

Process Data Retrieval Using OSI Software's PI System

A generous gift from OSISoft, Inc. (www.osisoft.com) allows us to collect and archive process and laboratory data for use in other application software. The gift includes their Enterprise Server, interfaces to control system software, and a host of client software tools used to retrieve, analyze, and report process data. The value of this gift is approximately \$300,000. In addition, free access to technical support from OSISoft is critical to the success of the installation. We are extremely grateful OSI and the individuals that made this a reality. I'm sure you will find the software very useful as well as convenient and easy to learn.

How the PI data snapshot/archive works:

Data are filtered, compressed, and, if appropriate, archived for long-term storage and retrieval. Data can be retrieved as real-time values, called snapshot data, or as compressed or sampled data. Because the compressed or sampled values are stored in the archive after being filtered and compressed, the archive data may not exactly match the actual process data from the control system. While each point passes through the value stored in the archive, the exact time the point actually passed through the value may not correspond with the archived value. Likewise, any noise is filtered out so that only an actual signal is considered for transfer to the archive.

Here's a simplified overview of how PI archives data:

A PI point is configured for each piece of data that you want to collect. In our case the PI system requests the current value of each of its points from the DeltaV control system.

PI has a snapshot register that contains all the current values for all archiving PI points. The snapshot register is updated on a five-second interval for most values and contains the most recent data from DeltaV.

For every PI point where compression is enabled, there is a set of compression settings (say $\pm 1^\circ\text{F}$) that decide if a snapshot value is enough different from the last snapshot to put it into the archive. The current snapshot value is compared to the current value in the compression register. If the change is less than the compression settings the value is discarded. If the value is greater than the compression settings then it is a signal and the last value with its timestamp is put into the archive. The newest value is put into the compression register and used for the next comparison in another 5 seconds.

Important to remember – Snapshot values are not compressed, so the value and timestamp should compare exactly with the DeltaV value and timestamp for the same point; Data retrieved from the PI archive are not necessarily identical to live DeltaV data and should not be used for such things as loop tuning; PI archives significant changes in values, then interpolates between archived data points when returning values to your spreadsheet; PI must be tuned for each point and the “best guess” values used for determining a significant change may need to be adjusted, but you need to determine that.

Here's an example of a PI tag:

Let's say you are interested in the temperature of the reboiler, TI132.

In the DeltaV system there is a control module called TI132. A control module is a collection of function blocks that performs a specific task.

The actual data for the temperature signal is located in the AI1 (Analog Input 1) function block of the control module. The temperature is found at the pv.cv (stands for the current value of the process variable) parameter of the AI1 function block.

So, if you want to archive the value of the temperature you create a PI tag for TI132/AI1/pv.cv

The measurement device is an RTD, so it is accurate to $\pm 1/2^\circ\text{F}$ and is expected to take about 5 seconds or more to show a significant change. Set the compression settings to $\pm 1/2^\circ\text{F}$ and the scan interval to every 5 seconds.

The PI Add-in for Excel while you are in any of the computer labs*:

In order to pull process data from the pilot plant into an Excel spreadsheet you will use an Excel Add-In called PI DataLink. The computers in the computer labs have DataLink installed on them. Open Excel and a PI tab should show up on the quick access bar.

Click the PI item and select "Connections" from the ribbon.

On the Connections pop-up, select the server steam.we.mtu.edu. The port should be 5450 and the default user should be pidemo.

You will have to connect to the server every time you open Excel.

If you are ever asked for a user account, the user name is "pidemo" and the password box is left blank.

If steam.we.mtu.edu isn't on the server list, click "server" from the menu bar and add it to the list.

If PI does not appear on your Quick Access tab:

Click on the File tab (top left of screen), then the "Options" menu item.

On the Excel Options window, click the Add-ins menu item.

At the bottom of the page, select Excel Add-ins, then click the "Go" button.

In the list of Add-Ins, select the PI DataLink, PIBVExcel.functions, and PI BatchView for Excel checkboxes, then click on "OK".

At this point you should have a PI tab on the quick access bar.

* If you are trying to import PI data into Excel while in the control room, the server name will be "uolab-pi".

Building a tag list in Excel

After connecting to the server you can import a list of tags from the PI system into Excel.

From the PI menu select "Tag Search".

In the Search box, change to pointsource from "*" to "o".

In the tag mask box, enter a mask and wildcard characters to get the tag names.

You can insert a ? for a single character wildcard

Use an * as a general wildcard.

Example 1 – If you want all the temperature indicators in the SRU, TI1* calls up all PI tags starting with TI1.

Example 2 – if you want all the pressure controllers in the PDMS pilot plant, PIC2* calls up all PI tags starting with PIC2.

Extensions you may be interested in are:

/PV.CV for process variable information;

/SP.CV for setpoint information;

/OUT.CV for outputs;
/MODE.ACTUAL for controller modes.

As an alternate means of searching, you can put a word that you think would be in the description of a particular point into the “Descriptor” box. For example, putting “*E-101*” in the descriptor box would generate a set of points having E-101 in their tag descriptor.

After you have entered either a tag mask or a descriptor, click on Search.

A list of points will appear in the “Search Results” dialog box.

Highlight the points you are interested in. Hold the CTRL key while selecting to skip around in the list.

Click on OK to transfer the list of tags to your Excel spreadsheet.

The list of tags is transferred to Excel starting with the location of the currently selected cell and working downward.

To retrieve historical data:

On the spreadsheet, starting with the tag list you just created, insert at least three lines above the tag list. In the top line, first cell put the start date/time when you want the data. In the first cell of the second line put the end date/time, and in the third line put the time interval. Use am or pm if you prefer to use a 12 hour clock or simply use military time. The date should be numerical month/day/year format. Excel should interpret the date/time into its preset format, and this is a good indication that it was entered correctly. For time interval use 1s for 1 second, 5m for 5 minutes, 2h for 2 hours, etc. The time interval is the spacing between the data points. Data are reported to PI every 60 seconds, so any time interval less than 60s will be of little value.

Next, on the PI pull-down select “Sampled Data” to open a dialog box. In the Tagname field select the “cell” box below tagname and select all the tagnames on your spreadsheet that you just imported from the tag search. Next, select the cell box below the Start Time field and select the start time you just entered on your spreadsheet. Do the same for End Time and Time Interval. Select the “Output” field and, on your spreadsheet, click the cell one to the right and one above your first tag. Finally, back on the dialog window, select “Show Timestamps”, and “Columns.” Click OK and your spreadsheet should populate with the data.

Since everything you did referenced a cell, you can change the start time, end time, or time interval by editing the cell and your spreadsheet will automatically update.

To retrieve snapshot data:

Again, starting with a tag list on your spreadsheet, select the “Current Value” option from the PI pull-down menu. Follow the same procedure as above to reference cells. You may want to select “Time stamp at left” and for the “Output” cell, use the one immediately to the right of your first tag. Since these are snapshot values, they do not need a start/end time or time interval.

There are other options in the PI menu. Experiment with some of the other data types. A help screen is available with definitions and additional information.

Finally, if you want to play with the data once it is gathered in your spreadsheet, you may want to break the link to the PI database by copying the tag names and data, selecting “paste special” and pasting “values only”.