

GE
Intelligent Platforms

Proficiency SmartSignal

How to “turbo-charge” your investment
in Bentley Nevada



imagination at work



Avoid surprise equipment failure

Working with Bently Nevada, the Proficy SmartSignal solution delivers early and accurate detection of developing issues and provides actionable early warnings.

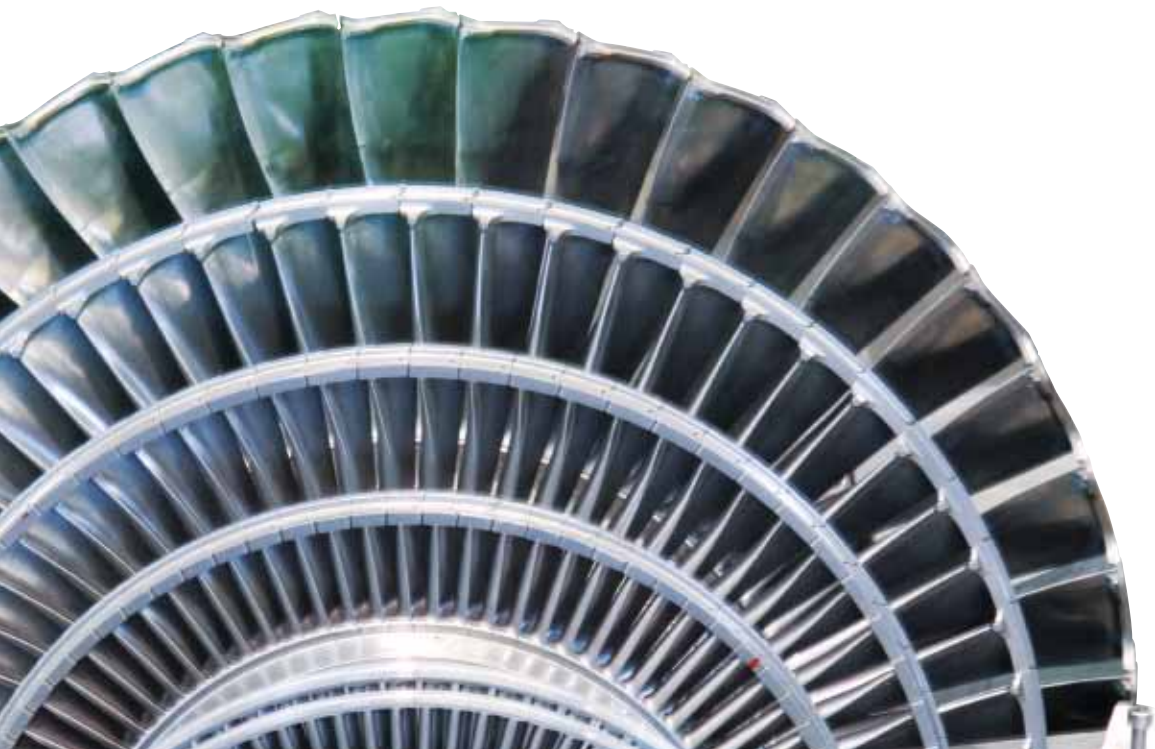
Solving the analysis gap

Regardless of the specifics, your business is focused on raising operational and financial performance, while lowering surprises. You're investing in data for optimizing operations—yet equipment problems still persist. Mountains of data and overwhelming numbers of alarms are causing confusion.

Simply put, you have too much data and too little time, and this is preventing you from making better decisions. In spite of your investments, you're still dealing with unplanned outages and unneeded PMs. This gap consumes your people's time,

your asset life, and your operating and maintenance budgets, so your performance is constrained.

The Proficy* SmartSignal solution can help close this gap. Working with Bently Nevada vibration data, the SmartSignal solution can deliver early and accurate detection of developing issues and provide actionable early warnings. The SmartSignal software can filter your data accurately and earlier in the degradation of equipment, giving you more time to mitigate an impending failure. With Bently Nevada and the SmartSignal solution, you can decrease analysis burden and help eliminate failure and waste. The result is "save where you can" and "spend where you should."



Benefits

- Early detection and diagnosis.
- Immediate localization.
- High true positives.
- Works across all assets: rotary, reciprocal, and fixed.
- Finds sensor issues to reduce doubt about your data.
- Fast implementation using engineered templates and personalized with your data.
- Finds impending equipment issues early and with confidence.



Why people choose the Proficy SmartSignal solution

It's proven

- Provides early warning of the broadest range of impending problems.
- Customers consistently report dramatic savings, *fast*.

For the real world

- Deployed on equipment with existing instrumentation.

With rapid time-to-value

- Complete deployment in a few months.
- User training in under a day.

With minimal disruption of asset staff

- Flexible deployment—turn-key, customer-operated, or hybrid.
- Monitoring services—an experienced extension of your staff.

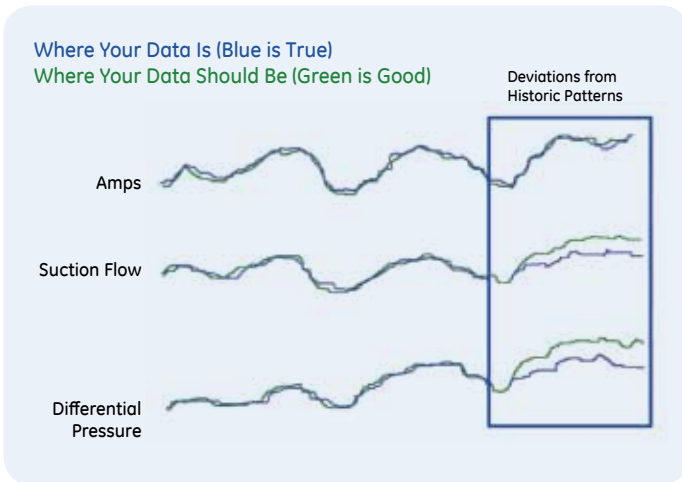
How the Proficy SmartSignal technology works

Protected by over 40 patents, the SmartSignal solution identifies impending equipment failures early, often weeks or months before other detection systems. For all critical rotating and non-rotating equipment, across all OEMs and across your fleet, the SmartSignal software can detect the broadest range of problems across the widest variety of assets, load ranges, and failure modes. With these early warnings, SmartSignal customers can reduce overtime and damage to critical equipment and avoid unexpected shutdowns from catastrophic failures.

The SmartSignal solution creates and monitors unique, personalized, empirical models for each piece of equipment at the serial-number level. The models relate groups of sensors based on actual performance data of each machine in its unique operating context, with dynamic bands across all known loads, ambient conditions, and operating contexts.

The software can detect any significant patterns of deviation from expected. From experience with over 12,000 rotating and stationary assets, anomaly notifications

are compared with precursor signatures based upon pattern and persistence. These provide prioritized diagnostics with a localized, apparent cause for each developing problem. For all problems identified, advisories are issued, supported by charts of pattern differences, so reliability and maintenance experts can track and diagnose the developing failures.



Early detection based on operation history

Associated parameters from monitored assets are modeled together. In this figure, Blue is True (actual reading) and Green is Good (model predicted reading). It is the overall behavior that determines what each individual sensor is "expected" to indicate.

All the details you need to get right to work

Advisories delivered through email notifications give priority, apparent cause, and associated detail. Updates are sent as conditions evolve.

Example of how it works

The SmartSignal solution avoided damage to a hydrogen compressor by identifying deterioration of a consumable rider band in a reciprocating compressor throw. This allowed the operators to shut down the machine before catastrophic failure occurred to the piston and cylinder liner.





Proficy SmartSignal + Bentley Nevada

Early warning. Deep diagnostics.



If you already own System 1 software, why add the Proficy SmartSignal solution?

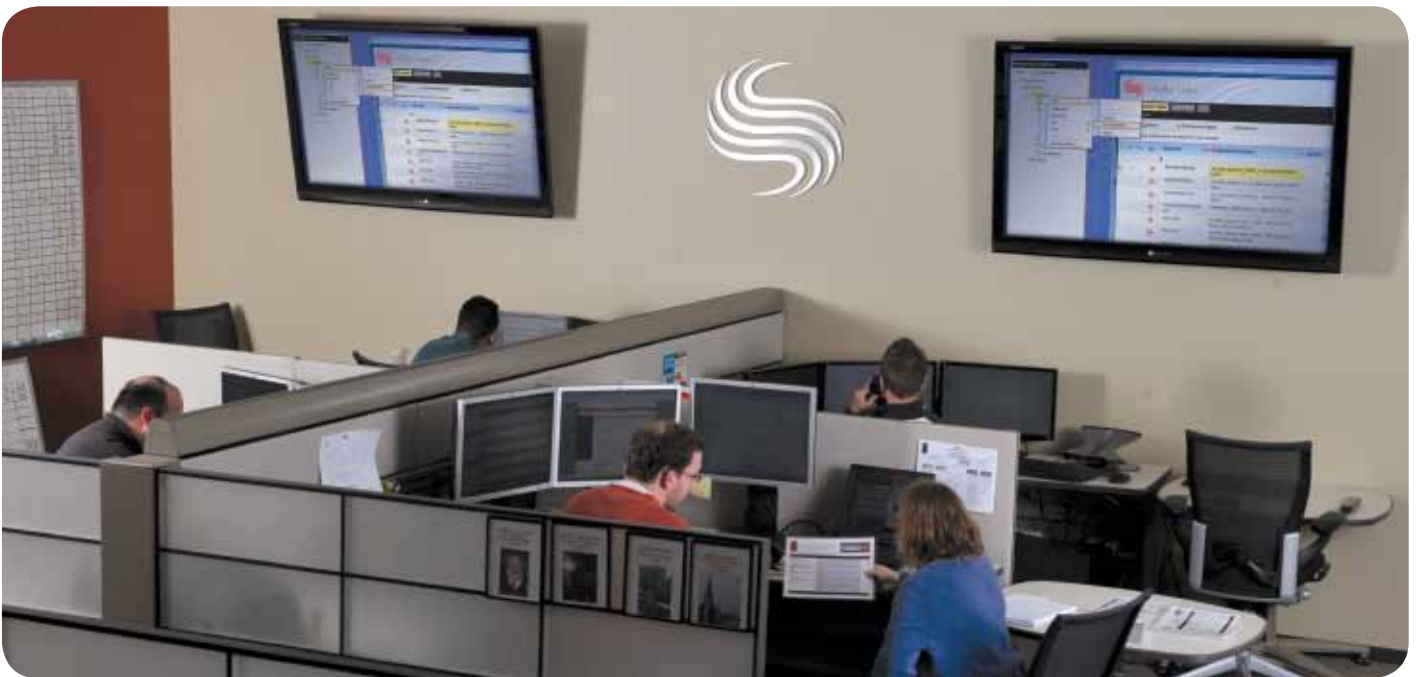
System 1 software excels at capturing dynamic mechanical data and deep-dive diagnostics with millisecond integrity. The SmartSignal solution excels at process and vibration data correlations, high true positives, and prioritized early warnings. Jointly, they deliver early warnings with the confidence for decisions and action. Dynamic normalization significantly reduces alarm overload and improves diagnostic focus. Together, they enable predictive, proactive, risk-informed, and timely decisions.

The SmartSignal software provides precursor **foresight** with very early detection, while the System 1 solution delivers dynamic **insight** to diagnose and define the causes of behavior change.

What if you don't own System 1 software?

You will receive the biggest benefit from a combined Foresight + Insight solution, but you can still purchase and benefit from a SmartSignal-only solution. SmartSignal software can provide early and accurate detection of impending problems across all critical equipment and all OEM's across your fleet.

Bently Nevada hardware, like the 3500 series, can provide rich vibration data directly to the historian for SmartSignal predictive diagnostics. Precursor foresight is provided with fault localization for improved actionability and productivity.



Engineers maintain the models and monitor the software in the Availability & Performance Center.



Proficy SmartSignal service and support

We provide a complete, solid, and proven implementation process, allowing for all the flexibility you need to integrate the SmartSignal solution into your unique work processes and culture. We implement the software, and we train you to take on what you feel comfortable with—we'll do the rest. We do so quickly, so you can obtain fast value and return on investment. Services include:

Availability & Performance Center

The Availability & Performance Center, our in-house monitoring center, provides optional, flexible, and full services. These include full access to the most advanced SmartSignal software, along with all necessary services to use and leverage the software. Availability & Performance Center engineers can implement the software, provide all regular software upgrades, maintain the models, and monitor the software—to detect, investigate, diagnose, prioritize, and help resolve impending problems and to capture learnings.

Customer support center

We maintain customer service and IT staffs to answer your questions about sustaining your implementation.

Training

Our training staff delivers a range of training options, including online courses, courses in our offices, and custom training at your site.

Product management

Our Product Managers (PMs) provide regular customer webinars regarding new releases and products, and the PMs include customers in new-product idea generation and testing.

Portal and community

Our customer web portal provides training, news, and software updates. And, we hold regular User Groups and Summits, where our customers gather to learn about latest innovations and to share best practices.

Where the Proficy SmartSignal technology can be applied:

Power Generation

- Combined-cycle
- Coal
- Wind
- Nuclear
- Hydro

Oil & Gas

- Upstream
- Midstream
- Downstream

Works across all assets: rotary, reciprocal, and fixed. Works on equipment regardless of OEM.

For more information about how the Proficy SmartSignal solution can deliver results for your business, visit

www.ge-ip.com/smartsignal

www.ge-mcs.com/bently-nevada-software

GE Intelligent Platforms Contact Information

Proficy SmartSignal Solutions: +1 630 829 4000

www.ge-ip.com/smartsignal



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