ProcessPlugins Condition Monitor of Gas Turbine driven Process Gas Compressors
PROCESS PLUGINS™ Condition Monitor of Gas Turbines driving Process gas Centrifugal Compressors

The following input data is suggested to be available, ideally accommodated with P&ID’s where appropriate:

1. Combustion turbine fuel supply flow rate
2. Combustion turbine fuel supply pressure
3. Combustion turbine fuel supply temperature
4. Combustion turbine exhaust temperatures
5. Air compressor inlet temperature
6. Air compressor filter inlet pressure
7. Air compressor filter outlet pressure
8. Air compressor outlet pressure
9. Air compressor outlet temperature
10. Process gas compressor fluid flow rate
11. Process gas compressor inlet pressure
12. Process gas compressor inlet temperature
13. Process gas compressor outlet pressure
14. Process gas compressor outlet temperature
15. Process gas heating value
16. All available gas chromatograph data (i.e. Constituents by percentage)
17. Bearing temperatures
18. Bearing vibrations

Gas constituent data is used to calculate gas density which is used in calculating real time mass flow rates. With heating value, this is used to calculate the fuel energy delivered to the combustion turbine. Turbine efficiency is then calculated as a function of fuel input and total work delivered to the Process gas compressor. The following parameters are calculated and key performance indicators (KPIs) are visually displayed in a real time comparison to manufacturer design curves or data, or to historical data trends:

1. Process gas compressor isentropic (adiabatic) efficiency
2. Process gas compressor polytropic efficiency
3. Air compressor isentropic (adiabatic) efficiency
4. Air compressor polytropic efficiency
5. Combustion turbine work
6. Combustion turbine efficiency
7. Applicable heat exchanger effectiveness

If any component’s performance drops substantially below the expected value, then a visual display and PI Notification will communicate this information.

This module includes a complete set of PI Process Book displays and corresponding PI Web Parts displays.
Shallow Creek HP Gas Compressor A

Solar Turbines
A Caterpillar Company

NGP: 94.7 %  NPT: 85.1 %

SPEED:
Actual 6,821 RPM
Nominal 6,968 RPM
Deviation -147 RPM

EFFICIENCY:
Actual 0.823
Nominal 0.850
Deviation -0.027

HORSEPOWER:
Shaft 2,426 hp

ISENTROPIC HEAD:
Actual 18,954 ft-lbf/lbm
Predicted 18,927 ft-lbf/lbm
Deviation 0.14 %

INLET FLOW:
Actual 1,292 acfm
Standard 115 MMscfd

SETPOINTS:
NGP 94.7 %
T5 1,409 °F
SoLoNOx T5 1,366 °F
Discharge 1,338 psig
Flow 145 MMscfd
Suction 305 psig

Head (ft-lbf/lbm) vs. Actual Flow (ACFM)
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.

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

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
The Process Plugins™ package resides primarily within OSIsoft’s PI Asset 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

Fundamental performance calculations exist as formulas within elements.
The Process Plugins™ package comes with a complete set of “Drag & Drop” Element Templates for use in PI-AF. Some routines utilize the Process Plugins™ Windows service, which delivers results back to an element.
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.
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.
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.