Reliability Solutions for Turbomachinery Applications

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Condition Monitoring

Achieve Business Goals by Implementing Prediction and Protection on Your Most Critical Production Assets

Across the entire plant, unreliable equipment increases the risk to maintaining both safety and profits. But nowhere is this more true than on the high-performance turbomachines that are critical to your operations.

Unscheduled downtime caused by equipment failure eats into the maintenance budget, derails production goals, and jeopardizes the safety of your plant and personnel. Routine maintenance can help, but it doesn't reveal the developing- and often avoidable - issues that result in process slowdowns or shutdowns.

In addition, your turbomachinery assets usually require API-certified protection systems so the equipment is tripped under unsafe operating conditions. But sometimes those trips aren't necessary – and again your production is shutdown while you determine the nature of the problem.

By applying condition monitoring technologies integrated with protection capabilities, you can:

- identify equipment at risk of failure
- increase equipment availability
- improve plant safety
- ensure production goals
- increase the reliability of your entire operation.

To learn more about the Emerson technologies, software, and services available for condition monitoring and protection of your critical turbomachinery, select a product icon on the right.

AMS improving asset reliability

ARES™ PLATFORM

*A typical refining facility will spend **less than 10%** of its time in **transient operations.** However, **50%** of all process safety **incidents occur during this time.***

– Tame your Transient Operations, Chemical Processing June 2010.

*It costs approximately **50% more to repair** a failed asset than if the problem had been addressed prior to failure.*

– U.S. National Response Center

*Production capacity is lost to as much as **5% every year as a result of unplanned shutdowns.***

– Asdza Nadleehe, "Engineering & Maintenance: Prevention is Better Than Cure," Oil & Gas IQ, October 2011.

EMERSON™

AMS 6500 ATG

CRITICAL MACHINERY

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AMS 6500 ATG

AMS 6500 ATG

Diagnostic and Configuration Software

Not your traditional protection system!

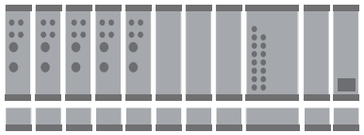
Traditional protection systems come with specific limitations. They lack prediction data for advanced warning of developing problems. They require an OPC server to tie back to the digital control system. They require a trip to the control room or field cabinet view of the data. The AMS 6500 ATG protection system comes with flexible cards that can be configured to acquire prediction data, a mobile app for viewing data from anywhere on the plant network, and an embedded OPC server.

While protection systems provide a safe environment by shutting down turbomachinery when specific parameters are breeched, prediction can alert you to the conditions that can lead to a breech and help to avoid an unnecessary interruption to production. And because failure in turbomachinery occurs most frequently during startup and coast down stages, it is most important to have prediction data during these transient events.

Stay in touch with your turbomachinery from anywhere in the plant via the ATG View mobile application. Simply scan a quick response code (QRC) located on the cabinet and data from the associated rack is viewable on your mobile device from anywhere on the plant network. You no longer run the risk of tripping a machine offline by plugging into the buffered outputs.

The AMS 6500 ATG offers scalable options for exporting and accessing the data from the system without adding to the footprint:

- Embedded Predictive Diagnostics means the system is already prepared to deliver a range of data such as impact measurements, order analysis including peak and phase, and much more, that can be used for alarming.
- Modbus Data Export allows system values and status information to be delivered to AMS Machinery Manager via Modbus and OPC UA.
-Licensed Full Prediction allows the user to configure the system to capture high resolution waveform pieces based on a range of options, and deliver the data to AMS Machinery Manager for advanced analysis.



Certifications include:
CSA Class 1 Div 2
ATEX and IECEx Zone 2

Compliant to:
API 670 standards

Upgrading an obsolete protection system?

EMERSON

AMS 6500
Machinery Health Monitor

CRITICAL MACHINERY

ESSENTIAL EQUIPMENT

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AMS 6500

Diagnostic and Configuration Software

Online condition monitoring for critical and balance of plant assets.

When your plant relies on critical turbomachinery to meet production goals, a prolonged process interruption can be the difference between profit and loss. Developing faults in turbomachinery - even from normal, daily wear - can lead to shutdown, resulting in unplanned downtime, reduced product quality, excessive repair costs, and compromised safety. And once the shutdown occurs, your protection system provides little insight to the cause of the problem. By adding condition monitoring to your system, you gain the predictive intelligence necessary to identify developing faults, schedule maintenance, and minimize the impact to production schedules.

The AMS 6500 Machinery Health Monitor can be layered onto your existing protection system to provide predictive coverage of your critical assets. Once in place, the AMS 6500 can be extended to cover the supporting assets, such as ID Fans, FD Fans, and Boiler Feedwater Pumps. In fact, the system becomes an effective way to extend online condition monitoring to your balance of plant (BOP) assets.

Failures in turbomachinery often occur or are most visible during load and speed changes such as the startup and coast down of the machinery. While it is important to have real-time data on the machinery condition during these stages, it is equally important to have historical data under the same conditions. Some faults can occur very quickly, which means you need a continuous measurement and not just periodic snapshots of the machine condition. The AMS 6500 includes a one hundred hour digital condition recording (DCR) capability to capture all the data – continuously across the entire machine train from all channels - during transient events.
This transient data can be archived for immediate analysis or recalled later for comparison to current data.

RoHS/REACH Compliant
Vibration/Shock Tested
Conformal Coated
Electronics

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AMS 6300 SIS
Digital Overspeed Protection

CRITICAL MACHINERY

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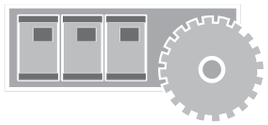
AMS 6300 SIS

Protect your assets when rotational speeds exceed their design limits.

Overspeed conditions on critical rotating equipment can be damaging to your assets and dangerous to the plant personnel in the area. During transient and normal operations, the CSI 6300 SIS guards against overspeed conditions caused by sudden load loss and unexpected changes. In addition, the same sensors will verify the rotational direction of your rotating equipment to ensure your assets are functioning correctly.



Certifications include:
SIL3

Compliant to:
API 670 standards

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AMS 2140
Machinery Health Analyzer

ESSENTIAL EQUIPMENT

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AMS 2140

AMS 2140

Savings Calculator

Portable technology provides advanced trouble-shooting in the field.

Portable technology plays a big role in every reliability program. Route-based vibration data collectors serve as the cornerstone of most monitoring programs for balance of plant equipment and provide excellent in-field analysis ability as well. High function portable equipment, such as Emerson's AMS 2140, can also be used for immediate in-field analysis of your critical turbomachinery. Simply connect the buffered outputs from your protection system to the AMS 2140, and you can tap into a host of diagnostic measurements. This enables you to determine when the equipment is running smoothly, when a fault is developing, and even what the nature of the problem is. In addition to overall readings, spectra and waveforms, the AMS 2140 provides a wealth of diagnostic options.

Peak and Phase Analysis: Identify structural resonances with peak and phase analysis including Bode-Nyquist plots.

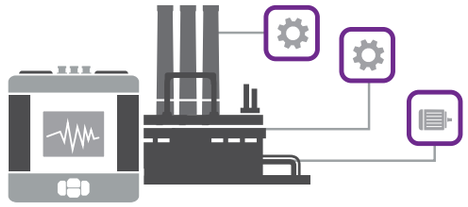
Four Channels with Phase: Equipped with 4 simultaneous vibration inputs plus a tachometer, the AMS 2140 stands out in its ability to handle all the data you can throw at it.

Dual Orbits: When connected to a protection system, the AMS 2140 can generate single or even dual orbit plots to visualize the motion of the shaft within the bearing.

Transient Capture: The AMS 2140 also offers the ability to capture the run-up or coast-down of your machinery on up to 4 channels complete with advanced diagnostic tools.

Analysis Experts: Trouble-shoot difficult machine problems using embedded Analysis Experts. Fourteen routines designed to tackle tough monitoring jobs like coast down, order tracking and bump tests.

Turbomachinery is just one of the many applications for the AMS 2140. It was designed to meet a broad range of machinery analysis tasks including detection of imbalance, misalignment, rolling element bearing defects, complex gear box diagnostics, and even variable speed analysis.



Certifications include:
Class 1 Div 2, A,B,C,D
Class 2 Div 2, F,G
ATEX and IECEx Zone 2

Upgrade your existing analyzer to an AMS 2140

EMERSON

Sensing Technology

ESSENTIAL EQUIPMENT

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Sensing Technology

Right sensor for the application

One Source of Responsibility for the Entire Measurement Chain

When there is a problem with your data, where is the source – your sensor? Your collection system? When your tools come from multiple vendors, it can sometime be difficult to pinpoint the responsibility and address the problem. Emerson offers a full line of quality sensors to complement its prediction and protection systems. Working with a leading third-party sensor supplier, Emerson has introduced a variety of specialized sensors to improve the accuracy of the measurement as well as the ability to physically capture early stage asset failure data.

Eddy Current Measurement Made Simple

Historically the various elements of an eddy current measurement chain have been expensive to keep on hand for replacement or outage planning. Factory-required calibration of the converter meant dozens of spare parts or long lead times for replacements. The new AMS EZ 1000 sensor can be calibrated in the field for most applications with a simple button push. Converter calibration makes use of a USB interface back to Emerson's Machine Studio for a simple three-step configuration process.

Certifications include:
CSA Class 1 Div 2, A,B,C,D
CSA Class 2 Div 2, F,G
ATEX and IECEx Zone 2
SIL2
SIL3

Compliant to:
API 670
standards

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AMS software platforms and applications

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AMS ARES

AMS ARES

AMS Machinery Manager

Predictive diagnostics for identifying faults and improving asset availability.

Data collection and monitoring on rotating assets is the first step in improving availability. Applying predictive intelligence delivers relevant information to both operations and maintenance to detect equipment problems before they occur. Emerson's AMS software platforms and applications provide the insight necessary to avoid unexpected downtime, optimize equipment operation, and plan for efficient maintenance activities.

AMS ARES Platform – the AMS ARES asset management platform features aggregated data from multiple sources, but delivers persona-based alerts and KPIs for improving reliability of your rotating equipment, instruments and valves. With additional connectivity to CMMS, advanced analytical tools, and other predictive intelligence programs, you'll stay on top of developing issues that could impact production.

AMS Machinery Manager - combines predictive maintenance techniques with comprehensive analysis tools to provide easy and accurate assessment of the machinery health in your facility. AMS Machinery Manager can integrate with multiple predictive diagnostic technologies to monitor different types of mechanical assets and identify unique failure symptoms. The modular technology applications incorporate diagnostic and reporting sources into a common database for the entire plant.

When understanding the machinery health and optimizing the performance of your critical turbomachinery assets calls for a more sophisticated view, Emerson offers **additional applications** that meet these specific needs. Emerson's human machine interface (HMI) software AMS Asset Graphics is easily integrated to the existing digital control system (DCS). AMS Performance Advisor helps reduce operating costs by tracking operating performance against targets and alerting you to degrading asset performance.

Emerson also provides easy-to-use configuration software for all online condition monitoring and protection systems. Emerson's new AMS 6500 ATG system is not only configured using **Machine Studio**, users can define functionality for a UM module, develop trip logic, and even view results from the predictive capabilities.

PREDICTIVE DIAGNOSTIC SOFTWARE

AMS ARES PLATFORM

Download: Online condition monitoring configuration software

EMERSON

Services

The expertise, technology and processes to operate safely, improve reliability, and optimize your plant performance.

Emerson's Reliability Consulting services can improve your financial and business performance through effective Enterprise Asset Management. Whether prepping a new project for reliability readiness or optimizing an existing reliability program, the Reliability Consulting team offers tools, educational opportunities and expertise to help shape a maintenance strategy for efficiency and consistency across all of your equipment.

Condition Monitoring services provide for the remote monitoring of your machinery utilizing a global network of experts in vibration and oil analysis. Regardless of whether you are utilizing online, portable, or wireless technologies for data collection, Emerson's Condition Monitoring services can supplement your in-house expertise by analyzing and diagnosing development faults in your mechanical equipment.

Emerson's Lifecycle Services cover wide ranged of issues – from STO planning to technical support for your AMS products. When you need help operating your plant safely, consistently, and economically, turn to Lifecycle Services.

Reliability Consulting

Condition Monitoring

Lifecycle Services

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About Machinery Condition Monitoring

Learn more about Lifecycle Services

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