

Improve Plant Reliability

Competition in the global economy has put industrial enterprises under intensive pressure to make the most of their investments in equipment reliability. For processing facilities, the objective is to optimize the utilization of all installed assets.

In recent years, there has been substantial emphasis on people and assets in order to maximize plant productivity and profitability. Now, more than ever, with shrinking budgets and fewer resources, plant management must find ways to improve changes in those industries dependent upon the performance and reliability of rotating equipment as key personnel retire or move to other industries.

Like any business process, reliability improvement requires a disciplined approach. Every plant has the capacity to enhance the quality and coordination of asset management, which represents a major untapped resource to better control operating and maintenance costs while maintaining desired productivity.

The typical industrial facility has thousands of rotating assets such as pumps, fans, agitators, motors and blowers that are manually monitored to determine their mechanical health. In many cases, there can be weeks or months between measurements, which can leave mechanical problems undetected, exacerbating problems, causing secondary damage to assets and causing assets to fail without warning.

Online Equipment Health Monitoring (EHM) has been adopted by process plants as a way of averting catastrophic equipment failure and the resulting downtime and loss of production. The concept of EHM is a simple one: monitor the steady-state characteristics of equipment and if conditions change in a negative way then generate alerts or notifications, investigate the problem and make a correction before the fault becomes so serious that operations are shut down and production is lost.

Common equipment health monitoring applications include:

- Vibration monitoring
- Temperature loss monitoring
- Fluid flow verification
- Temperature rise detection
- Fluid leak detection
- Mechanical noise detection
- Mechanical wear detection
- Audible noise detection

For rotating equipment, the most basic EHM technique is to take vibration measurements of machine shafts or bearing casings. The magnitude and phase relationships of the vibration are compared with historical values to infer changes in condition. The other major data inputs are lube oil analysis, motor electric current, infrared thermography and ultrasonic measurements.

Due to the high cost of a conventional wired EHM system, only a small percentage of critical or near-critical assets are monitored online. Online monitoring solutions can cost up to \$4,000 per point to instrument and deploy, totaling approximately \$20,000 per asset. Moreover, instrument cabling is difficult to install without disrupting working assets.

At many plants, maintenance departments must rely on walk-arounds with handheld measurement devices to capture periodic vibration signatures and other diagnostic readings. While this approach is effective in tracking gradual equipment degradation (such as aging of bearings), it is not suitable for tracking faults that can lead to failures within days or hours. It is a particularly ineffective approach to provide data to operations to prevent improper operation of equipment. Frequent rounds by maintenance personnel can also result in increased costs and some assets may pose a safety risk to monitor under certain conditions, making it impossible to get consistent data.

Difficult economic conditions are forcing some process plants to take drastic cost-cutting measures, which often include maintenance staff reductions. At the same time, industrial companies are struggling to capture the enormous amount of knowledge lost as experienced maintenance workers retire.

To help customers meet the challenges of today's business environment, Honeywell offers [OneWireless EHM](#), which provides a comprehensive set of asset monitoring tools. Customers now have an alternative that performs similar to a wired online system at a much lower price point. It provides plant owners/operators with the ability to:

- Increase uptime
- Reduce maintenance costs
- Improve maintenance planning
- Manage offsite assets
- Perform root cause analysis
- Monitor assets during startup, after repairs and other milestones

The OneWireless EHM system includes everything necessary to capture and analyze equipment health information, including data acquisition equipment, database management software and installation services. The EHM software can deduce probable bearing defects, misalignment, pump cavitations and impeller wear, and then translate the data into alarms.

OneWireless EHM transmits complete spectral information from the field to the plant control room. The system's compact, eight-channel (four vibration, four 4-20 mA) wireless monitoring devices communicate over Honeywell's [OneWireless industrial mesh network](#), which supports multiple industrial protocols and applications simultaneously. The wireless devices collect acceleration, velocity, temperature and bearing condition data and deliver it to operators and maintenance personnel to alert them of any equipment problems.

Other OneWireless EHM features include:

- ATEX Zone 2, IP67 North America certification
- Four ICP/accelerometer channels with a resolution of 24 bits per channel
- Four direct or 4-20 mA channels
- Two digital and two tachometer inputs for speed/triggering/gating
- Simultaneous measurements on all channels
- IEEE 802.11b/g standard (WiFi) and support for WEP, WPA, or WPA2/PSK security
- External wake-up
- Maximum 40 kHz bandwidth (102.4 sampling) with up to 12,800 lines resolution/one-minute update rates
- Battery or optional 10 to 30 Vdc power
- Acceleration enveloping filters 2, 3 and 4
- Ease of deployment— less than four hours

Industry applications for OneWireless EHM are diverse and widespread. For example, a large U.S. paper mill employed a biweekly walk-around route to perform vibration and lubrication checks on rotating machinery. Technicians discovered high vibration on a press roll, but the mill production schedule required the equipment to remain in operation for another five days until the next scheduled stop. The bearing was lubricated and a wireless EHM solution was installed in a few hours as a temporary online system to monitor bearing conditions and help determine whether to continue production. The bearing vibration was monitored closely over the next five days and were kept in check by lubricating the bearing multiple times. This allowed the mill to continue production, saving \$100K in downtime.

In another case, an Italian chemical plant used portable condition monitoring equipment to monitor cooling tower fans. The fans were difficult to reach for maintenance purposes and subject to periodic failure, thus requiring more frequent monitoring. A wired EHM system would have been difficult and costly to install in this application. Instead, the chemical plant opted for OneWireless EHM to perform fan bearing and gearbox monitoring. This significantly improved uptime for the cooling tower fans, which were a critical production asset. Additionally, data collection costs were reduced, the safety of maintenance workers was increased, repair costs were reduced and the capacity of the cooling tower actually increased.

Thanks to Honeywell's OneWireless EHM solution, industrial companies around the world can now extend the benefits of equipment health monitoring to all areas of plant, including those locations where it is cost-prohibitive to use conventional wired technology. The results include increased overall plant reliability and safety, and lower maintenance cost spending.

[Learn more about OneWireless EHM.](#)