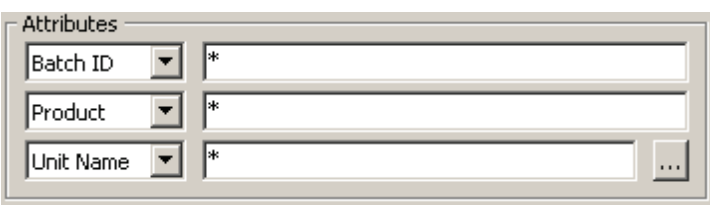
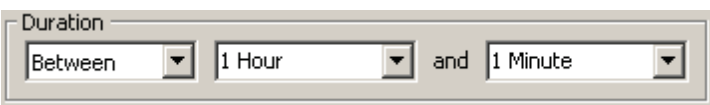
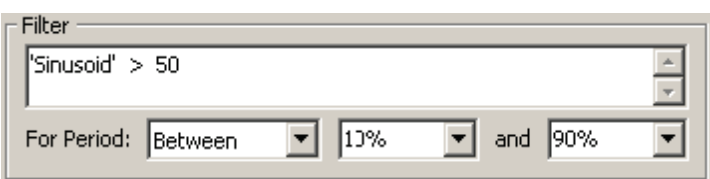
The first Filter Period value does not need to be smaller than the second Filter Period value. The order does not affect the way the search is run or results are returned.

Advanced Searches

You can specify the parameters used to search for batches, whether it be PIBatches or PIUnitBatches, for any area of an item's hierarchy. Although the *Batch Type* (page 86) parameter of the *Selection Component* (page 85) determines what kind of batch to return, some parameters are not restricted to one type of item; they can also extend to items above or below them in the hierarchy.

For example, the search query may return PIUnitBatches but contain parameters such that the PIBatch (parent) of each PIUnitBatch has a particular Recipe name and each PIUnitBatch contains a particular PISubBatch.

The parameter components that you can use in this way are:

| | |
|--|--|
| <p><i>Attributes Component</i> (page 89)</p> |  |
| <p><i>Duration Component</i> (page 93)</p> |  |
| <p><i>Filter Component</i> (page 94)</p> |  |

You can access advanced searches through the *Advanced Search Dialog Box* (page 97) of the PI ProcessBook and Microsoft Excel add-ins and the *PI BatchView QuickSearch* (page 7) utility. It may also be available in custom applications not included in PI BatchView.

Advanced Search Dialog Box

The **Advanced Search** dialog box shows the search parameter components described in previous sections, as they would normally appear, with one exception. The *Attributes Component* (page 89), *Duration Component* (page 93), and *Filter Component* (page 94) are each located in a tabbed display. The tabs represent the parameters for PIBatches, PIUnitBatches, and PISubBatches. Each tab has one of each of the parameters.

The tab that represents the parameters for the type of batch being searched for contains a magnifying glass icon (🔍). For example, in the following figure, the **Select** area shows that the search will look for PIUnitBatches. Therefore the **PIUnitBatch Criteria** tab contains the 🔍 icon.

Note: Applications other than those included with PI BatchView may not include the same Advanced Search dialog, and therefore the parameters may be arranged differently.

Time and Interval Strings

PI BatchView supports PI SDK time strings for times and periods (or intervals). The supported string formats are *PI time*, *relative time*, *interval arithmetic*, *ISO 8601 time* and *local system time* as indicated by regional settings.

PI Time and Relative Time

The format for PI Time is dd-MMM-yy hh:mm:ss (for example, 23-Jun-02 14:23:01) with the options of a long month (June), 4-digit year (2002), and fractional seconds (14:23:01.125). Any part omitted from the date defaults to the current day, month, or year. Any part omitted from the time defaults to 0.

The following examples apply for Friday, 23-March-2003 2:34:56. These are the US English defaults.

| Example | Resulting Date and Time |
|-----------------|----------------------------------|
| 7 or 7: | Friday, 23-Mar-03 07:00:00 |
| 7:25 or 7:25: | Friday, 23-Mar-03 07:25:00 |
| :25: or :25 | Friday, 23-Mar-03 00:25:00 |
| ::42.125 | Friday, 23-Mar-03 00:00:42.125 |
| 7::42 | Friday, 23-Mar-03 07:00:42 |
| 7:25:42.125 | Friday, 23-Mar-03 07:25:42.125 |
| 18-Aug-98 | Tuesday, 18-Aug-98 00:00:00 |
| 18-Aug 7:25 | Monday, 18-Aug-03 07:25:00 |
| August | Saturday, 23-Aug-03 00:00:00 |
| August 1998 | Sunday, 23-Aug-98 0:00:00 |
| 1998 | Monday, 23-Mar-98 00:00:00 |
| August ::25.125 | Saturday, 23-Aug-03 00:00:25.125 |

Because of the above assumptions about missing date parts, some PI times are relative. For example, the date generated by "Aug 98" is different every day. PI time also includes constants for other relative times. These include:

| Example | Resulting Date and Time |
|-----------------|---|
| * | The current time |
| Today or t | 00:00 (midnight) of the current day |
| Yesterday or y | 00:00 (midnight) of the previous day |
| Sunday or sun | 00:00 (midnight) of the previous Sunday * |
| ... | Including all of the days of the week |
| Saturday or sat | 00:00 (midnight) of the previous Saturday * |

* The "previous" weekday includes the current day, *not* the current day of last week.

Interval Arithmetic

In some cases, specific times and relative times are insufficient for specifying a desired time. PI time provides greater flexibility by supporting interval arithmetic. You can add or subtract pre-defined and custom-built time intervals in any PI time interval, multiple times.

The following pre-defined intervals are useful to interval arithmetic. Custom intervals are also supported. For details on custom intervals, see the example under the `ITimeIntervals` topic of the PI SDK online help.

| Interval | Short Format | Plural Format |
|----------|--------------|---------------|
| Second | s | Seconds * |
| Minute | m | Minutes * |
| Hour | h | Hours * |

| Interval | Short Format | Plural Format |
|----------|--------------|---------------|
| Day | d | Days |
| Week | w | Weeks |
| Month | mo | Months |
| Year | y | Years |

* These intervals support fractions.

An interval is not complete without a numeric part. For example, "day" is not a valid interval but "1 day" is valid (the space is optional). The numeric part of hours, minutes and seconds may be fractional. For example, "1.25m" is 1 minute and 15 seconds. Fractional days, weeks, months, and years are not supported.

The format of interval arithmetic is:

```
time +/- NumberInterval [+/- NumberInterval]
```

If the *time* parameter is omitted, current time is assumed. Some examples are:

```
* - 1 day
```

```
T + 2.1 hours
```

```
* - 3 weeks + 36h - 3.4 sec - 1 year
```

```
Tue + 1 month
```

Due to the irregularity of days, months, and years, these intervals are not specific lengths.

Days: The result is at the same time of the resulting day. Even if the result spans a daylight saving time transition (making a day 23 or 25 hours), the time is the same.

Months: The result is the same time and day of the resulting month. If the resulting month does not contain the corresponding day, the result is the last day of the month instead. For example, on 31-Jan-04 "T + 1 month" results in 29-Feb-04.

Years: The result is the same time and date of the resulting year. If the resulting day is Feb 29 but the resulting year is not a leap year, the result is Feb 28.

ISO 8601 Time

The ISO 8601 time format is in the form of:

```
year-month-dayThour:minute:second
```

Note that a **T** separates the date and the time. For example:

```
2003-03-23T02:34:56
```

Local System Time

The local system time format is the format specified in Windows as the long and short date and time settings in Windows regional settings. These contain month and day strings

localized by the operating system, configurable ordering of the date, configurable date separators and configurable time separators. The local system time format is extended to allow a fractional second to be specified.

Chapter 7

Work with Results

Use the Results Table Configuration component to define the appearance of the Results Table.

The Results Table contains the Result Items of one or more searches. It shows the immediate details of each batch, its hierarchy, and various attributes.

| Batch ID | | | Product | Ur |
|--------------------------|--|--|--------------------------|-------|
| ⊕ ChocChip3808_SLR2.635 | | | Chocolate Chip Ice Cream | Ice |
| ⊕ Chocolate2308_SLR1.614 | | | Chocolate Ice Cream | Ice |
| ⊕ Chocolate2308_SLR1.517 | | | Chocolate Ice Cream | Ice C |
| ⊕ Chocolate2308_SLR1.486 | | | Chocolate Ice Cream | Ice C |
| ⊕ ChocChip3808_SLR2.463 | | | Chocolate Chip Ice Cream | Ice C |
| ⊕ Chocolate2308_SLR1.433 | | | Chocolate Ice Cream | Ice |

Result Items

Each result item appears in a single row of the table and represents either a PIBatch or a PIUnitBatch. The content of a row depends on what columns are displayed. A result item has the following attributes:

| Attribute | Description |
|--------------------------------------|--|
| <i>Hierarchy</i> (page 104) | Shows the parent-child relationship of PIBatches, PIUnitBatches and PISubBatches |
| <i>Markers and Colors</i> (page 104) | Shows identification markers for result items |
| <i>Selection Status</i> (page 105) | Shows result item selection/highlight |

Result Columns

The Results Table columns represent various types of information about each result item, including an item's attributes (actual and derived) and status.

Click a column heading to sort the Results Table by that column.

Drag a column heading to rearrange the table.

See *Column Manipulation* (page 107) for other options.

Hierarchy

A result item may contain aggregate sub-items. For example, a PIBatch result item may contain multiple child PIUnitBatches, which, in turn, may contain multiple child PISubBatches. A single result item is able to show this hierarchy from itself down to the lowest level PISubBatch in the form of a tree. A result item cannot show its parent.

| Batch ID | | | Product | Unit |
|----------|------------------------|--|--------------------------|-----------|
| + | ChocChip3808_SLR2.635 | | Chocolate Chip Ice Cream | Ice C |
| + | Chocolate2308_SLR1.614 | | Chocolate Ice Cream | Ice C |
| | Prechill | | Chocolate Ice Cream | Ice Crt |
| | + Charge | | Chocolate Ice Cream | Ice Crea |
| | - Aerate | | Chocolate Ice Cream | Ice Crea. |
| | Freeze | | Chocolate Ice Cream | Ice Cream |
| | + Unload | | Chocolate Ice Cream | Ice Cream |
| | Clean | | Chocolate Ice Cream | Ice Cream |
| + | Chocolate2308_SLR1.517 | | Chocolate Ice Cream | Ice Crea |
| + | Chocolate2308_SLR1.486 | | Chocolate Ice Cream | Ice Cre |

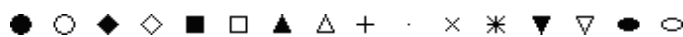
A result item indicates that it has a child with a **+** or **-** symbol. To open a result item's tree and reveal its sub-items, click its **+** symbol. You can also open and close a selected item on the tree by pressing the left or right arrow key. Pressing the right arrow key opens a closed tree or selects the first child item of an open tree. Pressing the left arrow key closes an item's tree or selects a closed item's parent item.

If a child item does not have data that is appropriate for all of the table's columns, the table shows the parent's data, which is grayed to indicate it is not a direct attribute of the item.

For example, in the image above, the Chocolate2308_SLR1.614 PIUnitBatch's Product is displayed in the Product column as "Chocolate Ice Cream". The child PISubBatches do not have product data and therefore show "Chocolate Ice Cream" as unavailable.

Markers and Colors















If the header of a result item is visible it may contain one of the following symbols:




Each of these symbols can be any color. Their main purpose is for quick and easy identification. For example, the PI ProcessBook Batch Group symbol uses them to match a result item in the table with the bars of a Batch Gantt chart or the traces of a Batch Trend.

| | Batch ID | | Product | Ur |
|---|----------|------------------------|--------------------------|-------|
| ● | + | ChocChip3808_SLR2.635 | Chocolate Chip Ice Cream | Ic. |
| ○ | + | Chocolate2308_SLR1.614 | Chocolate Ice Cream | Ice |
| ◆ | + | Chocolate2308_SLR1.517 | Chocolate Ice Cream | Ice C |
| ◇ | + | Chocolate2308_SLR1.486 | Chocolate Ice Cream | Ice C |
| ■ | + | ChocChip3808_SLR2.463 | Chocolate Chip Ice Cream | Ice C |
| □ | + | Chocolate2308_SLR1.433 | Chocolate Ice Cream | Ice |

Select Items in the Results Table

| Batch ID |  |  | Product | Ur |
|--------------------------|---|---|------------------------------|-------|
| + ChocChip3808_SLR2.635 |  |  | Chocolate Chip Ice Cream Ic. | |
| + Chocolate2308_SLR1.614 |  |  | Chocolate Ice Cream | Ice |
| + Chocolate2308_SLR1.517 |  |  | Chocolate Ice Cream | Ice C |
| + Chocolate2308_SLR1.486 |  |  | Chocolate Ice Cream | Ice C |
| + ChocChip3808_SLR2.463 |  |  | Chocolate Chip Ice Cream | Ice C |
| + Chocolate2308_SLR1.433 |  |  | Chocolate Ice Cream | Ice |

Click to select a result item, or use the Up and Down arrow keys. If the multiple-select feature is enabled, you can select multiple items by holding **Ctrl** or **Shift** while selecting. Multiple selection is useful for copying multiple items to the Clipboard (using **Ctrl+C**). You can also use multiple selection to change the Anchored and Visible state of multiple items; to do this, select multiple items and then change the Anchored or Visible state of one selected item. For example, if you select all of the items and then click  for one item, all of the selected items become hidden, regardless of their previous state.

You can also select items by interacting with other parts of the application. For example, in a PI ProcessBook display, clicking a Batch Gantt bar selects the corresponding item in the Results Table. If the item you select is in a tree that is not visible, the tree opens to reveal that item.

A highlighted item can sometimes be distracting. To clear a selection, click the blank space below the last item in the table, **Ctrl**+click the selected item, or click the row header of the selected item (if it is visible).

Attribute Columns

Most of the attribute columns in the Results Table represent actual attributes of PI SDK PIBatch, PIUnitBatch, or PISubBatch objects. Some of the columns in the table represent different things depending on the batch type. For example, the Batch ID column displays the Batch ID of a PIBatch or a PIUnitBatch, but displays a PISubBatch name because a PISubBatch is identified by its name rather than by a Batch ID.

| Column Type | PIBatch | PIUnitBatch | PISubBatch |
|-------------|--------------------|----------------------------|-----------------------|
| Batch ID | PIBatch Batch ID | PIUnitBatch Batch ID | PISubBatch Name |
| Product | PIBatch Product | PIUnitBatch Product | - |
| Recipe Name | PIBatch Recipe | - | - |
| Unit Name | - | PIUnitBatch's Unit Name | - |
| Procedure | - | PIUnitBatch Procedure | - |
| Heading | - | PIUnitBatch's Unit Heading | PISubBatch Heading |
| Start Time | PIBatch Start Time | PIUnitBatch Start Time | PISubBatch Start Time |
| End Time | PIBatch End Time | PIUnitBatch End Time | PISubBatch End Time |

| Column Type | PIBatch | PIUnitBatch | PISubBatch |
|-------------|------------------------------------|--|---------------------------------------|
| Server | PIBatch's PI Server | PIUnitBatch's PI Server | PISubBatch's PI Server |
| Description | - | PIUnitBatch's Unit Description | - |
| Unique ID | PIBatch Globally Unique Identifier | PIUnitBatch Globally Unique Identifier | PISubBatch Globally Unique Identifier |

For example, *Recipe* is a PIBatch property. Thus, a Recipe column shows the recipe name of the PIBatch in each result item row. Exceptions to this are:

- **Batch ID:** Applies to PISubBatch items but shows the Name property. This is the PISubBatch's equivalent of Batch ID and, being in the same column, it assists in viewing the hierarchy relative to its parent PIUnitBatch.
- **Heading, Unit Name and Unit Description:** Apply to PIUnitBatch items but are actually taken from the PIUnitBatch's PIUnit.

Some attributes represent derived values of a batch. These attributes are:





| Column Type | PIBatch | PIUnitBatch | PISubBatch |
|-----------------|------------------|---------------------|---------------------|
| Duration | PIBatch Duration | PISubBatch Duration | PISubBatch Duration |
| Batch Item Type | PIBatch Item | PIUnitBatch Item | PISubBatch Item |

For example, **Duration** is not a direct property of any batch but can be calculated from the start and end times of any batch.

Some columns are specific to a single batch type and others are common to two or more types. For example, the **Recipe** column applies only to PIBatch items, while both PIBatch and PIUnitBatch items share the **Product** column, and all batch types share the **Start Time** and **End Time**.

Status Columns

The status columns indicate the status of a result item. They are:

| Appearance | State | Behavior |
|---|------------------|--|
|  | Anchored (on) | An Anchored item remains in the Results Table when a new search is run, regardless of the search parameters. This is useful, for example, if you want to use a batch as a template for comparison (that is, a "golden" or perfect batch). |
|  (default) | Unanchored (off) | |
|  (default) | Visible | The visibility state behavior varies depending on the application, but normally controls behavior outside of the Results Table. For example, in a PI ProcessBook display, when an item's state is Hidden, the corresponding item in the Batch Gantt chart and the Batch Trend is hidden. |
|  | Hidden (off) | |

Each status is relative only to the result item itself and not to the corresponding batch in the PI Batch Database. Click an item's status icon to change its status.

If multiple-select is enabled and you select multiple items, changing the state of one of the selected items changes all selected items to that same state.

Data Columns

The types of data columns are:

- **Unit Property:** displays a single PIProperty of each PIUnitBatch's Unit. This also applies to PIProperties of child modules of a PIUnitBatch's unit and to child PIProperties of PIProperties. PIBatch items in the table are blank and PISubBatch items show the same value as the parent PIUnitBatch item.
- **PIBatch Property:** displays a single PIProperty of each PIBatch. This also applies to child PIProperties of PIProperties. PIUnitBatch and PISubBatch items in the table show the same value as the parent PIBatch item.
- **PI Tag:** displays the interpolated value of a PI tag at the end time of each batch item. This applies to PIBatch, PIUnitBatch and PISubBatch items. If an item is still running, the value in this column is the tag's snapshot.
- **Alias:** displays the interpolated value of a PIAlias' tag of each PIUnitBatch's unit at the end time of the PIUnitBatch. PIBatch items in the table are blank. PIUnitBatch items in the table shows data for the alias from the parent PIUnitBatch's unit; but it shows that value at the end of the PISubBatch If an item is still running, the value in this column is the tag's snapshot.
- **Expression:** evaluates an expression over the period of each batch item and displays the result. This applies to PIBatch, PIUnitBatch and PISubBatch items, with one exception: If an expression contains aliases, PIBatch items are blank because aliases cannot be evaluated for a PIBatch. The range of the expression is typically the period of the batch item, but this depends on the expression syntax.

For details on configuring data columns, see *Column Attributes* (page 112).

Column Manipulation

The columns in the Results Table are not fixed. You can remove, add, resize and reposition them.

Add and Remove Columns

You can add and remove column types in the Results Table. For details, see *Configuring Results* (page 110).

Resize Columns

To resize a column, position the pointer on the right edge of the column header. When the pointer changes to a double-headed arrow (or similar), drag it to the left or right. To size a column to the width of its widest cell, double-click its right edge.

You cannot resize the Anchored (🔒) and Visible (👁️) columns.

Reposition Columns

To move a column, drag its header to the left or right. A transparent image of the column header, which moves with the pointer, indicates which column you are moving, and a vertical line moves between columns to indicate where the column will sit when you release the mouse button.

| Product | Start Time | Unit Name | Start Time | End Time |
|------------------------|--------------------|-----------------------|--------------------|----------|
| Chocolate Ice Cream | 08-Mar-02 09:18:36 | Ice Cream Slurrifi... | 08-Mar-02 09:18:36 | 08-Mar- |
| Chocolate Chip Ice ... | 08-Mar-02 09:23:21 | Ice Cream Slurrifi... | 08-Mar-02 09:23:21 | 08-Mar |
| Chocolate Ice Cream | 08-Mar-02 11:31:54 | Ice Cream Slurrifi... | 08-Mar-02 11:31:54 | 08-M |
| Chocolate Chip Ice ... | 08-Mar-02 11:31:56 | Ice Cream Slurrifi... | 08-Mar-02 11:31:56 | 08- |
| Chocolate Chip Ice ... | 08-Mar-02 12:11:51 | Ice Cream Slurrifi... | 08-Mar-02 12:11:51 | 08- |
| Chocolate Ice Cream | 08-Mar-02 12:44:36 | Ice Cream Slurrifi... | 08-Mar-02 12:44:36 | 08- |
| Chocolate Ice Cream | 08-Mar-02 14:01:24 | Ice Cream Slurrifi... | 08-Mar-02 14:01:24 | 08-M. |

If you move a column to the leftmost position, it takes on the hierarchical tree format. This means that if you move the leftmost column, the next column becomes the leftmost and the tree format applies to that column.

For example, if you move the Start Time column to the leftmost position, the hierarchy tree format applies as shown in the following figure. The Batch ID column (which is the leftmost column by default) does not show the tree view because it is no longer the leftmost column.

| Start Time | Batch ID | Pr |
|----------------------|------------------------|----------|
| ⊕ 08-Apr-02 15:14:45 | ChocChip3808_SLR2.635 | 🔒 C |
| ⊖ 27-Mar-02 14:43:30 | Chocolate2308_SLR1.614 | 🔒 C |
| ⊖ 27-Mar-02 14:43:44 | Prechill | |
| ⊕ 27-Mar-02 14:45:52 | Charge | |
| ⊖ 27-Mar-02 14:47:07 | Aerate | |
| ⊖ 27-Mar-02 15:01:27 | Freeze | |
| ⊕ 27-Mar-02 15:07:45 | Unload | |
| ⊖ 27-Mar-02 15:10:32 | Clean | |
| ⊕ 27-Mar-02 12:24:24 | Chocolate2308_SLR1.517 | 🔒 Choco' |
| ⊕ 27-Mar-02 11:40:15 | Chocolate2308_SLR1.486 | 🔒 Chocr |
| ⊕ 27-Mar-02 11:06:02 | ChocChip3808_SLR2.463 | 🔒 Chor |
| ⊕ 27-Mar-02 10:23:12 | Chocolate2308_SLR1.433 | 🔒 Chr |

Note: Moving a column does not affect the sort order, even if the column being moved is the primary sort column.

Sort

You can sort items in the Results Table based on the data of any column or combination of columns. The sort order depends on the data type of the column being sorted.

| Column Data Type | Sort Type |
|------------------|----------------|
| Text | Alphabetical |
| Number | Numerical |
| Date | Chronological |
| Duration | Numerical |
| Status | Locked/On/Off* |

*Unanchored and Hidden are considered "Off" statuses.

The sorted column is indicated by an ascending (▲) or a descending (▼) triangle that is displayed in the column header. For example:

Start Time ▼

Sort Multiple Columns

Sometimes sorting a list of result items by a single column is not sufficient because the column may have multiple identical entries. When sorting multiple columns, sort the secondary columns before the primary column. For example, to sort items by Product, *then* by Start Time, first click the Start Time column header and *then* the Product column header. The result is:

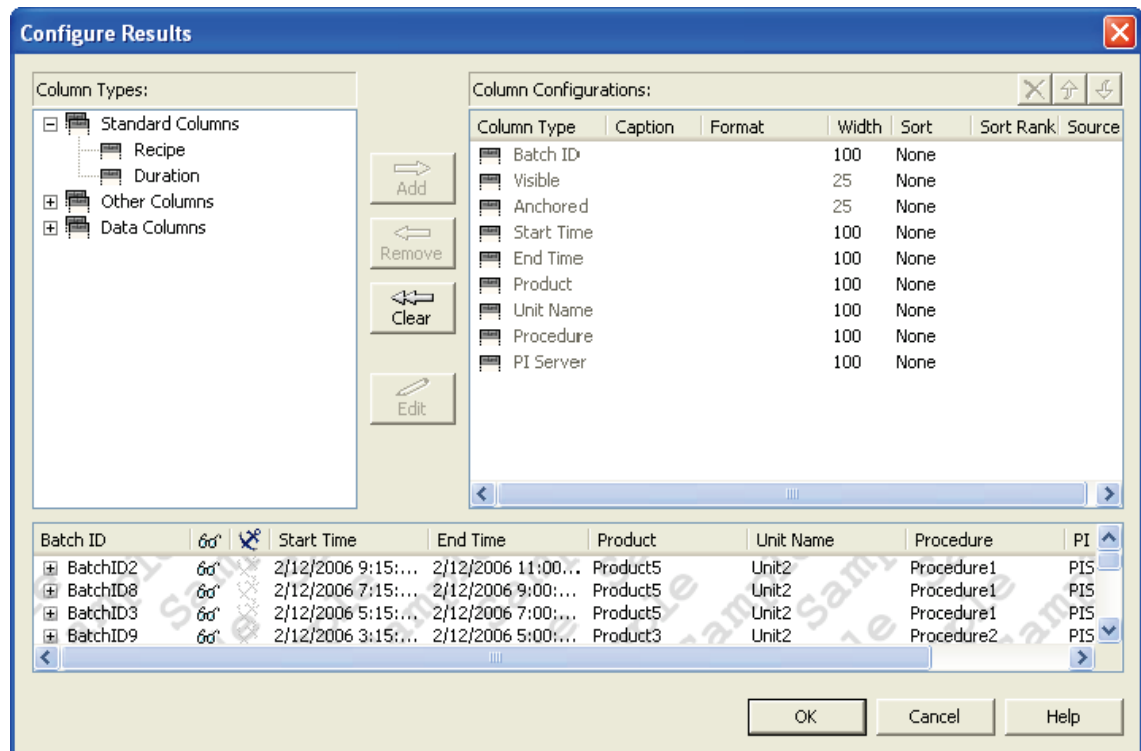
| | Product ▲ | Start Time | End Time |
|-----------|--------------------------|--------------------|-----------|
| RY... | Chocolate Chip Ice Cream | 08-Mar-02 09:23:21 | 08-Mar-02 |
| _RY... | Chocolate Chip Ice Cream | 08-Mar-02 11:31:56 | 08-Mar-02 |
| _SLRY... | Chocolate Chip Ice Cream | 08-Mar-02 12:11:51 | 08-Mar-02 |
| 8_SLR... | Chocolate Ice Cream | 08-Mar-02 09:18:36 | 08-Mar-02 |
| 08_SLR... | Chocolate Ice Cream | 08-Mar-02 11:31:54 | 08-Mar-02 |
| 08_SLR... | Chocolate Ice Cream | 08-Mar-02 12:44:36 | 08-Mar-02 |
| 8_SLR... | Chocolate Ice Cream | 08-Mar-02 14:01:24 | 08-Mar-02 |

The Product column is sorted alphabetically with the "Chocolate Chip Ice Cream" and "Chocolate Ice Cream" items each sorted by Start Time. Also, only the primary sort column header (Product) contains the sort direction arrow (▲).

You can use sort as many columns as are in the Results Table.

Configure Results

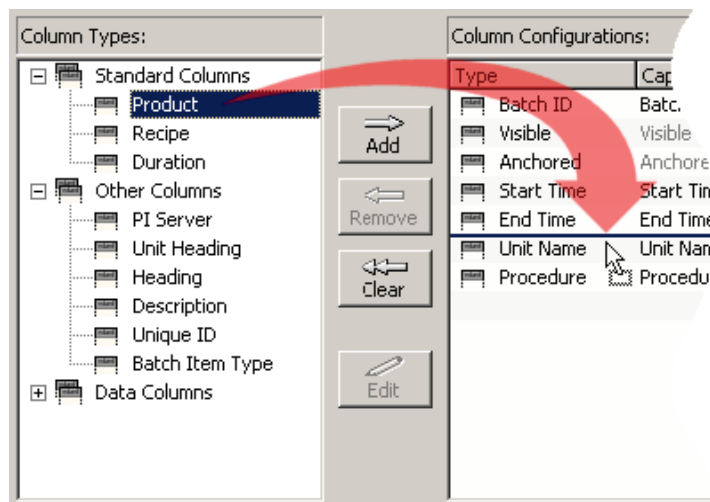
The **Configure Results** feature—appearing in either a dialog box or area within a dialog box—configures the Results Table of the Batch Group in the display. Here you define which columns appear in the Results Table and set their properties. Settings include which columns appear, the column order, column width, and table sorting.



Specify Columns



You can add and remove columns in the Results Table by moving column types between the **Column Types** list and the **Column Configurations** list. Add columns in any of the following ways:

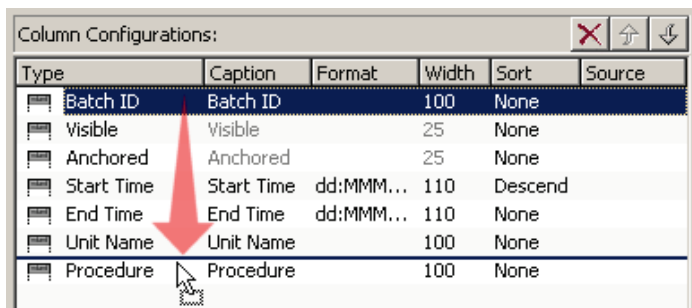
- Select an item from the **Column Types** list and click **Add**. In the **Column Configurations** list, the column appears above the highlighted item.
- Double-click the item you want to move. In the **Column Configurations** list, the column appears above the highlighted item.
- Drag the column name from one list to the other. Use the insertion line that appears to drop the item where you want.



To remove an item from the **Column Configurations** list, select it and click **Remove**, or drag it to the **Column Types** list.

Move Columns


To move a column within the **Column Configurations** list, select it and click  or  in the top-right corner of the list, or drag it to a new position.



To move a column in the sample Results Table at the bottom of the dialog box, drag the column to the new location.

Size Columns

You can size a column in the following ways:

- In the **Column Configurations** list, click the **Width** value for the Column Type you want to change and enter the new width in screen pixels.
- In the sample Results Table, position the pointer on the right edge of the column header. When the pointer changes to a , drag to resize the column.

Column Attributes

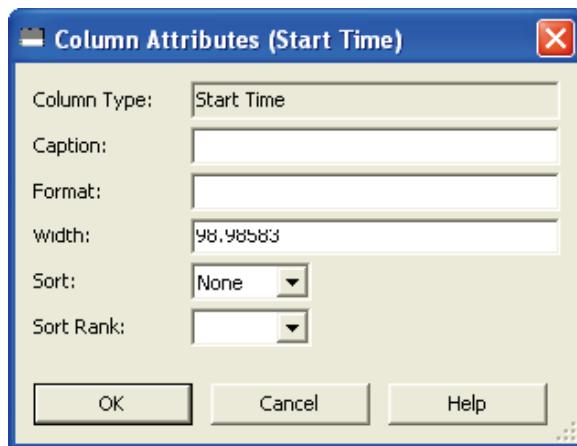
Each item in the **Column Configurations** list represents a column and its attributes. For details on the column properties, see *Column Attribute Settings* (page 113).

To edit a column's attributes, do one of the following:

- Click the column for the item you want to change, edit the text, and press **Enter** or **Tab** (or press **Esc** to cancel the change).
- Double-click the item you want to change. In the **Column Attributes** dialog box that appears, edit any of the attributes, and click **OK**.
- Select the item you want to change and click **Edit**. In the **Column Attributes** dialog box that appears, edit any of the attributes, and click **OK**.

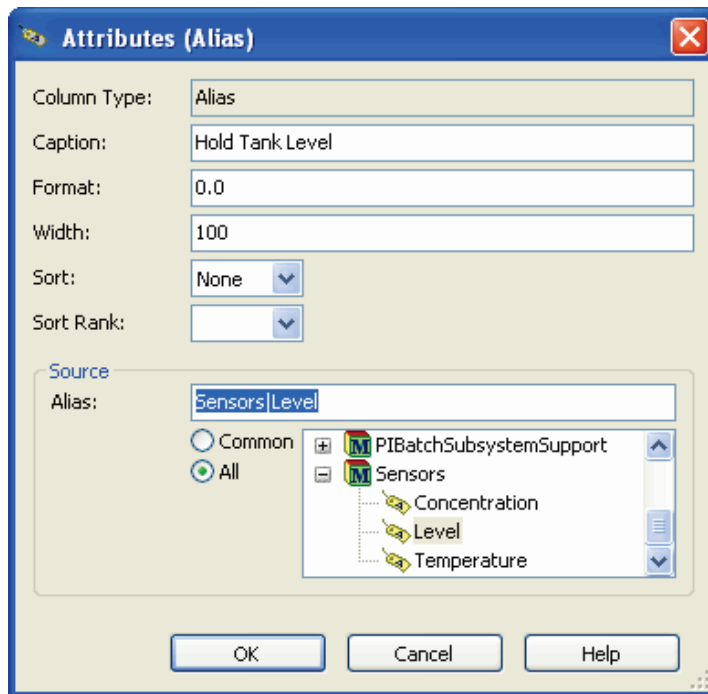
Column Attributes Dialog Box

Use the **Column Attributes** dialog box to enter the attributes of a column type. The **Column Attributes** dialog box that appears depends on the type of column—standard or data—that is being edited.



Column Attributes dialog box for standard columns

The **Column Attributes** dialog box for data columns includes the standard attributes, as well as an additional *Source* (page 114) area. Here you specify the source of the data for the column.



Column Attributes dialog box for data columns

Depending on the column that is edited, some text boxes are grayed and cannot be edited (such as **Column Type**, **Caption**, **Format**, and **Width** for the Visible column), but you can select the text for copying to the Windows Clipboard.

Column Attribute Settings

Caption

The caption of a Results Table column appears in its header. This does not apply to the **Anchored** and **Visible** columns, which do not have visible captions.

Format

A string representing the format for the data to take. For details on each of the format types, see *Format Types* (page 117).

Width

A column's width, measured in screen pixels. This does not apply to the **Anchored** and **Visible** columns, which have fixed widths.

Sort

The order in which to sort the column items. The options are **None**, **Ascend**, and **Descend**.

Sort Rank

When you sort multiple columns, this box specifies the order in which to sort the columns.

The **Sort** and **Sort Rank** attributes interact as follows:

- The **Sort Rank** box is blank if the **Sort** value is **All**, since a column has no sort rank if it is not being sorted.
- If the **Sort** value changes from **None** to **Ascend** or **Descend**, **Sort Rank** changes to 1.
- If the **Sort** value changes from **Ascend** or **Descend** to **None**, **Sort Rank** changes to blank.
- If the **Sort Rank** value changes from blank to a number, the **Sort** value changes to **Ascend**.
- If the **Sort Rank** value changes from a number to blank, the **Sort** value changes to **None**.

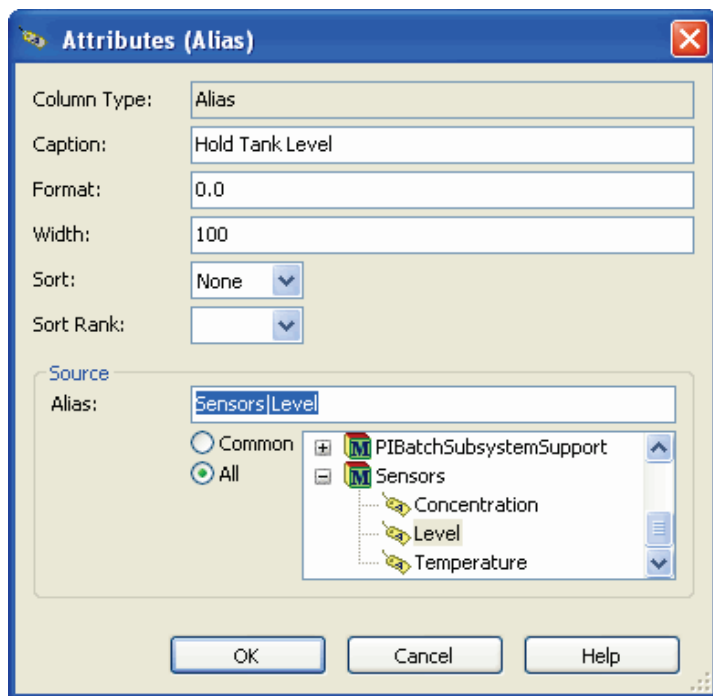
Source

The **Source** area appears in Column Attributes for data columns only (**Property**, **Aliases**, **Tag**, and **Expression** columns). A column's source is a string that provides additional information about where data in the column is retrieved from. For example, a PI tag column's **Source** attribute contains the name of the PI tag to display in the column.

The format of the **Source** area depends on column type. You can enter a column's source in the text box at the top of the **Source** area.

In addition to the text box, each column type includes features to assist you in specifying the source.

The **Column Attributes** dialog box for the Alias column includes an alias picker. You can select aliases common to all items in the Results Table or all aliases that are relative to the items in the Results Table. The picker contains aliases only if the Results Table that is being configured contains items; otherwise it is empty. When you select an alias in the picker, its source string appears in the text box. Similarly, if you enter an alias that matches one in the alias picker in the text box, the alias in the picker is selected. If you edit the text in the box, the selection clears until an alias is entered that matches one in the picker.

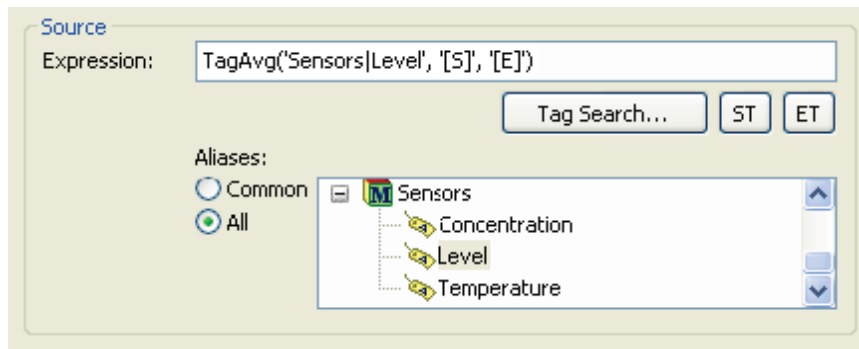


Note: If an alias is not in the picker, it is still accepted as an alias. No validation is done at this point.

The **Source** areas of the PIBatch, PIProperty, and Unit PIProperty **Column Attributes** dialog boxes are similar to the **Source** area of the **Column Attributes (Alias)** dialog box, except that common—or all—PIProperties appear instead of aliases.

The **Column Attributes (PI Tag)** dialog box's **Source** area contains only a **Tag Search** button, which opens the **Tag Search** dialog box. When you select a tag, the fully qualified tag name appears the text box.

The **Column Attributes (Expression)** dialog box's **Source** area contains **Tag Search**, start time (**ST**), and end time (**ET**) buttons. When you select a tag from the **Tag Search** dialog box, the tag that appears in the text box is not fully qualified, but is simply the tag itself. The **ST** and **ET** buttons insert the start and end time placeholders ([**S**] and [**E**]). Thus, you don't need to remember the placeholders' formats to insert them. These buttons do not insert the single quote marks (') required for tags, aliases and time strings.



DATA TYPE SYNTAXES

The data column types have the following syntaxes:

| Data | Icon | Syntax/Examples |
|-----------------------|------|--|
| Unit PIProperty | | <p>Syntax: <code>[SubPIModule[\SubPIModule]] PIProperty[PIProperty]</code></p> <p>Examples: Manufacturer Sensors\Thermocouples Count Inspection Date</p> |
| PIBatch PIProperty | | <p>Syntax: <code>PIProperty[PIProperty]</code></p> <p>Examples: Prop1 Prop1 Prop2 Prop3</p> |
| PI tag | | <p>Syntax: <code>[\\Server\] Tag</code></p> <p>Examples: Outside_Temp \\localhost\Relative_Humidity</p> |
| Alias | | <p>Syntax: <code>[Sub-PIModule[\Sub-PIModule]] Alias</code></p> <p>Examples: Level Sensors\Temps Temp1</p> |
| Expression | | <p>Syntax: Standard PI PE expression syntax, with alias support and time placeholders.</p> <p>Examples: <code>'cdt158' * 2</code> <code>TagAvg('temp', '[S]'+10m, '[E]')</code></p> |

Aliases are used in expressions in the same way that PI tags are used: the name of the alias is used in the expression with single quote marks (') around it. Aliases are evaluated before the expression is evaluated; if an alias has the same name as a PI tag, the alias is used instead of the PI tag. Aliases of a PIModule that is a child of a PIUnitBatch's unit are also supported. The syntax follows that of the alias data column.

The time placeholders, **[S]** and **[E]**, can be used anywhere a PI time is used. When the expression is evaluated, the placeholder is replaced with the batch item's actual start and end time. You can also use standard PI interval arithmetic with these placeholders. You must use the single quote marks (') of the PI PE expression syntax when using these placeholders. If * is used in an expression it is treated as the end time of the batch item, which is identical to using **[E]**. For example:

```
TagAvg('Level', '[S]', '[E]')
TagBad('Sensors\Temps|Temp1', '[S]+10m')
TagMax('cdt158', '[E]-2h', '[E]')
```

Format Types

The following sections describe the format types you can use in the **Format** column of the **Column Configurations** list.

Numeric Format

Apply numeric formats to any column that contains numeric data.

| Characters | Meaning | Example |
|------------|---|------------|
| 0-000000 | Number of significant digits/decimal places. Pad with leading/trailing zeros. | 0123.45600 |
| #-##### | Number of decimal places. Do not pad with trailing zeros. | 123.456 |
| . | Decimal separator* | 1.2 |
| , | Thousands separator* | 1,000,000 |

* You must specify these separators regardless of your regional settings for them. The proper separators, however, appear in the Results Table per your regional settings.

If numeric format characters are used for a cell that contains a date, the cell is formatted as the date format interprets the characters.

Date Format

The date format is the same format used by the PI SDK. The following table describes this format. See the PI SDK documentation for more details.

| Characters | Meaning | Example |
|------------|----------------------------|-------------|
| yy, yyyy | Year. Two or four digits. | 01, 2001 |
| M, MM | Month. Short/long number. | 3, 03 |
| MMM, MMMM | Month. Short/long name. | Mar, March |
| d, dd | Day. Short/long number. | 2, 02 |
| ddd, dddd | Weekday. Short/long name. | Fri, Friday |
| h, hh | Hour. Short/long number. | 4, 04 |
| m, mm | Minute. Short/long number. | 5, 05 |

| Characters | Meaning | Example |
|------------|--|----------------------------|
| s, ss | Seconds. Short/long number. | 6,06 |
| 0 - 00000 | Fraction of a second. Show trailing zeros. | 0.1 - 0.12300 |
| # - ##### | Fraction of a second. No trailing zeros. | 0.1 - 0.123 |
| z, zz | Time zone. Short/long name. | PDT, Pacific Daylight Time |
| AP | Local AM/PM symbol | AM |
| \ | Next character is literal | \h = "h" |
| other char | Itself | x = "x" |
| [blank] | Windows Short Date format | 03/02/2001 4:05 am |

If date format characters are used for a cell that contains numeric data, the cell is formatted as the numeric or duration formats interpret.

Duration Format

You can apply the duration format to any column that contains numeric data. The number is formatted as a duration instead of a number. In the following table, all examples use the same period of 0 years, 1 month, 3 days, 4 hours, 15 minutes and 43.6 seconds, beginning at 1-Jan-04 00:00:00.

| Token | Meaning | Example | Example Output |
|--------|---|---|----------------|
| | The length of the period in Years | y -M-d | 0-6-3 |
| M | The length of the period in Months | M , d | 1, 3 |
| w | The length of the period in Weeks | w ; d | 4; 6 |
| d | The length of the period in Days | y , d | 0, 34 |
| h | The length of the period in Hours | d , h :m:s | 34, 4:15:44 |
| m | The length of the period in Minutes | d , h :m:s | 34, 4:15:44 |
| s | The length of the period in Seconds | d : h : m : s | 34:4:15:44 |
| i-iiii | The minimum width of an interval, padded with zeros | dddd, hh:mm:ss | 0034, 04:15:44 |
| [i] | The short name for an interval | d[d] | 34d |
| [ii] | The long name for an interval, with automatic plurality | d [dd] | 34 days |
| [iii] | The singular long name for an interval (not common) | m[m], d[ddd] | 1mo, 85day |
| [iiii] | The plural long name for an interval (not common) | m [mmmm], d[d] | 1 months, 85d |
| { } | Exclude everything within { } if all intervals are 0 | {y[y], }m [mm] | 1 month |
| . | Fraction of an interval (up to 6 decimal places) | d. | 34.177499 |

| Token | Meaning | Example | Example Output |
|-------|---|-------------------|--------------------------------------|
| 0 | Fraction of an interval, with trailing zeros | h:m:s. 000 | 820:15:43.600 |
| # | Fraction of an interval, without trailing zeros | h:m:s. ### | 820:15:43.6 |
| : | Local time separator | h:m:s | 820:15:44 |
| \ | Next character is literal | a\\bc\\de | a\\bcde |
| P | ISO 8601 period format | P | P0Y1M3DT4H15M44S |
| PS | ISO 8601 period + start time format | PS | 20040101T000000/ P0Y1M3DT4H15M44S |
| PE | ISO 8601 period + end time format | {PE} | P1M3DT4H15M44S/ 20040203T041544 |
| PSE | ISO 8601 start time + end time format | PSE | 20040101T000000/ 20040203T041544 |

Chapter 8

Use Custom Names

The PI Batch software (both PI BatchView and the PI Server components) have applicability across many industries. However, the terminology used in each industry varies. In some cases, generic batch terminology may be inadequate.

The Custom Names feature allows you to customize batch-related terms that appear in the PI BatchView user interface (both at run time and build time).

Custom names are organized in sets. Custom Name Sets are user-defined, and each set contains one or more custom names that apply to a single concept or theme. Every set has the same range of batch-related terms that you can customize. See *Custom Names Terms* (page 147) for a list of customizable terms. Only terms within this range can be customized, but not all of them are required to be—see *Example 1* (page 121).

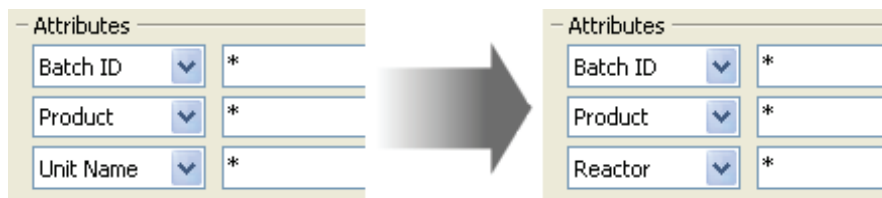
Note: Custom names apply only to specific batch-related client tools. They do not apply to the PI Server, PI SDK, or any of the COM interfaces for the PI BatchView objects.

Following are three examples that show how you can use Custom Names. The examples are oversimplified, but they illustrate potential uses of Custom Names.

Examples

Example 1

Company X is a traditional batch-oriented production company. Most of the batch terms used in PI BatchView apply to Company X's processes, but it would be helpful to change a few of the terms. For example, Company X would like to use *Reactor* instead of *Unit*. With Custom Names you can change the appearance of every instance of the term *Unit* and its counterparts so that they appear as *Reactor*. Such terms include *Unit*, *Units*, *Unit Name*, and *Unit Heading*.

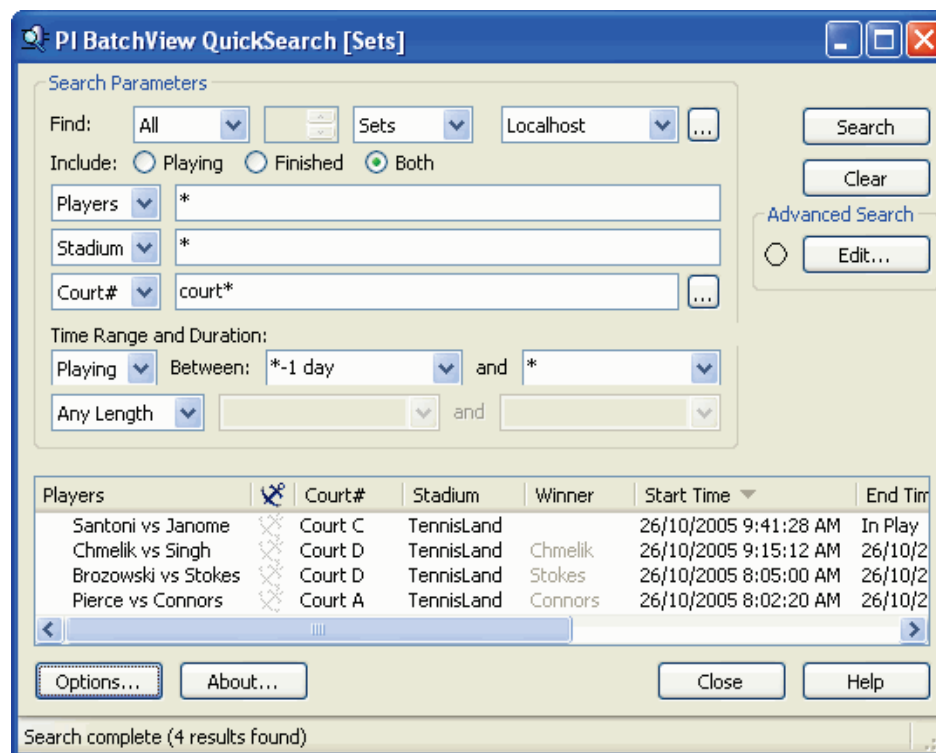


Example 2

Company Y is a power generation company that does not do traditional batch processing. PI BatchView is still useful to the company because they monitor each turbine's startup process. Treating each startup as a PIUnitBatch allows them to compare them with previous startups. Traditional batch terms that appear in PI BatchView are not very helpful. With Custom Names they can rename several of their terms more appropriately. For example, they can use *Still Starting* in place of *Still Running* in the Results Table and *Turbine* in place of *Unit Name* in the Attributes search component.

Example 3

Organization Z runs an annual company-wide tennis tournament and uses PI BatchView to compare games, matches, and so on. Not only do they not want to see PI BatchView's standard batch terms, but also they use properties for things that have completely different meanings from the original batch term. For example, they store the name of the stadium hosting each set in the PIUnitBatch's Product field, but the word *Product* in the user-interface doesn't make much sense. Following is a view of QuickSearch with terms customized for a tennis tournament:

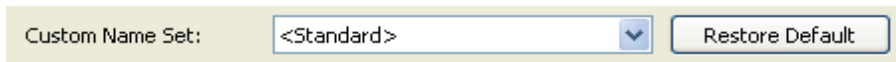


Use Custom Name Sets

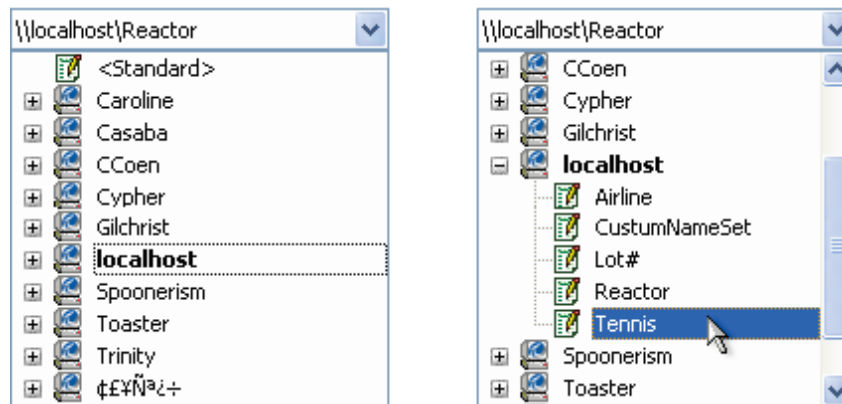
You can use Custom Name Sets in each of PI BatchView's client tools. You can configure QuickSearch for a single set. In PI ProcessBook, you can configure each BatchGroup symbol for its own set, and in Microsoft Excel, you can configure each formula array with its own set.

Custom Name Set Box

In PI BatchView QuickSearch, the **Custom Name Set** box is in the **QuickSearch Options** dialog box. In Microsoft Excel, it is in the Settings tab of the **PI BatchView for Excel** dialog box. In PI ProcessBook, it is in the **Settings** tab of the **Batch Definition** dialog box. The **Custom Name Set** box appears with the **Restore Default** button.



The drop-down list displays a list of PI Servers in tree format. Initially, the server tree is collapsed. The server that contains the current set is also collapsed, but appears in bold text to indicate that it contains the current set. When a server is expanded, the tree shows a list of Custom Names sets defined on that server.



Click a Custom Names set to select the set name and close the drop-down list. Clicking on a PI Server does not close the drop-down list. You can also manually edit the **Custom Name Set** box. The format of a Custom Names set name is:

```
\\ServerName\CustomNameSetName
```

If you do not specify the server, the default server is used. If PI BatchView cannot resolve the name (because it is not defined on the server or the server is offline), PI BatchView does not use any Custom Names set and it records a message in the message log.

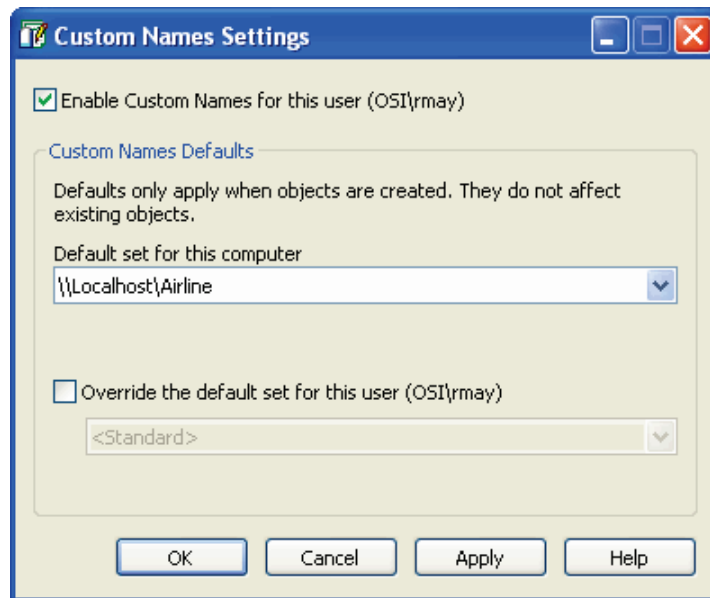
Note: When the Custom Names Sets feature is disabled, the **Custom Name Set** box is unavailable. To open the **Custom Name Settings** dialog box and enable Custom Names Sets, run the `PIBatchCustomNameSettings.exe` file in the `\pipc\batch` directory.

To revert the Custom Names set to the default set as defined in the Custom Names settings, click **Restore Default**.

Custom Names Settings

To view or change Custom Names settings for your computer, run the `CustomNamesSettings.exe` file located in the `\PIPC\batch` directory.

Custom Names Settings apply to every application that uses Batch Custom Names sets, whether it is currently open or not.



Enable Custom Names For This User

The Custom Names feature is enabled by default on installation. Select this check box to disable or re-enable it. When this feature is disabled or enabled, all applications that are already open automatically change their user interface to the appropriate values. For example, disabling Custom Names immediately has the following effects:

- Custom Names do not appear in the user interface of any application; the standard PI batch names are used instead.
- The **Custom Names Set** drop-down list in every batch application is automatically disabled and grayed out.

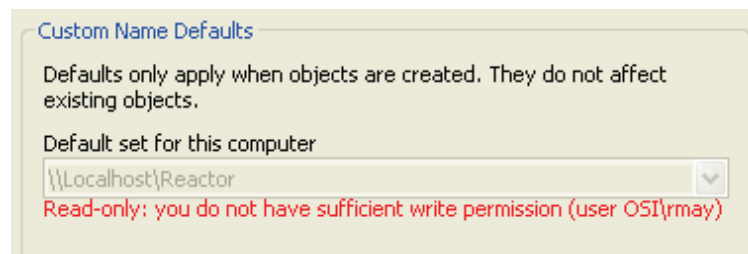
\\localhost\Reactor

Default Set For This Computer

When you define a new PI BatchView function within a Microsoft Excel spreadsheet or insert a new BatchGroup symbol into a PI ProcessBook display, the default Custom Names set is applied. This Custom Names set is used throughout the definition dialogs for the new Microsoft Excel function or the new Batch Group symbol.

Note: The default set affects **only** newly created items (such as in the PI BatchView add-in function for Microsoft Excel). It does not apply to dialog-based applications (such as PI BatchView QuickSearch) and other standalone applications.

Changes made to the **Default set for this computer** appear for all users of the machine. If a user does not have permission to change this setting, the box is disabled and a warning message appears in the dialog box.



Override the Default Set for This User

You can change your own default Custom Name Sets without affecting other users. Check this box to enable the **Custom Name Set** box below it. When this box is checked, the Custom Names set shown in the box displays custom names for the current user only.

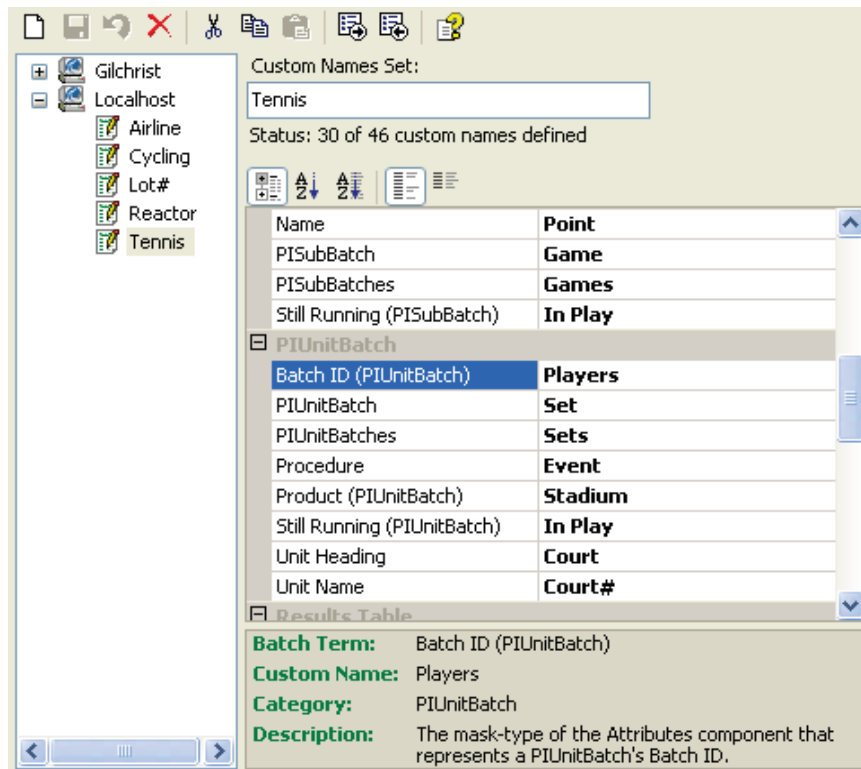
If the current user does not have permission to change this setting, the check box and the drop-down list are unavailable and a read-only message appears in the dialog box.

Create and Edit Custom Names Sets

Each PI BatchView term to be renamed is defined within a Custom Names Set. A set is defined on a PI Server as a Module in the Module database (MDB). Thus, multiple sets can be defined on a single server. These definitions are defined using the PI BatchView Custom Naming plug-in for PI System Management Tools 3.0. The plug-in is distributed with PI System Management Tools versions 3.2 and greater.

The online help distributed with the plug-in contains a full description of how to use it. A brief synopsis follows.

The plug-in is located under the Batch branch of the plug-ins tree in the SMT3 host. When it loads, it shows the servers and their custom names in a tree on the left and the selected custom names set (no set initially), the customizable terms, and their descriptions on the right.



When you open a server in the tree, all of its custom names sets appear. When a custom names set is selected from the tree, the names are retrieved from the server and appear in the Custom Names Set panel. The left column shows the standard PI Batch name. The right column shows the corresponding custom name. Click a cell in the right column to enter a new custom name.

The toolbar includes buttons to create new sets, save, delete sets, cut, copy and paste sets, and import and export sets. Buttons are also available above the Custom Names Set grid to group the names by category, or order them alphabetically by either the standard PI Batch name column or by the custom name column, and to toggle between views that show all terms and only those with custom names.

Below the grid is a description pane that shows the original PI Batch term, its custom name, its category, and a description of what the name is and where it is used.

Part III

Appendixes

Appendix A

Install PI BatchView

PI BatchView must be installed on a Microsoft Windows Operating System as specified in *System Requirements* (page 129).

The installed PI BatchView package includes:

- *Batch Search* (page 60) components
- *Results Table* (page 61)
- *Batch Gantt Chart* (page 63)
- *Batch Trend* (page 74)
- *Microsoft Excel add-in* (page 13)
- *PI BatchView QuickSearch* (page 7) utility
- Help files

To take full advantage of PI BatchView, first install PI ProcessBook, Microsoft Excel, and PI DataLink.

The PI BatchView installation method that is supported by OSIsoft is to use the distributed setup kit. Administrative privileges are required while installing.

System Requirements

The full PI BatchView installation package requires:

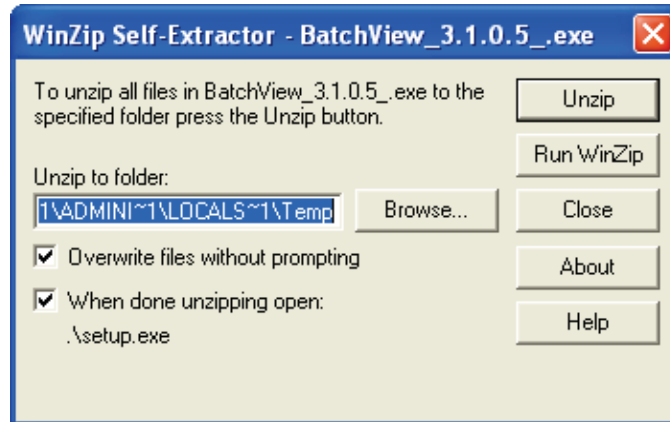
- Microsoft Windows 2000, Windows XP, or Windows 2003 server
- Microsoft Excel XP (2002) or higher, for the Microsoft Excel add-in
- PI ProcessBook 3.0.15 or higher, for the PI ProcessBook components
- PI Server version 3.3 SR1 (3.3.361.98) or higher

To view existing batch data stored in the Batch Subsystem in PI BatchView 3.0 and later, you must first create copies of the units from the `pibaunit` table and place these into the Module Database. For details, see *Batch Database Support of the PI Batch Subsystem* found on the OSIsoft Technical Support Web site.

Setup Kit

PI BatchView is distributed as a self-extracting executable. Before running this executable, close all other programs so that they do not interfere with the installation process.

The executable opens a message box stating that it will install PI BatchView. Then it opens the **WinZip Self-Extractor** dialog box.

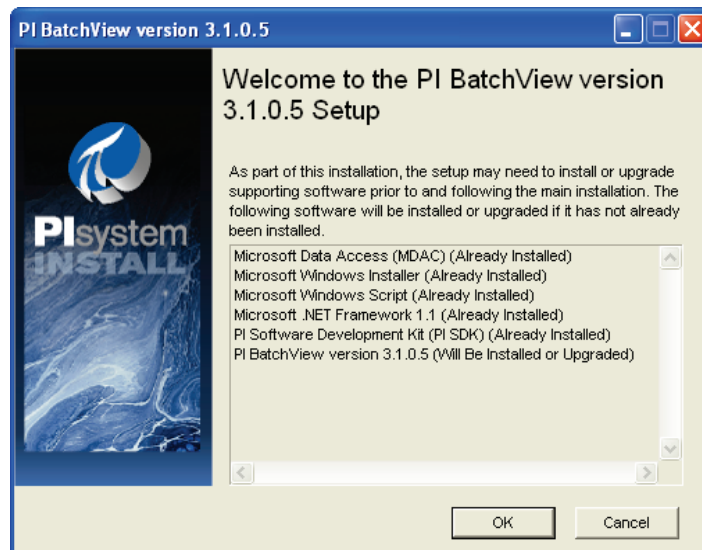


The recommended options, **Overwrite files without prompting** and **When done unzipping open: setup.exe**, are checked by default.

Click **Unzip** to unzip and run the setup kit. If **When done unzipping open: setup.exe** is not checked, you must run the `setup.exe` file from the unzip folder path specified in the **Unzip to folder** box.

Setup Wizard

This welcome screen lists the dependant components that will be installed. Setup only installs components that are not installed or that need to be updated.



If a compatible version of PI ProcessBook is not installed, a warning screen appears. See *System Requirements* (page 129) for details on PI ProcessBook version requirements.

Note: If you install PI BatchView before upgrading PI ProcessBook, then later upgrade PI ProcessBook, you must re-install PI BatchView.

After installing the prerequisite components, Setup displays two screens that may require your input for destination and PI Server information.

If another OSIsoft product is installed, you cannot change the destination folder or PI Server information—PI BatchView is installed in the PIPC folder and a default PI Server and user name is specified. Usually, this information is already determined in the installation of PI ProcessBook or another PI client application.

Follow the instructions on the remaining Setup screens to complete the installation.

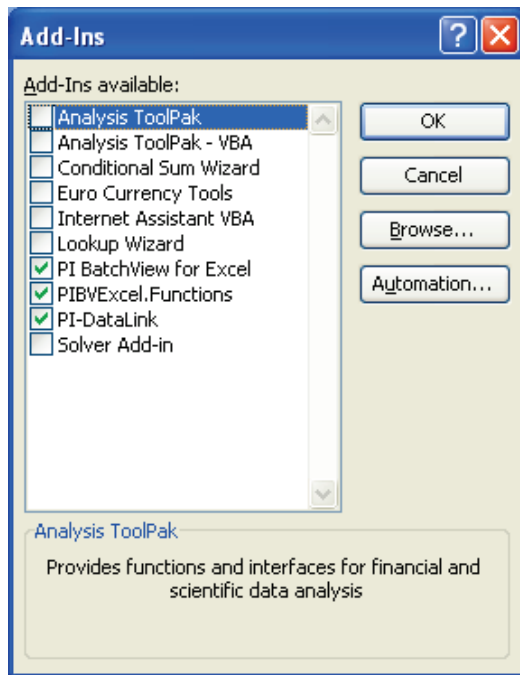
Post-Setup Steps

The results of the setup wizard are available in the setup log files, `SetupBatchView_Setup.log` and `BatchViewMaster.log`, located in the `PIPC\Dat` folder. OSIsoft Technical Support requires these files to assist with any problems that occur during installation.

The PI BatchView add-in for Microsoft Excel loads into Microsoft Excel after the PI BatchView installation is complete. The Microsoft Excel **Add-Ins** dialog box includes PI BatchView for Microsoft Excel and `PIBVExcel.Functions`. Once the add-ins are loaded for the first time, `HKEY_CURRENT_USER\Software\PISystem\PI-BatchView\Excel\Installed =1` is written to the registry. When this key is **1**, PI BatchView for Excel does not automatically load the add-ins on startup. This allows you to unload PI BatchView for Excel through the Microsoft Excel **Add-Ins** dialog while keeping PI BatchView installed.

An older Microsoft Excel add-in is also installed: version 2.1.1.2 of `pibat32.xla`. This add-in is necessary for backward compatibility with worksheets created from PI BatchView versions 3.0 and earlier. If you need this add-in, you must manually configure it in Microsoft Excel. To do this: in Microsoft Excel, choose **Tools > Add-Ins**. In the dialog box that appears, click **Browse**, navigate to the `PIPC\Batch` folder, and select `pibat32.xla`.

You can run both the current and 2.1.1.2 version of the add-in side-by-side.



To verify setup, browse to the PIPC\Batch folder (typically at C:\Program Files\PIPC\Batch). The release notes (PIPC\Batch\readme.htm) list the files that are installed with PI BatchView. You can also check from the Windows **Start** menu > **Programs** > **PI System** > **PI BatchView QuickSearch**.

Uninstalling and Repairing PI BatchView

We recommend using administrative privileges while repairing or uninstalling PI BatchView.

To repair or uninstall PI BatchView:

1. Open the Windows Control panel and choose **Add or Remove Programs**. The **Add or Remove Programs** dialog box that appears contains a list of installed applications.
2. Depending on your Windows version, select **Change/Remove** or **Add/Remove**. PI BatchView Setup runs with **Application Maintenance** dialog box.
3. If you select **Repair**, the program searches for missing components or corrupt registry keys attempts to restore them. This process is much quicker than the installation process because not every component needs to be restored.

If you select **Remove**, a warning appears and the program uninstalls PI BatchView. It leaves any files that do not belong to PI BatchView in the PIPC\Batch folder. It does not remove any shortcuts or copies of PI BatchView components that are not in the original places they were installed.

Upgrade From a Previous Version

Upgrading from PI BatchView 2.1 is designed to be as seamless as possible. Because of the advances in storing batches on the PI Server, however, behaviors have changed.

If you are upgrading from version 3.0, skip to *Microsoft Excel Add-In* (page 134).

View Batch Subsystem Batches

To view existing batch data stored in the Batch Subsystem in PI BatchView 3.0 and later, you must first create copies of the units from the `pibaunit` table and place these into the Module Database. For details, see *Batch Database Support of the PI Batch Subsystem* found on the OSIsoft Technical Support Web site.

ActiveX Controls for Searching Batches

The search controls for PI BatchView 3.0 and later have been completely redesigned since version 2.1. Any code written for the version 2.1 ActiveX control (`pibatchv.ocx`) does not work with the newer controls. However, the 2.1 version of the control still ships with the current version of PI BatchView for backward compatibility of your existing projects.

The 2.1 ActiveX control uses the PI API, which supports batches from the Batch Subsystem (BSS) and PIUnitBatches from the Batch Database (BDB). On the other hand, the current PI BatchView Search controls and add-in for PI ProcessBook use the PI SDK, which supports the full batch hierarchy from the BDB but requires a copy of the unit in the Module Database to view BSS batches as PIUnitBatches. See *Viewing Batch Subsystem Batches* (page 133) for details.

Batch Trend Conversion

The current version of PI BatchView supports displays created with PI BatchView 2.1.

When you open a display containing a Batch Trend created with BatchView 2.1, the display treats the Batch Trend as a Batch Group with only a Batch Trend showing. If you do not edit the Batch Trend, you can save the display without changing its format to a Batch Group; it remains a version 2.1 Batch Trend.

In Build mode, when you double-click a version 2.1 Batch Trend in the display, the **Batch Definition** dialog box for the current version of BatchView appears. If there are any edits that invoke a feature introduced in BatchView 3.0 or later, a dialog box appears asking if you

want to convert your 2.1 Batch Trend to a Batch Group. Converting a Batch Trend to a Batch Group is not reversible.

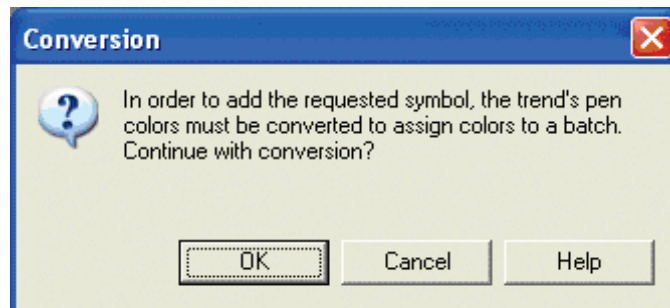
Some existing PI ProcessBook displays may not work properly until you create the PIUnit in the Batch Database (BDB) corresponding to the Batch Subsystem (BSS) unit. This includes:

- Searches for batches from the BSS
- Any PI ProcessBook displays that search for batches with the 2.1 ActiveX control and then populate the Batch Trend with the resulting batches

Color Schemes

For easier identification of batch data across the Gantt chart, Results Table, and Batch Trend, color schemes have changed. A PI ProcessBook display with a Batch Trend symbol that was created with BatchView 2.1 opens with the same color scheme as in 2.1. Until a new feature specific to BatchView 3.0 or later is chosen, the old color scheme is supported for that Batch Trend symbol.

If you attempt to add a Search, Results Table, Gantt Chart, or additional Batch Trend symbol in the Batch Definition Layout tab, a warning message appears:



Click **Cancel** to prevent the change from taking place. Click **OK** to apply the new color scheme.

Programmatic Interface

The Batch Trend's automation interface from PI BatchView 2.1 is supported in the current release with a few exceptions. Refer to the release notes (`readme.htm` in the `\PIPC\batch` directory) for the latest information.

Microsoft Excel Add-In

PI BatchView 3.1 introduces a redesigned Microsoft Excel add-in implementing full PI Batch Database implementation. However, for compatibility, PI BatchView ships with version 2.1.1.2 of the Microsoft Excel add-in. This version fully supports all Microsoft Excel worksheets created with PI BatchView 2.1. You can use the 3.1 and 2.1.1.2 add-ins side-by-side in Microsoft Excel. See *Post-Setup Steps* (page 131) for details on how to do this.

Version 2.1.1.2 is based on the PI API. Thus it can detect Batch Subsystem (BSS) batches and PIUnitBatches from the PI Batch Database (BDB). However, it cannot detect PIBatches or PISubBatches from the BDB.

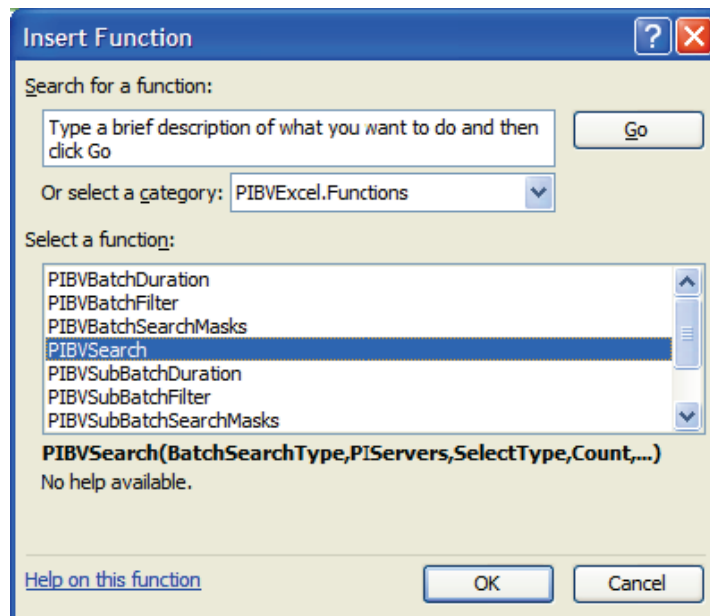
Version 3.0 is based on the PI SDK and can fully access PI Batch Database batch items such PIBatches, PIUnitBatches, and PISubBatches.

Appendix C

Microsoft Excel Functions

The PI BatchView Microsoft Excel add-in installs several functions into Microsoft Excel. The main function is **PIBVSearch**. There are also several supporting functions, which are discussed in *Optional Arguments* (page 140). When you choose **PI > Batch Search...** the PIBVSearch function is pasted into your spreadsheet as required by the function. In most cases you do not need to modify it.

To access these functions in Microsoft Excel, choose **Insert > Function**. In the **Insert Function** dialog box that appears, select **PIBVExcel.Functions** from the drop-down list.



PIBVSearch

Syntax

```
=PIBVSearch(BatchSearchType, PIServers, SelectType, Count, IncludeState, TimeState, SearchStartTime, SearchEndTime, CustomNameSet, Headers, DisplayOptions, OptionalArguments)
```

Parameters

| Argument | Description |
|-----------------|---|
| BatchSearchType | A numeric expression that specifies the type of batch search to do. The options are: 1: PIBatch Search 2: PIUnitBatch Search This parameter has no default, a value must be specified. |
| PIServers | A string expression or cell reference that specifies the PI Server(s). If more than one PI Server is specified, each server must be separated by a comma. If an empty string ("") or nothing at all is specified, the default server is used. |
| SelectType | A numeric expression or cell reference that specifies which records to find. The options are: 0: All Batches 1: First XX Batches 2: Last XX Batches Where XX is the value specified in the Count argument. If nothing is specified, the default of 0 (All Batches) is used. |
| Count | A numeric expression or a cell reference that specifies the number of Batches to return. Only used when applicable. If nothing is specified, the default of 1 is used. |
| IncludeState | A numeric expression or cell reference that specifies the state of the batches to include. The options are: 1: Running Batches G Completed Batches H Both Running and Completed Batches If nothing is specified, the default of 3 (Both) is used. |
| TimeState | A numeric expression or cell reference that specifies the state of the batch in the time range searched in. The options are: 0: Batches that have started in the time range. 1: Batches that are active in the time range. 2: Batches that fit entirely in the time range. 3: Batches that have ended in the time range. If nothing is specified, the default of 1 (Active) is used. |
| SearchStartTime | A string expression or cell reference that specifies the time range component of the beginning boundary of the search. If nothing is specified, the default of *-1 day is used. |
| SearchEndTime | A string expression or cell reference that specifies the time range component of the ending boundary of the search If nothing is specified, the default of * is used. |
| CustomNameSet | A string expression or cell reference that specifies the Custom Name Set to use. The format of a custom name set is: \\PIServerName\CustomNameSet If nothing is specified, the standard Custom Name set is used. |
| Headers | A string expression or cell reference that specifies the ordering of the data returned. See <i>Headers</i> (page 139). |

| Argument | Description |
|-------------------|---|
| DisplayOptions | A numeric expression or cell reference that specifies the display options in Microsoft Excel. See <i>Display Options</i> (page 140). |
| OptionalArguments | Optional Arguments describing PI Batch, PI Unit Batch, and PI Sub Batch search masks, durations, and filtering. See <i>Optional Arguments</i> (page 140). |

Headers

The headers parameter specifies which properties to display. The list of headers used is a comma-separated list with the following parts:

- A one-character string specifying which header to use. Valid string values are:

| Value | Description | Value | Description |
|-------|-------------|-------|--------------------|
| B | Batch ID | D | Duration |
| S | Start Time | H | PIUnit Heading |
| E | End Time | A | PISubBatch Heading |
| P | Product | T | Description |
| U | Unit | I | Unique ID |
| C | Procedure | Y | Batch Item Type |
| V | Server | O | PIBatch PIProperty |
| R | Recipe | | |

- A sign to specify the sort direction. Valid sort direction indicator values are:

| Value | Description |
|-------|-------------|
| + | Ascending |
| - | Descending |
| . | No Sorting |

- A number to specify the sort index
- An optional header title to override the default header title. Any string can be used. The header title must be preceded by the pipe character (|).
- The PIBatch PIProperty path (applies only to PIBatch PIProperty columns)

The following example shows the Batch ID, Start Time, and End Time, sorted by Start Time in ascending order, with the Batch ID title overwritten with Lot #:

```
"B.0|Lot #,S+1,E.0"
```

For a PIBatch PIProperty header, the path to the PIProperty in the PIBatch is required. To specify this, add another pipe character, then the path to the PIProperty, which may include more pipe characters. Since the title is not required, it is possible to have two pipe characters with nothing between them. For example:

```
"B.0|Lot #,S+1,E.0,O.0||PIProperties|PISubProperties|PIProperty"
```

Display Options

The display options control how the search output is displayed. The value of this parameter is a bit mask. To specify options, use the sum of the values for all the options you want.

The options are:

| Value | Description |
|-------|---|
| 0-7 | Number of Levels to show. 0 means show only the Level searched for (that is, just Unit Batches when doing a PUnitBatch search). Higher values show the children (that is, the sub-batches from a unit batch or sub-batch) |
| 8 | Display the number of PIBatches or PUnitBatches returned. If not specified, then do not display the count. |
| 16 | If number of Levels to show is greater than 0, then indent children batches into the next cell, and use the type of batch as the header if headers are shown. If not specified, then do not indent into the next cell. |
| 32 | If number of Levels to show is greater than 0, then indent children batches using cell indenting. If not specified, then do not use cell indenting. |
| 64 | If number of levels to show is greater than 0, then use Microsoft Excel grouping. If not specified, then grouping is not used. |
| 128 | Display the header titles for the data shown. If not specified, then headers are not shown. |
| 256 | Orient data in columns. If not specified, then data is oriented in rows |

Optional Arguments

The optional arguments describe the search masks, duration lengths, and filtering for PIBatch, PUnitBatch, and PSubBatches. The arguments are themselves functions, which provide a way to reference cells for their values, and to make it easier to read.

The functions that can be used as optional arguments are: PIBVBatchSearchMasks, PIBVUnitBatchSearchMasks, PIBVSubBatchSearchMasks, PIBVBatchDuration, PIBVUnitBatchDuration, PIBVSubBatchDuration, PIBVBatchFilter, PIBVUnitBatchFilter, and PIBVSubBatchFilter.

Returns

The query results appear in a rectangular array, arranged according to the Display Options.

Remarks

Paste this function into your worksheet as a rectangular array by pressing **Ctrl+Shift+Enter**. The horizontal or vertical dimension of the array (according to the Display Options setting) must cover the same number of cells as the number of headers in the Headers argument. Its other dimension must cover enough cells to contain the number of results that you expect the query to return.

PIBVBatchSearchMasks

Use this function only as an optional argument in the PIBVSearch function.

Syntax

```
PIBVBatchSearchMasks (Batch ID, Product, Recipe)
```

Parameters

| Part | Description |
|----------|---|
| Batch ID | A string expression or cell reference that specifies a PIBatch Batch ID. If nothing is passed, the default of * is used. |
| Product | A string expression or cell reference that specifies a PIBatch Product. If nothing is passed, the default of * is used. |
| Recipe | A string expression or cell reference that specifies a PIBatch Recipe. If nothing is passed, the default of * is used. |

Returns

This function returns the passed-in arguments separated by pipe characters (|) with the prefix BM.

Remarks

This function returns a string, not an array.

PIBVUnitBatchSearchMasks

Use this function only as an optional argument in the PIBVSearch function.

Syntax

```
PIBVUnitBatchSearchMasks (Batch ID, Product, UnitName,  
UnitHeading, Procedure)
```

Parameters

| Part | Description |
|----------|---|
| Batch ID | A string expression or cell reference that specifies a PIUnitBatch Batch ID. If nothing is passed, the default of * is used. |

| Part | Description |
|-------------|---|
| Product | A string expression or cell reference that specifies a PIUnitBatch Product. If nothing is passed, the default of * is used. |
| UnitName | A string expression or cell reference that specifies a PIUnitBatch UnitName. The format for this option is specified in the Attributes Component of Chapter 2., Searching for Batches. If nothing is passed, the default of * is used. |
| UnitHeading | A string expression or cell reference that specifies a PIUnitBatch UnitHeading. If nothing is passed, the default of * is used. |
| Procedure | A string expression or cell reference that specifies a PIUnitBatch Procedure. If nothing is passed, the default of * is used. |

Returns

This function returns the passed in arguments separated by pipe characters (|) with the prefix UBM.

Remarks

This function returns a string, not an array.

PIBVSubBatchSearchMasks

Use this function only as an optional argument in the PIBVSearch function.

Syntax

PIBVSubBatchSearchMasks (Name, Heading)

Parameters

| Part | Description |
|---------|---|
| Name | A string expression or cell reference that specifies a PISubBatch Name. If nothing is passed, the default of * is used. |
| Heading | A string expression or cell reference that specifies a PISubBatch Heading. If nothing is passed, the default of * is used. |

Returns

This function returns the passed in arguments separated by pipe characters (|) with the prefix SBM.

Remarks

This function returns a string, not an array.

PIBVxxxDuration

This function description applies to PIBVBatchDuration, PIBVUnitBatchDuration, and PIBVSubBatchDuration.

Use these functions only as optional arguments in the PIBVSearch function.

Syntax

```
PIBVxxxDuration(DurationType, DurationLength1, DurationLength2)
```

Parameters

| Part | Description |
|-----------------|--|
| DurationState | A numeric expression or cell reference that specifies the duration type of the duration lengths specified. Possible values are: 0: Any Length 1: Shorter Than 2: Between 3: Longer Than If Any Length is specified, DurationLength1 and DurationLength2 are ignored. If nothing is specified, the default of 0 (Any Length) is used. |
| DurationLength1 | A string expression or cell reference that specifies the duration length of a batch. This field is used only when DurationState is 1 (shorter than), 2 (between), or 3 (longer than). If nothing is passed, the default of 1 hour is used. |
| DurationLength2 | A string expression or cell reference that specifies the duration length of a batch. This field is used only when DurationState is 2 (between). If nothing is passed, the default of 1 minute is used. |

Returns

These functions return the passed-in arguments separated by pipe characters (|) with the prefix BD (BatchDuration), UBD (UnitBatchDuration), or SBD (SubBatchDuration).

Remarks

These functions return a string, not an array.

PIBVxxxFilter Functions

This function description applies to **PIBVBatchFilter**, **PIBVUnitBatchFilter**, and **PIBVSubBatchFilter**.

Use these functions only as optional arguments in the PIBVSearch function.

Syntax

```
PIBVxxxFilter(Filter, FilterPeriodType, FilterPeriodLength1,
FilterPeriodLength2)
```

Parameters

| Part | Description |
|---------------------|---|
| Filter | A numeric expression or cell reference that specifies the filter string used to verify that a value is true. If nothing is specified, the default of blank is used. |
| FilterPeriodType | A numeric expression or cell reference that specifies the filter period type of the filter lengths specified. The options are: 0: Any Time 1: Less Than 2: Between 3: Greater Than 4: Always 5: Absolute If Any Time or Always is specified, FilterPeriodLength1 and FilterPeriodLength2 are ignored. If nothing is specified, the default of 0 (Any Time) is used. |
| FilterPeriodLength1 | A string expression or cell reference that specifies the filter period length that the filter must be true for. This field is only used when the FilterPeriodType value is 1 (less than), 2 (between), or 3 (greater than). If nothing is passed, the default of 1% is used. |
| FilterPeriodLength2 | A string expression or cell reference that specifies the filter period length that the filter must be true for. This field is only used when the FilterPeriodType value is 3 (between). If nothing is passed, the default of 99% is used. |

Returns

These functions return the passed-in arguments separated by pipe characters (|) with the prefix **BF** (BatchFilter), **UBF** (UnitBatchFilter), or **SBF** (SubBatchFilter).

Remarks

These functions return a string, not an array.

Appendix D

Custom Names Terms

Many—but not all—of the terms that appear in PI BatchView can be renamed. Custom naming does not affect the way the data appears, only the terms that are part of the user interface. This appendix lists all the terms that can be renamed.

General

These terms include the titles and captions of dialog boxes and controls. The captions of search parameter components are not necessarily visible. So although the caption may be renamed, it may not appear in the component. Furthermore, the default caption (and the renamed caption) of these components can be overridden by the host application—therefore, the renaming may not take effect.

| Term | Description |
|--------------------|--|
| Attributes Caption | The default caption of the Attributes search parameter component. |
| Duration Caption | The default caption of the Duration search parameter component and the default label of the Duration column header in the Results Table. |
| Filter Caption | The default caption of the Filter search parameter component. |
| Select Caption | The default caption of the Select search parameter component. |
| Time Range Caption | The default caption of the Time Range search component. |
| Unit | The term for a PIUnit used in the Unit Mask Selection dialog box. |
| Units | The plural of the term for a PIUnit used in the Unit Mask Selection dialog box. |

PIBatch Terms

| Name | Description |
|---------------|--|
| Batch ID | The Batch ID attribute of a PIBatch displayed in the Attributes parameter component and the default caption of the Batch ID column header in the Results Table (PIBatch Result items). |
| PIBatch | The term for a PIBatch in the Batch Type column of the Results Table. |
| PIBatches | The term for the plural of PIBatch that indicates the batch type in the Select parameter component. |
| Product | The Product attribute of a PIBatch displayed in the Attributes parameter component and the default caption of the Product column header in the Results Table (PIBatch Result items). |
| Recipe | The Recipe attribute of a PIBatch displayed in the Attributes parameter component and the default caption of the Recipe column header in the Results Table. |
| Still Running | The end-time text in the Results Table that indicates that a PIBatch that has not yet completed. |

PIUnitBatch Terms

| Term | Description |
|---------------|--|
| Batch ID | The Batch ID attribute of a PIUnitBatch displayed in the Attributes parameter component and the default caption of the Batch ID column header in the Results Table (PIUnitBatch Result items). |
| PIUnitBatch | The term for a PIUnitBatch in the Batch Type column of the Results Table. |
| PIUnitBatches | The term for the plural of PIUnitBatch that indicates the batch type in the Select parameter component. |
| Procedure | The Procedure attribute of a PIUnitBatch displayed in the Attributes parameter component and the default caption of the Procedure column header in the Results Table. |
| Product | The Product attribute of a PIUnitBatch displayed in the Attributes parameter component and the default caption of the Product column header in the Results Table (PIUnitBatch Result items). |
| Still Running | The end-time text in the Results Table that indicates that a PIUnitBatch that has not yet completed. |
| Unit Heading | The Unit Heading attribute of a PIUnitBatch displayed in the Attributes parameter component and the default caption of the Unit Heading column header in the Results Table. |
| Unit Name | The Unit Name attribute of a PIUnitBatch displayed in the Attributes parameter component and the default caption of the Unit Name column header in the Results Table. |

PISubBatch Terms

| Term | Description |
|---------------|---|
| Heading | The Heading attribute of a PISubBatch displayed in the Attributes parameter component and the default caption of the PISubBatch Heading column header in the Results Table. |
| Name | The Name attribute of a PISubBatch displayed in the Attributes parameter component. |
| PISubBatch | The term for a PISubBatch in the Batch Type column of the Results Table. |
| PISubBatches | The term for the plural of PISubBatch in the Batch Type column of the Results Table. |
| Still Running | The end-time text in the Results Table that indicates that a PISubBatch that has not yet completed. |

Search Parameter Terms

| Term | Description |
|-----------|---|
| Active | The activity state of the Time Range component that specifies items that are running at some point within the time range. |
| Both | The Select component option to specify items that both have and have not completed (PIBatch selection mode). |
| Both | The Select component option to specify items that both have and have not completed (PIUnitBatch selection mode). |
| Completed | The Select component option to specify only items that have completed (PIBatch selection mode). |
| Completed | The Select component option to specify only items that have completed (PIUnitBatch selection mode). |
| Ended | The activity state of the Time Range component that specifies items that end within the time range. |
| Entirely | The activity state of the Time Range component that specifies items that start and end within the time range. |
| Running | The Select component option to specify items that have not completed (PIBatch selection mode). |
| Running | The Select component option to specify items that have not completed (PIUnitBatch selection mode). |
| Started | The activity state of the Time Range component that specifies items that start within the time range. |

Results Table Columns

The host application or the user can override the default caption and the renamed caption of the Results Table columns, and therefore the renaming may have no effect. Many columns that are available in the Results Table are not present in this section because they are present in other sections. For example, Batch ID is already included in both the *PIBatch* (page 148) and *PIUnitBatch* (page 148) sections.

The default labels for the column headers in the results table are:

- Alias
- Batch Item Type
- Batch Property
- End Time
- Expression
- Start Time
- Tag
- Unique ID
- Unit Description
- Unit Property

Appendix E

Technical Support and Resources

You can read complete information about technical support options, and access all of the following resources at the OSISOFT Technical Support Web site:

<http://techsupport.osisoft.com> (<http://techsupport.osisoft.com>)

Before You Call or Write for Help

When you contact OSISOFT Technical Support, please provide:

- Product name, version, and/or build numbers
- Computer platform (CPU type, operating system, and version number)
- The time that the difficulty started
- The message log(s) at that time

Help Desk and Telephone Support

You can contact OSISOFT Technical Support 24 hours a day. Use the numbers in the table below to find the most appropriate number for your area. Dialing any of these numbers will route your call into our global support queue to be answered by engineers stationed around the world.

| Office Location | Access Number | Local Language Options |
|-----------------------|-----------------|------------------------|
| San Leandro, CA, USA | 1 510 297 5828 | English |
| Philadelphia, PA, USA | 1 215 606 0705 | English |
| Johnson City, TN, USA | 1 423 610 3800 | English |
| Montreal, QC, Canada | 1 514 493 0663 | English, French |
| São Paulo, Brazil | 55 11 3053 5040 | English, Portuguese |
| Altenstadt, Germany | 49 6047 9890 | English, German |
| Manama, Bahrain | 973 1758 4429 | English, Arabic |
| Singapore | 65 6391 1811 | English, Mandarin |
| Perth, WA, Australia | 61 8 9282 9220 | English |

Support may be provided in languages other than English in certain centers (listed above) based on availability of attendants. If you select a local language option, we will make best efforts to connect you with an available Technical Support Engineer (TSE) with that language skill. If no local language TSE is available to assist you, you will be routed to the first available attendant.

If all available TSEs are busy assisting other customers when you call, you will be prompted to remain on the line to wait for the next available TSE or else leave a voicemail message. If you choose to leave a message, you will not lose your place in the queue. Your voicemail will be treated as a regular phone call and will be directed to the first TSE who becomes available.

If you are calling about an ongoing case, be sure to reference your case number when you call so we can connect you to the engineer currently assigned to your case. If that engineer is not available, another engineer will attempt to assist you.

Search Support

From the OSIsoft Technical Support Web site, click **Search Support**.

Quickly and easily search the OSIsoft Technical Support Web site's Support Solutions, Documentation, and Support Bulletins using the advanced MS SharePoint search engine.

Email-based Technical Support

techsupport@osisoft.com

When contacting OSIsoft Technical Support by email, it is helpful to send the following information:

- Description of issue: Short description of issue, symptoms, informational or error messages, history of issue
- Message logs: See documentation for your PI System for information on obtaining message logs pertinent to the situation.

Online Technical Support

From the OSIsoft Technical Support Web site, click **Contact us > My Support > My Calls**.

Using OSIsoft's Online Technical Support, you can:

- Enter a new call directly into OSIsoft's database (monitored 24 hours a day)
- View or edit existing OSIsoft calls that you entered
- View any of the calls entered by your organization or site, if enabled
- See your licensed software and dates of your Service Reliance Program agreements

Remote Access

From the OSIsoft Technical Support Web site, click **Contact Us > Remote Support Options**.

OSIsoft Support Engineers may remotely access your server in order to provide hands-on troubleshooting and assistance. See the Remote Access page for details on the various methods you can use.

On-site service

From the OSIsoft Technical Support Web site, click **Contact Us > On-site Field Service Visit**.

OSIsoft provides on-site service for a fee. Visit our On-site Field Service Visit page for more information.

Knowledge Center

From the OSIsoft Technical Support Web site, click **Knowledge Center**.

The Knowledge Center provides a searchable library of documentation and technical data, as well as a special collection of resources for system managers. For these options, click Knowledge Center on the Technical Support Web site.

- The Search feature allows you to search Support Solutions, Bulletins, Support Pages, Known Issues, Enhancements, and Documentation (including user manuals, release notes, and white papers).
- System Manager Resources include tools and instructions that help you manage: Archive sizing, backup scripts, daily health checks, daylight savings time configuration, PI Server security, PI System sizing and configuration, PI trusts for interface nodes, and more.

Upgrades

From the OSIsoft Technical Support Web site, click **Contact Us > Obtaining Upgrades**.

You are eligible to download or order any available version of a product for which you have an active Service Reliance Program (SRP), formerly known as Tech Support Agreement (TSA). To verify or change your SRP status, contact your Sales Representative or *Technical Support* (<http://techsupport.osisoft.com/>) for assistance.

Index

A

- Absolute level of Gantt • 64
- Absolute plot time • 44, 51
 - Zooming • 69
- Active X controls • 81, 133
- Activity State • 88
- Actual Time • 44
- Advanced Search • 22, 61, 97, 98
- Aliases • 23, 24
- Aligning
 - Batch Trend • 76
 - Gantt bars • 31, 72
- All, selection mode • 85
- Always, filter state • 96
- Anchored Classic • 46
- Anchoring, Results Table • 62
- Any Length, duration state • 94
- Any Time, filter state • 96
- Appearance
 - Batch Trend • 74
 - Gantt Chart • 63
 - Results Table • 62
- Attribute
 - Columns, Results Table • 105
 - Masks • 90
 - Selection • 89
 - Unit Name List • 90
- Attributes Component • 89
- Autorange scale • 34
- Available Aliases • 23
- Available Units • 92

B

- Bar Labels • 31
- Bar Size, Gantt Chart • 65
- Batch Color • 78
- Batch Definition dialog box
 - Advanced Search • 22
 - Layout tab • 25
 - Main tab • 22
 - Settings tab • 40
- Batch Gantt Preferences dialog box • 78
- Batch Group • 59
 - creating • 20
 - editing • 20

- symbol, customizing • 81
- updates • 76
- Batch Legend • 37
- Batch Query, updating • 49
- Batch Results Preferences dialog box • 78
- Batch Search • 59
 - Advanced Search • 61
 - Configuration • 60
 - Interactions • 60
 - Preferences dialog box • 78
- Batch Subsystem Batches, Viewing • 133
- Batch Trend • 74
 - Aligning • 76
 - Appearance • 74
 - Configuration • 74
 - Conversion • 133
 - Cursors • 75
 - Interactions • 75
 - Maximize • 75
 - Preferences dialog box • 78
 - Scale • 34
 - Selecting • 62
 - Shortcut menu • 75
 - ToolTips • 75
 - Traces on • 24
- Batch Type • 86
- Batches Not Found error • 76
- BatchID
 - Terminology • 2
- Between
 - Duration State • 94
 - Filter State • 96

C

- Caption, Column Attributes • 113
- Cell references • 14
- Classic color scheme • 46
- Clear Button • 22
- Collapsing Bars, Gantt Chart • 68
- Color Schemes • 45, 47, 78, 104
 - Anchored Classic • 46
 - Classic • 46
 - Upgrading • 134
- Column Attributes • 112, 113
 - Caption • 113
 - Format • 113
 - Format types • 117

- Sort • 114
- Sort Rank • 114
- Source • 114
- Width • 113
- Column Manipulation • 107
- Completed
 - Include • 86
- Configuration
 - Batch Search • 60
 - Batch Trend • 74
 - Gantt Chart • 63
 - Results Table • 61, 110
- Configure Columns
 - Adding • 107
 - Custom Names and • 149
 - Moving • 108, 111
 - Removing • 107
 - Sizing • 108, 111
 - Sorting • 109
 - Specifying • 110
- Configure Gantt dialog box • 30
- Configure Limit Set dialog box • 58
- Configure Results dialog box • 28, 110
- Configure Search dialog box • 27
- Configure Trend dialog box • 32
 - Trend Tab • 32
- Count • 86
- Cursors
 - Batch Trend • 75
 - Gantt Chart • 66
- Custom Names Sets • 17, 123, 124
 - choosing • 123
 - configuring • 124
 - creating • 125
 - default set • 124
 - editing • 125
 - enabling • 124
 - examples • 121
 - overview • 121, 122
 - terms • 147
- D**
- Data columns, Results Table • 107
- Data sets • 24, 55
- Database scale • 34
- Date format • 118
- Dialog Boxes
 - Advanced Search • 22, 61, 97
 - Batch Definition • 21
 - Batch Gantt Preferences • 78
 - Batch Results Preferences • 78
 - Batch Trend Preferences • 78
 - Batches Not Found • 76
 - Column Attributes • 112
 - Configure Gantt • 30
 - Configure Results • 28
 - Configure Search • 27
 - Configure Trend • 32
- Display settings, Batch Trend • 37
- Displays
 - Editing • 50
 - Saving • 51
- Duration
 - Component, searches • 94
 - Format • 118
 - Periods • 94
 - State • 94
- E**
- Editing
 - Batch Groups • 20
 - Displays • 50
- Errors in PI BatchView • 76
- Expanding
 - Bars, Gantt Chart • 66, 68
 - This item • 68
 - This item (all levels) • 68
- F**
- Filter
 - Component • 95
 - Expression • 95
 - Periods • 96
 - State • 96
- First
 - Selection Mode • 85
- Format
 - Column Attributes • 113
 - date • 118
 - duration • 118
 - numeric • 117
 - types in Column Configurations • 117
- G**
- Gantt Chart • 62
 - Aligning • 72
 - Bar Labels • 31
 - Bar Size • 65
 - Collapsing Bars • 68

- Configuration • 63
- Cursors • 66
- Display settings • 30
- Expanding Bars • 68
- Gantt Bar right-click menu • 66
- Hierarchy Level • 64
- Interactions • 65
- Label • 63
- Markers • 64
- Maximize • 65
- Navigation • 67
- Plus and Minus signs • 63, 68
- Preview • 31
- Properties • 65
- Selecting • 62
- Shortcut menu • 66
- Title • 30
- ToolTips • 65
- Trimming bar labels • 31
- Zoom with Align • 31
- Zooming • 69
- General scale • 34
- Greater Than
 - Filter State • 96

H

- Heading
 - Terminology • 2
- Hierarchy
 - in Results • 104
 - Level, Gantt Chart • 64

I

- Import Limit Set dialog box • 56, 57
- Include • 86
- Installation • 129
 - Repair • 132
 - Uninstallation • 132
- Interactions
 - Batch Search • 60
 - Batch Trend • 75
 - Gantt Chart • 65
 - Results Table • 62
- Interval Arithmetic • 99
- Interval Strings • 98
- ISO 8601 time format • 100

L

- Label, Gantt Chart • 63
- Last
 - Selection Mode • 85
- Less Than Filter State • 96
- Limit Sets • 52, 59
 - adding • 55
 - buttons • 58
 - configuring • 53, 58
 - data sets • 55
 - editing • 58
 - importing limits from • 56
 - naming • 59
 - PI ProcessTemplates • 53
 - plot time scale • 54
 - properties • 58
 - traces • 54
- Limits
 - adding • 55
 - importing from limit sets • 56
 - naming • 59
- Local system time format • 101
- Longer Than
 - Duration State • 94

M

- Markers
 - Color • 47
 - Gantt Chart • 64
 - Result Items • 104
 - Type • 47
- Mask List • 90
- Maximize
 - Batch Trend • 75
 - Gantt Chart • 65
- Maximum Traces • 78
- Microsoft Excel
 - add-ins • 13, 134
- Module Context • 61, 91
- Moving
 - columns • 111
 - symbols • 50

N

- Name
 - Terminology • 2
- Navigation, Gantt Chart • 67
- Numeric format • 117

P

Parameters

- Attributes • 89
- Duration • 94
- Filter • 95
- restricting • 60
- Selection • 85
- Servers • 87
- Time Range • 88

PI BatchView

- components • 1
- errors • 76
- installing • 129
- Microsoft Excel add-in • 13
- new features • 1
- PI ProcessBook • 19
- preferences • 77
- programming interfaces • 81
- upgrading • 133

PI BatchView for Excel • 13

- Search page • 14
- Settings page • 15

PI BatchView QuickSearch • 7

- Advanced Search • 8
- Parameters • 7
- QuickSearch Options dialog box • 10
- Results Table • 8
- Search Button • 8

PI ProcessBook

- Batch Group symbol in • 81
- symbols • 59
- viewing batches in • 19

PI ProcessTemplates • 53

PI Time • 99

PIBatch

- Batch Type • 86
- Terminology • 2
- Terms, Custom Names and • 147

PIVBatchSearchMasks • 141

PIBVSearch • 137

PIBVSubBatchFilter • 144

PIBVSubBatchSearchMasks • 142

PIBVUnitBatchFilter • 144

PIBVUnitBatchSearchMasks • 141

PIBVxxxDuration • 143

PIBVxxxFilter • 144

PISubBatch

- Terminology • 2
- Terms, Custom Names and • 148

PIUnitBatch

Batch Type • 86

Terminology • 2

Terms, Custom Names and • 148

Plot elements, configuring • 30

Plot Time • 40

- Absolute • 44
- Actual Time • 44
- Relative • 40
- Time into Batch • 44
- Time into Plot • 44

Post Setup Steps • 131

Preferences • 77

Previewing batch symbols • 27, 31, 38

ProcedureName

Terminology • 2

Product

Terminology • 2

Programming interfaces • 81, 134

Properties dialog box, Gantt Chart • 65

Q

QuickSearch Options dialog box • 10

R

Recipe

Terminology • 2

Relative level of Gantt • 64

Relative Plot Time • 41

Relative time • 51, 99

Zooming • 69

Repair • 132

Resizing Symbols • 50

Results Table • 8, 23, 61, 62, 103

Anchoring • 62

Colors • 104

Columns • 103, 107, 149

Configuration • 28, 61, 62, 110

Data columns • 107

Hierarchy • 104

Interactions • 62

Items • 103

Markers • 104

Selecting items in • 62, 105

Showing • 49

Sorting • 62

Status columns • 106

Visibility • 62

Results Table Columns • 103, 107

Adding and Removing • 107

Attributes • 105, 112, 113

- Moving • 108, 111
- Resizing • 108, 111
- Sorting • 109
- Specifying • 110

S

- Saving PI ProcessBook Displays • 51
- Scientific scale • 34
- Search
 - Advanced • 8, 22, 61, 97
 - Button • 22
 - Parameters • 22, 85, 149
- Select Include • 86
- Selecting
 - Batch Trend • 62
 - Gantt Chart • 62
 - Results Table • 62, 105
- Selection
 - Component • 85
 - Count • 86
 - Mode • 85
 - Result Item • 105
 - Type • 86
- Servers
 - Adding to PI BatchView QuickSearch • 8
 - Component • 87
 - Removing from PI BatchView QuickSearch • 8
- Setup Kit • 130
- Setup Wizard • 130
- Shortcut menu
 - Batch Trend • 75
 - Gantt Align • 66
 - Gantt Bars • 66
 - Gantt Chart • 66
- Shorter Than
 - Duration State • 94
- Show New Results • 49
- Show parent level • 66
- Sizing Columns • 111
- Sort Rank, Column Attributes • 114
- Sort, Column Attributes • 114
- Sorting columns, Results Table • 62, 109
- Source, Column Attributes • 114
- Specifying Columns • 110
- Status Columns, Results Table • 106
- Support, technical • 151
- Symbols • 20
 - Batch Group • 20, 59
 - Batch Search • 20, 59

- Batch Trend • 74
- Configuration Preferences • 78
- Gantt Chart • 20, 62
- Moving • 50
- Resizing • 50
- Results Table • 20, 61
- Trend • 20

- Synchronizing Time Scale • 50, 74
- System Requirements • 129

T

- Tags/Aliases • 24
- Technical support • 151
- Terminology • 2
- Time
 - interval arithmetic • 99
 - into Batch • 44
 - into Plot • 44
 - ISO 8601 • 100
 - local system time • 101
 - PI Time • 99
 - relative • 99
 - scale, synchronizing • 50
 - strings • 98
- Time Range • 88
- TimeFrom and TimeTo parameters • 88
- ToolTips
 - Batch Trend • 75
 - Gantt Chart • 65
- Trace Style • 36
- Trend Format Tab
 - Batch Legend • 37
 - Display settings • 37
 - Preview • 38
 - Trace Style • 36
- Trend Tab
 - Available Aliases • 23
 - Tags/Aliases • 24
- Trends • 26
 - Configuring • 32
 - Scale • 34
 - Title • 32

U

- Un-installation • 132
- Unit • 2
- Unit Name List • 90
- Unit Name Mask Selection dialog box
 - Available Units • 92

- Unit Mask List • 93
- Update Batch Query • 49
- Updates
 - Results List • 76
- Upgrading • 133
 - ActiveX Controls • 133
 - Batch Trend • 133
 - Color Schemes • 134
 - Microsoft Excel add-in • 134
 - Programmatic Interface • 134
 - Viewing Batch Subsystem Batches • 133

V

- Visibility, Results Table • 62
- Visible Symbols • 26

W

- What's New • 1

Z

Zooming

- Absolute time • 69
- Gantt affects Trend • 69
- Gantt Chart • 69
- PISubBatches • 69
- PIUnitBatches • 69
- Relative time • 69
- with Align • 31