Bently Nevada
a Baker Hughes business

# Condition monitoring and protection solutions brief

# Why partner with Bently Nevada?

We have earned your trust. For five decades the Bently Nevada product line has supported the most demanding applications in multiple industries. And even as we protect and monitor your machinery, we constantly strive to refine and improve our offerings—and help enable your success.

We design and deliver solutions for all of your monitoring needs—including sensors, distributed and rack-based monitors, software, and supporting services—with the following goals:

- Increased availability and production
- Lowered maintenance costs
- Reduced risk in terms of safety, environmental, and asset upsets

**Quantifiable, proven results:**

- Over 60 years of innovation in asset protection and condition monitoring
- More than 240 international patents issued, including over 150 in the U.S.
- More than 360 international patents pending, including over 95 in the U.S.
- Over 75,000 3500 Series monitoring systems installed globally
- Over 4 million sensor monitoring points
- Over 20 years of offering overspeed detections systems
- Services support globally
- Over 1,600 System 1 software users worldwide

## Applicable across all critical levels of your rotating machinery...

Criticality is defined by assessing consequence of failure for each piece of equipment in 5 key areas of impact including, Staff and Public Safety, Regulatory and Environmental Compliance, Production, Operations and Maintenance Costs (O&M), and Product Quality. This understanding of equipment criticality along with your maintenance strategy drives the proper monitoring strategy.

| Consequence of failure | Process Data Analysis | Portables | Wireless, scanning | On line, continuous CM or Protection | On line continuous CM and Protection |
|---|---|---|---|---|---|
| Higher | | | | | |
| High Critical | → | → | → | → | → |
| Critical | → | → | → | → | |
| Medium to Low Critical | → | → | → | | |
| Lower | | | | | |



# Bently Nevada software solution:

## System 1
Machinery Condition Monitoring

### BN System 1*

System 1 software is at the core of Bently Nevada's Condition monitoring solution and represents a refreshed approach in our mission of providing users with a single system designed to enable plant-wide machinery management.

Leverage Condition monitoring alarms, long term trended data, and diagnostics to understand the health of your equipment. Combine this with people and process to enable strategic data driven maintenance planning and decision making.

### User experience

Modern consumer software applications have pushed the envelope when it comes to user experience; we believe the same expectations apply for industrial Condition monitoring applications:

- Modern and intuitive interface
- Continuous user involvement
- User driven condition monitoring and diagnostic workflows

### Capability

System 1 provides scale when it comes to database management, diagnostics, and work prioritization:

- High resolution trend, alarm and startup/shutdown data
- Bulk template configuration
- Best in-class anti-friction & hydrodynamic bearing diagnostics

### Accessibility

Successful Condition monitoring programs require collaboration between departments and controlled access to the tools:

- Distributed client/server deployment model
- Data replication to view data on a business network
- Remote portable data transfer
- User security profiles

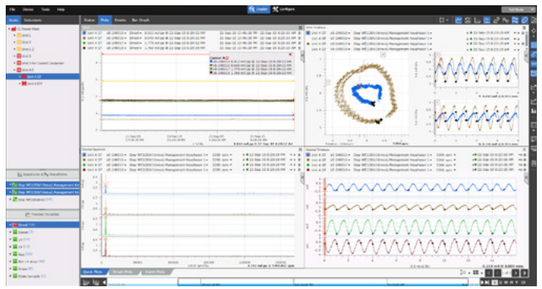
### Embedded expertise

Bently Nevada differentiates itself by providing equipment focused solutions and best practice configuration and diagnostics:

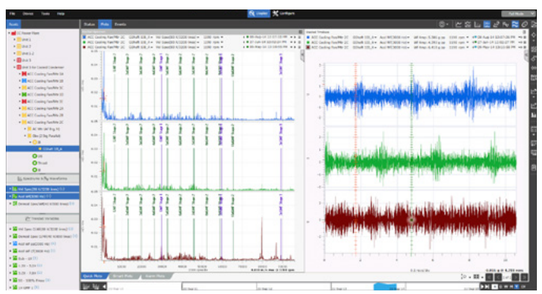
- Equipment templates
- Technical associates proven method wizard
- Embedded iso 10816-3, 10816-7, and 14694 wizards

Work Prioritization

Problem Identification and Detailed Diagnostics



Display Capabilities



Display Capabilities (Cont)

# ...complemented by a full line of protection and condition monitoring solutions

### But it all starts with the proper transducer...

From the early days when Don Bently pioneered the first commercially successful use of Proximity Probe systems (for direct rotor vibration and position measurements within journal bearing machines)—to the application of accelerometers and Velomitors to measure casing vibration on rolling element bearing (REB) machines—Bently Nevada has installed more than 4 million sensor points worldwide.

### Orbit 60 Series

Latest condition monitoring, protection and data Integration platform

Orbit 60 Series is built on a innovative and fully distributable architecture that allows you to monitor all your assets regardless of complexity or location and is intrinsically cyber secure with a built in data diode.

### 3500 Series

Machinery monitoring and protection

Anticipate and prevent mechanical failures with continuous, online machinery protection and asset condition monitoring. The 3500 Series solution represents our most capable and flexible system in a traditional rack-based design and offers numerous features and advantages not provided by competitor systems.

### ADAPT* Series

Advanced Distributed Architecture Platform Technology

This distributed architecture monitoring technology is well suited to support essential rotating equipment across multiple industries. The growing application-based ADAPT product family offers an easy, user-defined configuration that is skid-mountable, flexible, and optimized for hydro, aero, wind, emergency shut down (ESD), and general purpose applications.

### 2300 Series

Vibration monitor

The 2300 vibration monitors delivers cost-effective vibration monitoring and protection capabilities for small machinery. It is designed specifically to provide continuous monitoring and protection. With the 2300/20 monitor, you can perform condition based maintenance of your assets in a wide range of industries—including oil and gas, power generation, water treatment, pulp and water, manufacturing, food & beverage, pharmaceutical, mining, and cement.


### 1900/65A

Vibration monitor

The Bently Nevada 1900/65 General Purpose Equipment Monitor is a flexible, cost-effective system specifically designed to continuously monitor and protect assets in a wide range of industries This monitor has four vibration inputs that can accept proximitors, accelerometers and velocity measurements as well as four temperature inputs. The ease of configuration, local display, 4-20mA and BNC Outputs have made this monitor very popular across the industry.




### Trendmaster* Pro System

Online condition monitoring

The Bently Nevada Trendmaster Pro System is specifically designed to address critical and non critical assets that require more frequent surveillance. Using a single cable that can host hundreds of permanently mounted sensors ranging from pressure to vibration and temperature.

### AnomAlert*

Motor monitoring

The AnomAlert general industrial motor monitoring system is well suited to almost any motor as well as motor-driven loads such as pumps, fans, compressors, and blowers.

### vbOnline Pro

Next generation of economical simultaneous scanning condition monitoring

Targeted for the hundreds of important pumps, motors, blowers, fans, fixed and mobile equipment and other assets that populate a typical plant. vbOnline Pro's innovative parallel/sequential architecture delivers the right level of cost-effective condition monitoring for these machines.

### SCOUT* and VBX Series

Portable data collection and analysis

The SCOUT and VBX platform brings BHGE's industry-leading Bently Nevada condition monitoring expertise to the world of portable data collection and analysis, giving you access to a dependable, efficient, and cost-effective condition monitoring solution that is deployable across your entire plant.

### Ranger Pro

ISA100.11a wireless wibration sensor

The Ranger Pro wireless platform is targeted to low to medium criticality machines with rolling element bearings (REB), allowing customers to take more frequent data, while reducing installation costs for an online system. This innovative platform (single or tri-axial w/ casing temperature) provides static data collection through a ISA100/11a gateway and/or diagnostics through System 1 software.

Ranger Pro provides quality, performance, System 1 connectivity, environmental ruggedness at a low cost.

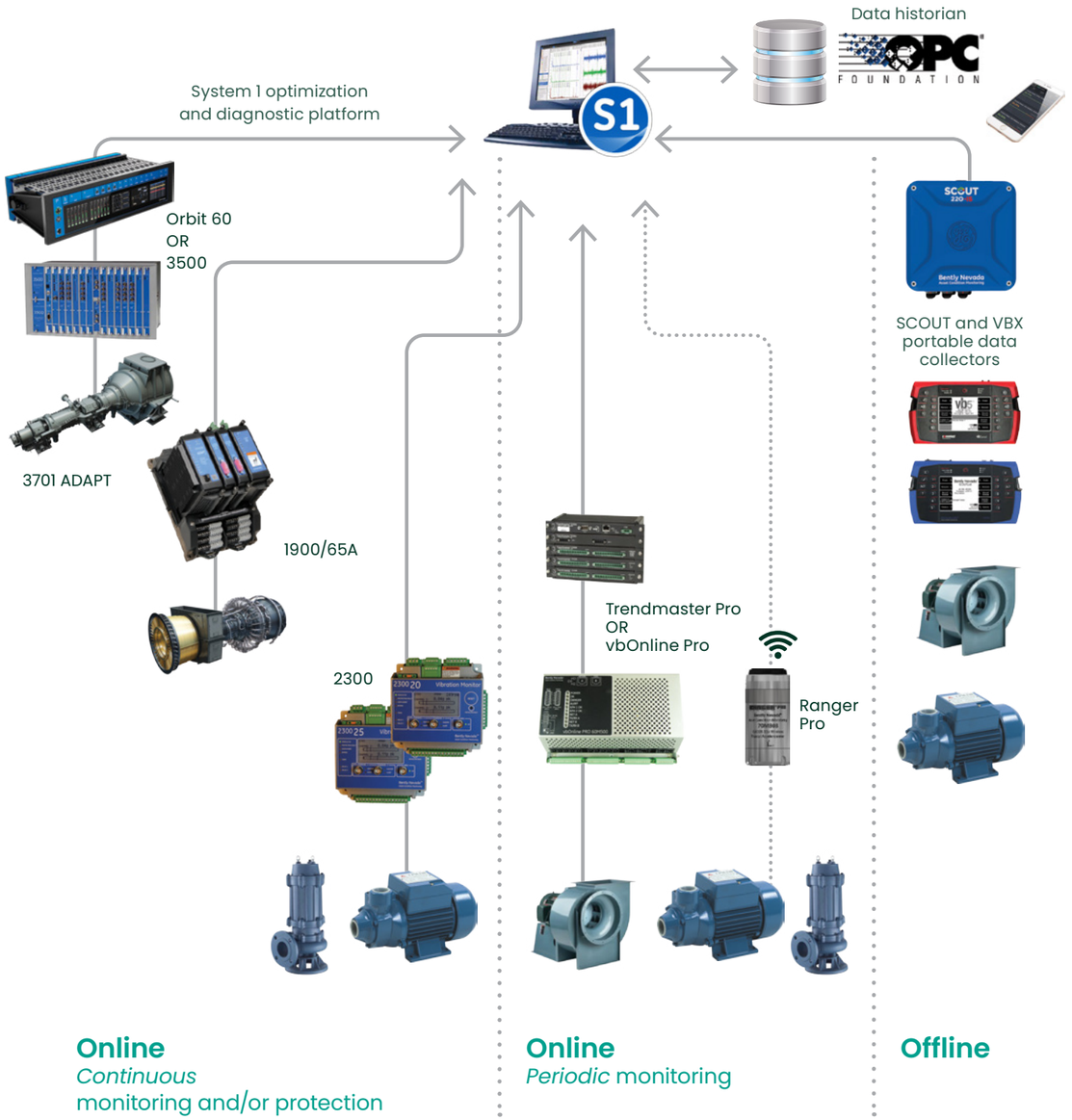
### ADRE*

Machinery diagnostic instrument

As the world's premier rotating equipment data acquisition system, ADRE enables professionals to quickly assess machinery conditions, in the field and on the test stand. Whether you are collecting data from control valves to understand process dynamics, studying the electromagnetic behavior of locomotive motors on a test stand, performing structural analysis and impact testing on piping, or collecting start-up data on the rotor dynamics of a recently overhauled steam turbine, the flexbility of the ADRE System is a perfect fit.

# System 1:

## Protection and condition monitoring solutions






# Bently Nevada service menu

| | | Key benefits | |
|---|---|---|---|
| Implementation services | **Get it right the 1st time**<br>• Ensure your assets are protected and monitored when you're ready to startup<br>• Avoid costly delays and rework<br>• One source to design, plan, manage, and execute the installation<br>• Avoid startup trips due to improper installation and configuration | **Up to $1M/day**<br>Avoided cost from lost production, secondary process & equipment damage | **100%**<br>Service work guarantee<br>1 year warranty standard on all service work |
| Proactive support | **Keep your system healthy and optimized**<br>• Prevent instrumentation related false trips<br>• Prevent and minimize potential data loss events<br>• Keep up to date and compliant with the best technologies available<br>• Access the expert support you need when you need it most | **80%**<br>Industry wide machinery alarms & events are due to instrumentation | **>90%**<br>Typical reduction in non-actionable alarms & events |
| Asset health and consulting | **Actionable insights you can trust**<br>• Understand your asset health to optimize outage and maintenance planning<br>• Plug in to our global network of machinery experts with remote monitoring<br>• Professional OEM agnostic machinery diagnostics when and where you need it<br>• Custom analytic development and tuning to pinpoint specific conditions | **100% ROI**<br>A single machine save often results in complete monitoring contract payback and more | **5-10X**<br>Cost reduction for well planned maintenance outage vs unplanned reactive outage |
| Cybersecurity[1] | **Stay ahead of evolving cyber threats**<br>• Ensure your system is up to date and protected as threats continually evolve<br>• Identify and mitigate cybersecurity risks to your operation<br>• Keep your system both secure and accessible with advanced security technologies and architectures leveraging data diodes and database replication | **29%**<br>Patch management can reduce your attack surface up to 29% | **243 days**<br>Average time before detection that a system is compromised |
| Training and education | **Critical skills that amplify your machinery management capabilities**<br>• Enable your personnel to operate and maintain your monitoring and protection system<br>• Enable your operation to maximize the value of your system leveraging expert product and application training and knowledge | **400+**<br>Customer courses delivered each year in 10 languages and over 45 global locations | |

1. https://www.us-cert.gov/sites/default/files/documents/Seven%20Steps%20to%20Effectively%20Defend%20Industrial%20Control%20Systems_S508C.pdf

GEA31190D (10/2019)

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