

SentientAlert

Be warned... earlier

Fact Sheet

SentientAlert is Synengco's leading early warning system technology to help power generators meet the demand to reduce abnormal equipment operations.

SentientAlert

SentientAlert offers a sophisticated software approach that goes far beyond equipment monitoring. The system automates the monitoring of conditions in both equipment and processes.

SentientAlert overcomes the problems of previous single technologies and offers instead a comprehensive framework with an early warning system for both equipment and process failures. SentientAlert not only identifies the problem, it also provides operator advice on how to address the problem.

SentientAlert Operation

SentientAlert involves 10 stages that let different technologies add:

- precision;
- sensitivity;
- fault isolation;
- identification;
- notification;
- action; and
- learning;

to the process. The process is fully automated to provide consistent low cost performance.

The SentientAlert process is based on the physical model of the power generation system so provides a common analysis and reporting framework. A base case for each system component and piece of equipment is determined from your targeted performance. All current operations are then compared to this base case.

Technologies such as mass and energy balance models and partial least squared are applied to measure and predict performance. Statistical process control and/or adaptive statistical process control limits are used to determine sensitivity or detection and when exceeded, an alert is generated as shown in the above diagram.

Events are reclassified as alerts through a sophisticated and structured process that accounts for equipment state, event charting and primary alert initiators. SentientAlert reduces false alerts by as much as 80% or more. An alert is displayed on-screen with the associated operator response to guide the operator in managing the abnormal operation.

The alerts are handled in the same way as traditional alarm management, with the addition of quick links to improve alert reviews, such as displaying the history of a single alert or filter by process, equipment or time. The alert notification is highly

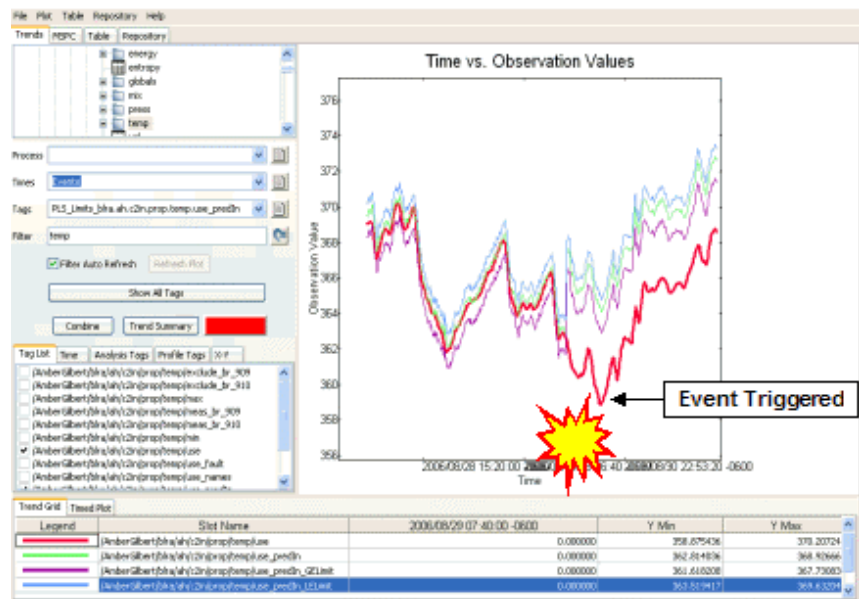
configurable. Alerts may be sent to a group of users such as operators, or to a single user in the case of a plant engineer carrying out a process equipment investigation.

Increasing the base cases to match standard operational profiles such as overload, maximum demand, and low demand operation or to match categories of fuel sources, can also be done to create greater sensitivity in the system.

Integration with SentientCause

SentientAlert is combined with SentientCause to provide an extremely comprehensive package. SentientCause is another of Synengco's SentientSystem® showcase technologies.

It provides an integrated solution to find the root cause of abnormal process and related equipment operation.



Picture: Partial Least Squared Limits vs Actual

Table 1: SentientAlert Coverage

Equipment	Frequency of Fault	Fault Impact	Ability to take short term rectification	Sentient Alert Coverage
Generator	Low	High	Low	✓
Steam Turbine	Low	High	Low	✓
Condenser	High	Medium	Medium	✓
Gas Turbine/Compressor	Low	High	Low	✓
Condenser Cooling System	Medium	Medium	Medium	✓
Feedwater Heating	Low	Low	Medium	✓
Boiler Feed Pump	Low	Medium	Low	✓
Boiler Fans	Low	Medium	Low	✓
Air Preconditioning (Air Heater, Evaporative Cooler)	Medium	Medium	Medium	✓
Boiler	High	Medium	High	✓
Emissions Control	High	High	High	✓
Pulvisers	Medium	Medium	High	✓
Fuel Handling	Medium	Medium	High	✓

SentientAlert Coverage

SentientAlert covers the entire process and systems of power generation for both gas and coal fired power generators.

While each plant has a unique set of equipment and challenges, Table 1 summarises the typical fault frequency and impact as well as the ability of the plant to take short term corrective action (ie, not major outage to investigate and repair), for each of the components within a coal fired power station.

Many of these components are also common with gas-fired plants. As noted in Table 1, SentientAlert and SentientCause cover all equipment and processes. Importantly, they cover both equipment with

a high impact and also the equipment most likely to generate faults.

This comprehensive coverage allows plant operators to take short-term corrective actions. This extensive coverage is unique to SentientSystem® and has the benefits of providing:

- a comprehensive solution for the early warning of potential problems; and
- the root cause of a fault and identification of the required solution.

The benefits of SentientAlert

The benefits of SentientAlert are:

- Its high sensitivity provides a warning as soon as a process is impacted.

- The sophisticated alert suppression system ensures only valid alerts are raised with operators.
- No knowledge is lost through the alert suppression system.
- A complete root cause analysis can be conducted after an early warning is provided.

SentientAlert has been used to detect tube leaks, boiler element slugging, bearing failures, heater performance degradation, and ineffective maintenance activities.

Our clients have experienced savings of \$250,000 to \$500,000 through SentientAlert by the prevention of equipment failure that would have lead to forced outages.

A simple roles-based security system allows SentientAlert to be easily implemented in your organisation. Users are only permitted to access functions of the system that are appropriate for their roles.

SentientAlert Options

SentientAlert is the most advanced early warning system in the market today. As not everyone will require the full range of tools that comprise SentientAlert, a range of smaller modules can be chosen to meet your specific needs. The system has also been designed to enable upgrading at a later date should your needs change.

The Payback Period

SentientAlert effectively pays for itself. Clients have experienced payback periods ranging from 6 to 18 months.

To contact us

For more information, please contact:

Don Sands
Director

[P] +617 3229 3333
[F] +617 3229 8011
[E] info@synengco.com
[W] www.synengco.com

Table 2: SentientAlert Options

Option	Features	Hardware	
		Sentient Server	User
SentientAlert Basic	<ul style="list-style-type: none"> • Low Cost • Uses plant instrumentation 	CPU: Intel® Pentium® IV 3.2GHz/800/1M RAM:2GB HDD: 250GB Monitor: 17" (1280x1024 res)	CPU: Intel® Pentium® IV 3.0Ghz/533/1M RAM: 1GB HDD: 160GB Monitor: 17" (1280x1024 res)
SentientAlert Lite	<ul style="list-style-type: none"> • High precision total unit model including boiler • Virtual instruments of key parameters 	CPU: Intel® Pentium® IV 3.2GHz/800/1M RAM:2GB HDD: 250GB Monitor: 17" (1280x1024 res)	CPU: Intel® Pentium® IV 3.2GHz/800/1M RAM:2GB HDD: 250GB Monitor: 19" (1440x900 res)
SentientAlert Quantum	<ul style="list-style-type: none"> • SentientCause • Adaptive SPC limits 	CPU: Intel® Xeon® 3.2GHz/800/2M (Dual Core) RAM:4GB HDD: 500GB Monitor: 17" (1280x1024 res)	CPU: Intel® Pentium® IV 3.2GHz/800/1M RAM:2GB HDD: 250GB Monitor: 21" (1440x900 res) Recommended 2nd Monitor: 17" (1280x1024 res)
Operating Systems	Microsoft Windows 2000 professional Microsoft Windows XP Professional	Microsoft Windows Server 2003 Linux	