



ProcessPlugins Combustion Analysis



Partner Organizations:



PROCESS PLUGINS™ GAS TURBINE COMBUSTION ANALYSIS

The Gas Turbine Combustion Analysis module monitors and presents a real time polar-plot display of the combustion turbine exhaust gas temperatures. As shown below, each exhaust thermocouple's reading is displayed on a polar plot. Also displayed are the turbine can fixed positions and the real time corrected positions which are calculated as function of the exhaust gas swirl angle. The thin black circle represents the maximum thermocouple reading displayed around the circumference of the plot. This aids in viewing any appreciable inconsistencies around the exhaust plane. Real time displayed calculated results include:

- Swirl Angle
- Minimum Temperature
- Maximum Temperature
- Temperature Spread
- Corrected Can Positions

The Process Plugins™ solution provides a unique method of rendering polar (θ , R) plots onto Cartesian (X, Y) coordinates. As such, the black (maximum) and red (actual) circular plots (see illustration below) are continually rendered in real time and you can step back in time to review historical information.

By plotting the real time temperatures against the corrected can positions, irregularities in the temperature profile become easy to identify.

The Process Plugins™ solution has the capability of monitoring an unlimited number of turbines, which could be added by the end user at any time in the future.

Using the 'Element Relative Display' feature, one master Process Book display file may be used to consistently display the key performance indicators of each turbine by simply selecting the turbine in the Element Relative pane (left side of display). With the 'Element Relative Display' feature, one master display file may be used for an unlimited number of similar assets. Corporate level summary "drill down" screens make navigation easy via PI Process Book, or Internet Explorer using PI Web Parts.

Flexibility of the OSIsoft AF structure allows for value substitution whenever certain instrumentation may be unavailable. This substitution can take a number of forms including real-time calculation of the expected value based upon surrounding instrumentation, manual input via AF, manual input to a PI tag based on operator rounds, or any combination of manual and calculated inputs.

Element Relative

Search
Search Ma

Elements of Interest

Group by: Template

Filter

Name

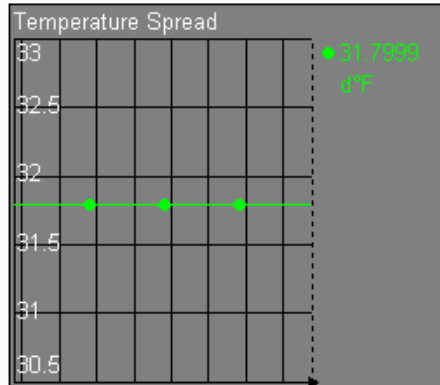
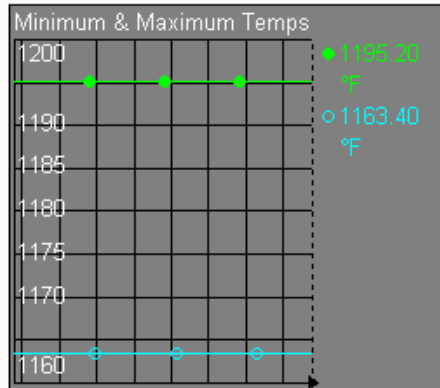
- CTG1
- CTG2
- CTG3

Train 1 Sum	HRS1	Gen 1	CTG 1 Exh	Comp1 Wsh	FWP101A	FWP101B	FWP102A	FWP102B	Steam Turb	Power Support Center
Train 2 Sum	HRS2	Gen 2	CTG 2 Exh	Comp2 Wsh	FWP201A	FWP201B	FWP202A	FWP202B	Cond&CTwr	

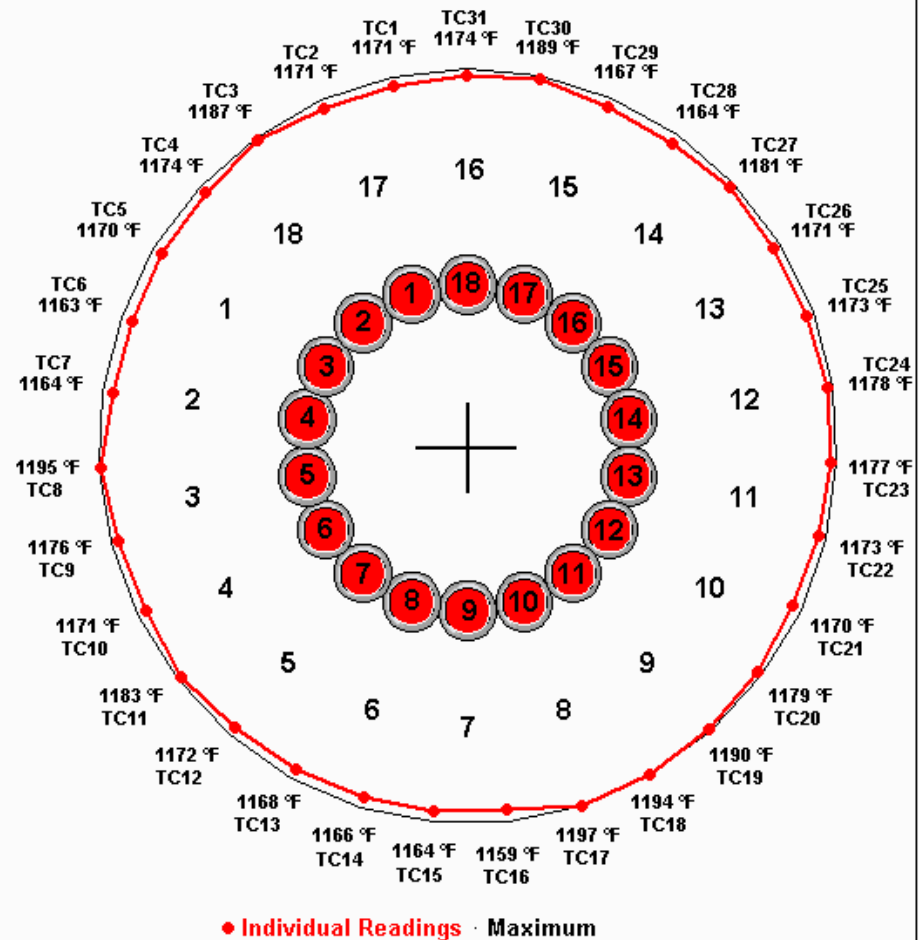
CGT101 EXHAUST PROFILE

CALCULATED RESULTS:

CT Generation: 218.57 MW
 Swirl Angle: 35.4 °
 Minimum Temperature: 1163.4 °F
 Maximum Temperature: 1195.2 °F
 Temperature Spread: 31.8 °F



Process Plugins™



The diagram illustrates exhaust gas moving toward the viewer while swirling counter-clockwise. Inner numbers identify fixed combustor positions where the hot gas originates. Outer numbers are dynamic and map hot gas back to the originating fixed position.

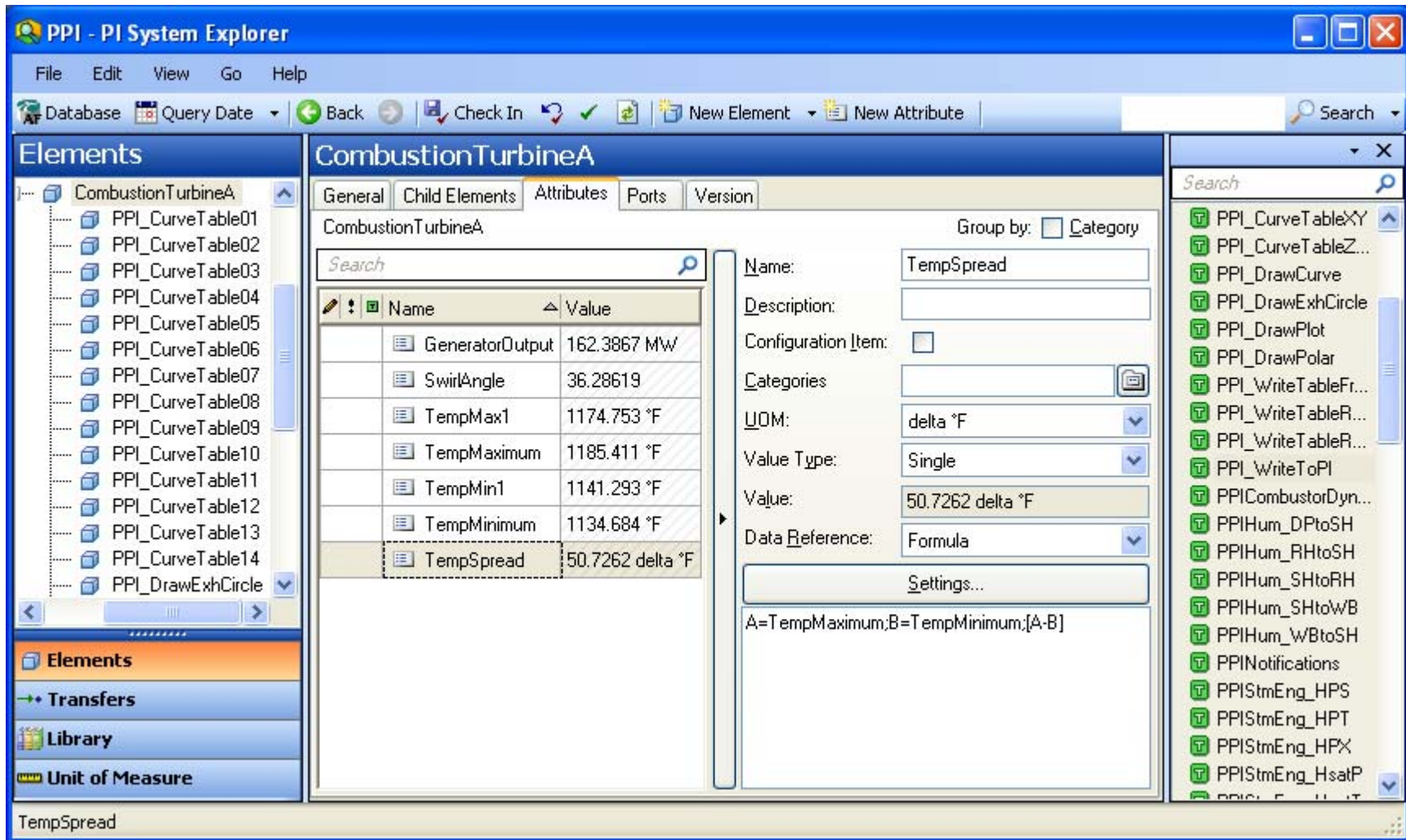
MORE ABOUT PROCESS PLUGINS™

OSIsoft's PI System continues to be the industry standard in data historians, which has been the core of its 21st century real-time infrastructure platform. And now this platform comes fully loaded with every feature necessary to support all of your needs for monitoring, modeling, diagnostics, or forecasting without the need for any 3rd party software. That's where the Process Plugins™ package comes in.

Process Plugins™ is not 3rd party software. The Process Plugins™ package customizes your OSIsoft platform for your plant. This is the only existing solution if you want:

1. No unnecessarily redundant PI tags
2. No 3rd party software
3. One Microsoft certified package with seamless integration of calculations and models
4. Web browser interface capability
5. Ability to drill down into calculations to see (or edit) exactly what they're doing

PI Analysis Framework (PI-AF)



The Process Plugins™ package resides primarily within OSIsoft's PI Analysis Framework (PI-AF). Your plant customization exists in the form of *elements* which handle most of your basic performance calculations. Using PI System Explorer, system administrators can view, modify, or enhance elements as desired.

Element Formulas

Formula Configuration: (SwirlAngle)

Parameters

A=GeneratorOutput

Default Values Allowed

Equations

if A>209 then 0 else 0.0000346994*A^3-0.0119031*A^

Result

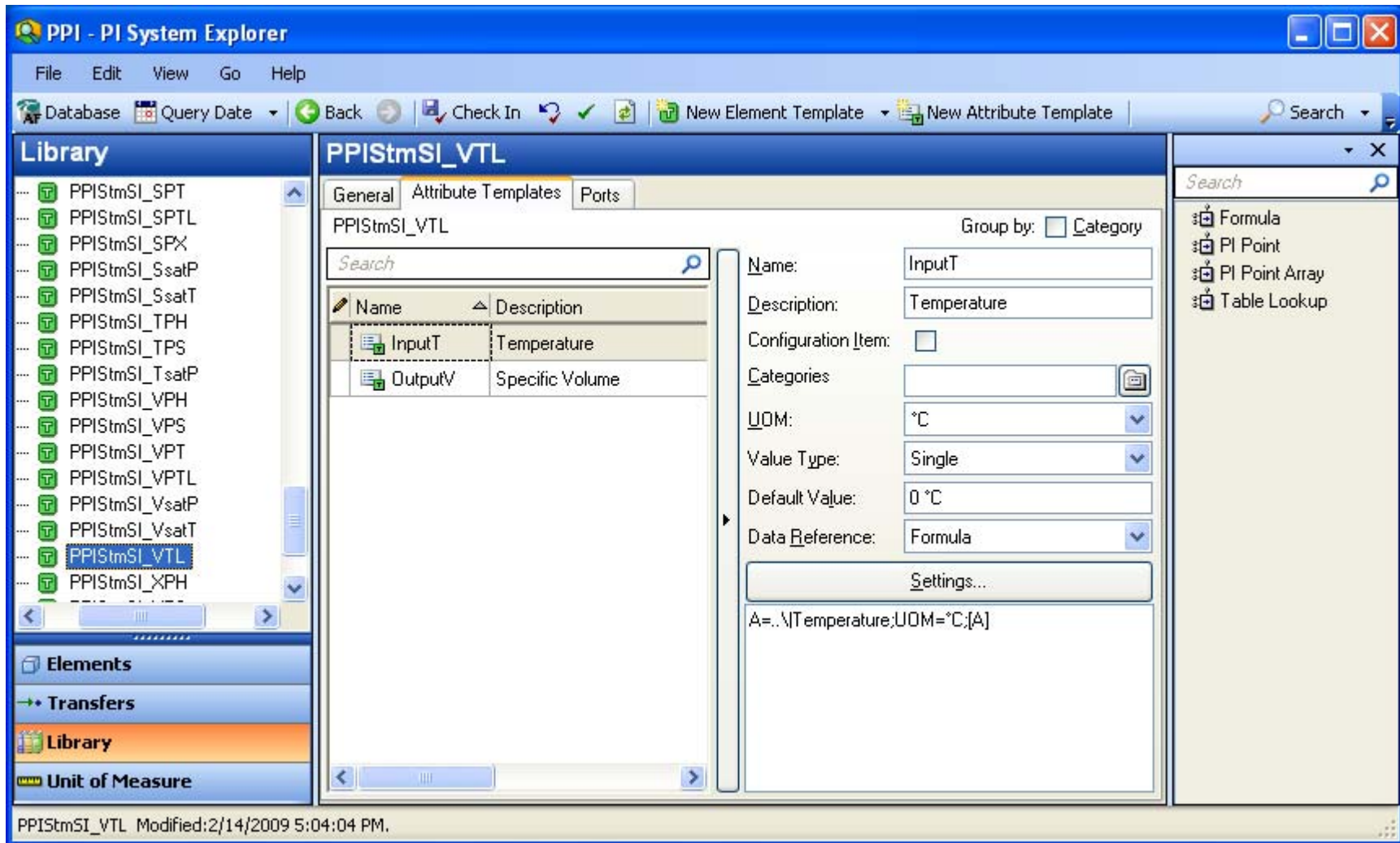
Unit of Measure: <None> Minimum: Maximum:

Evaluate

OK Cancel

Fundamental performance calculations exist as formulas within elements. Some routines utilize OSIssoft's PI Advanced Computing Engine (PI ACE), which delivers results back to an element.

Element Templates



The Process Plugins™ package comes with a complete set of “Drag & Drop” Element Templates for use in PI-AF.

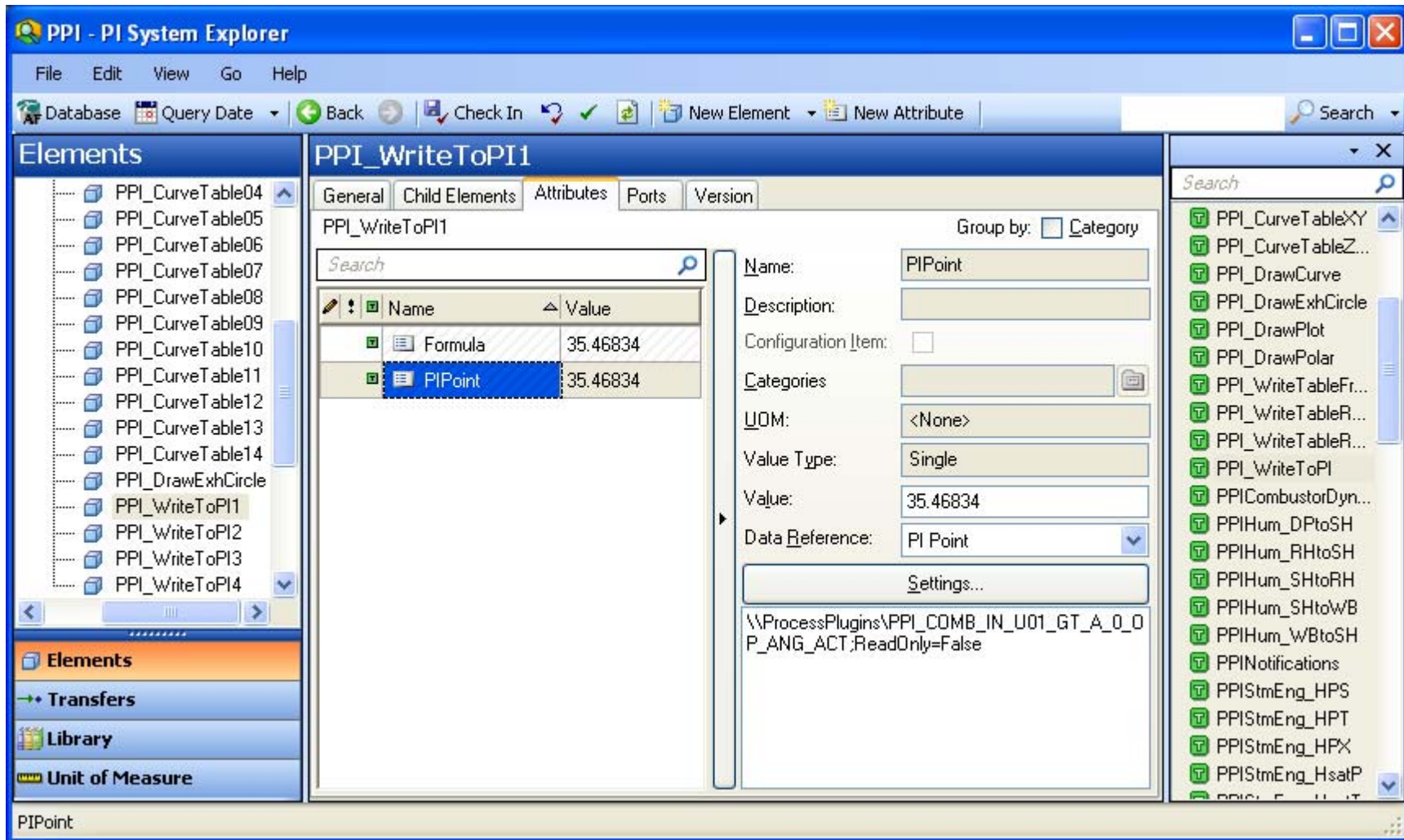
Lookup Tables

The screenshot displays the PPI - PI System Explorer interface. The main window is titled "PumpEfficiency" and shows a table with two columns, X and Y. The table contains data points for X values from 0 to 1040 in increments of 80, with corresponding Y values. The status bar at the bottom indicates the table was modified on 2/14/2009 at 5:09:47 PM, version 1/1/1970 at 12:00:00 AM, and is revision 1.

X	Y
0	3.52384
80	13.82063
160	23.01308
240	31.19163
320	38.442
400	44.84508
480	50.47703
560	55.40922
640	59.70823
720	63.43588
800	66.64922
880	69.40051
960	71.73725
1040	73.70216

The Process Plugins™ package comes with both industry standard and site specific tables which are used by elements for lookup functions as well as interpolation.

Data Storage



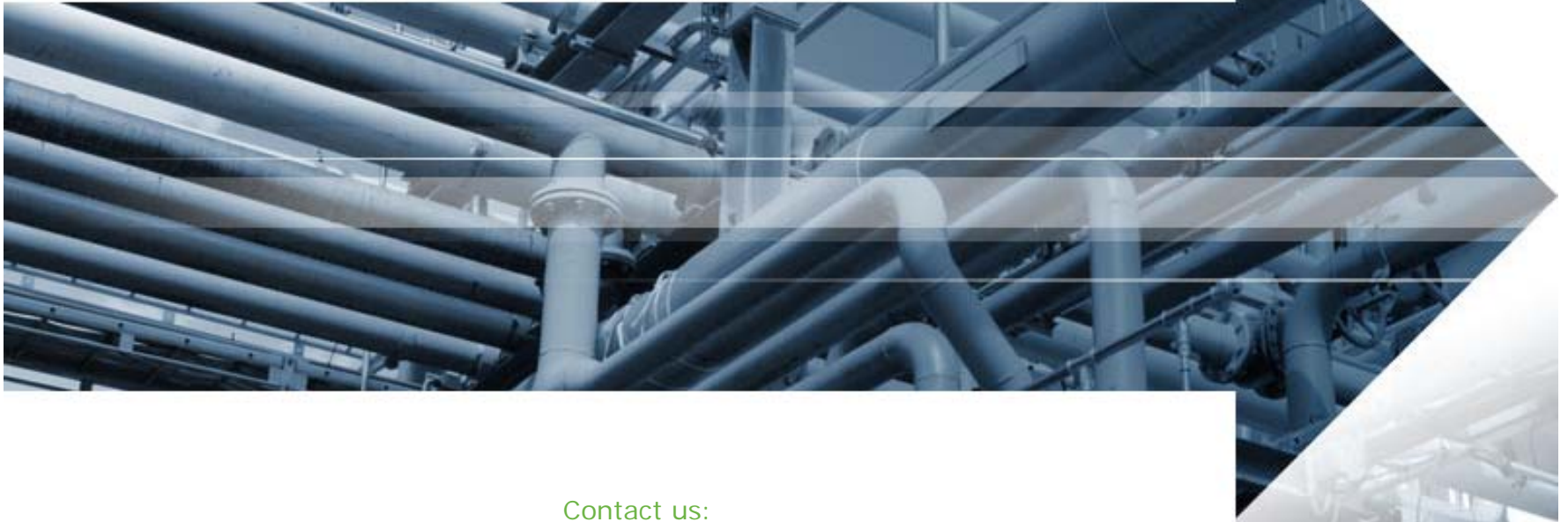
Key resultant data generated by Process Plugins™ modules are stored in the OSIsoft PI historian. Process Plugins™ modules do NOT store redundant or unnecessary data, but only a handful of PI tags for key results.

Units of Measure

The screenshot shows the 'ProcessPlugins1 - PI System Explorer' application. The main window is divided into two panes. The left pane, titled 'Unit of Measure', shows a tree view of classes with 'Power' selected. The right pane, titled 'Power', displays a table of units with columns for Name, Abbrevi..., Class, Canonical, and R. The status bar at the bottom indicates 'Unit-of-Measure Database on PROCESSPLUGINS (33 Classes, 218 UOMs) Modified:7/2/2008 10:40:56 AM.'

Name	Abbrevi...	Class	Canonical	R.
Btu/h	Btu/h	Power	0.29307107017222 W	0...
Cal/s	Cal/s	Power	4.1868 W	4...
HP	HP	Power	745.699871582 W	7...
J/s	J/s	Power	1 W	1...
kBTu/h	kBTu/h	Power	293.07107017222 W	1...
kVA	kVA	Power	1000 W	1...
kVAR	kVAR	Power	1000 W	1...
kW	kW	Power	1000 W	1...
MJ/h	MJ/h	Power	277.777777777778 W	2...
MMBtu/d	MMBtu/d	Power	12211.2945905092 W	4...
MMBtu/h	MMBtu/h	Power	293071.07017222 W	1...
MMBtu/min	MMBtu/min	Power	17584264.2103332 W	6...
MMcal/h	MMcal/h	Power	1163 W	1...
MVA	MVA	Power	1000000 W	1...
MVAR	MVAR	Power	1000000 W	1...
MW	MW	Power	1000000 W	1...
VA	VA	Power	1 W	1...
VAR	VAR	Power	1 W	1...
W	W	Power	1 W	1...

The Process Plugins™ package includes a complete set of engineering units utilized by the utility industry for use with the PI AF Unit of Measure (UOM) system. PI-AF automatically performs unit conversions on demand and delivers results in either the U.S. English or S.I. engineering unit systems.



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Partner Organizations:

