Digitization of Condition Monitoring:
Shift from Asset-Functional Strategies to Enterprise Performance Optimization

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50 Years of Growth, Innovation and Leadership
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CHAPTER 3: SCALING ASSET RELIABILITY — A FUTURE-READY APPROACH TO WIRELESS CONDITION MONITORING SOLUTIONS

The practice of monitoring machinery and equipment that is located in remote or hazardous environments creates significant challenges to organizations. Keeping technicians in the field can be costly, time-consuming, and involves the risk of human safety. In the industry, the trend of seeing fewer technicians on-site in production facilities is expected to continue. As technology advances, more focus is going into centralized monitoring or remote monitoring of assets from different locations using solutions that disseminate asset health information in real time. The need for plant-wide assets continues, and wireless is once such technology that is here to help.

Exhibit 12 - RangerPro Remote Monitoring of Assets

The need for online monitoring and wireless CM to collect data, especially from critical and essential equipment, is on the rise. Where it makes sense, the industry is looking to wireless to expand plant-wide, provide more frequent data over traditional portable walk around measurements, offer easy expansion, and address difficult-to-access locations.

This chapter focuses on introducing CM captured specifically through wireless vibration sensors and discusses the impact on data frequency, machine location coverage, and overall business operations and processes. Cybersecurity coverage, cost-effective data collection, and improvement of machinery life under an effective predictive management program are also discussed.
3.1 Wireless CM Action Framework

Many organizations wonder what wireless CM brings to the table. The value of wireless is straightforward: remote access to systems at a lower cost than a wired solution. Bently Nevada’s Ranger Pro wireless vibration sensor is used to measure the vibration levels and temperature across any number of assets. While there are a variety of measurements within CM, vibration and temperature are typically the best for early indications of potential required action. In the simplest form, the vibration sensor detects the amplitude and frequency of vibration. Advanced tools, such as Bently Nevada’s System 1, help diagnose and predict asset health leveraging the vibration patterns. Vibration monitoring is critical for tracking and analyzing changes in the condition of machinery parts, such as gears and bearings; the data is used to predict potential part or equipment failure.

With wireless CM, plant operators and management can check data more frequently (e.g., once a day or once a week) depending on the asset need. In this way, intelligent wireless solutions help improve asset performance by providing remote diagnostics. Wireless CM combines various sources of data to support direct integration between operations, mechanical equipment, ERP systems, and data analytics. Plant operators, in particular, seek the key advantages that relatively easy and simple-to-deploy vibration monitoring solutions can provide using wireless technology in the IoT environment by introducing a single indicator that impacts machinery health.

Every industry is in an “invest-to-transform” cycle with opportunities coming from additional wireless CM adoption.

- **The oil and gas industry** is moving from siloed oilfield operations to integrated production fields.
- **The power industry** is seeing the benefits of smart meters and decentralized power generation units with the integration of network and security operation centers.
- **The mining industry** is identifying the reliability gaps in current operations at mining facilities and implementing corrective actions.
- **The food and beverage industry** is driven by the need to reduce maintenance costs, centralize visibility of filling machine lines, and standardize the drying process.
- **The pulp and paper industry**, some applications have focused on detecting early bearing degradation, identifying high frequencies for monitoring of speed rollers, and maximizing sensitivity to low-level vibrations.
EXAMPLES OF SUCCESSFUL IMPLEMENTATION

3.2 Business Value-Led Examples

Wireless Vibration Sensor — Ranger Pro

Bently Nevada’s Ranger Pro is a cost-effective monitoring solution applicable in an effective predictive management program with proven customer value benefits that include lower maintenance costs, fewer unplanned failures, and more asset lifetime, as described in the illustration below.

Bently Nevada’s latest Ranger Pro is a wireless CM solution that can be used across all industries to economically monitor the performance of assets and expand existing reliability programs. Combined with System 1 trending, alarming, and data analytics, customers have a powerful CM solution. Ranger Pro is a case-mounted seismic wireless vibration sensor that provides critical data insights to help customers prevent costly equipment failure. This secure, wireless, remote monitoring solution is suited for unsafe areas where it can expand into many points throughout a wireless range of more than 150 meters line of sight or 100 meters typical in an industrial environment. Ranger Pro increases safety by remotely monitoring assets in hazardous environments and areas where it is difficult to assess assets, reducing the need for human interaction in these challenging areas.

When coupled with System 1 CM, the diagnostic software provides a scalable and wide CM system. The System 1 software platform facilitates data acquisition, machine analytics, machine insights, machine diagnostics reporting, and previous detection of machinery failures. The end result is a unified and scalable ecosystem for all wireless CM requirements, extending coverage for plant-wide assets beyond that provided by existing wired or portable solutions used in periodic monitoring programs. Plus, Bently Nevada’s System 1 couples seamlessly with wired and portables.

The Ranger Pro is powered by a lithium-thionyl chloride battery that typically lasts five years; its smart sleep-wake cycle can extend battery life.
3.3 Cyber Asset Risk Assessment Option

Bently Nevada’s Ranger Pro utilizes 128-bit AES keys for end-to-end message encryption under a comprehensive security risk assessment and audit. This risk assessment produces an exhaustive report that measures the risk rating for the asset features that are not meeting the required security compliance standards, such as ISA 99, NERC, NIST 800-82, and WIB. Bently Nevada’s security risk assessment includes:

- Protection System (password strength, control system integration methodology, TCP/IP network integration architecture, run/program key management control, environmental conditions, and physical security);
- TCP/IP Network Infrastructure Review (review firewall, router and switch configuration, firmware updates and management process, access control and authorization system performance, availability management physical security, and environmental conditions); and
- Process Review (change management, IT incident management, patch management, system access authorization and implementation, lost/forgotten password, and key management).

Data security and cyber threats hinder major end users from sharing asset condition and performance data with third parties over the cloud. Numerous organizations wish to keep their data on site. Wi-Fi remains one of the most vulnerable technologies to security breaches, and, moreover, not every organization has the same security policies or regulatory requirements in place. Regardless of existing industry concerns toward security vulnerabilities, Bently Nevada can provide a security risk assessment and audit, contributing to secure network access to remote monitoring of assets. The key result of this security risk assessment is a comprehensive analysis quantifying asset features under a risk rating and compliance condition.

3.4 The Imperative of CM Wireless Solutions

The potential to improve machine uptime and perform configuration fixes through easy deployment and remote asset monitoring (without having to travel to the facility) provides significant customer value. Wireless CM solutions provide operators a cost-effective, scalable architecture option across all assets, irrespective of geography or location.

Users’ comfort and adoption of wireless technology will continue to grow as long as wireless CM solutions further reduce maintenance costs, enhance machinery life, achieve better performance, and secure intelligent information to predict failures. Moreover, it will help to identify new patterns and failure modes that plant operators were previously unable to identify.

The move from periodic inspection to continuous monitoring is inevitable in the upstream and downstream oil and gas and power generation industries because the technology has proven high ROI benefits. The oil and gas and power generation industries were early adopters of CM, but every industry is leveraging and expanding CM adoption.

No one will argue that defects and imbalances in assets—if not detected accurately and on time—can lead to significant losses in productivity. Growing awareness of this fact is a key driver for wireless CM adoption, as users strive to make facilities more efficient, lower costs, and to see greater returns on their investments.

Wireless is growing beyond the early adopter lifecycle into mainstream use. Ranger Pro is one such offering available for this journey.
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NEXT STEPS

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For more information, please contact your nearest Bently Nevada sales professional specializing in Bently Nevada Asset Condition Monitoring products, or visit us at: www.gemeasurement.com/condition-monitoring-and-protection

Or for support information, contact our Bently Nevada technical support team by:

- E-mailing bntechsupport@GE.com
- Calling +1 775-215-1818
- Logging into www.bntechsupport.com

You may also visit us at www.gemeasurement.com/condition-monitoring-and-protection and navigate to Technical Support for a list of technical support phone numbers specific to your global location.

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Schedule a meeting with our global team to experience our thought leadership and to integrate your ideas, opportunities and challenges into the discussion.

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Attend one of our Growth Innovation & Leadership (GIL) events to unearth hidden growth opportunities.

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