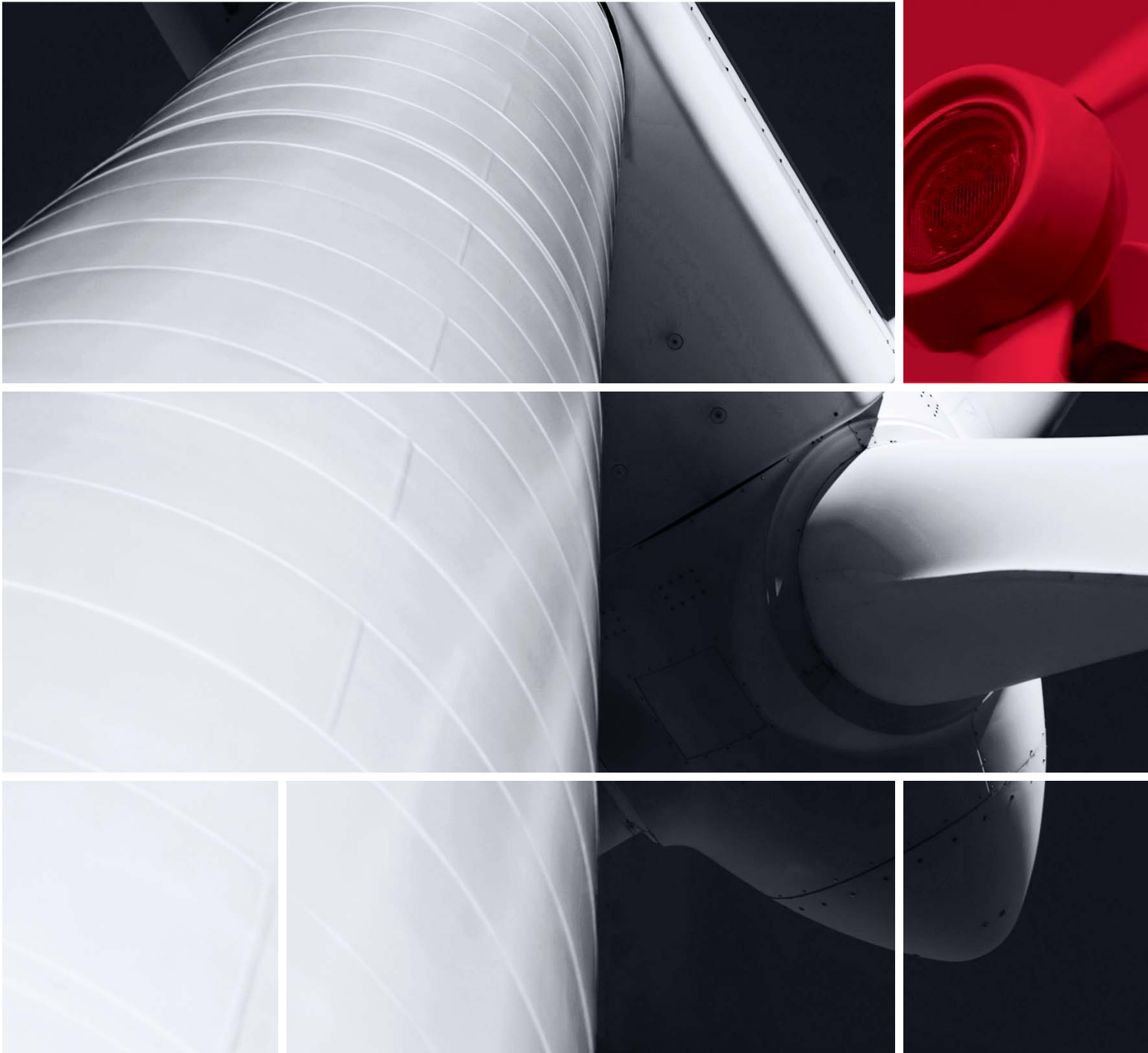


# SMARTSIGNAL WIND AVAILABILITY AND PERFORMANCE SOLUTION

SMARTSIGNAL RAISES WIND POWER AVAILABILITY AND RELIABILITY  
PERFORMANCE





**Exhibit A: Wind Components and Fault Modes**

	Pitch Deviation	Excessive Stress	Position Motor Degradation	Torque Deviation	Hydraulic Positioner	Yaw Deviation	Inadequate Cooling	Wind Speed Indication	Bearing Degradation	Gear Wear	Gear Tooth Failure	Performance	Electrical	MW	MVAR	Current	Voltage	Sensor Faults	Sensor Degradation
<b>Wind Components</b>																			
Blades	x	x	x	x	x														
Nacelle						x	x	x											
<b>Transmission Components</b>																			
Hub									x										
Gear Box							x	x	x	x									
<b>Hydraulic Systems</b>																			
Motors							x	x											
Pumps								x				x							
<b>Electrical</b>																			
Generator							x		x				x						
Transformer							x						x						
*Inverter							x						x	x					
Electrical Measurements														x	x	x	x		
<b>Brakes</b>														x					
<b>Turbine System</b>													x						
<b>Miscellaneous Sensors</b>																		x	x
*Synchronous Generators																			

Eliminate more failures on more equipment with SmartSignal.

communicates the likely set of impending failures. The SmartSignal WindAPS team employs the Internet, pagers, and the telephone to keep in contact with your operations while the failures are investigated and resolved. SmartSignal WindAPS provides the intelligence and guidance to detect, diagnose, and prioritize developing failures well before traditional condition-based monitoring tools even sense them.

The SmartSignal WindAPS team of subject-matter experts and information-technology professionals maintains the solution and Internet communication links with your people. All you need to do is provide a link to your data infrastructure and the names of the personnel who will receive the reports/alerts and communicate with the SmartSignal WindAPS team. SmartSignal WindAPS frees your people from the problematic maintenance of traditional condition-based monitoring solutions and provides a complete and proven solution.

*"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 you could detect the problems sitting up there in Chicago."*

**POWER PLANT MANAGER**

The SmartSignal WindAPS team also spots failing sensors. In many cases, it can provide a virtual sensor capability that can keep you running until the appropriate time for maintenance.

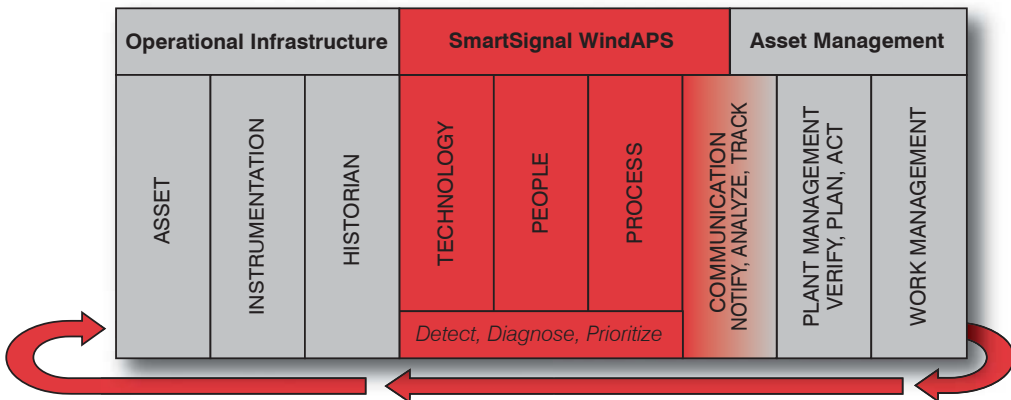
**SmartSignal WindAPS Is Proven**

SmartSignal advanced asset analytics have protected critical equipment for hundreds of millions of hours of operation. Today, SmartSignal monitors over 5000 assets for some of the most dynamic wind operators, power stations, mining

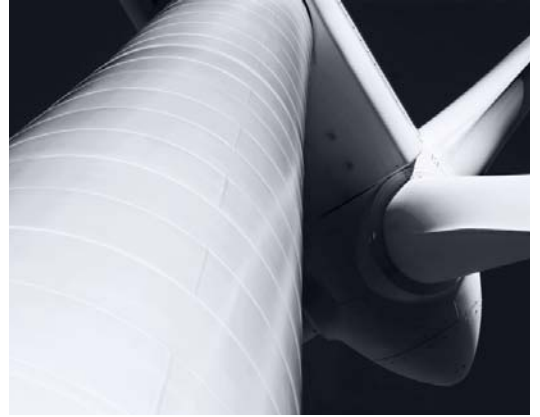
companies, airlines, refineries, and oil production platforms in the world. These assets span both rotating and non-rotating equipment, such as transformers, across major OEMs. Exhibit A provides a list of some wind farm components and the faults that SmartSignal WindAPS can eliminate.

**Getting Started Is Straightforward And Productive**

To get started, SmartSignal will visit your operation to learn more about your infrastructure, assets, processes, people, and failure profiles. SmartSignal will gather data and perform a Value Analysis to identify your particular major asset opportunities and quantify expected value. It also will illustrate how SmartSignal WindAPS can integrate into your work processes and provide the equipment-performance intelligence you need to continuously improve performance. Once that is done, you and SmartSignal can design a Test Drive, based upon your own personal evaluation plan, that will let you experience SmartSignal WindAPS and have all your remaining questions answered. Then your wind farm will be ready to raise availability and reliability while lowering O&M costs and improving safety. In less than one month, your entire wind farm can be up and running on SmartSignal WindAPS.



SmartSignal WindAPS connects your operational infrastructure with your asset management processes by detecting, diagnosing and prioritizing equipment failures.



## 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 SMARTSIGNAL WIND AVAILABILITY AND PERFORMANCE SOLUTION,  
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ELIMINATE FAILURE\_

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