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## FORUM

SPECIAL REPORT: MAINTENANCE

# When failure is not an option, plants opt for predictive analytics

By Steve Tonissen, SmartSignal Corp.

I recently heard a news commentator remark that failure is not an option for the incoming Obama administration. For power plants, refineries, oil and gas production and other industries with critical equipment, plant process and equipment failures have never been an option. That's even truer today, when budgets are tight and money just isn't available to fix equipment unnecessarily or to cover the exorbitant collateral expenses of catastrophic failure. And nobody can risk being down when demand requires one to be up and producing much-needed revenue.

Inadequately maintained plant equipment steadily siphons off profits and can quite suddenly become a costly equipment failure. Extending the useful life and optimal performance of plant equipment through proper maintenance practices is a sound and critical investment.

### Relying on tradition

Many plant owners have tradi-

tionally relied on equipment condition monitoring (CM) solutions to minimize maintenance on key pieces of equipment by monitoring critical operating parameters. Data historians, digital control, vibration analysis and trending critical operating parameters are popular strategies. These systems compare pressure, temperature, flow, speed and vibration readings to predetermined upper and lower thresholds.

The thresholds are set by plant operators to be wide enough to minimize unnecessary alarming, but narrow enough not to miss potential failures that may be catastrophic. If a reading is higher or lower than it should be, the system triggers an alarm, shuts down equipment or both. However, because they are based on generalized models and lack sensitivity, most of these alarms are false. And, CM systems cannot pick up subtle sensor deviations from normal that could signal an impending equipment failure; rather they "alarm" when damage is already done.

Conversely, companies that rely



Photo courtesy of SmartSignal

This photo shows turbine blade damage. A blind test of historical data showed that predictive analytics could have identified this problem early.

on strict routine maintenance schedules with no regard to actual equipment condition or performance spend scarce O&M dollars unnecessarily on preemptive repairs.

Photo courtesy of SmartSignal



A transition failure is shown in this photo. A blind test of historical data showed that predictive analytics could have warned the plant of this problem before it happened.

### Predictive analysis differences

Optimally, the key to successful prevention is to predict developing equipment problems with accuracy and clear notification well in advance of failure. This requires an effective

monitoring solution that recognizes every piece of equipment as unique, and works on all types of equipment to detect, diagnose and prioritize problems across a wide array of assets and failure modes that other methods cannot see. That is exactly what today's predictive analytic solutions can do.

The amount of data being retrieved, recorded, trended and viewed in plants and monitoring centers has been growing exponentially. Given the variability of the data and the quantity of data being stored, the job of the analyst to make sense of the raw data is next to impossible. The all too common flaw with CM and other legacy monitoring systems is that operators find themselves data rich, but information poor.

Every company has a unique combination of people, equipment, processes and technology. The key to optimizing resources is to get the right information to the right people at the right time – to turn the data into intelligence. Predictive analytics – especially as delivered through new service-based business models – have a tremendous role to play in navigating through the brain drain. “Boots on the ground” in a plant can never be replaced, but plant workers’ focus can shift.

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### Beyond eyes, ears

Predictive analytic applications supplement the “eyes and ears” at the plant – capturing equipment knowledge that can help leaner, less-experienced staffs detect and diagnose equipment failures and prioritize their actions to eliminate them. Because the analytics are data-driven, the information and the decision-making are less subjective. With predictive analysis on the job 24/7, plant workers can spend their time solving problems – not looking for them.

For example, predictive analytic technology can monitor and analyze the performance and mechanical condition of equipment and can detect degradation in advance of the OEM monitoring systems, thus averting potential failures. These new predictive analytic solutions focus attention on abnormal equipment conditions, resulting in improved system performance, reliability and availability. Analysts do not need to be involved in direct data trending. The data is monitored by the software, and analysts only review the data when an exception is identified, giving ample time to respond to the changing condition.

By highlighting only signals that deviate from a pattern, monitoring is

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# Is your pump working harder than it has to?

## Think about ITT.

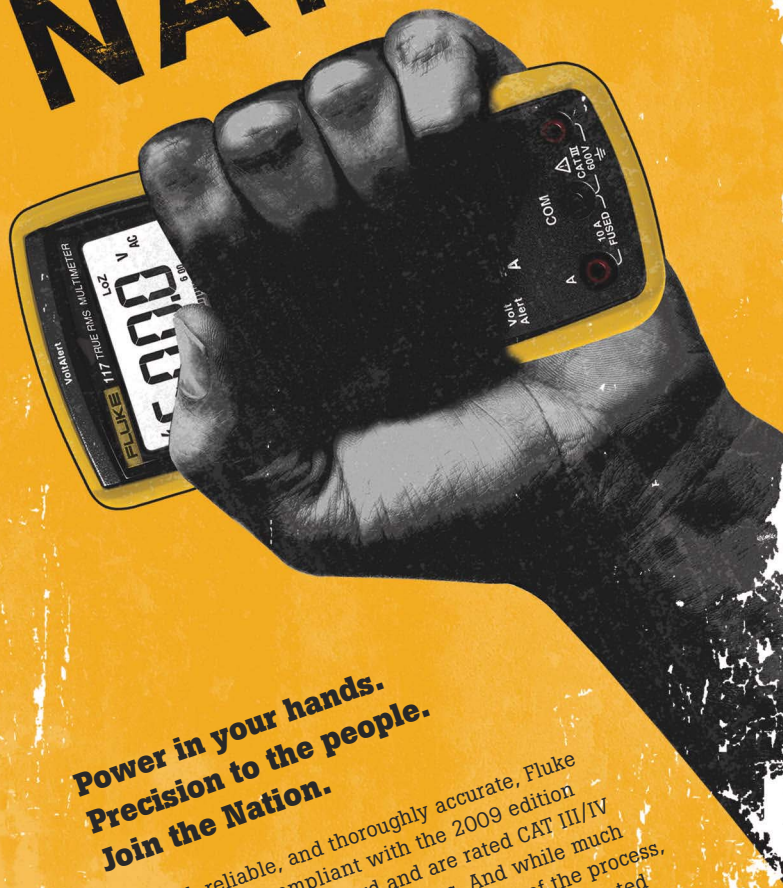
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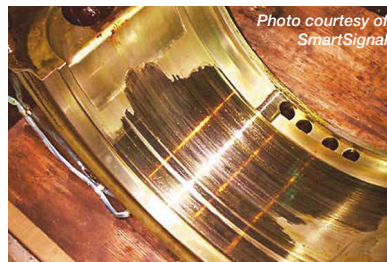


Photo courtesy of SmartSignal

This turbine generator bearing problem was identified early by predictive analytics, preventing further deterioration.

more efficient. If indicators show that a piece of equipment is continuing to operate normally, a scheduled overhaul can be delayed. Steady slow changes in readings enable plant engineers to detect impending failures early – before the equipment's condition worsens to the point of needing urgent (more costly) attention. Early awareness of a problem makes it possible to schedule repairs during planned production downtime, and gives plant managers time to schedule technicians best qualified to do the work.

Predictive analytics fill an important industry void – complementing traditional condition-based monitoring systems, and going well beyond to complex analytics for early warning and insights into root causes of problems. Predictive analytics significantly reduce problems related to aging equipment, lean personnel and other constraints, while increasing production capacity and profitability.

Predictive analytic solutions complement existing CM and other legacy systems, and are scalable for individual plants to entire fleets. They monitor all critical equipment – rotating and non-rotating – for all industries with critical equipment. Companies successfully implementing a predictive analytics initiative can reasonably expect a return on investment in a matter of months.

*Steve Tonissen is vice president of SmartSignal Corp.*