2016 OSIsoft TechCon

Tips and Tricks with PI System Explorer and PI Builder

OSIsoft, LLC
777 Davis St., Suite 250
San Leandro, CA 94577 USA
Tel: (01) 510-297-5800
Web: http://www.osisoft.com

Published: April 11, 2016

Table of Contents

Contents

Introduction

In this lab, you will learn some tips and tricks on using the PI System Explorer (PSE) and the PI Builder. These are things that you may not be aware of and will help you in using these two application in a more effective manner. The material is presented in two parts: Part 1 focusses on the PSE and Part 2 on the PI Builder. The Appendix contains some more tips and tricks that we will not have time for during this lab. Hope you find them useful.

Login Step by Step:

1. Log into the machine PISRV01
2. Username: pischool\student01
3. Password: student

Part 1 – PI System Explorer (PSE)

Open the PSE and make sure you are on the **TechCon2016** database.

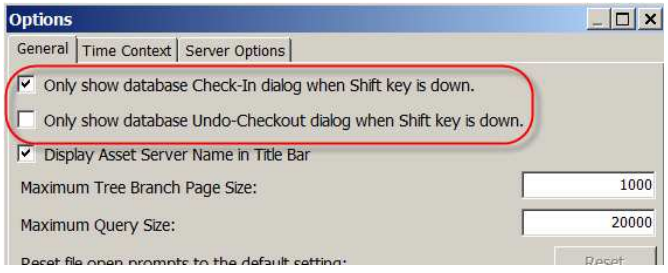
Hiding Check In and Check out Dialogs

Contrary to popular belief, you do not need to perform a **Check In** all the time when you are working in the PSE. The only reason to do that is to make the changes available to external PI AF Clients. When you do perform a **Check In** it is a time saving not to have to have the **Check In** dialog pop-up every time and then having to click the **Check In** button.

1. Change the options for **Check In** to hide the dialog, create a new element, and check it in without the dialog popping up.

   Step by step:

   a. If you are not in the **Elements** view press the **Ctrl+1** key combination
   b. In the menu, navigate to **Tools>Options…**
   c. In the **Options** dialog check the Check Box **Only show database Check-In dialog when Shift key is down**



   d. Click the **OK** button
   e. Press the **Ctrl+S** key combination. The changes are now checked in.

2. Create a new element and check it in, but have the **Check In** dialog appear first.

   Step by step:

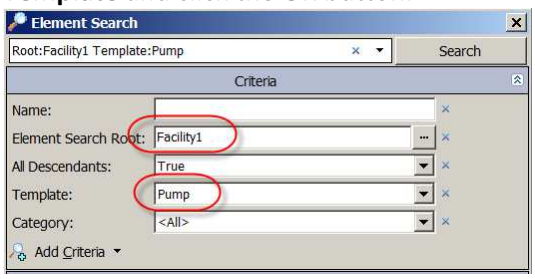
   a. You can do this in two ways. The first one is to use the **Options** dialog, as above, and unchecking the Check Box **Only show database Check-In dialog when Shift key is down**
   b. Then you can check in using either the **Ctrl+S** key combination or clicking the Check In in the Toolbar. The dialog will appear and then click the **Check In** button.
   c. The second way is to hold the **Shift** key down and click the Check In in the Toolbar. Note, you cannot use the **Ctrl+S** key combination with holding down the **Shift** key.

Searching and Filters

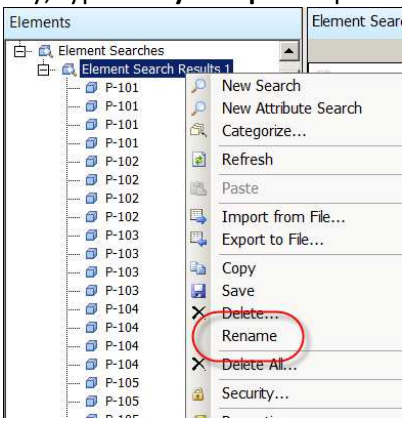
1. Create search view named **My Pumps** containing all the pumps from **Facility1**.

   Step by step:

   a. If you are not in the **Elements** view press the **Ctrl+1** key combination
   b. Press the **F3** key, and select **Facility1** for the **Element Search Root** and **Pump** for the **Template** and click the **OK** button.

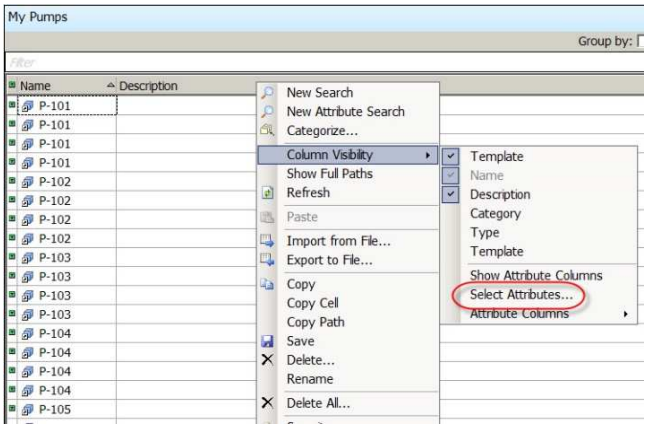


   c. You can rename the search results in two ways. One way is to right click the **Element Search Results 1** in the **Browser** pane and select **Rename**. Type in **My Pumps** and press the **Enter** key. The other is click on the **Element Search Results 1** and the press the **F2** key, type in **My Pumps** and press the **Enter** key.

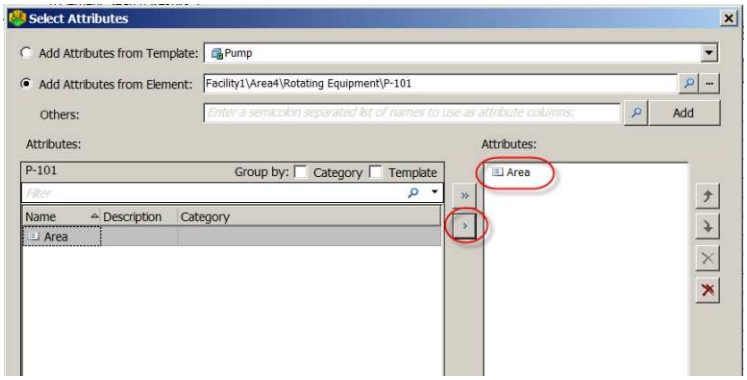


2. Then in the **Viewer** pane of the PSE filter the results to show pumps in **Area1** only.

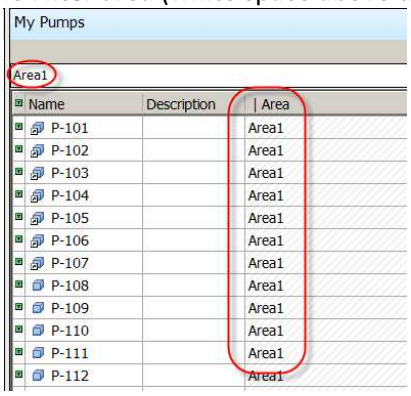
a. In the **Viewing** pane all the pumps are listed.
   - To filter out pumps that belong to **Area1** we first need to add an **Attribute** to the header to make it visible.
   - An **Attribute** named **Area** has been configured in the **Pump** template to retrieve the name of the pump's grandparent. (You can look in the **Pump** template to see how this is done).
   - Right click on the gray area of the header and select **Column Visibility>Select Attributes**.



b. In the **Select Attributes** dialog select the row with the name **Area** and click the › button. Then click the **OK** button**.**



c. In the **Filter** area (white space above the header in the **Viewing** pane) type in **Area1**.



d. Now only pumps in **Area1** show up in the **Viewing** pane. (**Note:** filters can be used almost anywhere there is a list and will filter on any columns that are displayed. This includes Tables.)

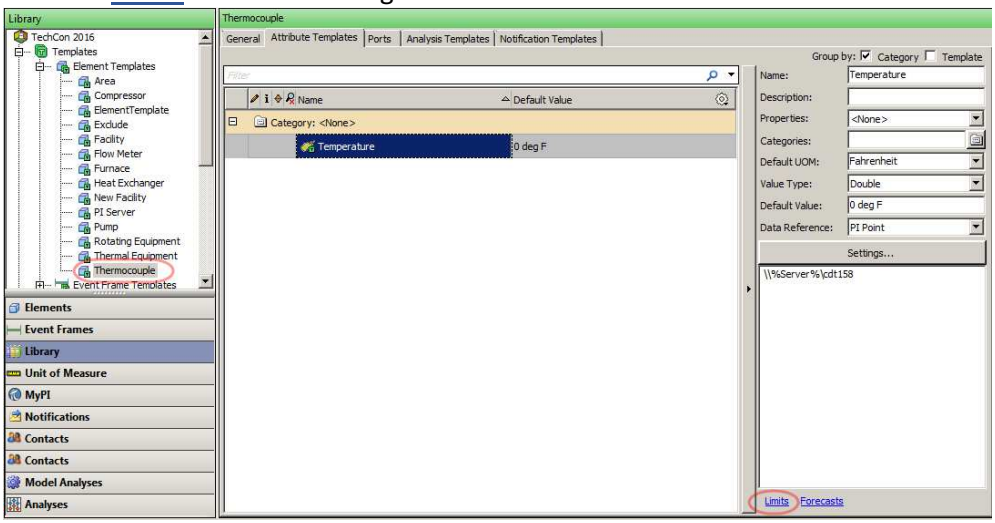
Attribute Traits

This is a new feature of the upcoming release **PI AF 2.8**. There are two types of traits – Limits and Forecasts. These are will be used in the new Coresight 2016 release to show and trend these for the Attribute in question, and Coresight automatically knows that these are the Traits for this Attribute.

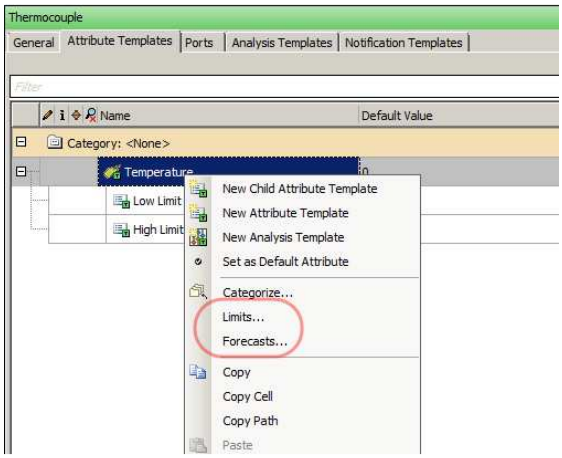
Approach: Add high and low limits to the Attribute **Temperature** in the **Compressor** Template. Add high and low limits; rename these to **High Limit** and **Low Limit** and fixed values of 150 and 50, respectively. Then reset the **Low Limit** to be the **Minimum** limit and the **High Limit** to be the **Maximum** limit.

Step by step:

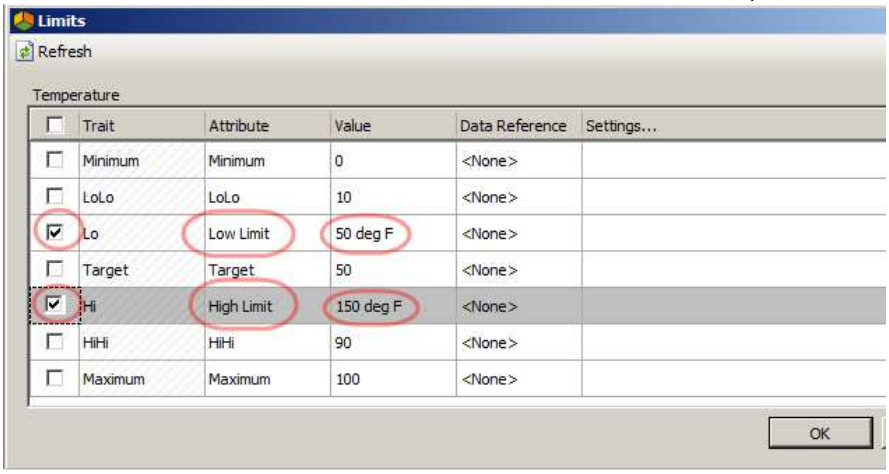
a. Press the **Ctrl+3** key combination to navigate to the **Library** view.
b. Select the **Thermocouple** Template under **Element Templates**. Click on the **Attribute** tab in the **Attribute Viewing** pane and select the **Temperature** Attribute.
c. Click the **Limits** at the bottom right corner of the **PSE** Window.



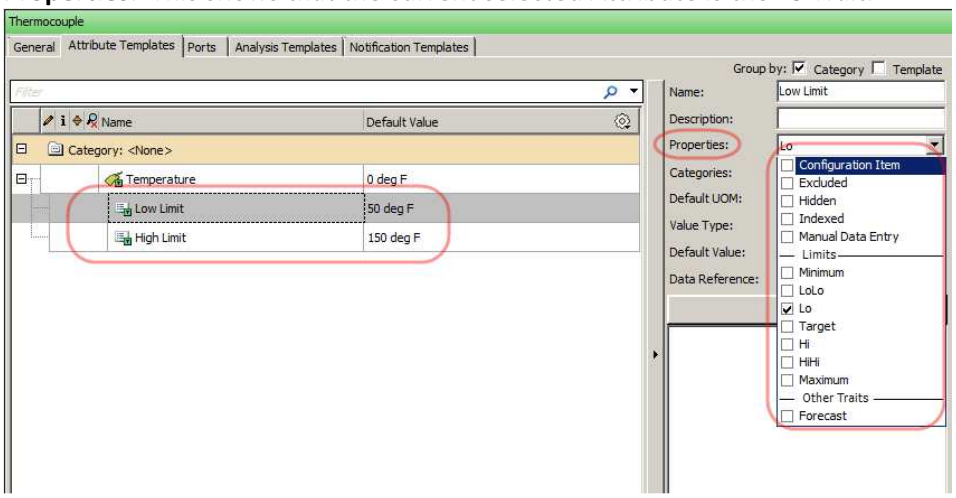
d. You can also **Right-Click** the **Temperature** Attribute and select **Limit** from the **Right-Click** Menu.



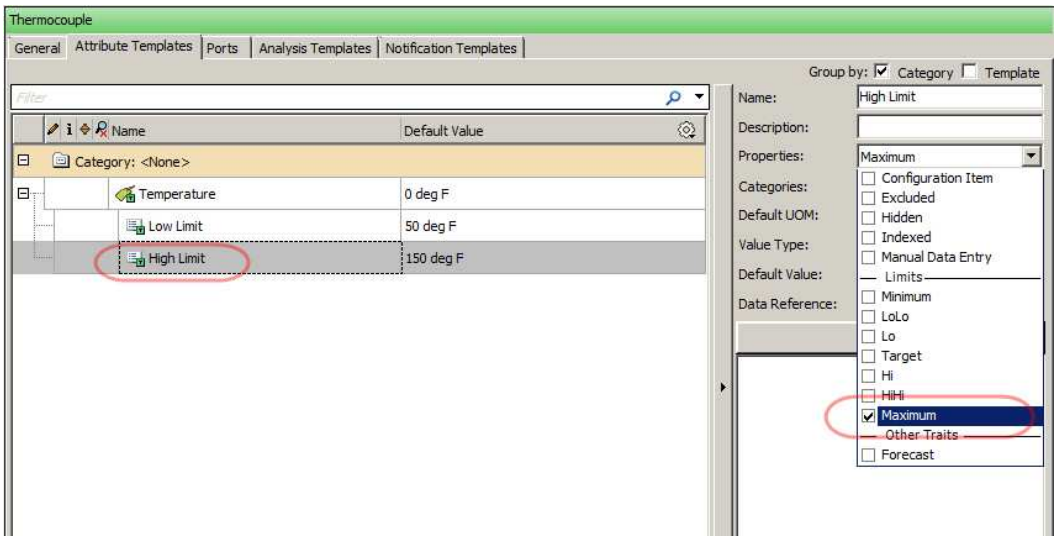
e. In the **Limits** Window select the **Lo** and **Hi** check boxes. Then in the **Attribute** column rename these to **Low Limit** and **High Limit**, respectively. Enter 50 for the Value of the **Low Limit** and 150 for the Value of the **High Limit**. Then click **OK**. (**Note:** The units of measure for the limits are inherited from the Parent-Attribute.)



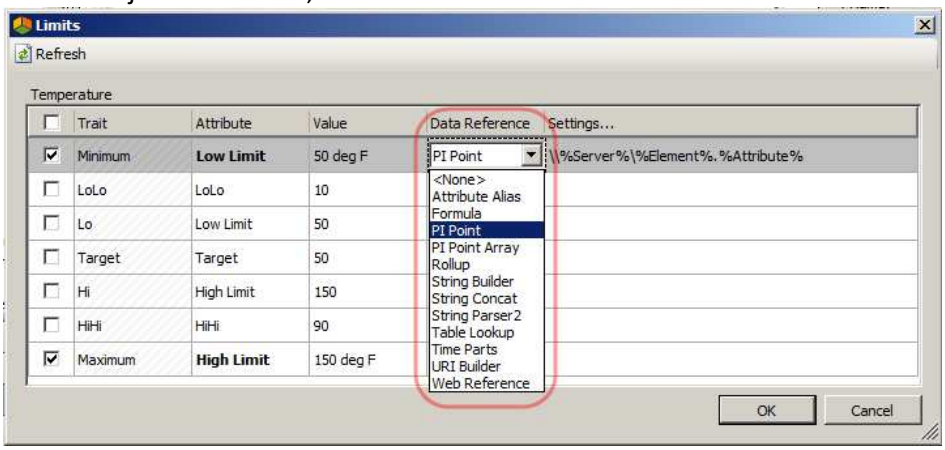
f. Click on the + next to the **Temperature** Attribute to view the newly created Child-Attributes. Select the **Low Limit** Attribute and click on the combo box next to the **Properties**. This shows that the current selected Attribute is the **Lo** Trait.



g. Click on the check box next to the Minimum Trait. Do the same for the High Limit Attribute, except click the check box next to the Maximum Trait.



h. **Note**: In the Limits Window, you can use Data References to assign dynamic values instead of just static ones, as we did above.



Hidden and Excluded Attributes

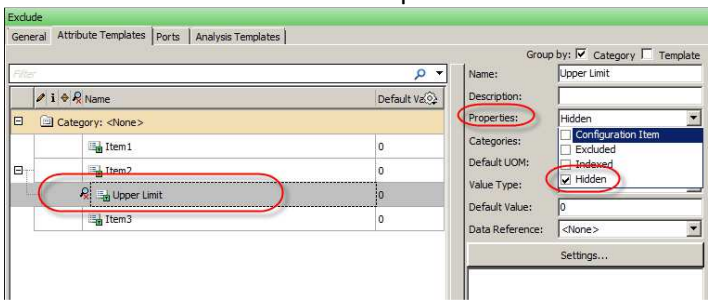
There are new capabilities to hide and/or exclude Attributes for Elements and will affect the accessibility of these Attributes via the client tools ProcessBook 2015, Coresight 2015, and DataLink 2015.

Approach: Use the **Exclude** Template to make the **Item2>Upper Limit** child-Attribute set to be **Hidden** and **Item3** Attribute set to be **Excluded**. Create two new Elements based on the **Exclude** Template and rename them **Exclude1** and **Exclude2**. For **Exclude1**, change the Properties to **Excluded**. Open ProcessBook, create a new ProcessBook Display File (**pdi)**, and show the **AF Browser** and **AF Property** panes. Select the Elements **Exclude1** and **Exclude2** in turn and see what Attributes show up in the **AF Property** pane.

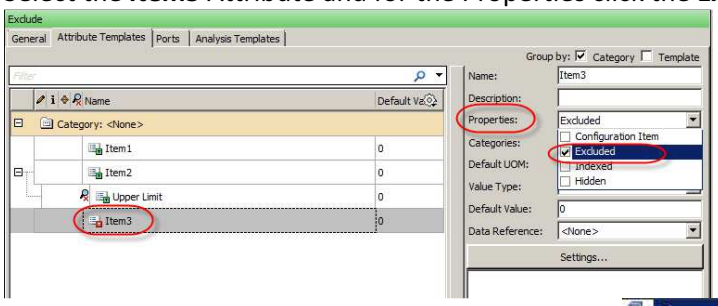
Step by step:

a. If you are not in the **Library** view press the **Ctrl+3** key combination
b. Select the **Exclude** Template under **Element Templates**. Click on the **Attribute** tab in the **Attribute Viewing** pane.

c. Show the child-Attribute for the **Item2** Attribute by clicking the ⊞ sign, select the **Upper Limit** child-Attribute. For the Properties click the **Hidden** check box**.**



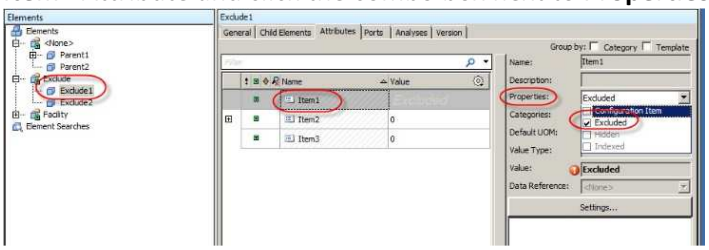
d. Select the **Item3** Attribute and for the Properties click the **Excluded** check box.



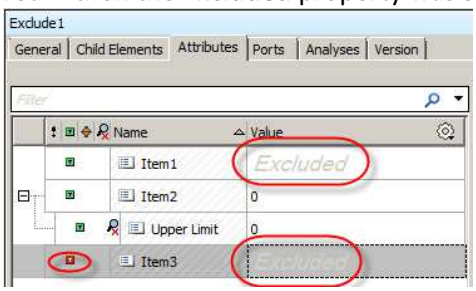
e. Create a new Element by right clicking on **Elements**  and select **New Element**. Press the **F2** key and type **Exclude1** to rename it.

f. Create another Element named **Exclude2** in the same way.

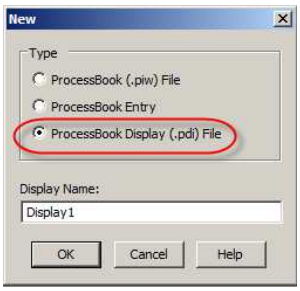
g. Select **Exclude1** and click on the **Attribute** tab in the **Attribute Viewing** pane. Select the **Item1** Attribute and click the combo box next to **Properties** and select **Excluded**.



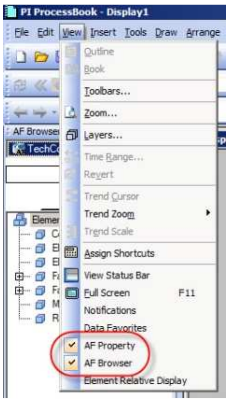
h. Show the child-Attribute for the **Item2** Attribute by clicking the ⊞ sign. Note, the **Hidden** Attributes are designated by next to the Attribute, the **Excluded** Attributes show *Excluded* for the Value. When the template symbol next to the Attributes turns red then the **Excluded** property was set at the Template level.



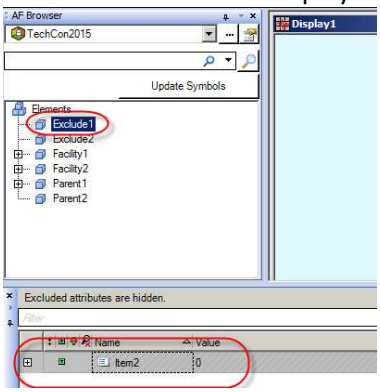
i. Press the **Ctrl+S** key combination to Check In your changes. Then open ProcessBook and click the symbol in the menu bar. In the dialog select the **ProcessBook Display File** radio button and click the **OK** button.



j. Click **View** in the menu and select **AF Browser**. Click **View** again and select **AF Property**.



k. These two panes are now displayed and you can click elements in the **AF Browser** pane to see the attributes for that Element. Select the **Exclude1** Element and notice that only the **Item2** Attribute is displayed.



l. Select the **Exclude2** Element and **Item1** and **Item2** Attributes are displayed.

(**Note:** The following table shows which PI clients support the hidden and excluded features.)

Client	Hidden	Excluded
ProcessBook	Not Supported	Supported
DataLink	Supported	Supported
Coresight	Supported	Supported

Tip for No PI Tag Naming Convention

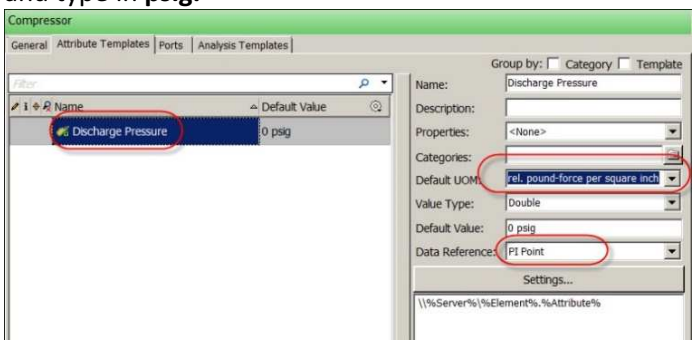
This is a tip for mapping PI tags to Elements when there is no tag naming convention that can be applied to the Element Template.

Approach: Add a new Attribute named **Discharge Pressure** to the **Compressor** Template, change the Units of Measure to **psig**, and make it Data Reference **PI Point**. Then add a child-Attribute to this Attribute called **Tag Name**.

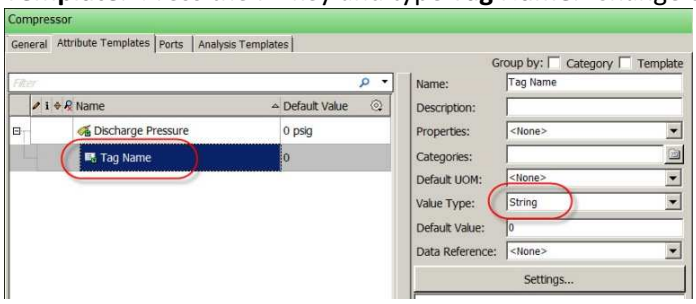
Step by step:

i. Press the **Ctrl+3** key combination to navigate to the **Library** view.
   - Then select the **Compressor** Template under **Element Templates**.
   - Click on the **Attribute** tab in the **Attribute Viewing** pane.
   - Right click anywhere on the white space in the **Viewing Pane** and select **New Attribute Template**.
   - Select the Attribute, press the **F2** key, and type **Discharge Pressure**.

j. For the **Data Reference** select **PI Point**. Click inside the combo box for **Default UOM** and type in **psig.**



k. Select the **Discharge Pressure** Attribute. Right click and select **New Child Attribute Template**. Press the **F2** key and type **Tag Name**. Change the **Value Type** to **String**.



l. Press the **Ctrl+S** key combination to Check In your changes. Later in the PI Builder exercise, we will use this template to enter PI Tags for the compressors.

Substitution parameters

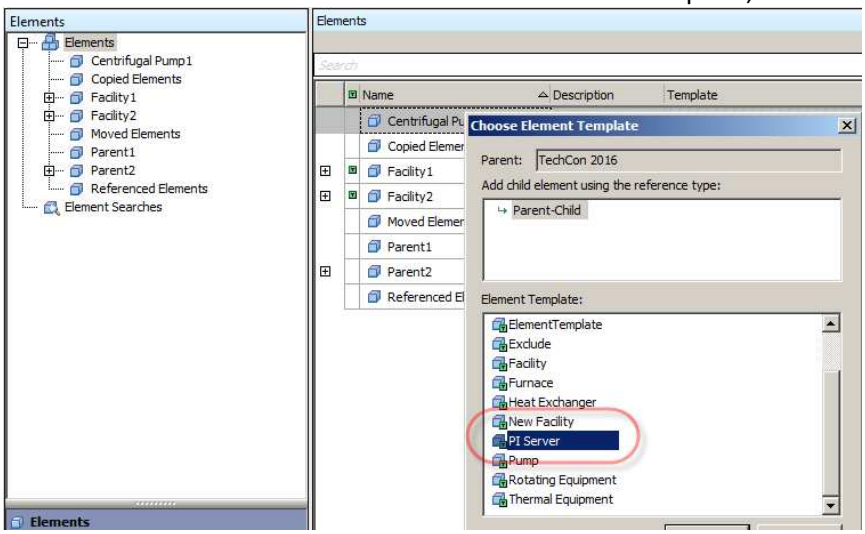
Approach: Using the **Compressor** Template created above, configure the **Discharge Pressure** Attribute to use the value of the child-Attribute **Tag Name** for the PI point tag name. Then create an

Element at the root level named **PI Servers** with an Attribute named **Server1**. Enter the server name into this Attribute (The server name is the machine name that you logged into). Then replace the **%Server%** in the configuration of the **Discharge Pressure** Attribute to get the value of the **Server1** Attribute in the **PI Servers** Element you just created.

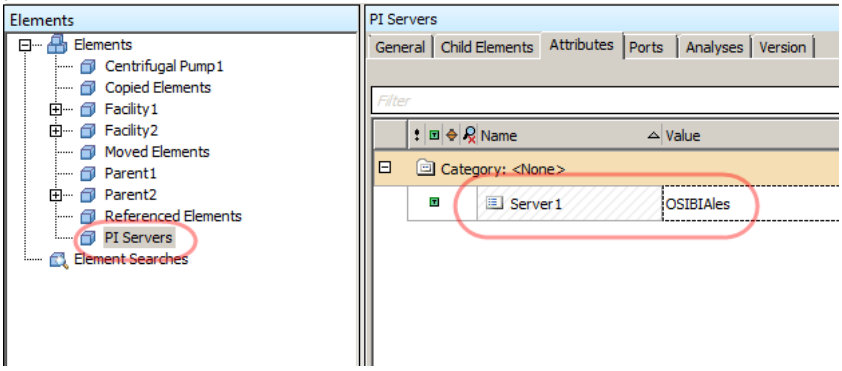
Step by step:

a. Press the **Ctrl+1** key combination to go to the **Elements** view.

b. Create an Element **PI Servers** based on the **PI Server** Template, and name it **PI Servers**.



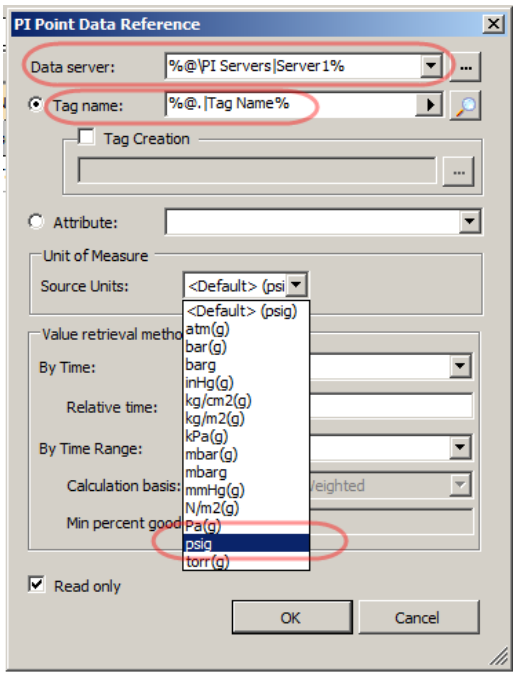
c. Click on the **PI Servers** element, then click on the **Attribute** tab in the **Attribute Viewing** pane. Enter the server name into the **Server1** Attribute.



d. Press the **Ctrl+3** key combination to navigate to the **Library** view. Then select the **Compressor** Template under **Element Templates**. Click on the **Attribute** tab in the **Attribute Viewing** pane.

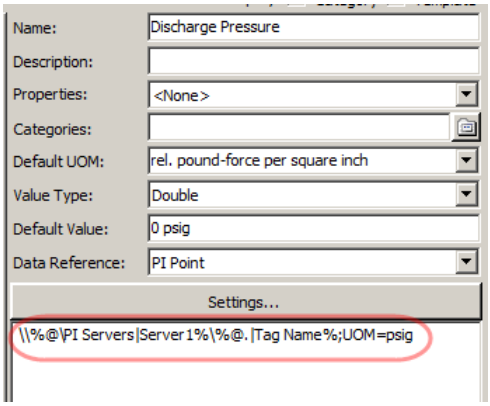
e. Select the **Discharge Pressure** Attribute and set the Data Reference to **PI Point.** Click the **Settings** button, then in the **PI Point Data Reference** dialog type **%@\PI Servers|Server1%** in the field next to the **Data Server**, and then type **%@.|Tag Name%** in the field next to the **Tag Name**.

f. One last thing, my preference is never to use <default> units for a measurement. So click on the **Source Units** combo-box and select **psig** from the available units of measure.

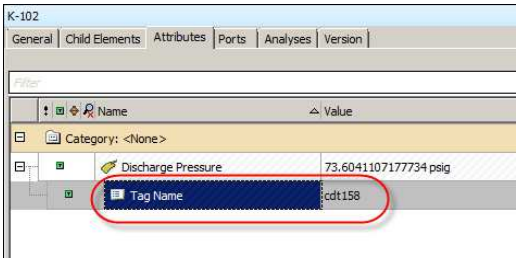


g. Click the **OK** button.

Note: The other way to do this is (once you become familiar with the syntax), is to delete the text under the **Settings** button and type **\\%@\PI Servers|Server1%\%@.|Tag Name%;UOM=psig** directly.



h. Press the **Ctrl+1** key combination to go to the **Elements** view.
i. Select the first compressor element (name starts with **K**) in the **Browser** pane (**Facility1>Area1>Rotating Equipment)** then click on the **Attribute** tab in the **Attribute Viewing** pane.
j. Select the child-Attribute **Tag Name**, press the **F2** key, and type **cdt158** for the value. Press the **F5** key to refresh. The **Discharge Pressure** Attribute is now receiving data.



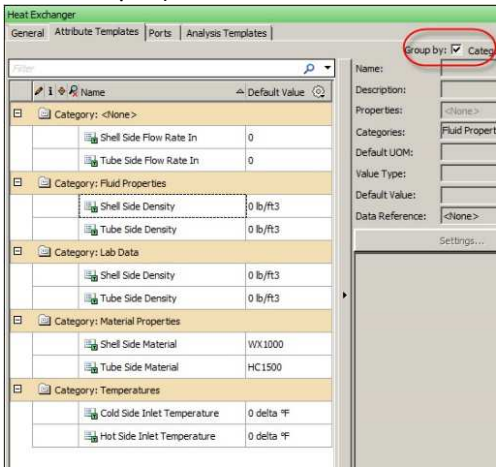
k. Press the **Ctrl+S** key combination to Check In your changes. Later in the PI Builder exercise, we will use this template to enter PI Tags for the other compressors.

Categories and Multi-select editing

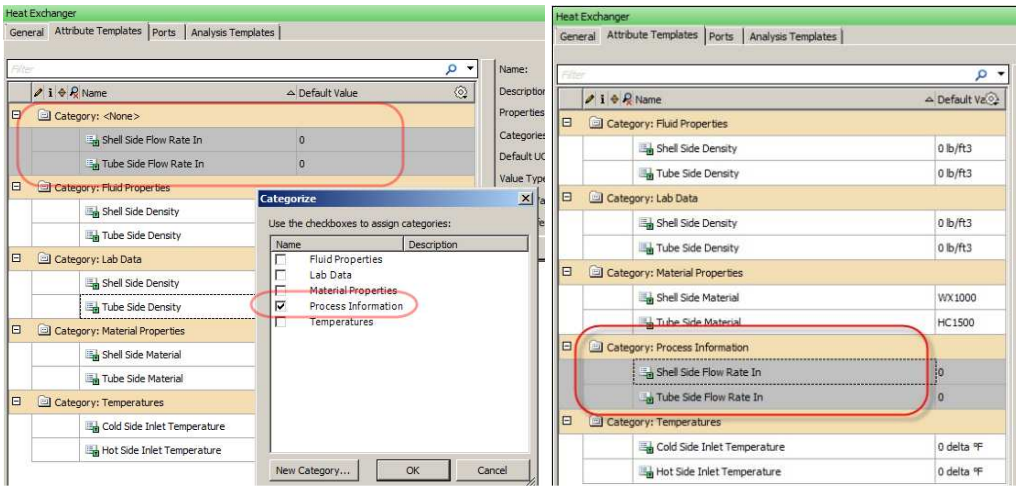
1. Assign Categories for the Attributes in the **Heat Exchanger** Template and for both the flow rate Attributes and assign **Process Information** Category and **gpm** UOM to both at the same time.

   Step by step:

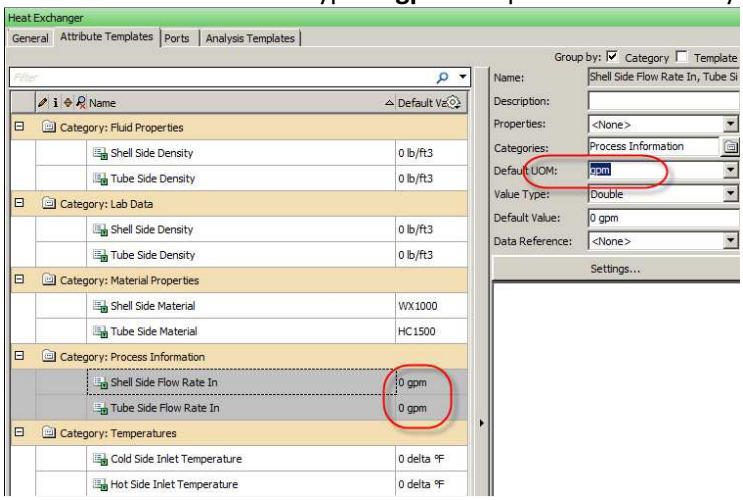
   a. If you are not in the **Library** view press the **Ctrl+3** key combination
   b. Then select the **Heat Exchanger** Template under **Element Templates**. Click on the **Attribute** tab in the **Attribute Viewing** pane.
   c. Select the **Group by: Category** check box. (**Note:** an Attribute can belong to multiple Categories, the **Shell Side Density** and **Tube Side Density** belong to two Categories in this example.)



   d. Select the **Shell Side Flow Rate In** Attribute, hold down the **Ctrl** key and select the **Tube Side Flow Rate In** Attribute. Both are now selected. Click the  button next to the **Categories** text box and click the **Process Information** check box.



e. In the **Default UOM** field type in **gpm** and press the **Enter** key.

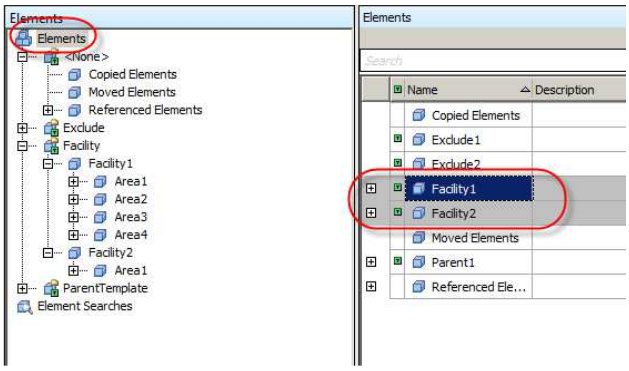


f. Notice that the **Properties Viewing** pane is displaying properties common to both Attributes.

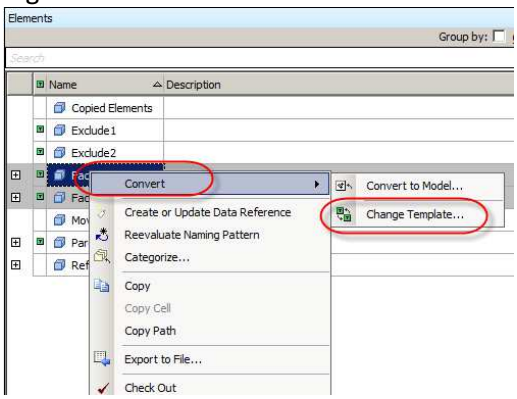
2. For the next part, select the **Facility1** and **Facility2** Elements and change their template to **New Facility** at the same time.

Step by step:

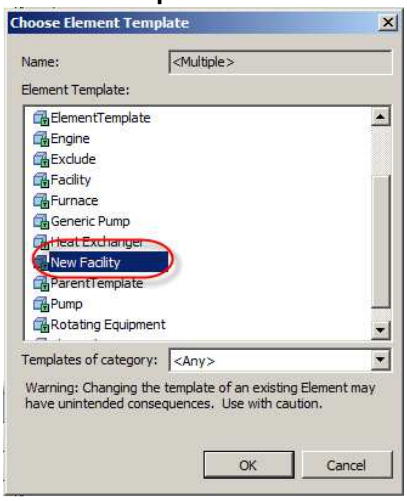
a. If you are not in the **Elements** view press the **Ctrl+1** key combination.
b. Select the **Elements** in the **Browser** pane, and then select the **Facility1** and **Facility2** Elements by holding down the **Ctrl** key and clicking on them in the **Viewing** pane.



c. Right click one of the selected Elements and select **Convert>Change Template**



d. Then select **New Facility** and click **OK**. (**Note:** notice that display next to the **name** field reads **<Multiple>** since more than one Element is selected.)



e. Both elements have their templates changed. (**Note:** multi-select is also useful for many other operations like change/create Categories, configure Attributes, move/reference groups of Elements)

Annotations

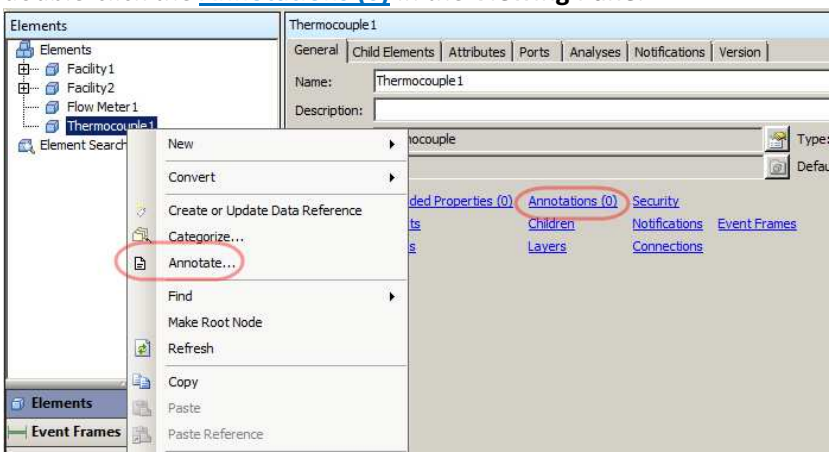
This is a new feature of the upcoming release **PI AF 2.8**. You can add annotations to Elements and Event Frames to document something about them and attach certain document types to the annotation.

Approach: Add comment to the **Thermocouple1** Element and attach the **Thermocouple K.pdf** document to the comment.

Step by step:

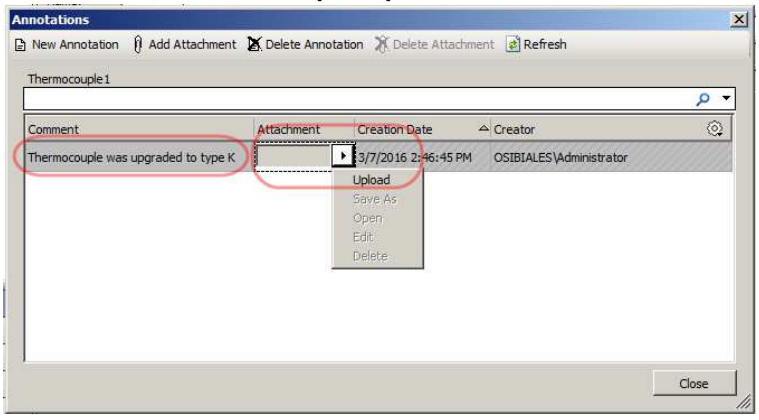
a. Press the **Ctrl+1** key combination to navigate to the **Elements** view and click on the **Thermocouple1** Element.

b. You can either right-click the **Thermocouple1** Element or you can select it and then double-click the **Annotations (0)** in the **Viewing Pane**.

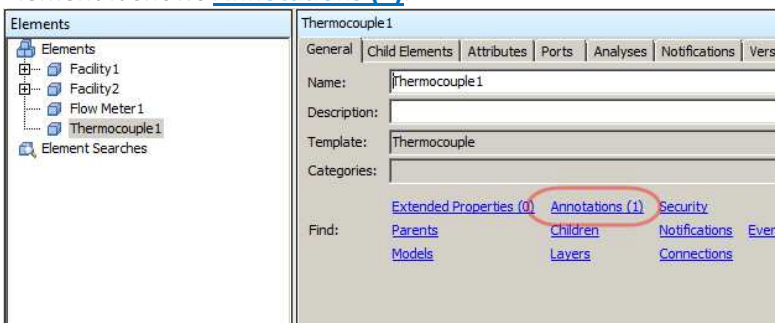


c. In the **Annotations** window click on **New Annotation**.

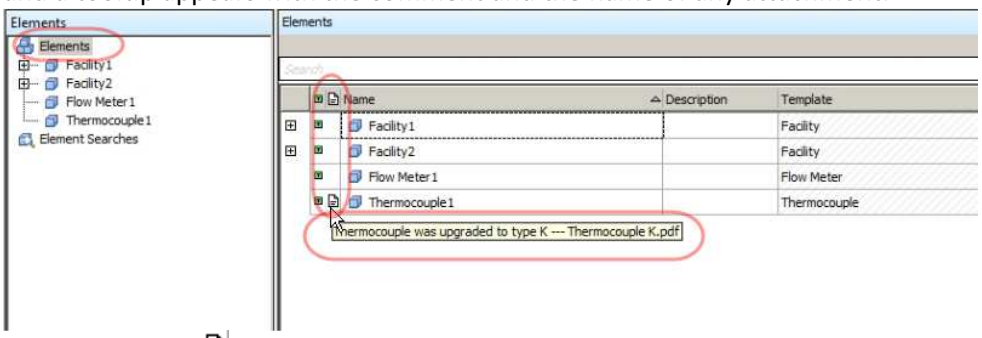
d. In the **Comment** field type in, **Thermocouple was upgraded to type K**. Click on the **Attachment** field and then on the ▸ symbol. Select **Upload**, navigate to the Desktop and select the **Thermocouple K.pdf** file. Then click on **Close** to close the window.



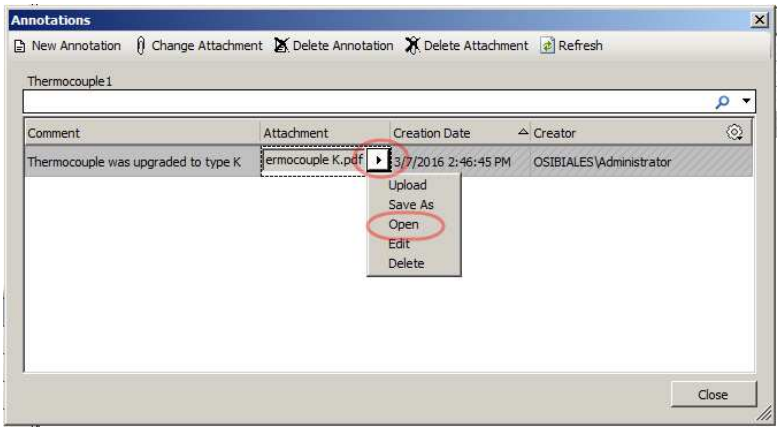
e. Notice that when you select the Element you can see how many annotations that particular Element has in the **General** tab of the **Viewing Pane**. For the **Themocouple1** Element it shows **Annotations (1)**.



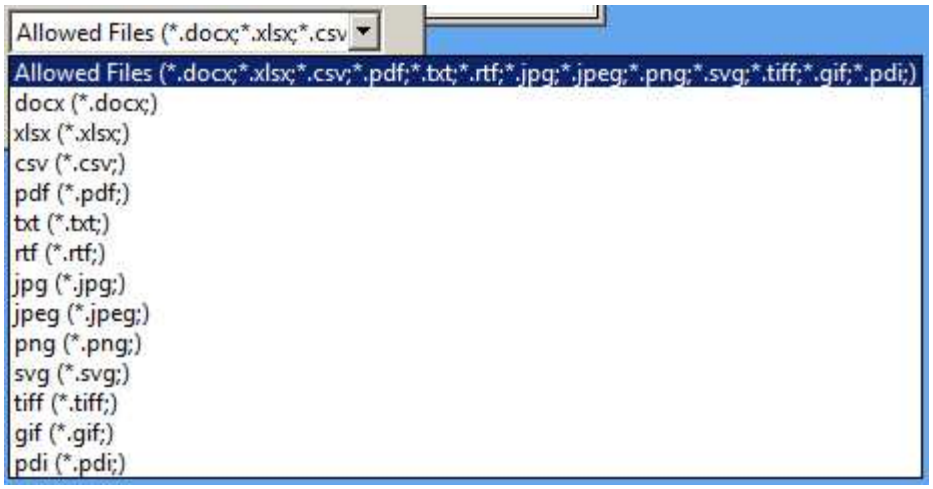
f. Click on **Elements** in the **Browser Pane** and in the **Viewing Pane,** you can see which Elements have annotations by the icon. Hover the mouse cursor over the icon and a tooltip appears with the comment and the name of any attachment.



g. Double-click the icon that you just hovered over. The **Annotations** window opens, select the **Annotation** field, and click on the symbol. Select the **Open** option. The document is opened in Acrobat Reader. This is a good way to attach important instructions and documentation about the asset so that it is available for all users. Close the Acrobat Reader.



h. **Note:** The following formats are supported as attachments.

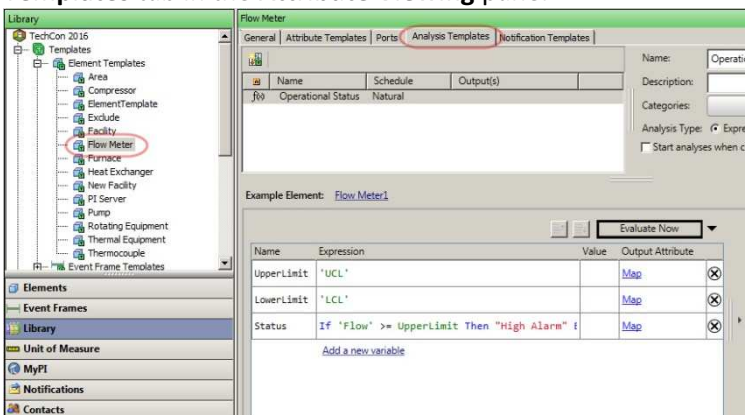


Analytics – Comments and Breaking up your calculations

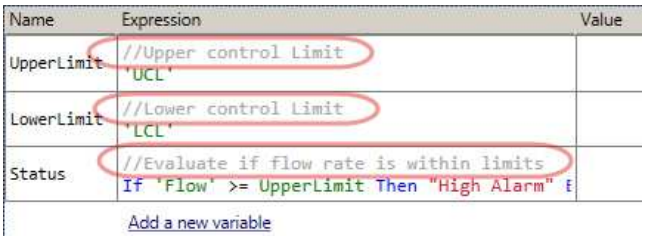
Approach: It is not easy to try to read and understand an equation that is very long (those of you who have experience with the PI Performance Equations can attest to this), or when the calculations are not documented. Go to the **Analysis Templates** tab in the **Flow Meter** Template and enter comments for the three expressions. Then make the **Status** expression more readable.

Step by step:

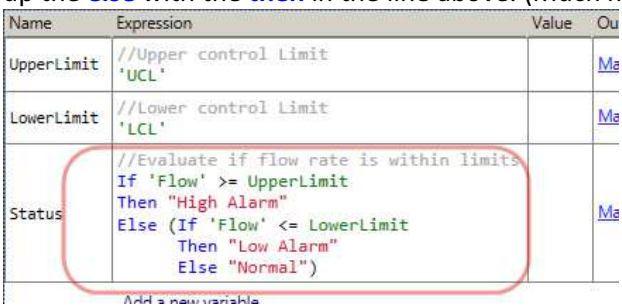
a. If you are not in the **Library** view press the **Ctrl+3** key combination
b. Select the **Flow Meter** Template in the **Browser** pane and then click on the **Analysis Templates** tab in the **Attribute Viewing** pane.



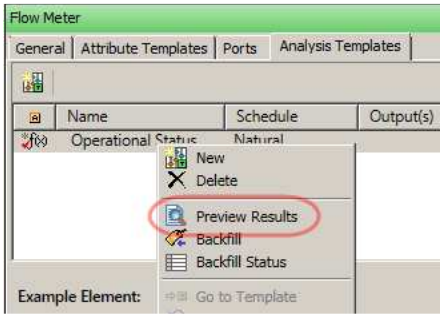
c. Click on the field under **Expressions** next to the **UpperLimit**. At the beginning of the line enter **// Upper Control Limit**, then hold down the **Shift** key and press **Enter**. Then press the **Esc** key, this exits you out of the editing mode.
For the **LowerLimit**, do the same but type **// Lower Control Limit**, and for **Status** type **// Evaluate if flow rate is within limits**.



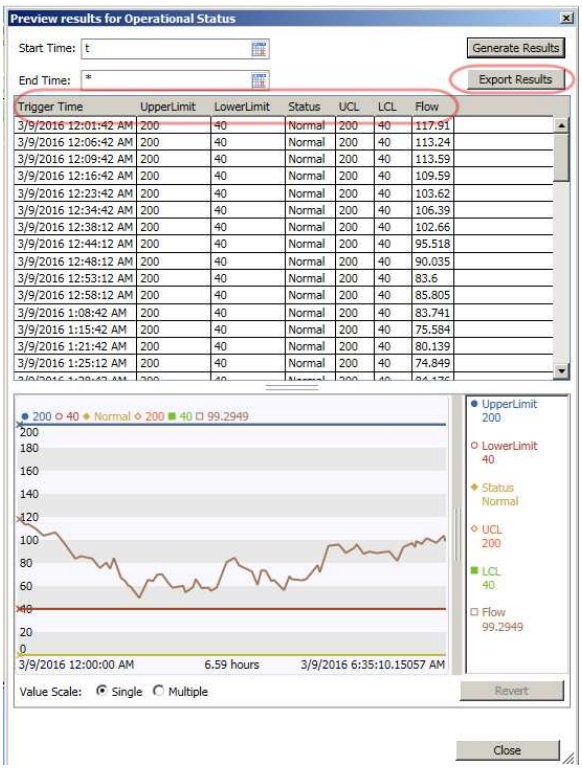
d. To make the **Status** expression more readable click inside the expression. Click in front of the first **then** and then hold the **Shift** key down and press **Enter**. Then click in front of the first **else** and then hold the **Shift** key down and press **Enter**.
Click in front of the next **then** and then hold the **Shift** key down and press **Enter**. Use the space bar to lineup the **then** with the **if** in the line above. Then click in front of the next **else** and then hold the **Shift** key down and press **Enter**. Use the space bar to ling up the **else** with the **then** in the line above. (Much more readable)



e. Bonus round ☺ - an extremely useful feature is the **Preview** option. Before you check in and enable the calculation of an expression, it is always useful to validate your logic and see if it is giving the desired results. Right click the **Operational Status** Analysis and select **Preview Results**.



f. In the **Preview results for Operational Status** window click the **Generate Results** button. The results for variables in the Analysis and values for all of the Attributes used in the Analysis are displayed in columns. Usually there will be a lot of columns and rows and it will be difficult to check the results in this dialog. So, click the **Export Results** button and save the file to the Desktop. (This saves a file in the CSV format so you can then use Excel to analyze the results.)



g. After you are happy that the expression is correct, press the **Ctrl+S** key combination to Check In your changes.

Part 2 – PI Builder

Open Microsoft Excel with a blank workbook. Click on **PI Builder** in the menu to display the PI Builder ribbon.

PI Builder is used for bulk editing/creation of either PI Tags or PI AF objects. Select the PI Server and Asset Server, and make sure the Database is set to **TechCon2016.**

PI Point Search

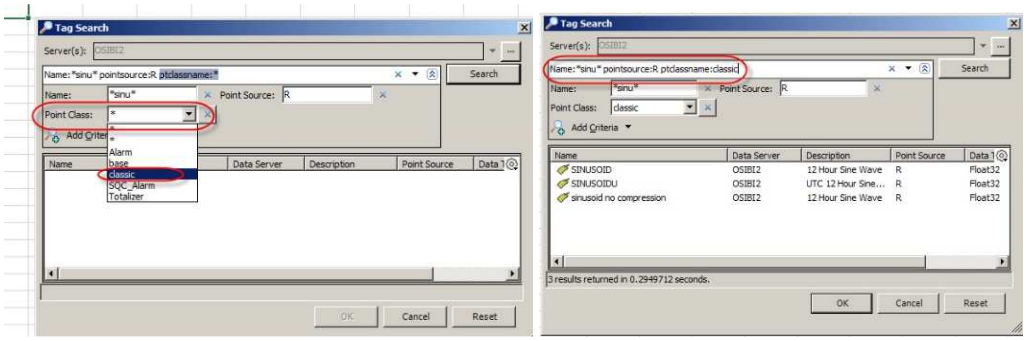
Search for PI Tags whose names contain **Sinu** and have a Point Source of **R** and a Point Class of **Classic**.

Step by step:

a. In the ribbon click the down arrow under the **PI Points** and select **Find PI Points**

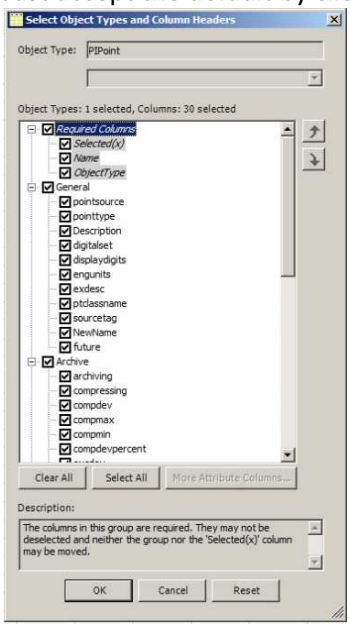
b. Type ***Sinu*** in the **Name** field, type **R** in the **Point Source** field. Click on **Add Criteria** and select **Point Class**.

c. Select **Classic** from the **Point class** combo box and click the **Search** button.



d. You can select the tags you want or just click the **OK** button to select all the tags that the search retrieved. (**Note** – you can also type in the search string directly if you know the syntax)

e. The **Select Object Types and Column Headers** dialog pops up. Here you can make selections on what attributes of the PI tags you would like to retrieve into the workbook. Just accept the default by clicking the **OK** button.



f. The result should look very familiar to users of the old **PI SMT** add-in to Excel with one exception. There is a mandatory additional property called **ObjectType**. For PI Tags the value is **PIPoint**, it is different for different AF objects.

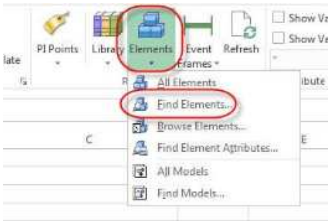
	A	B	C	D	E	F	G	H	I	J	K
1	Selected(x)	Name	ObjectType	pointsource	pointtype	Description	digitalset	displaydigits	engunits	exdesc	ptclassname
2	x	SINUSOID	PIPoint		Float32	12 Hour Sine Wave		-5			classic
3	x	SINUSOIDU	PIPoint		Float32	UTC 12 Hour Sine Wave		-5			classic
4											
5											

Element Search and Hierarchy Backup

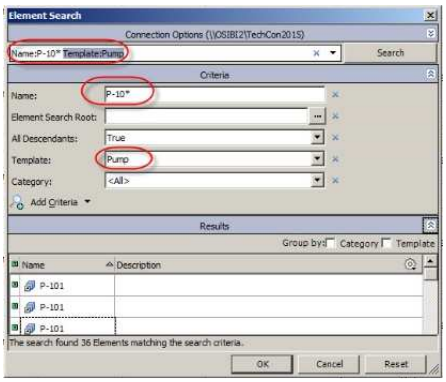
1. Import all Pumps starting with **P-10** and their Attributes from the **TechCon2016** database into the workbook.

Step by step:

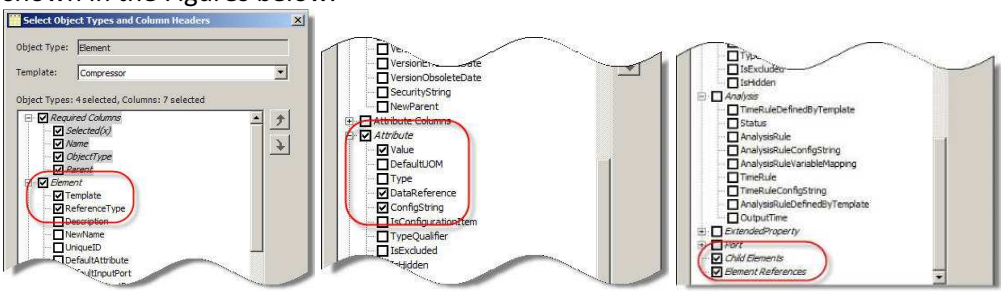
a. Create a new workbook. In the ribbon click the down arrow under the **Elements** and select **Find Elements**.



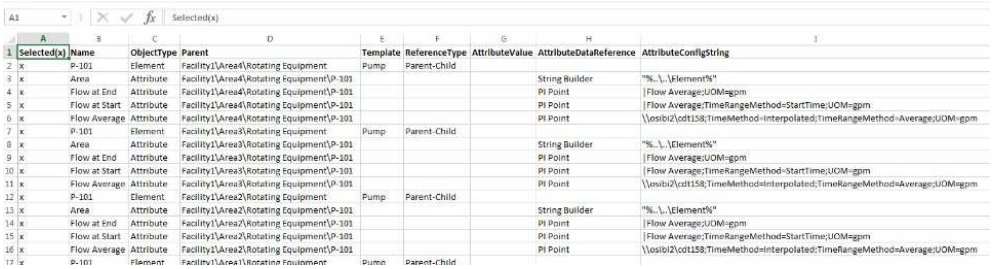
b. In the **Name** field type **P-10*** and select **Pump** in the **Template** combo box. Click the **Search** button.



c. To select all the pumps you can just click the **OK** button (**Note** - no need to select the pumps in the results if you want all of them). The **Select Object Types and Column Headers** dialog pops up. Deselect all the options, and then select only the options shown in the Figures below.



d. The pumps and their Attributes are listed by row.

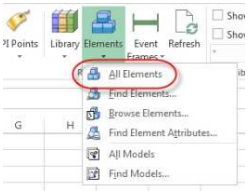


Selected(x)	Name	ObjectType	Parent	Template	ReferenceType	AttributeValue	AttributeDataReference	AttributeConfigString
x	P-101	Element	Facility1\Area4\Rotating Equipment	Pump	Parent-Child			
x	Area	Attribute	Facility1\Area4\Rotating Equipment\P-101				String Builder	"%..\..\Element%"
x	Flow at End	Attribute	Facility1\Area4\Rotating Equipment\P-101				PI Point	|Flow Average;UOM=gpm
x	Flow at Start	Attribute	Facility1\Area4\Rotating Equipment\P-101				PI Point	|Flow Average;TimeRangeMethod=StartTime;UOM=gpm
x	Flow Average	Attribute	Facility1\Area4\Rotating Equipment\P-101				PI Point	\\osibi2\cdt158;TimeMethod=Interpolated;TimeRangeMethod=Average;UOM=gpm
x	P-101	Element	Facility1\Area3\Rotating Equipment	Pump	Parent-Child			
x	Area	Attribute	Facility1\Area3\Rotating Equipment\P-101				String Builder	"%..\..\Element%"
x	Flow at End	Attribute	Facility1\Area3\Rotating Equipment\P-101				PI Point	|Flow Average;UOM=gpm
x	Flow at Start	Attribute	Facility1\Area3\Rotating Equipment\P-101				PI Point	|Flow Average;TimeRangeMethod=StartTime;UOM=gpm
x	Flow Average	Attribute	Facility1\Area3\Rotating Equipment\P-101				PI Point	\\osibi2\cdt158;TimeMethod=Interpolated;TimeRangeMethod=Average;UOM=gpm
x	P-101	Element	Facility1\Area2\Rotating Equipment	Pump	Parent-Child			
x	Area	Attribute	Facility1\Area2\Rotating Equipment\P-101				String Builder	"%..\..\Element%"
x	Flow at End	Attribute	Facility1\Area2\Rotating Equipment\P-101				PI Point	|Flow Average;UOM=gpm
x	Flow at Start	Attribute	Facility1\Area2\Rotating Equipment\P-101				PI Point	|Flow Average;TimeRangeMethod=StartTime;UOM=gpm
x	Flow Average	Attribute	Facility1\Area2\Rotating Equipment\P-101				PI Point	\\osibi2\cdt158;TimeMethod=Interpolated;TimeRangeMethod=Average;UOM=gpm

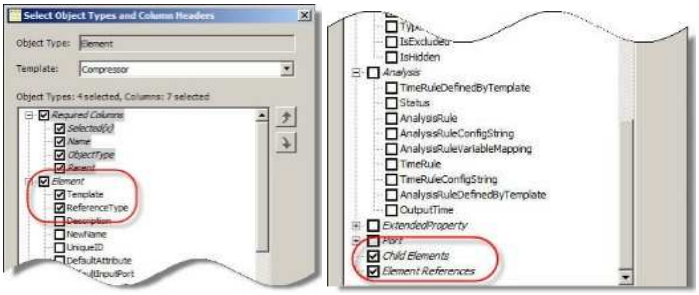
2. Import all the elements and the element hierarchy only. (**Note** - this is useful for making a backup of the elements and the hierarchy.)

Step by step:

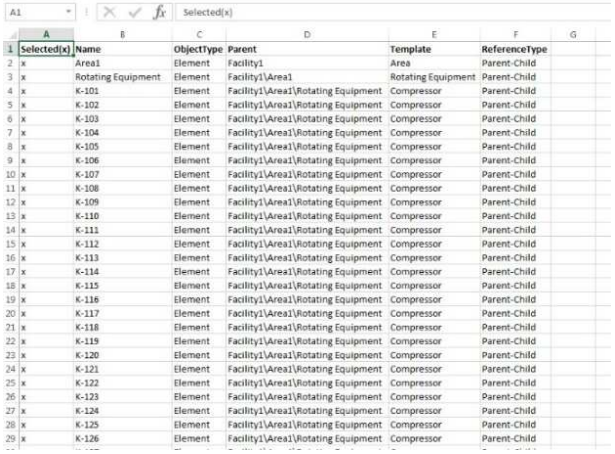
a. Create a new workbook. In the ribbon click the down arrow under the **Elements** and select **All Elements**.



b. The **Select Object Types and Column Headers** dialog pops up. Deselect all the options, and then select only the options shown in the Figures below.



c. The elements and their hierarchy are now listed in the workbook.



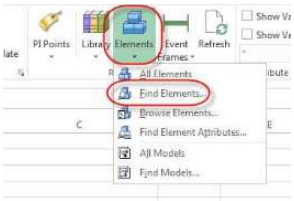
Selected(x)	Name	ObjectType	Parent	Template	ReferenceType
x	Area1	Element	Facility1	Area	Parent-Child
x	Rotating Equipment	Element	Facility1\Area1	Rotating Equipment	Parent-Child
x	K-101	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-102	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-103	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-104	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-105	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-106	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-107	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-108	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-109	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-110	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-111	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-112	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-113	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-114	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-115	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-116	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-117	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-118	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-119	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-120	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-121	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-122	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-123	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-124	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-125	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child
x	K-126	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child

Setting PI Tag names in Attributes

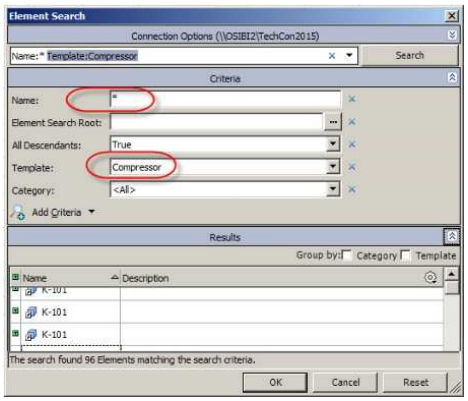
For all the Compressors, set the PI Tag names for all the **Discharge Pressure** Attributes.

Step by step:

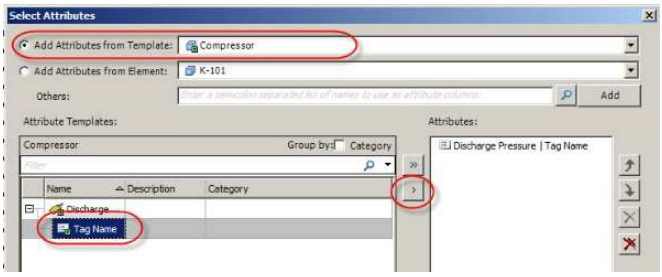
a. Create a new workbook. In the ribbon click the down arrow under the **Elements** and select **Find Elements**.



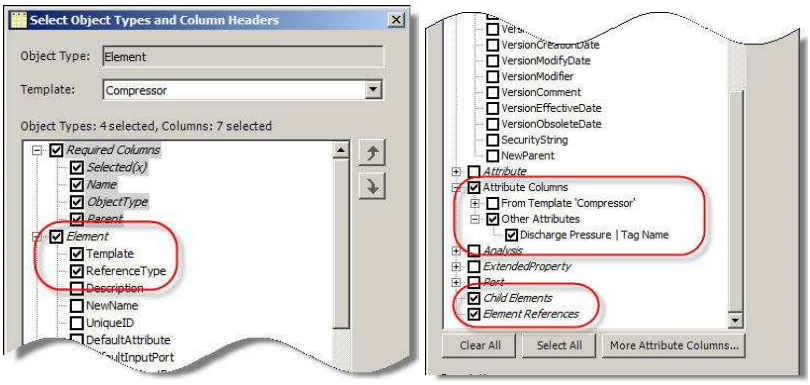
b. In the **Name** field type ***** and select **Compressor** in the **Template** combo box. Click the **Search** button, and then the **OK** button.



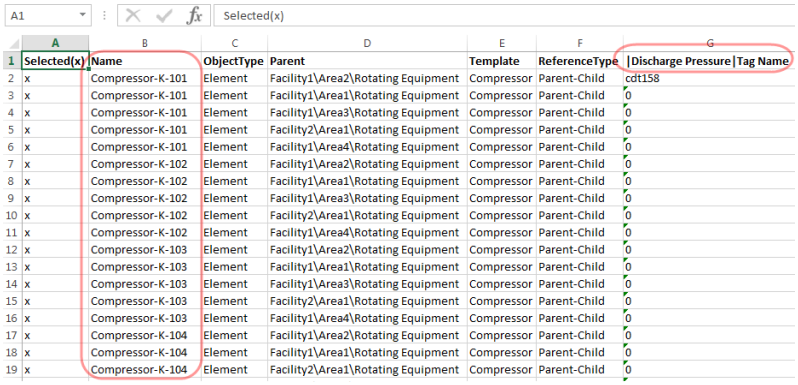
c. The **Select Object Types and Column Headers** dialog pops up. Click the **More Attribute Columns** button. Select the **Add Attributes from Template** radio button and then **Compressor** from the combo box. Select the **Tag Name** Attribute and click the › button. Then click the **OK** button.



d. Now you are back in the **Select Object Types and Column Headers** dialog. Make sure that only the options shown in the Figures below are selected. Then click the **OK** button.



e. You will now have the workbook contain only the **Tag Name** child-Attributes of the **Discharge Pressure** Attributes for all the compressors.

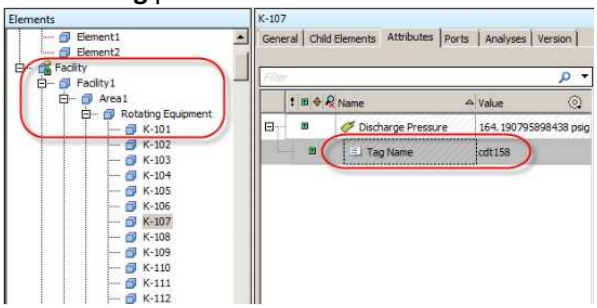


Selected(x)	Name	ObjectType	Parent	Template	ReferenceType	|Discharge Pressure|Tag Name
x	Compressor-K-101	Element	Facility1\Area2\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-101	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child	0
x	Compressor-K-101	Element	Facility1\Area3\Rotating Equipment	Compressor	Parent-Child	0
x	Compressor-K-101	Element	Facility2\Area1\Rotating Equipment	Compressor	Parent-Child	0
x	Compressor-K-101	Element	Facility1\Area4\Rotating Equipment	Compressor	Parent-Child	0
x	Compressor-K-102	Element	Facility1\Area2\Rotating Equipment	Compressor	Parent-Child	0
x	Compressor-K-102	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child	0
x	Compressor-K-102	Element	Facility1\Area3\Rotating Equipment	Compressor	Parent-Child	0
x	Compressor-K-102	Element	Facility2\Area1\Rotating Equipment	Compressor	Parent-Child	0
x	Compressor-K-102	Element	Facility1\Area4\Rotating Equipment	Compressor	Parent-Child	0
x	Compressor-K-103	Element	Facility1\Area2\Rotating Equipment	Compressor	Parent-Child	0
x	Compressor-K-103	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child	0
x	Compressor-K-103	Element	Facility1\Area3\Rotating Equipment	Compressor	Parent-Child	0
x	Compressor-K-103	Element	Facility2\Area1\Rotating Equipment	Compressor	Parent-Child	0
x	Compressor-K-103	Element	Facility1\Area4\Rotating Equipment	Compressor	Parent-Child	0
x	Compressor-K-104	Element	Facility1\Area2\Rotating Equipment	Compressor	Parent-Child	0
x	Compressor-K-104	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child	0
x	Compressor-K-104	Element	Facility2\Area1\Rotating Equipment	Compressor	Parent-Child	0

f. Replace the **0**s in the column under the header **|Discharge Pressure|Tag Name** with **cdt158**. Then click the Publish button in the ribbon. Click **OK** and **Close** on the next two dialogs that pop up.

Selected(x)	Name	ObjectType	Parent	Template	ReferenceType	|Discharge Pressure|Tag Name
x	Compressor-K-101	Element	Facility1\Area2\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-101	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-101	Element	Facility1\Area3\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-101	Element	Facility2\Area1\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-101	Element	Facility1\Area4\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-102	Element	Facility1\Area2\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-102	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-102	Element	Facility1\Area3\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-102	Element	Facility2\Area1\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-102	Element	Facility1\Area4\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-103	Element	Facility1\Area2\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-103	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-103	Element	Facility1\Area3\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-103	Element	Facility2\Area1\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-103	Element	Facility1\Area4\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-104	Element	Facility1\Area2\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-104	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-104	Element	Facility2\Area1\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-104	Element	Facility1\Area3\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-105	Element	Facility1\Area2\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-105	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-105	Element	Facility2\Area1\Rotating Equipment	Compressor	Parent-Child	cdt158
x	Compressor-K-105	Element	Facility1\Area3\Rotating Equipment	Compressor	Parent-Child	cdt158

g. Open the **PI System Explorer**, press the **Ctrl+1** key combination. Navigate to any compressor in the **Browser** pane. Select a compressor and click the **Attributes** tab in the **Viewing** pane.

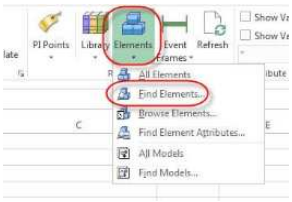


Attribute Columns

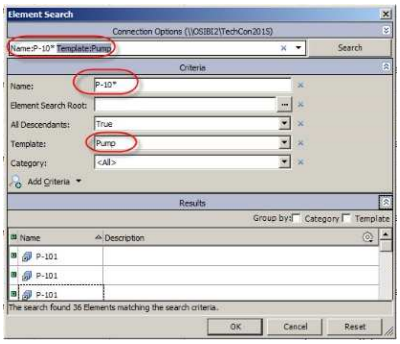
Select all the pumps starting with **P-10** and the pump Attributes and display them with the pumps in rows and the Attributes in columns.

Step by step:

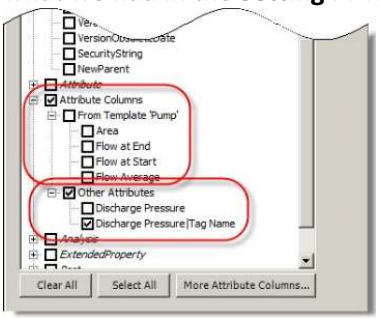
a. Create a new workbook. In the ribbon click the down arrow under the **Elements** and select **Find Elements**.



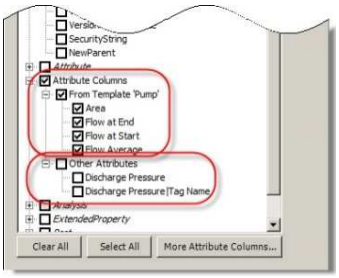
b. In the **Name** field type **P-10*** and select **Pump** in the **Template** combo box. Click the **Search** button.



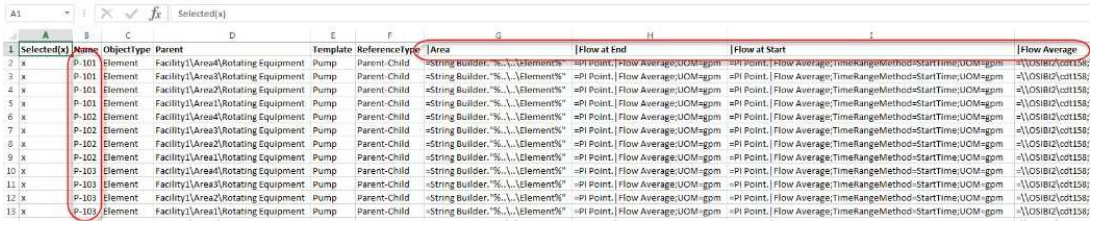
c. Click the **OK** button. Note, **PI Builder** keeps the last settings that you made. In this case, what we had in the **Setting PI Tag Names**.



d. Uncheck the **Other Attributes** check box and check the **From Template 'Pump'** check box. Then click the **OK** button.



e. The pumps are now listed by row and the Attributes by column.

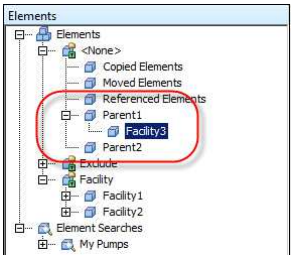


Moving elements

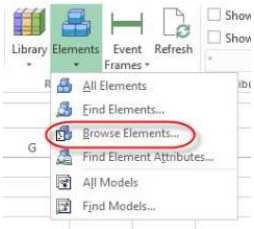
Move the child-Element **Facility3** from **Parent1** to **Parent2**.

Step by step:

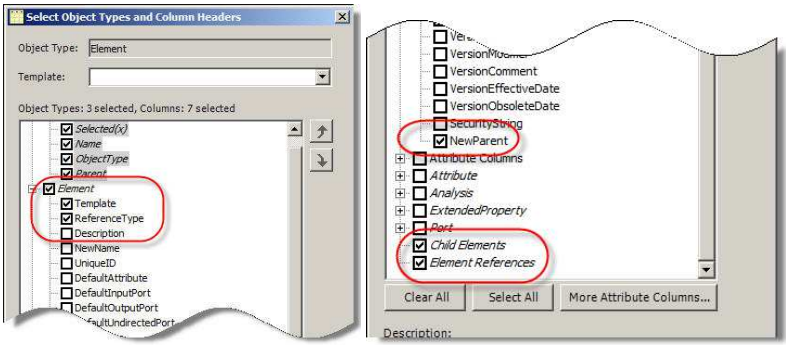
a. Open the **PI System Explorer**, press the **Ctrl+1** key combination. In the **Browser Pane** you can see that **Parent1** element has **Facility3** as a child-Element. **Parent2** has no child-Element.



b. Create a new workbook. In the ribbon click the down arrow under the **Elements** and select **Browse Elements** and select **Parent1**.



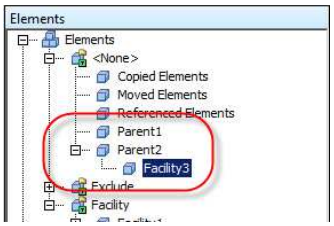
c. Click the **OK** button. In the **Select Object Types and Column Headers** dialog, make sure that only the options shown in the Figures below are selected. Then click the **OK** button.



d. In the workbook, type in **Parent2** in cell **G3** (or the column where the **NewParent** header is).

	A	B	C	D	E	F	G
1	**Selected(x)**	**Name**	**ObjectType**	**Parent**	**Template**	**ReferenceType**	**NewParent**
2	x	Parent1	Element				
3	x	Facility3	Element	Parent1	Facility	Parent-Child	Parent2
4							
5							

e. Then click the Publish button in the ribbon. Click **OK** and **Close** on the next two dialogs that pop up. Press the **F5** key to refresh the tree view. **Facility3** is now a child of **Parent2**.


Elements
Elements
<None>
Copied Elements
Moved Elements
Referenced Elements
Parent1
Parent2
Facility3
Exclude
Facility

Appendix

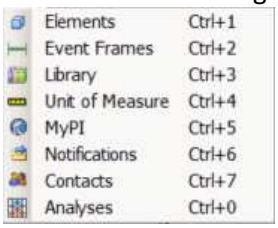
PI System Explorer (PSE)

Keyboard shortcuts

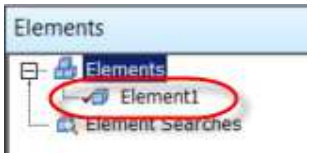
1. It is a lot faster to use the keyboard shortcuts to move between the ribbons as well as to perform other tasks in PSE. Navigate to the **Library** in the **Navigator Pane** using the keyboard. Then navigate back to the **Elements**.

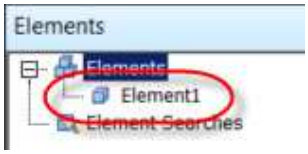
Step by step:

a. Press the **Ctrl+3** key combination to navigate to the **Library** view. To navigate back to the **Elements** view press the **Ctrl+1** key combination. The **Ctrl+<number>** key combinations to navigate to different views is:



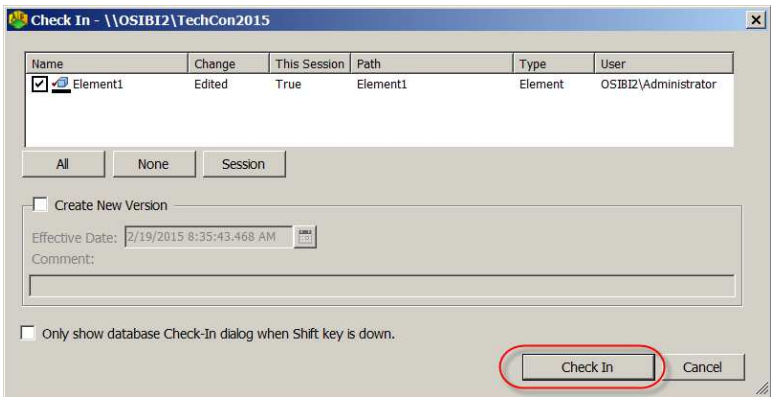
2. Add an element (choose element template <None>) and check in the changes.





Step by step:

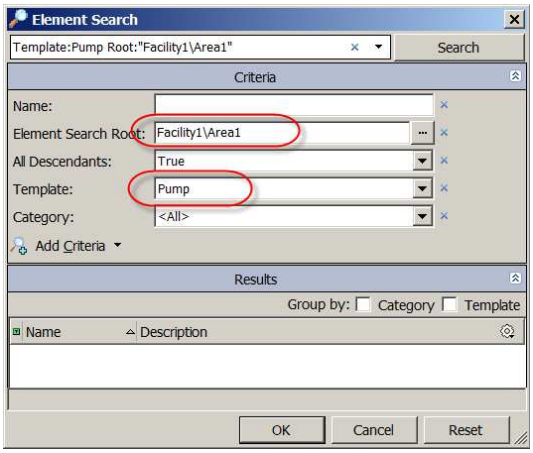
a. If you are not in the Elements view press the **Ctrl+1** key combination
b. Right click the **Elements** (Elements) in the **Browser** pane and select **New Element** (choose element template <None>). Alternately, you can also select **Elements** (Elements) and press the **Ins** key.
c. Press **Ctrl+S** key combination, this brings up the Check In dialog. Then press the **Check In** key.



3. Search for pump elements under **Area1**.

Step by step:

a. If you are not in the **Elements** view press the **Ctrl+1** key combination
b. To perform a search press the **F3** key
c. In the **Search Dialog** select **Pump** for the **Template** combo box
d. Then click the ... next to the **Element Search Root** and then select **Area1** under **Facility1**



e. Click the **OK** button. An **Elements Search Results 1** view is created in the Browser pane under **Element Searches**.

The table below shows other very useful keyboard shortcuts.

Key Combination	Action
CTRL+A	Selects all objects in the Viewer.
CTRL+C	Copies the selected object to the clipboard.
CTRL+ALT+C	Copies the path of the selected object to the clipboard.
CTRL+V	Pastes the object on the clipboard to the Viewer.

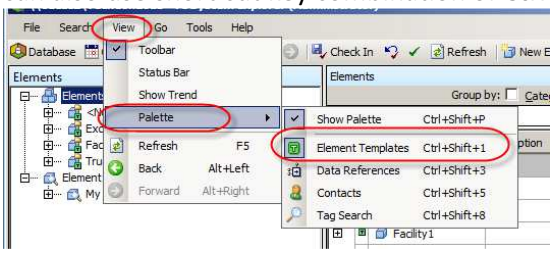
Key Combination	Action
CTRL+X	Cuts (deletes) the selected object and copies it to the clipboard.
DELETE	Deletes the selected object.
SHIFT+DELETE	Same as CTRL+X
INSERT	Adds a new object to the Viewer or Browser.
HOME	Selects the first row in the Viewer, for example, the first row in a table of attributes.
END	Selects the last row in the Viewer.
CTRL+HOME	Selects the first cell of the current page in the Viewer.
CTRL+END	Selects the last cell of the current page in the Viewer.
ALT+HOME	Selects the first page of objects in the Viewer.
ALT+END	Selects the last page of objects in the Viewer.
CTRL+PAGE UP	Selects the previous page of objects in the Viewer.
CTRL+PAGE DOWN	Selects the next page of objects in the Viewer.
CTRL+ENTER	If the Viewer contains multiple pages of objects, displays the Select Page Number window.
ALT+ENTER	In the Browser, displays the properties of the selected object.
SPACE or ENTER	Presses the currently selected button.
Left, Right, Up, and Down Arrows	Navigate objects in the Viewer or Browser.
F2	Edits the selected object on the Viewer. For complex objects, displays the edit window for the object.
F4 or ALT+Up Arrow or ALT+Down Arrow	Displays the choices in the selected list box. For layered lists, displays the complete hierarchy of choices.

Using Palettes

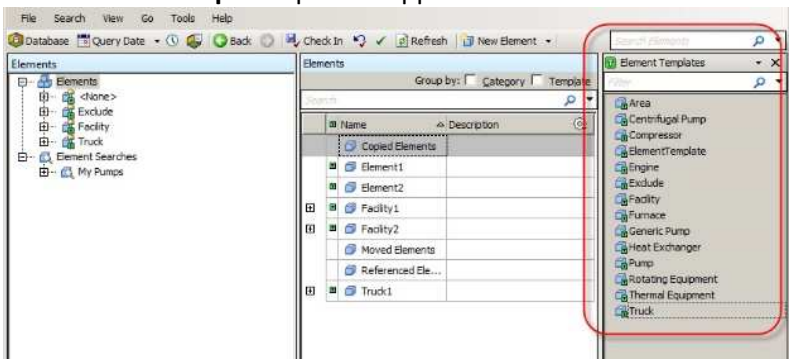
1. Create a new Heat Exchanger Element by using the **Element Template Palette**.

Step by step:

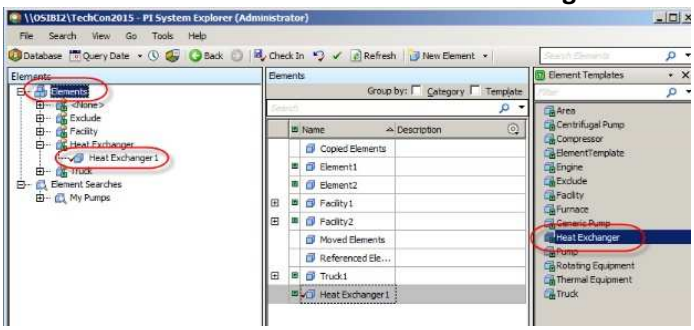
a. If you are not in the **Elements** view press the **Ctrl+1** key combination
b. In the **Menu** bar click on **View** and then select **Palette>Element Templates**. (Note you can also use short cut key combination of **Ctrl+Shift+1**)



c. The **Element Templates** palette appears.



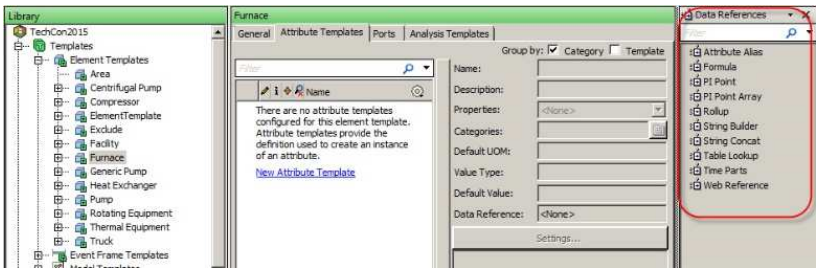
d. Select the **Heat Exchanger** in this pane and drag it to the **Elements** in the **Browser** pane. This creates a new Element called **Heat Exchanger1**.



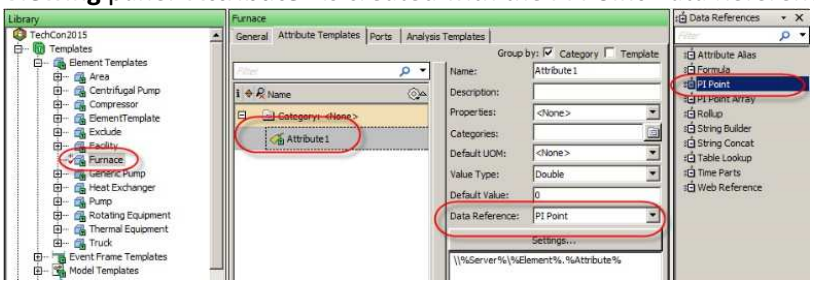
2. Add a new Attribute to the **Furnace** Template that has the **PI Point** Data Reference by using the **Element Template Palette**.

Step by step:

a. If you are not in the **Library** view press the **Ctrl+3** key combination
b. Then select the **Furnace** Template under **Element Templates**. Click on the **Attribute** tab in the **Attribute Viewing** pane.
c. In the **Menu** bar click on **View** and then select **Palette>Data References**. (Note you can also use short cut key combination of **Ctrl+Shift+3**). The **Data References** palette appears.



d. Select **PI Point** from the palette and drag it onto the white space in the **Attribute Viewing** pane. **Attribute1** is created with the **PI Point** Data Reference.



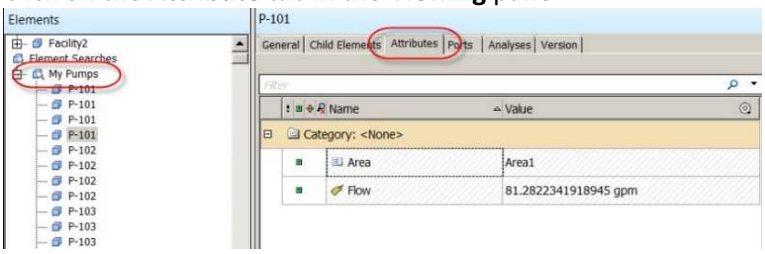
Column visibility

Select a pump element and in the **Attribute Viewing** pane show the time stamp of values in this view.

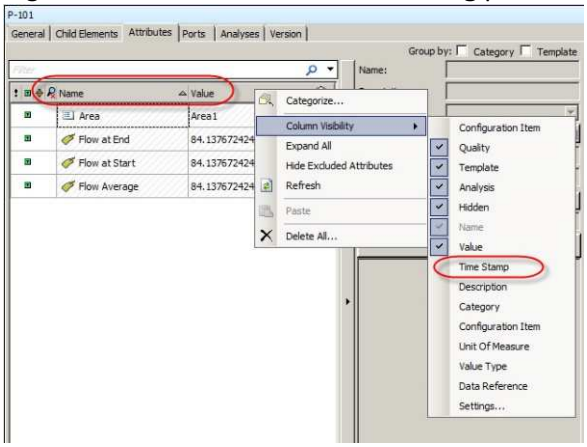
Step by step:

a. Click on a pump in the **My Pumps** under **Element Searches** in the **Browser** pane (created in the **Searching and Filters** section above)

b. Click on the **Attribute** tab in the **Viewing** pane



c. Right click on the header in the **Viewing** pane and select **Column visibility>Time Stamp**



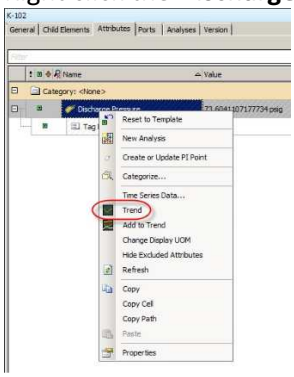
d. Now you have the **Time Stamp** added to the **Viewing** pane. This one is especially useful since the PSE does not show the current time for performance purposes. To update the values for the attributes you need to do a **Refresh**. With the **Time Stamp** being visible you have a time context for the values.

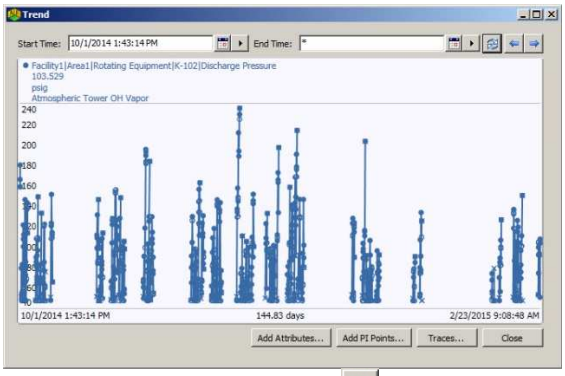
Trending and Archive Data

Using the compressor Element from the above example create a trend of the **Discharge Pressure** Attribute and view archive data for the same Attribute.

Step by step:

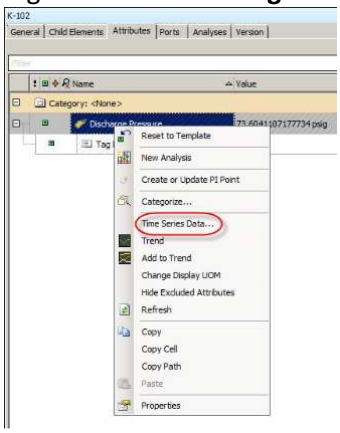
a. Right click the **Discharge Pressure** Attribute and select **Trend**

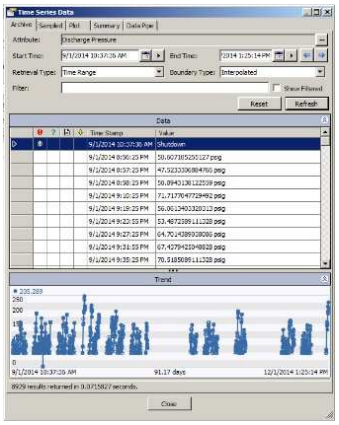




b. You can modify the Start and End times and click the  button to see the changes

c. Right click the **Discharge Pressure** Attribute and select **Time Series Data**



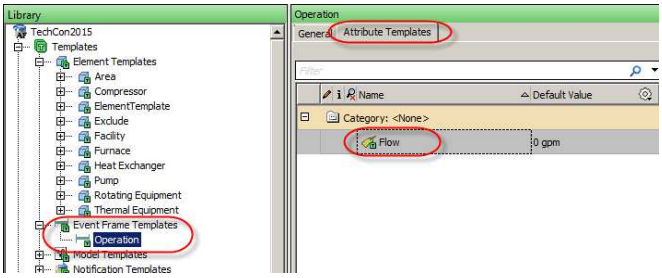


Event frames capture/recapture, locking

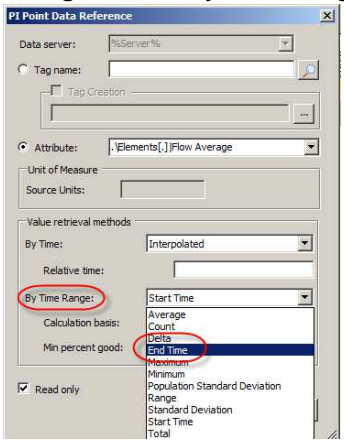
1. Change a Data Reference in the Event Frame Template **Operation**, go to the Event Frame view and recapture the event to make the change take effect in the event itself.
Step by step:

a. If you are not in the **Library** view press **Ctrl+3** key combination

b. Select on the **Operation** Template under the **Event Frame Templates** and click on the **Attribute** tab in the **Attribute Viewing** pane.

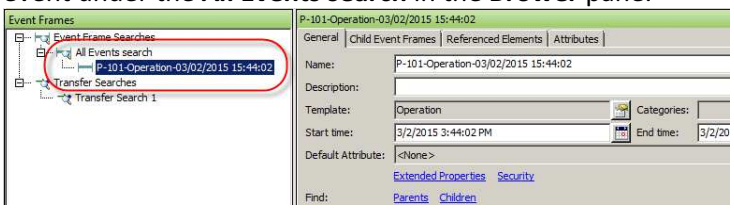


c. Select the **Flow** Attribute, click the **Settings** button, then in the **PI Point Data Reference** dialog click the **By Time Range** combo box and select **End Time**. Click the **OK** button.

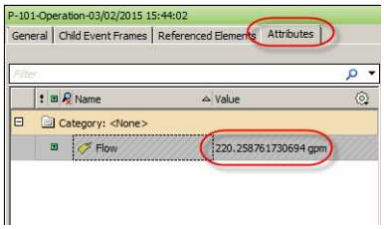


d. Check in the changes by pressing the **Ctrl+S** key combination

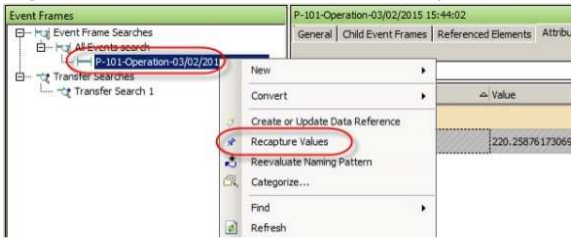
e. Press the **Ctrl+2** key combination to navigate to the **Event Frames** view. Select the event under the **All Events search** in the **Brower** pane.



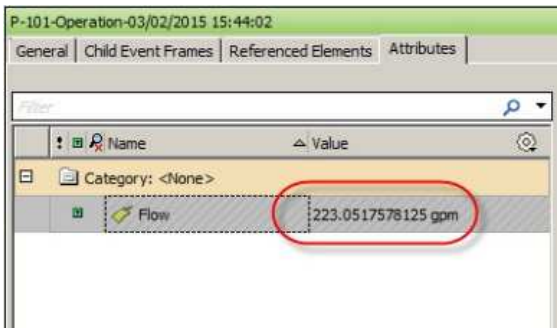
f. Click on the **Attribute** tab in the **Attribute Viewing** pane and note the value of the **Flow** Attribute.



g. Right-click the event in the **Browser** pane and select **Recapture Values**



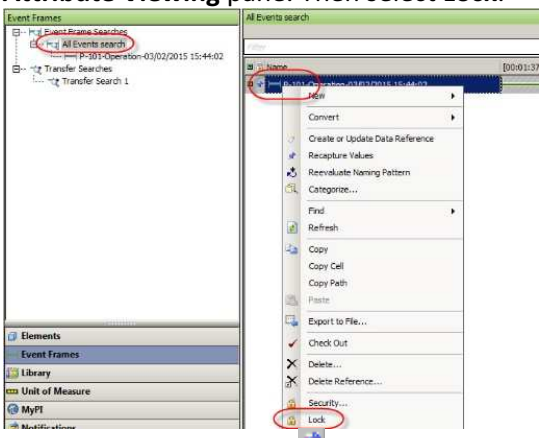
h. The value for the **Flow** Attribute now reflects the changes you made in the **Operation** Template



2. Lock an event and then try to delete it. (**Note**: Only administrators of Event Frames can lock and unlock events).

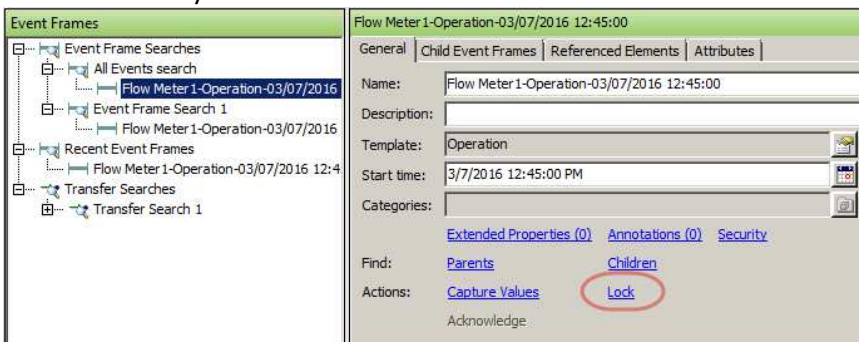
   Step by step:

   a. Select the **All Events search** in the **Brower** pane and then right-click the event in the **Attribute Viewing** pane. Then select **Lock**.



   b. The event will now have  symbol next to it. Try to delete the event. If you right-click it you will see that you can no longer delete, recapture, or rename the event.

   c. Note: In the upcoming release AF 2.8 you can also lock the event frame in the **Viewing Pane** when you select an Event Frame in the **Browser Pane**.

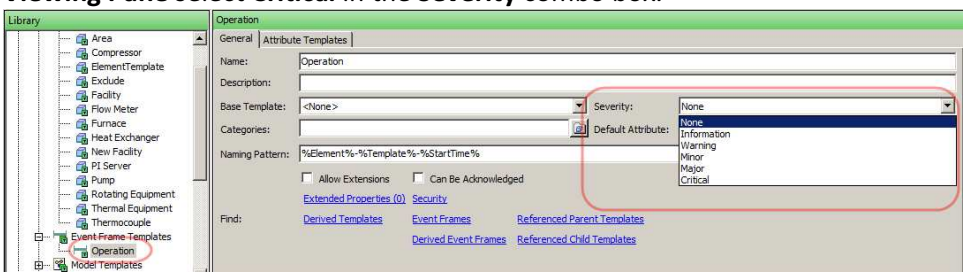


Event Frames Severity

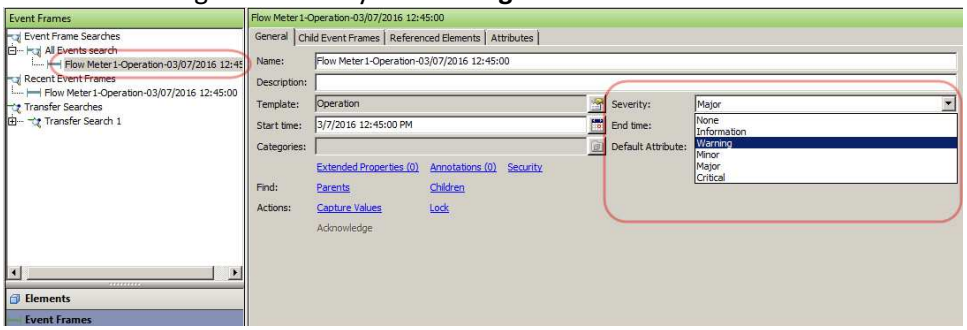
Assign a severity of **Critical** to the **Operation** Event Frame Template. For an Event change the severity to **Warning**, then create a new search and find all Events that have the severity of **Warning**.

Step by step:

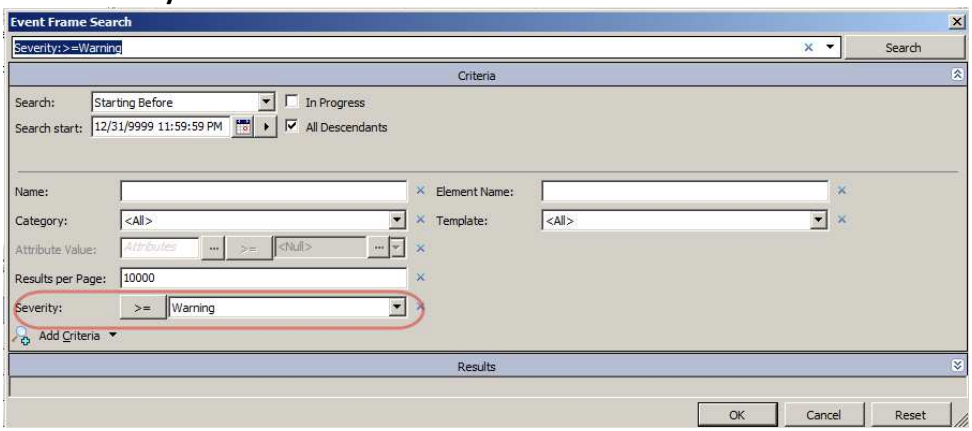
a. Open the **PI System Explorer**, press the **Ctrl+3** key combination to navigate to the **Library**. In the **Browser Pane** select the **Operation** Event Frame Template. Then in the **Viewing Pane** select **Critical** in the **Severity** combo box.



b. Press the **Ctrl-2** key combination to navigate to the **Event Frames**. Select an Event Frame and change the severity to **Warning**.

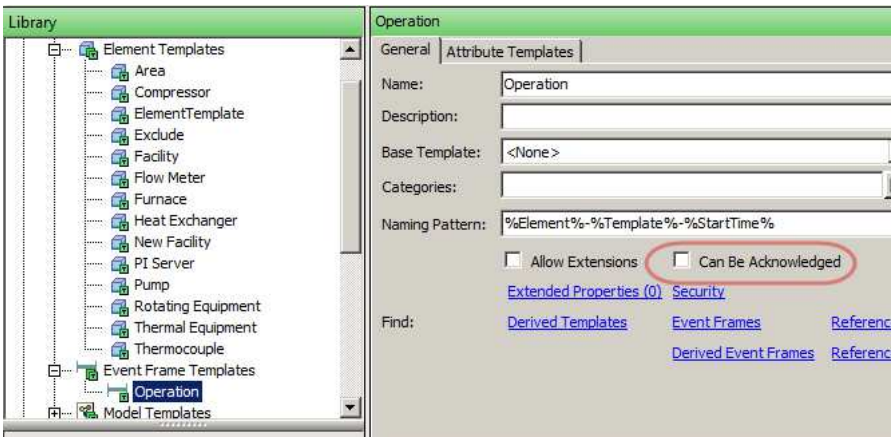


c. Right-click the **Event Frame Searches** in the **Browser Pane** and select **New Search**. In the **Event Frame Search** window click **Add Criteria** and select **Severity.** Select **Warning** in the **Severity** combo box and click the **Search** button. Then click **OK**.



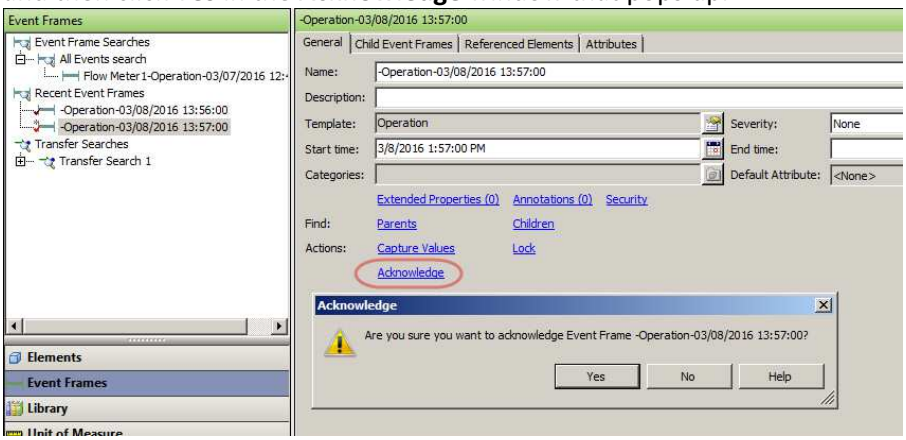
d. The new search now contains all Events with a severity setting of **Warning**.

e. **Note:** There is also an option in the Event Frame Template to allow the Event Frame to be acknowledged. This is used by the upcoming **Coresight** and **Notification** releases. To allow an Event to be acknowledged click the check box in the **Viewing Pane** of the Event Frame Template.

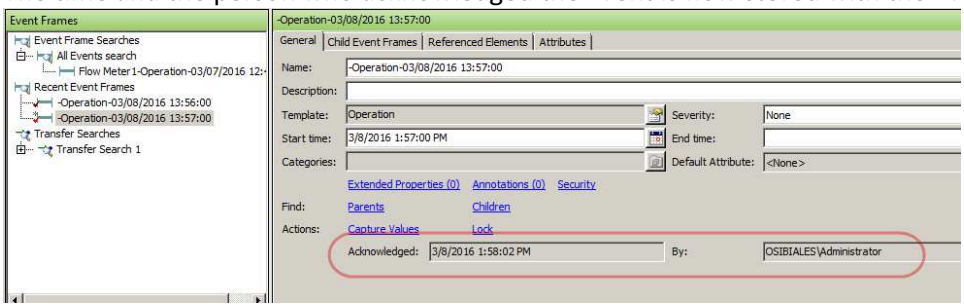


f. Press the **Ctrl-2** key combination to navigate to the **Event Frames**. Right-click the **Event Frames Search** in the **Browser Pane** and select **New Event Frame**. In the **Choose Event Frame Template** window choose **Operation** and click **OK**. Create one more Event Frame in the same manner.

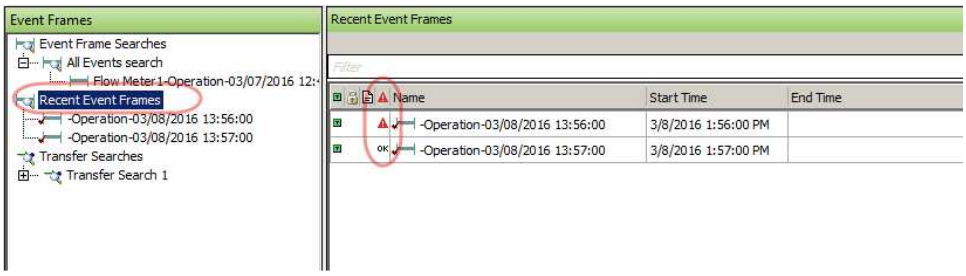
g. Select one of these new Event Frames and then click **Acknowledge** in the **Viewing Pane**, and then click **Yes** in the **Acknowledge** window that pops up.



h. The time and the person who acknowledged the Event is now stored with the Event.



i. Click on the **Recent Event Frames** in the **Browser Pane** and notice that in the **Viewing Pane** one of the new Event Frames has the ⚠ in front of it (not acknowledged) and the other has the OK symbol (is acknowledged). You can hover over these symbols to get a tooltip text. You can sort on this **Is Not Acknowledged** column and also use this as a filter in Event Frame searches.

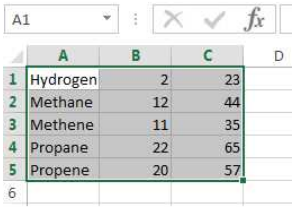


Pasting Data from Excel into a PI AF Table

Open the **Material.xlsx** file in Excel. Copy the data in the worksheet and paste them into the **Material Table** in PI AF. Then filter the values on all materials where **Property B** is **65**, and then on all materials containing the string **an**.

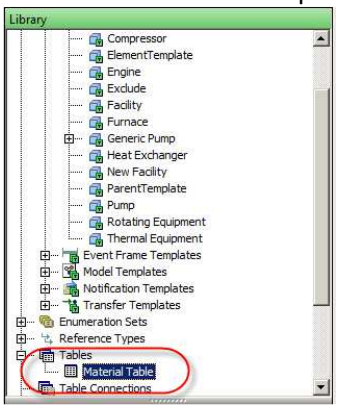
Step by step:

a. Open Excel and the file **Material.xlsx** located in the C:\ root. Highlight the data in the worksheet and copy.

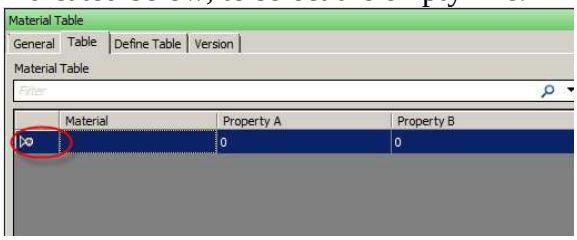


	A	B	C	D
1	Hydrogen	2	23	
2	Methane	12	44	
3	Methene	11	35	
4	Propane	22	65	
5	Propene	20	57	
6				

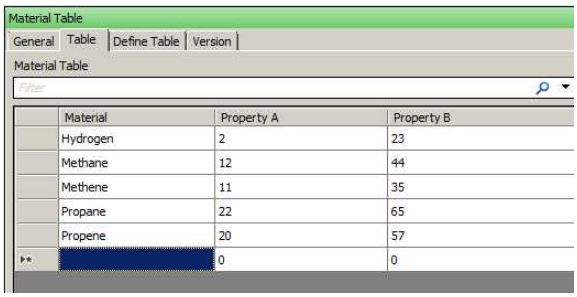
b. Navigate to the **Library** view by using the **Ctrl+3** key combination, and select the table **Material** in the **Browser** pane.



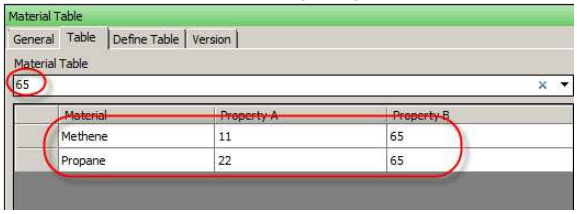
c. In the **Viewing** pane select the **Table** tab and click on the left side of the line, as indicated below, to select the empty line.



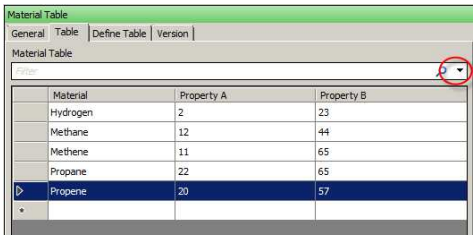
d. Right click on the same area as indicated above, and select Paste from the right click menu.

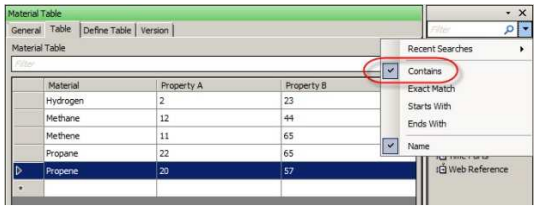


e. Type **65** in the filter field, the white area above the table, as indicated below. Wait a second or so, and the **Viewing** pane is refreshed automatically and now you only see materials with **65** for **Property B**.

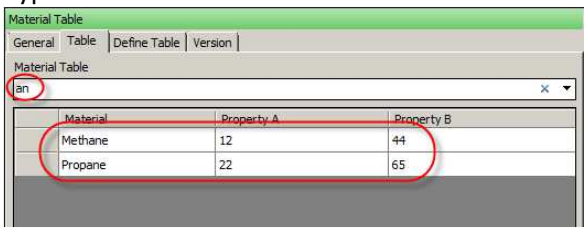


f. Click the ✕ to clear the filter and then click the ▾ in the filter field. Then select **Contains**.





g. Type **an** in the filter field.

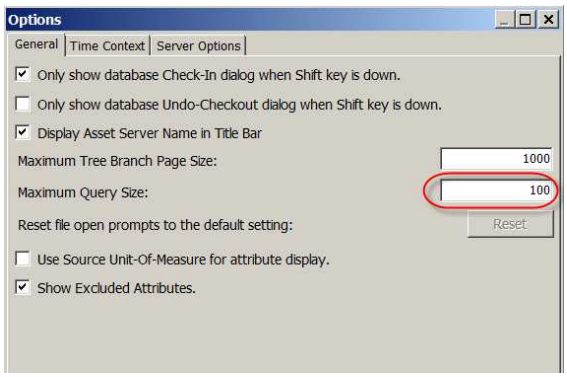


h. The two materials that have the string **an** in their name, **Methane** and **Propane**.

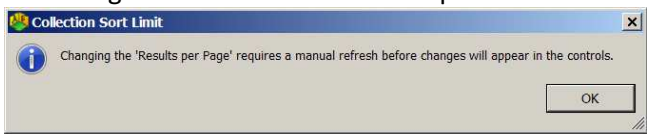
Options – Maximum Query Size and Time Context

1. Select **My Pumps** under **Element Searches** in the **Browser** pane, adjust the query size to show only 100 pumps at a time in the **Viewing** pane.
   Step by step:

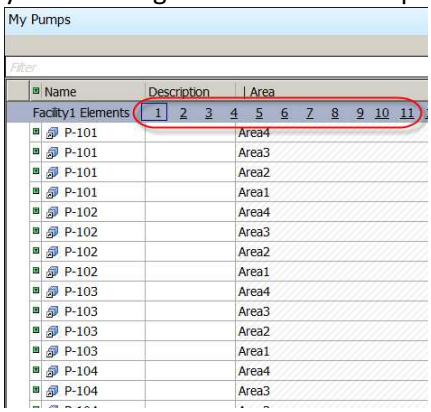
   a. Click on a pump in the **My Pumps** under **Element Searches** in the **Browser** pane
   b. Select **Tools>Options** from the menu. Enter 100 for the **Maximum Query Size**.



c. The following dialog opens to inform you that you will need to perform a **Refresh** to see the changes. Click the **OK** button or press the **Enter** key.

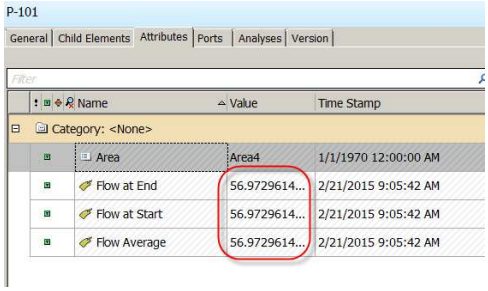


d. Press the **F5** key to refresh the **Viewing** pane. The view now shows only 100 pumps, but you can navigate to the next 100 pumps by clicking the number **2** under the header, etc.

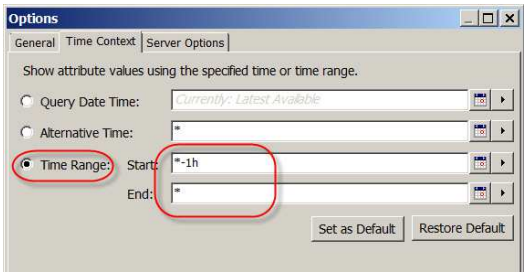


2. Select a pump and change the time context settings to show the values for the three **Flow** Attributes (**Flow Average**, **Flow at Start**, and **Flow at End**) in the **Time Range** context. **Step by step:**

a. Click on a pump in the **My Pumps** under **Element Searches** in the **Browser** pane
b. Click on the **Attribute** tab in the **Attribute Viewing** pane. You will see that the three Attributes **Flow Average**, **Flow at Start**, and **Flow at End** all have the same value.

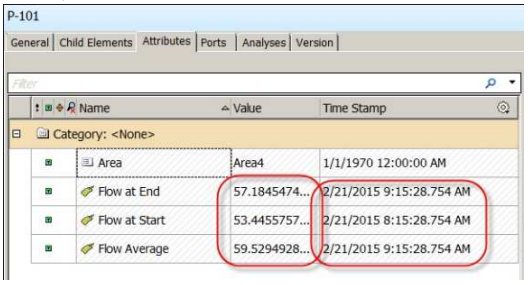


c. Select **Tools>Options** from the menu. Then select the **Time Context** tab. Then click the **Time Range** radio button and enter *-1h for the **Start** and * for the **End** fields. Click the **OK** button.



d. Note that the Title Bar now shows the time context.

e. The **Attribute Viewing** pane shows that the three Attributes **Flow Average**, **Flow at Start**, and **Flow at End** now have different values.

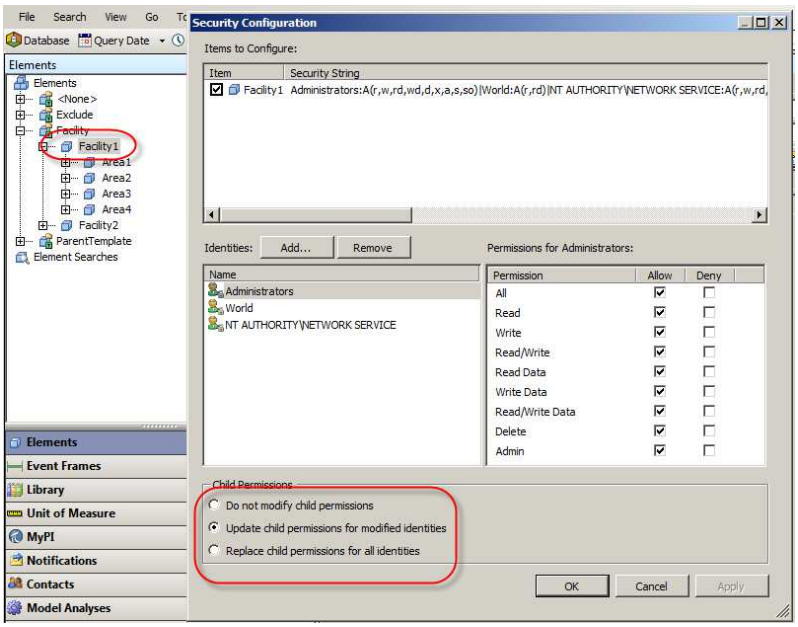


Security – Propagating Settings from Parent Elements to Child Elements

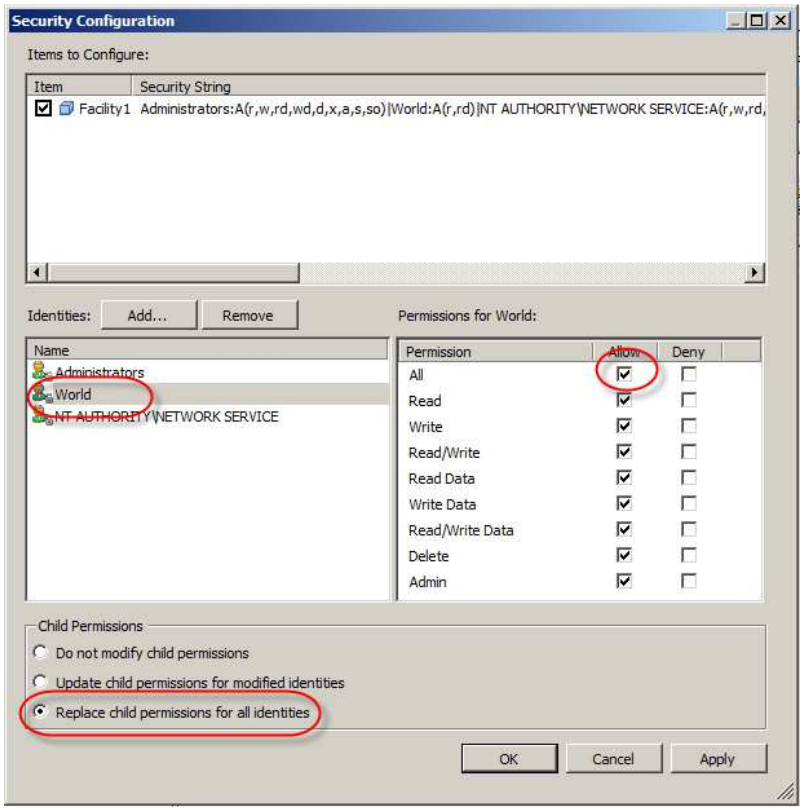
Change the security settings for the **World** Identity for the **Facility1** Element and propagate these settings to all the child Elements.

Step by step:

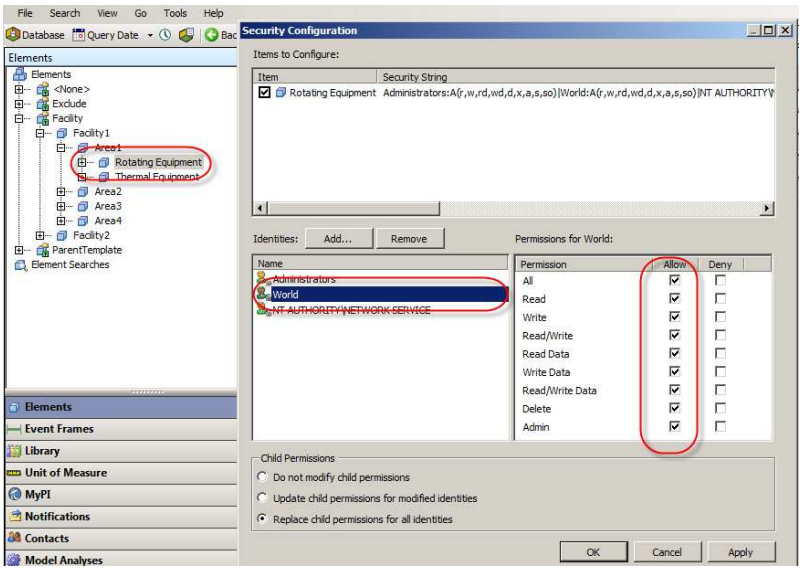
a. If you are not in the **Element** view press **Ctrl+1** key combination. Right click the **Facility1** Element and select **Security** from the right click menu.



b. Select the **World** Identity and then click the **Allow** check box for **All** in the **Permissions**. Then click the radio button for **Replace child permissions for all identities** under the **Child Permissions**. Then click the **OK** button.



c. Select one of the child Elements of **Facility1** and right click it and select **Security**. Select the **World** identity and see that the permissions have been set to the same settings as the **Facility1** Element.

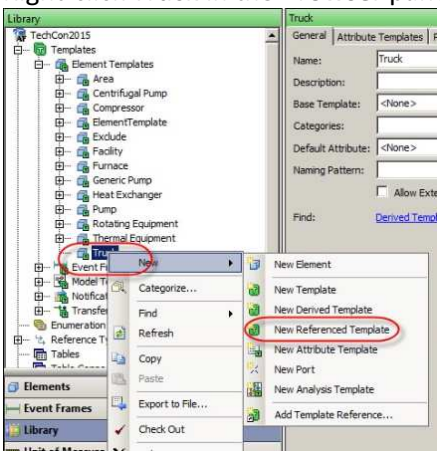


Template references

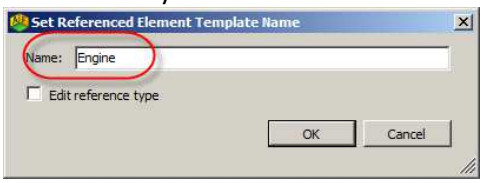
Create a Template for a truck, call it **Truck**, and then create a Referenced Template for **Truck** and call it **Engine**. Create a new Element based on the **Truck** Template and a child-Element based on the **Engine** Template.

Step by step:

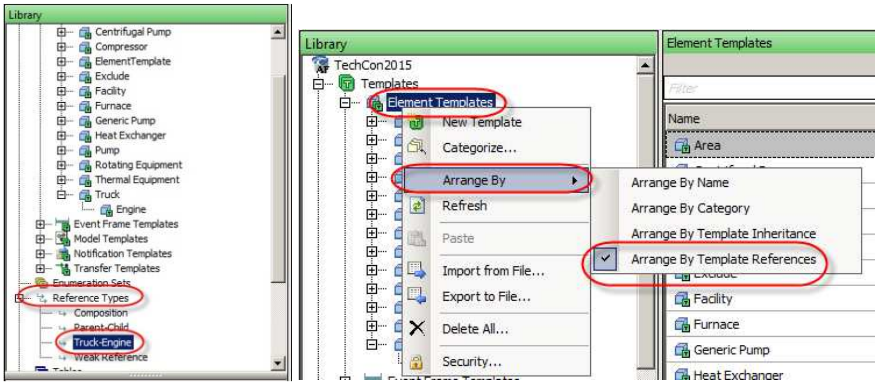
a. If you are not in the **Library** view press **Ctrl+3** key combination
b. Right-click the **Element Templates** and select **New Template**. Press the **F2** key and type **Truck**.
c. Right-click **Truck** in the **Browser** pane and select **New>New Referenced Template**



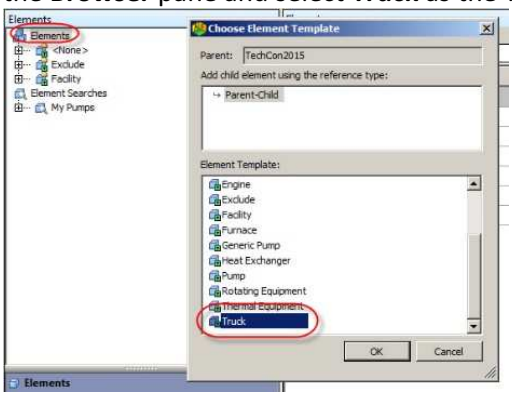
d. Type in **Engine** in the Name field. Leave the **Edit reference type** check box unchecked. You can always edit this later. Click the **OK** button.



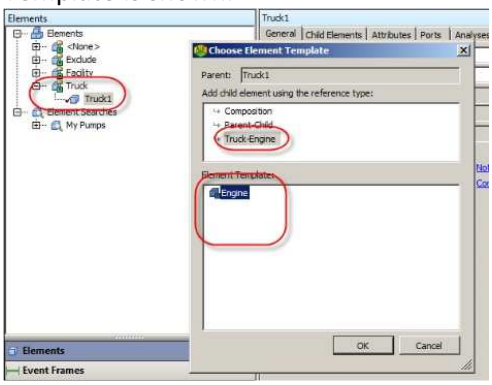
e. Expand the **Reference Types** in the **Browser** pane and you will see a new reference type **Truck-Engine**. To edit the properties just select it and make changes in the **Attribute Viewing** pane. To see which Templates are referenced right-click the **Element Templates** in the **Browser** pane and select **Arrange By>Arrange By Template References**.



f. Press the **Ctrl+1** key combination to go to the **Elements** view. Right-click **Elements** in the **Browser** pane and select **Truck** as the Template.



g. Right-click the newly created Element **Truck1** and select **New>New Child Element**. Note that by default the **Truck-Engine** reference type is selected and only the **Engine** Template is shown.

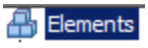


Copying, moving, creating references, and arrange elements

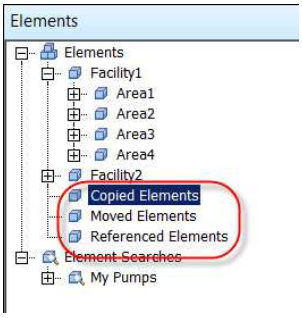
Elements can be referenced, copied, or moved using the mouse by dragging and dropping. By using the **Ctrl** or the **Shift** key you can control the behavior of the drag and drop result.

1. Add three new Elements and name them **Copied Elements**, **Moved Elements**, and **Referenced Elements** based on no Template. You are going to use these to be parents for copied, moved, and referenced child-Elements, respectively. Arrange the Elements view to be by **Template**. Copy a furnace Element as a child-Element to **Copied Elements**, move a furnace Element as a child-Element to **Moved Elements**, reference a furnace Element as a child-Element to **Referenced Elements**.
   Step by step:

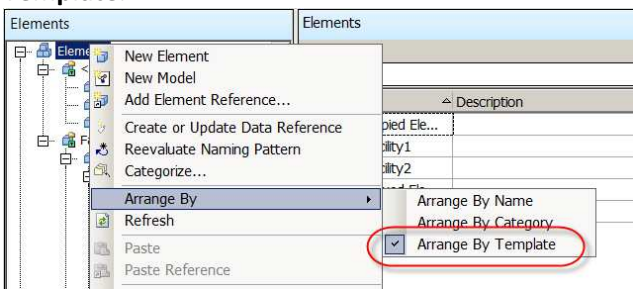
   a. If you are not in the **Elements** view press **Ctrl+1** key combination

   b. Right click the 

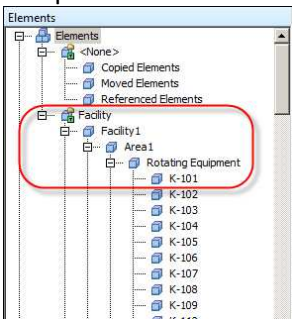
in the **Browser** pane and select **New Element** (select <None> as the Template). Rename the new Element by selecting it, pressing the **F2** key, and type **Copied Elements**. Create two more Elements in the same way and rename them to **Moved Elements** and **Referenced Elements**, respectively.



   c. Select the **Elements** in the **Browser** then right click it. Select **Arrange By>Arrange By Template**.

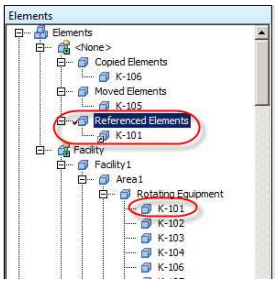


   d. Expand the tree in the **Browser** pane to show the Elements under **<None>** and the compressor Elements under **Facility>Facility1>Area1>Rotating Equipment**

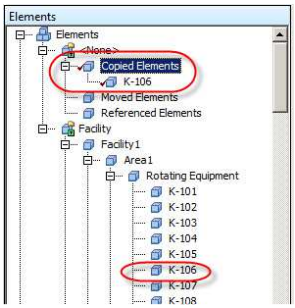


   e. Drag a compressor under the **Rotating Equipment** Element to the **Referenced Elements** Element. Select **Weak Reference** in when the **Choose Reference Type** dialog pops up. This now makes a reference to the compressor Element, but the two Elements are

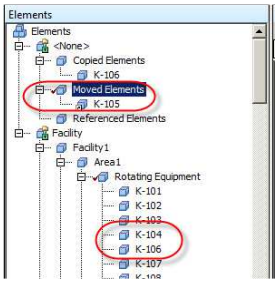
identical. **Note** that the mouse icon changes to  when you hover over the destination Element.



f. Hold down the **Ctrl** key and drag a compressor under the **Rotating Equipment** Element to the **Copied Elements** Element. This now makes a copy of that compressor and the two Elements are now different. **Note** that the mouse icon changes to  when you hover over the destination Element.



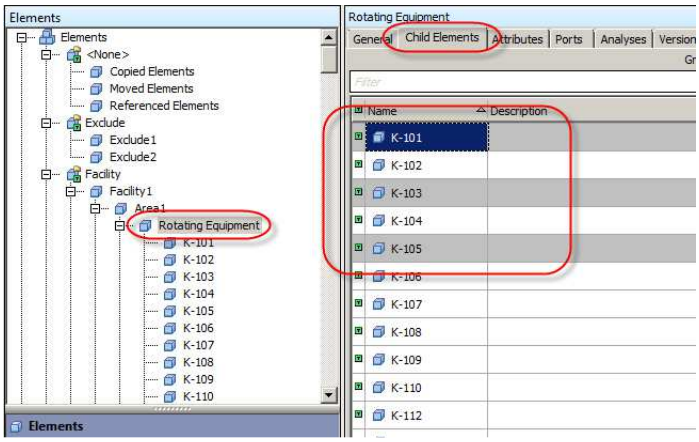
g. Hold down the **Shift** key and drag a compressor under the **Rotating Equipment** Element to the **Moved Elements** Element. This now moves that compressor from one location to the other. **Note** that the mouse icon changes to  when you hover over the destination Element.



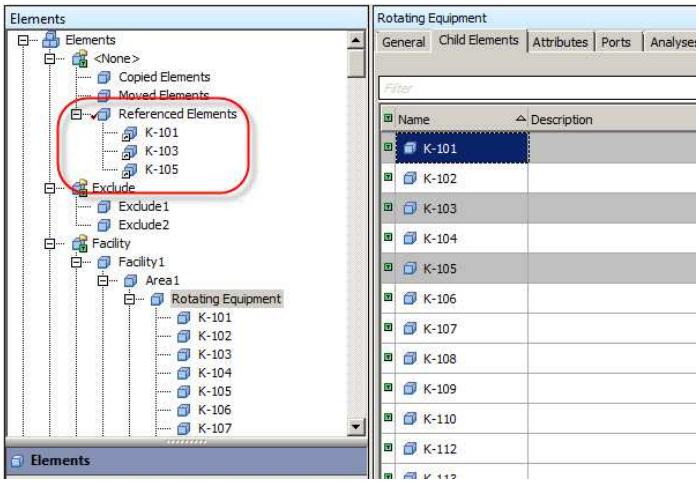
2. A little known feature, you can reference, copy, or move several Elements at one time.

Step by step:

a. Expand the tree in the **Browser** pane to show the Elements under **<None>** and the compressor Elements under **Facility>Facility1>Area1>Rotating Equipment** . Select **Rotating Equipment** and then click the **Child Elements** tab in the **Attribute Viewing** pane. Select three compressors by holding down the **Ctrl** key and clicking on them one by one.



b. To move the selected Elements click on the ▣ symbol next to one of the selected compressors and drag over to the **Referenced Elements.** Select **Weak Reference** in when the **Choose Reference Type** dialog pops up. All the selected Elements are now referenced.

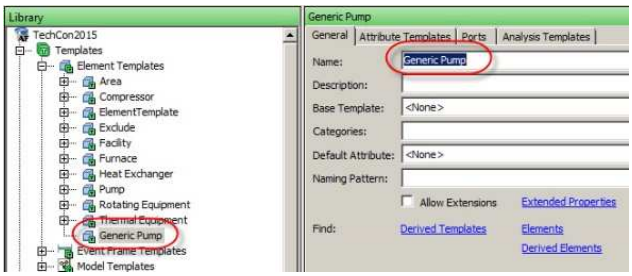


Template inheritance

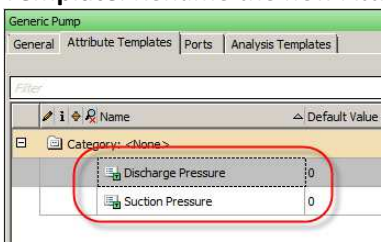
Approach: Create a Template for a pump (call it **Generic Pump**) and then create another Template for a centrifugal pump call it (**Centrifugal Pump**). Assign the **Centrifugal Pump** Template to inherit from the **Generic Pump** Template. Add Attributes **Suction Pressure** and **Discharge Pressure** to the **Generic Pump** Template, and **Motor Revolutions** to the **Centrifugal Pump** Template.

Step by step:

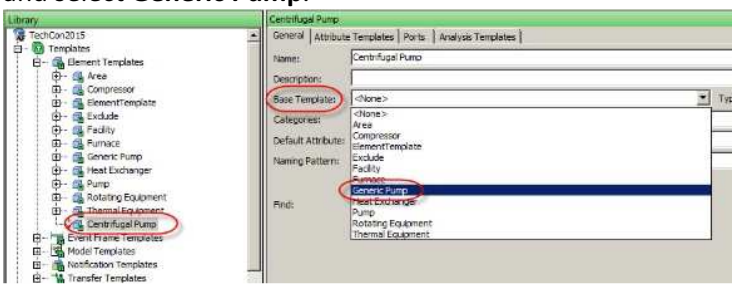
a. If you are not in the **Library** view press the **Ctrl+3** key combination
b. Right-click the **Element Templates** and select **New Template**. Press the **F2** key and type **Generic Pump**.



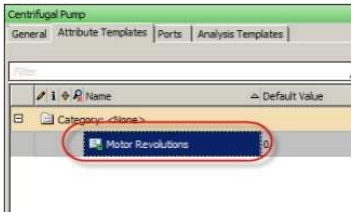
c. Click on the **Attribute Templates** tab in the **Attribute Viewing** pane. Click the **New Attribute Template** and rename (highlight the Attribute and then press the **F2** key) it to **Discharge Pressure**. Right-click anywhere on the white space and select **New Attribute Template**. Rename the new Attribute to **Suction Pressure**.



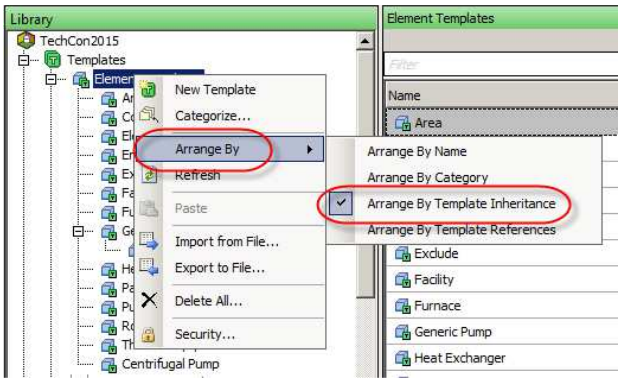
d. Right-click the **Element Templates** and select **New Template**. Press the **F2** key and type **Centrifugal Pump**. It the **Attribute Viewing** pane click the **Base Template** combo box and select **Generic Pump**.



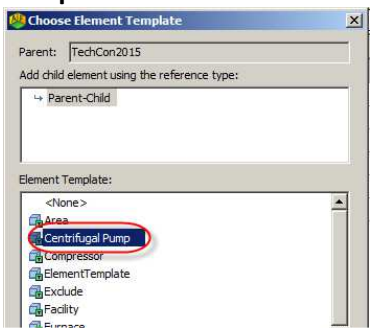
e. Click on the **Attribute Templates** tab in the **Attribute Viewing** pane. Click the **New Attribute Template** and rename (highlight the Attribute and then press the **F2** key) it to **Motor Revolutions**.



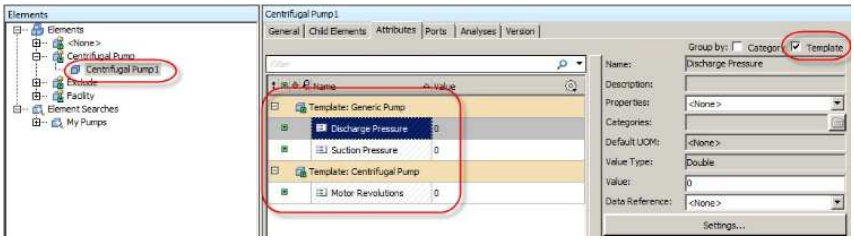
f. Arrange the Templates in the **Browser** pane by right clicking on the **Element Templates** and selecting **Arrange By>Arrange By Template Inheritance**. You now see the **Centrifugal Pump** under the **Generic Pump**.



g. Press the **Ctrl+1** key combination to go to the **Elements** view. Right-click the **Elements** in the **Browser** pane and select **New Element** and the Element Template as **Centrifugal Pump**.



h. Select the **Centrifugal Pump1** Element you just create and click on the **Attribute** tab in the **Attribute Viewing** pane. Click the **Group by Template** check box in the upper right corner. You can see the three Attributes grouped by the Templates they were created in.



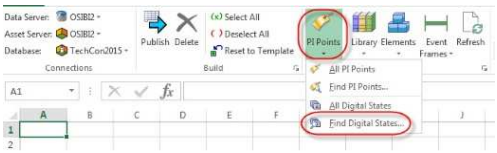
PI Builder

Moving Digital States to Enumeration Sets

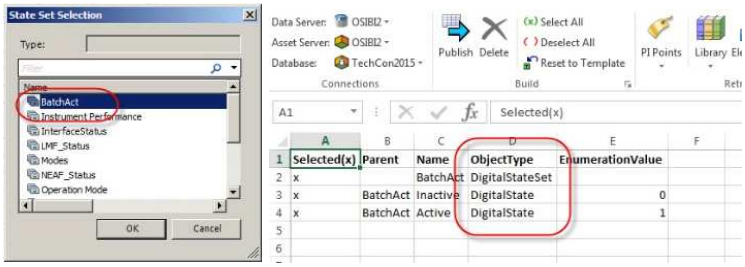
Create Enumeration Sets in PI AF from the Digital States you have created in the PI Archive.

Step by step:

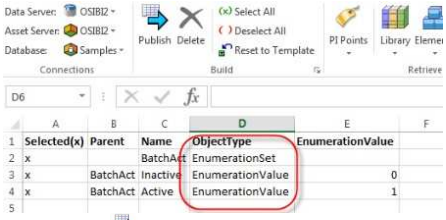
a. Create a new workbook. In the ribbon click the down arrow under the **PI Points** and select **Find Digital States**.



b. Select **BatchAct** and click the **OK** button.

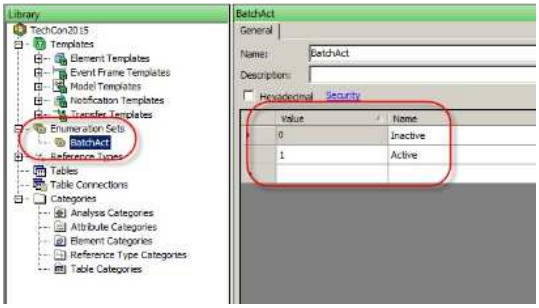


c. Under the **ObjectType** property change the **DigitalStateSet** to **EnumerationSet**, and **DigitalState** to **EnumerationValue**.



d. Click the Publish in the ribbon, then click the **OK** button on the next dialog, and the **Close** button on the last dialog that pops up.

e. Open the **PI System Explorer** if it is not already open, and press the **Ctrl+3** key combination to navigate to the **Library** view. Expand the **Enumeration Sets** in the **Browser** pane and you will see the **BatchAct** Enumeration Set and the Enumeration values.

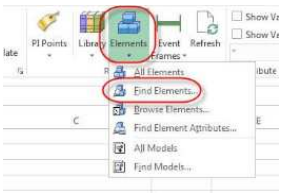


Renaming elements

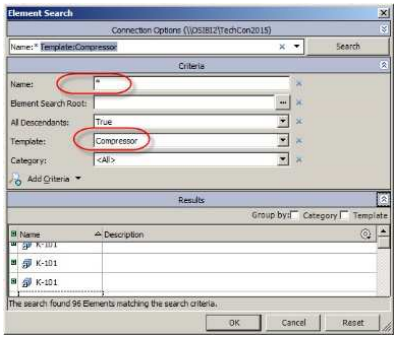
Rename the compressor Elements by appending **Compressor-** in front of the original names.

Step by step:

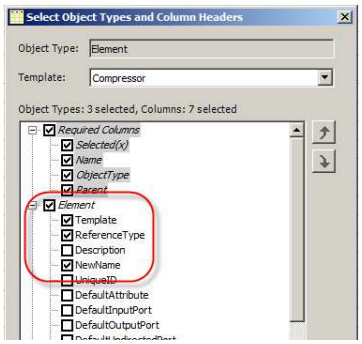
a. Create a new workbook. In the ribbon click the down arrow under the **Elements** and select **Find Elements**.

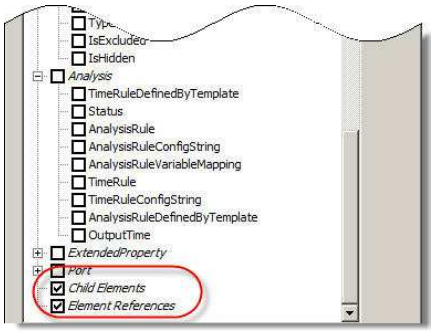


b. In the **Name** field type ***** and select **Compressor** in the **Template** combo box. Click the **Search** button.

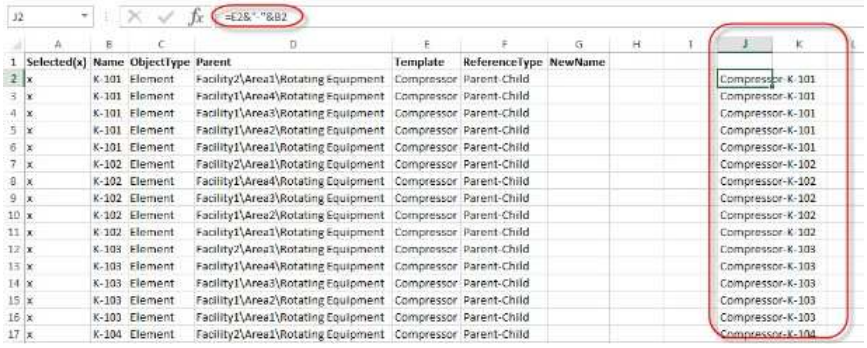


c. Click the **OK** button. In the **Select Object Types and Column Headers** dialog, make sure that only the options shown in the Figures below are selected. Then click the **OK** button.



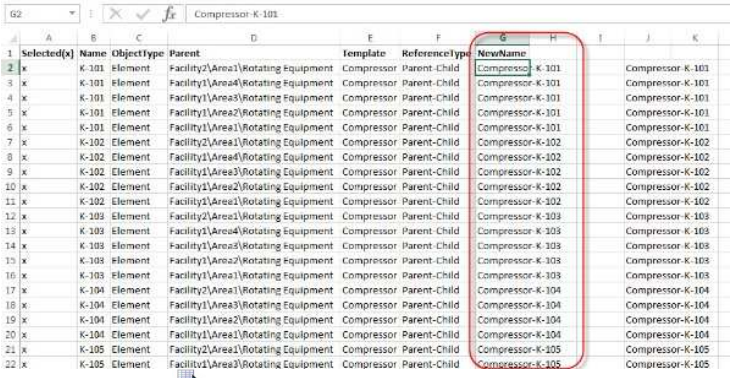


d. All the compressors are listed in the workbook. Go cell **J2** and type in **=E2&"-"&B2** (You are concatenating the column **Template** with column **Name**, so change the column reference in the **=E2&"-"&B2** to the one corresponding in your sheet. Then copy this cell in column **J** for all the compressors.



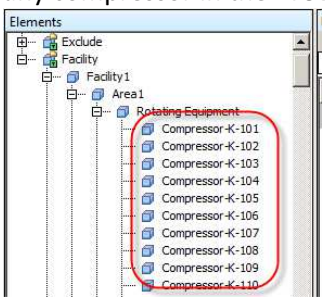
	A	B	C	D	E	F	G	J
1	Selected(x)	Name	ObjectType	Parent	Template	ReferenceType	NewName	
2	x	K-101	Element	Facility2\Area1\Rotating Equipment	Compressor	Parent-Child		Compressor-K-101
3	x	K-101	Element	Facility1\Area4\Rotating Equipment	Compressor	Parent-Child		Compressor-K-101
4	x	K-101	Element	Facility1\Area3\Rotating Equipment	Compressor	Parent-Child		Compressor-K-101
5	x	K-101	Element	Facility1\Area2\Rotating Equipment	Compressor	Parent-Child		Compressor-K-101
6	x	K-101	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child		Compressor-K-101
7	x	K-102	Element	Facility2\Area1\Rotating Equipment	Compressor	Parent-Child		Compressor-K-102
8	x	K-102	Element	Facility1\Area4\Rotating Equipment	Compressor	Parent-Child		Compressor-K-102
9	x	K-102	Element	Facility1\Area3\Rotating Equipment	Compressor	Parent-Child		Compressor-K-102
10	x	K-102	Element	Facility1\Area2\Rotating Equipment	Compressor	Parent-Child		Compressor-K-102
11	x	K-102	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child		Compressor-K-102
12	x	K-103	Element	Facility2\Area1\Rotating Equipment	Compressor	Parent-Child		Compressor-K-103
13	x	K-103	Element	Facility1\Area4\Rotating Equipment	Compressor	Parent-Child		Compressor-K-103
14	x	K-103	Element	Facility1\Area3\Rotating Equipment	Compressor	Parent-Child		Compressor-K-103
15	x	K-103	Element	Facility1\Area2\Rotating Equipment	Compressor	Parent-Child		Compressor-K-103
16	x	K-103	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child		Compressor-K-103
17	x	K-104	Element	Facility2\Area1\Rotating Equipment	Compressor	Parent-Child		Compressor-K-104

e. Then copy the cells from **J2** to the last compressor in column **J**. Click in cell **G2** and **Paste Special as Values**.



Selected(x)	Name	ObjectType	Parent	Template	ReferenceType	NewName
x	K-101	Element	Facility2\Area1\Rotating Equipment	Compressor	Parent-Child	Compressor-K-101
x	K-101	Element	Facility1\Area4\Rotating Equipment	Compressor	Parent-Child	Compressor-K-101
x	K-101	Element	Facility1\Area3\Rotating Equipment	Compressor	Parent-Child	Compressor-K-101
x	K-101	Element	Facility1\Area2\Rotating Equipment	Compressor	Parent-Child	Compressor-K-101
x	K-101	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child	Compressor-K-101
x	K-102	Element	Facility2\Area1\Rotating Equipment	Compressor	Parent-Child	Compressor-K-102
x	K-102	Element	Facility1\Area4\Rotating Equipment	Compressor	Parent-Child	Compressor-K-102
x	K-102	Element	Facility1\Area3\Rotating Equipment	Compressor	Parent-Child	Compressor-K-102
x	K-102	Element	Facility1\Area2\Rotating Equipment	Compressor	Parent-Child	Compressor-K-102
x	K-102	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child	Compressor-K-102
x	K-103	Element	Facility2\Area1\Rotating Equipment	Compressor	Parent-Child	Compressor-K-103
x	K-103	Element	Facility1\Area4\Rotating Equipment	Compressor	Parent-Child	Compressor-K-103
x	K-103	Element	Facility1\Area3\Rotating Equipment	Compressor	Parent-Child	Compressor-K-103
x	K-103	Element	Facility1\Area2\Rotating Equipment	Compressor	Parent-Child	Compressor-K-103
x	K-103	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child	Compressor-K-103
x	K-104	Element	Facility2\Area1\Rotating Equipment	Compressor	Parent-Child	Compressor-K-104
x	K-104	Element	Facility1\Area3\Rotating Equipment	Compressor	Parent-Child	Compressor-K-104
x	K-104	Element	Facility1\Area2\Rotating Equipment	Compressor	Parent-Child	Compressor-K-104
x	K-104	Element	Facility1\Area1\Rotating Equipment	Compressor	Parent-Child	Compressor-K-104
x	K-105	Element	Facility2\Area1\Rotating Equipment	Compressor	Parent-Child	Compressor-K-105
x	K-105	Element	Facility1\Area3\Rotating Equipment	Compressor	Parent-Child	Compressor-K-105

f. Then click the Publish button in the ribbon. Click **OK** and **Close** on the next two dialogs that pop up. Open the **PI System Explorer**, press the **Ctrl+1** key combination. Navigate to any compressor in the **Browser** pane. All the compressors are now renamed (magic).

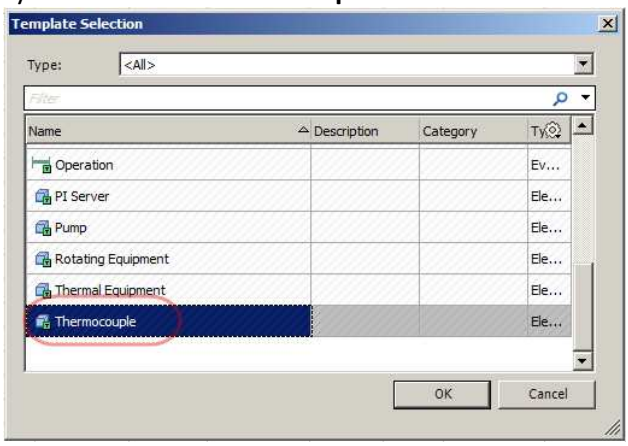


Traits

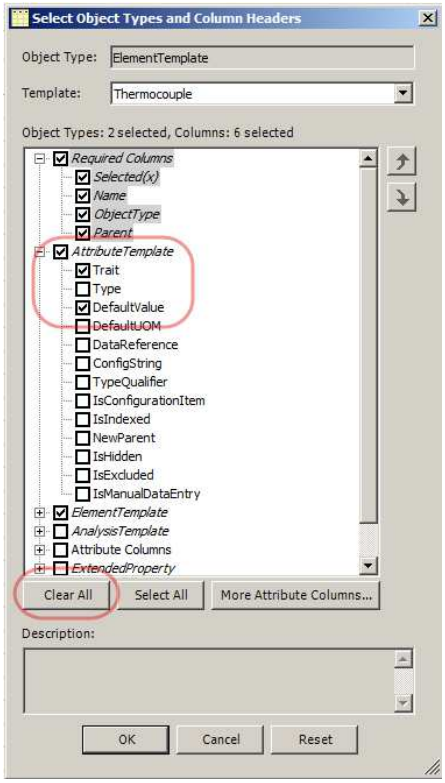
Load the traits for the **Thermocouple** Template into **PI Builder** and modify the names from **Maximum** to **Max** and **Minimum** to **Min**. If these do not exist then perform the **Attribute Traits** exercise earlier in this document to create these traits first.

Step by step:

a. Create a new workbook in Excel. In the ribbon click the down arrow under the Library symbol and select **Find Template**. Select the **Thermocouple** Template and click **OK**.



b. In the next window, that pops up first click the **Clear All** button. Then click the check boxes for **Trait** and **Default Value** under ***Attribute Template***. Then click **OK**.



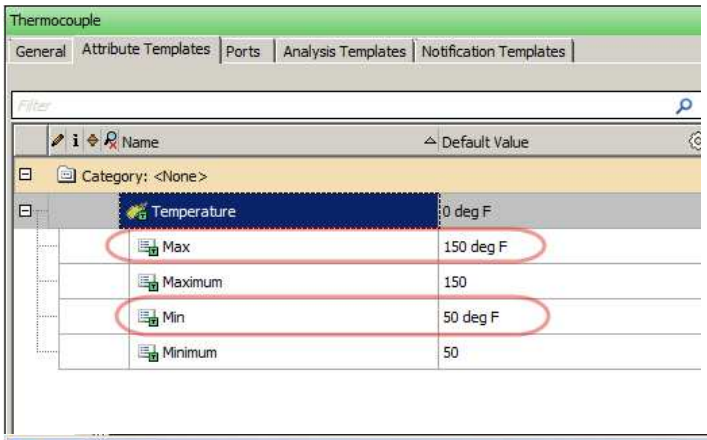
c. All Attributes that have Traits and the Trait Attributes are brought into the worksheet.

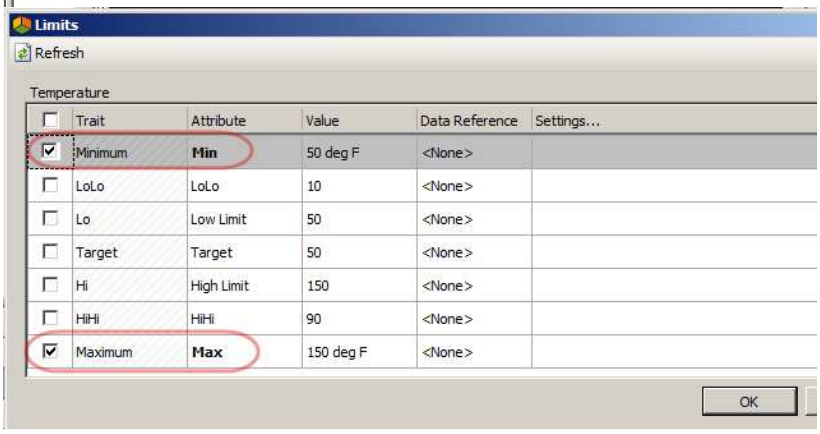
	A	B	C	D	E	F
1	**Selected(x)**	**Name**	**ObjectType**	**Parent**	**AttributeTrait**	**AttributeDefaultValue**
2	x	Thermocouple	ElementTemplate			
3	x	Temperature	AttributeTemplate	Thermocouple		0
4	x	Temperature|Maximum	AttributeTemplate	Thermocouple	Maximum	150
5	x	Temperature|Minimum	AttributeTemplate	Thermocouple	Minimum	50
6						

d. Change the names in **Column B** to the ones as shown below.

	A	B	C	D	E	F
1	**Selected(x)**	**Name**	**ObjectType**	**Parent**	**AttributeTrait**	**AttributeDefaultValue**
2	x	Thermocouple	ElementTemplate			
3	x	Temperature	AttributeTemplate	Thermocouple		0
4	x	Temperature|Max	AttributeTemplate	Thermocouple	Maximum	150
5	x	Temperature|Min	AttributeTemplate	Thermocouple	Minimum	50
6						
7						

e. Click the **Publish** button in the **Ribbon** and then **OK** in the dialog that pops up. Switch to the **PSE**, navigate to the **Library** and select the **Thermocouple** Element Template. In the **Viewing Pane**, click on the **Attribute Templates** tab. Click on the ⊞ next to the **Temperature** Attribute to display the Child-Attributes. Notice that we now have four Child-Attributes. **Max** and **Min** are now the **Limits**, and the **Maximum** and **Minimum** are now just Child-Attributes. You can delete the latter two. You can also take existing Child-Attributes and convert them to **Limits** or **Forecasts** using **PI Builder** by just entering one of the following (**Minimum, LoLo, Lo, Target, Hi, HiHi, Maximum**) in the **AttributeTrait** column.


Thermocouple
General
Attribute Templates
Ports
Analysis Templates
Notification Templates
Filter
Name
Default Value
Category: <None>
Temperature
0 deg F
Max
150 deg F
Maximum
150
Min
50 deg F
Minimum
50


Limits
Refresh
Temperature
Trait
Attribute
Value
Data Reference
Settings...
Minimum
Min
50 deg F
<None>
LoLo
LoLo
10
<None>
Lo
Low Limit
50
<None>
Target
Target
50
<None>
Hi
High Limit
150
<None>
HiHi
HiHi
90
<None>
Maximum
Max
150 deg F
<None>
OK