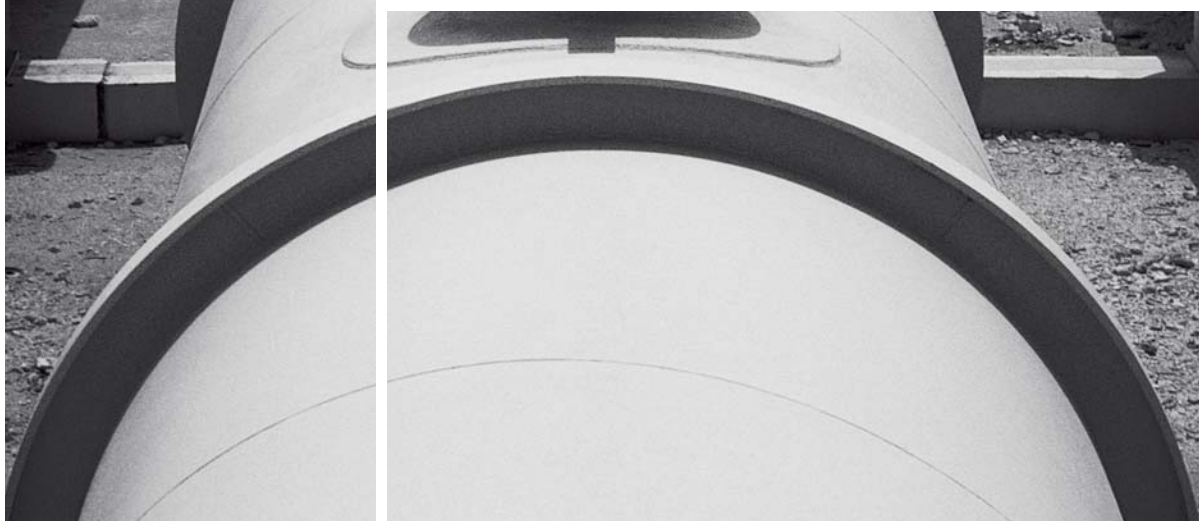
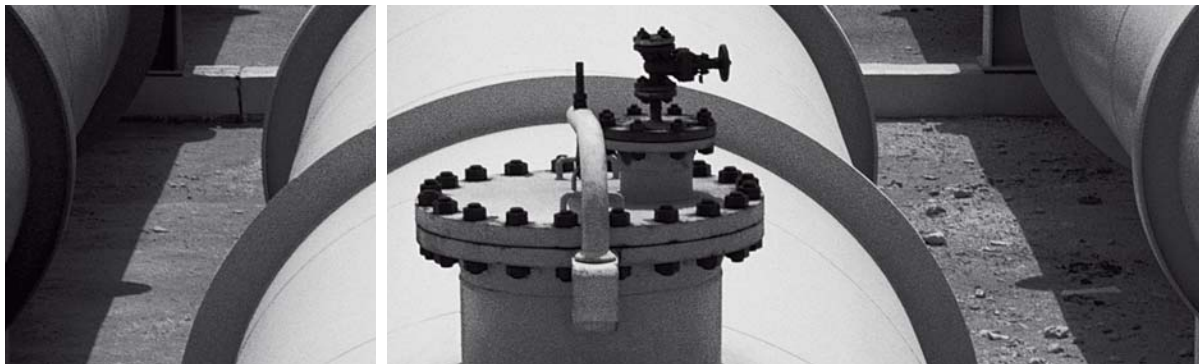
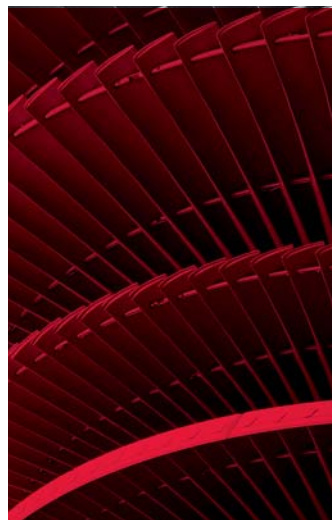


# SMARTSIGNAL PLANT AVAILABILITY AND PERFORMANCE SOLUTION

LEARN HOW TO ELIMINATE EQUIPMENT FAILURE—WITH MINIMAL  
TIME AND EFFORT





## Eliminate Equipment Failure With SmartSignal Plant Availability And Performance Solution

SmartSignal® Plant Availability and Performance Solution™ (PlantAPS™) provides hundreds of power stations with the intelligence to detect, diagnose, and prioritize developing equipment problems well before they happen. Power plants reduce critical equipment failures across a wide range of rotating and non-rotating equipment, while driving down costs and improving safety. They experience:

- Improved EFOR,
- Increased capacity factor,
- Improved heat rate,
- Decreased maintenance costs.

SmartSignal PlantAPS uses a unique combination of SmartSignal technology, people, and process. We quickly deliver real value to you with minimal impact to your team.

With SmartSignal PlantAPS, plant management is more confident making future power-delivery commitments.

*“SmartSignal Plant Availability and Performance Solution delivers the intelligence needed to improve availability and reliability while lowering costs and improving safety.”*

### POWER PLANT MANAGER

Tag Name	Source Tag Name	Units	Actual	Indication
SHELL_SIDE_NORMAL_DRAIN_TEMP	P1U3_FWH2_DT	DEG F	354.328	↑
SHELL_SIDE_NORMAL_DRAIN_VALVE_POSITION	P1U3_FWH2_DVP	%	70.574	↑

SmartSignal email notification of faults.

## SmartSignal PlantAPS Fits Your Way of Working

Every plant has a unique combination of people, process, and technology. SmartSignal PlantAPS is configured to give you the right equipment intelligence delivered the right way for your plant.

## SmartSignal PlantAPS Provides The Earliest And Most Precise Failure Detection

SmartSignal PlantAPS provides the intelligence and guidance to detect, diagnose, and prioritize developing failures *well before traditional condition-based monitoring tools even sense them.*

SmartSignal PlantAPS employs SmartSignal's own patented technology to develop personalized models for each unique piece of your plant's critical equipment—across all known loads and ambient conditions. It then takes real-time data from your DCS or OSI PI infrastructure, analyzes it, compares it with expected model values, detects impending failures, confirms, investigates, diagnoses, and prioritizes. It then communicates these impending failures to you through a concise set of customized reports and real-time notifications, designed to fit your O&M processes.

## SmartSignal PlantAPS Maximizes Your Personnel Resources

The SmartSignal PlantAPS team of power-plant and information-technology experts maintains the solution and communication links with your

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SmartSignal fault detail web interface.

### Exhibit A: Power Equipment Types and Fault Modes

	Efficiency Loss	Excessive Axial Thrust	Lube Oil Cooling	Bearing Failures	Seal Problems	Electrical Problems	Rotor Problems	Stator Problems	H <sub>2</sub> Problems	Exciter Problems	Flow & Level Problems	Motor Problems	Feeder Problems	Roller Problems	Duct Leakage	Control Valve Problems	Fouling	Air Problems	Recirculation	Tube Leaks	Gear Box
Turbines	x	x	x	x	x										x						
Generators			x	x	x	x	x	x	x	x											
Condensers											x					x	x	x	x		
General Pumps	x			x	x						x					x					
Boiler Feed Pumps	x			x	x						x					x					
Fans			x	x							x				x	x					
Pulverizers			x	x							x	x	x	x	x	x					x
Air Heaters			x	x							x				x		x				x
Feed Water Heaters	x										x				x						x

Eliminate more failures on more equipment with SmartSignal.

people. All you do is provide a connection to your real-time plant data and the names of your plant people with whom we should communicate. SmartSignal will notify them of impending problems and collaborate with them until the issues are investigated and resolved.

### SmartSignal PlantAPS Is Proven

SmartSignal has protected critical equipment for hundreds of millions of hours of operation. Today, SmartSignal protects over 3000 assets for a broad spectrum of power stations worldwide. Exhibit A illustrates examples of monitored power plant components and some of the failures that SmartSignal PlantAPS has eliminated.

### SmartSignal PlantAPS Delivers Value—Fast—And Pays Back In Three To Nine Months

In less than one month, an entire power plant can be up and running with SmartSignal PlantAPS—with virtually no time required by plant personnel. Through preventing unplanned downtime and repair of failures, clients directly attribute quick and dramatic returns on their investments.

They report that not only does SmartSignal PlantAPS provide payback in three to nine months, it continues to provide payback day after day.

### Stop Everyday Problems, Before They Stop You

Our clients detect, diagnose, and prioritize equipment and process problems everyday with SmartSignal PlantAPS. Below are some examples of their success:

At a 430 MW unit, on a coal pulverizer, three sensors deviated from their normal behavior. SmartSignal technology detected an increase in load, a decrease in lube oil pressure, and an increase in inboard bearing temperature. SmartSignal PlantAPS investigated, diagnosed a potential bearing problem, and immediately contacted the client. The plant initiated an investigation and discovered hot air leaking from the lower mill bowl seal onto the bearing. A temporary fix was made, and the full repair was handled during the next outage. The client said that, without SmartSignal's early diagnostic guidance, the unit would have lost four to eight hours of availability.

At a 700 MW coal-fired baseload unit, SmartSignal notified a client that a secondary air heater support bearing temperature was rising above normal levels relative to SmartSignal's estimates. The plant took quick action and added 3.5 gallons of oil to the bearing, and the temperature returned to normal, averting a potential bearing failure. If the bearing had failed, the client estimates it would have suffered \$1.5-4.0 million in lost generation.

For a new client, during initial deployment, the SmartSignal technology identified a current swing

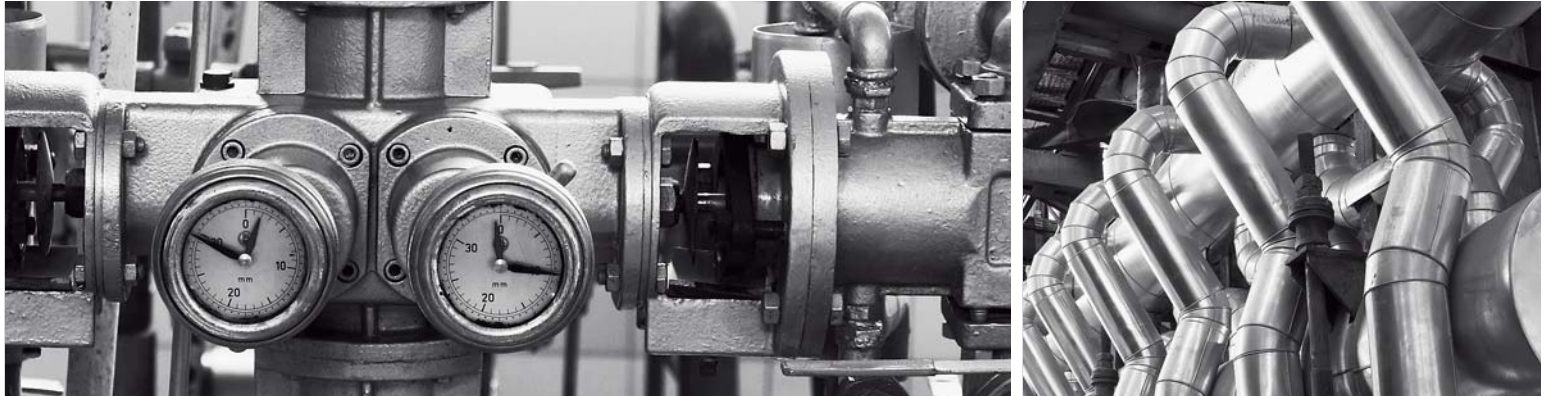
*"We have 120 guys here around the clock and nobody noticed these problems and there were no alarms...I think it's pretty cool that SmartSignal PlantAPS could detect the problems."*

POWER PLANT MANAGER

in an air heater drive motor and high differential pressure across the air heater. The basket was inspected and pluggage confirmed during a planned maintenance outage. The baskets were washed and balanced. One month later, SmartSignal identified a similar air heater problem on another unit. Soon afterwards, SmartSignal identified a third problem, this time on a boiler feed pump. The client was notified of a step change in both x and y vibrations on a coupling. The turbine/pump was tagged and isolated, and the coupling was replaced. The client calculated that these three problems alone—all within the first month of deployment—provided approximately \$1 million in value.

### Getting Started Is Quick And Easy

To get started, SmartSignal will visit your plant to learn more about your infrastructure, assets, processes, people, and failure profiles. We will gather data and perform a Value Assessment that will identify your particular major asset-improvement opportunities and quantify your specific expected value. We also will



illustrate how SmartSignal PlantAPS can integrate into your work processes and provide the advanced equipment-performance intelligence you need to continuously improve performance. Once that is done, we will design a Test Drive based upon your own personal evaluation plan. This proven process takes very little of your time, lets you experience SmartSignal PlantAPS, and answers all your questions. After a successful Test Drive, your plant will be ready to make informed decisions about how to integrate SmartSignal into your business.

### About SmartSignal

SmartSignal maximizes worldwide industry equipment performance, availability and reliability by detecting, diagnosing, and prioritizing equipment and process problems before they become costly failures. Drawing on over 40 patents, SmartSignal delivers specific, relevant, and actionable intelligence that makes people more proactive and productive. SmartSignal serves clients in power generation, oil and gas, mining, aviation, pulp and paper, and other process industries worldwide. SmartSignal and its clients have won over twenty awards for excellence, including the *Wall Street Journal* Technology Innovation Award.

TO LEARN MORE ABOUT HOW SMARTSIGNAL PLANT AVAILABILITY AND PERFORMANCE SOLUTION CAN HELP YOU ELIMINATE EQUIPMENT FAILURE, CONTACT US AT:

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