

AMS Wireless Vibration Monitor

Making the Right Choice in a Crowded Playing Field



AMS™


EMERSON™

Wireless: Separating Signal From Noise

When something is successful, everyone wants a piece of the action.

Case in point: search on the term “IIoT sensor” and you’ll get nearly 150,000 results. Even when refining those results to include only wireless vibration, you’re still left with more than thirty manufacturers vying for your attention.

In such a crowded space, there’s bound to be noise. Lots of it. So how do you get past that noise to the signal – the must-have capabilities versus the frivolous?

Compounding the problem is that it’s no longer merely about technology. It’s also about a commercial model as the days of buying, installing, and using sensors yourself have often given way to cloud-enabled, subscription-based delivery. But is that truly the only model out there – and more importantly, is it the right model for you?

The pages that follow are designed to help you answer those questions, going beyond the superficial marketing superlatives that crowd this space and getting down to the details that really matter.



Insist on wireless vibration monitoring that delivers:

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Rich Data

Whether you'll be looking at the data yourself or outsourcing this task to someone else, the quality of the analysis can only be as good as the quality of the underlying data. But in the quest for the lowest possible cost, many manufacturers forget this – becoming so fixated on cost that data quality is tossed overboard.

AND – not OR

A low-cost sensor and data quality are not mutually exclusive. The AMS Wireless Vibration Monitor economically delivers an industry-leading 51.2 kHz sampling rate along with 1600-line spectra from both vibration and PeakVue¹ data, originating in a primary-axis accelerometer element that delivers a 2 Hz – 10 kHz (± 3 dB) frequency response. The result is that your analysis will rarely be inconclusive or need to send a tech out to collect more data. The data needed will be at your fingertips with the resolution needed to isolate root cause.

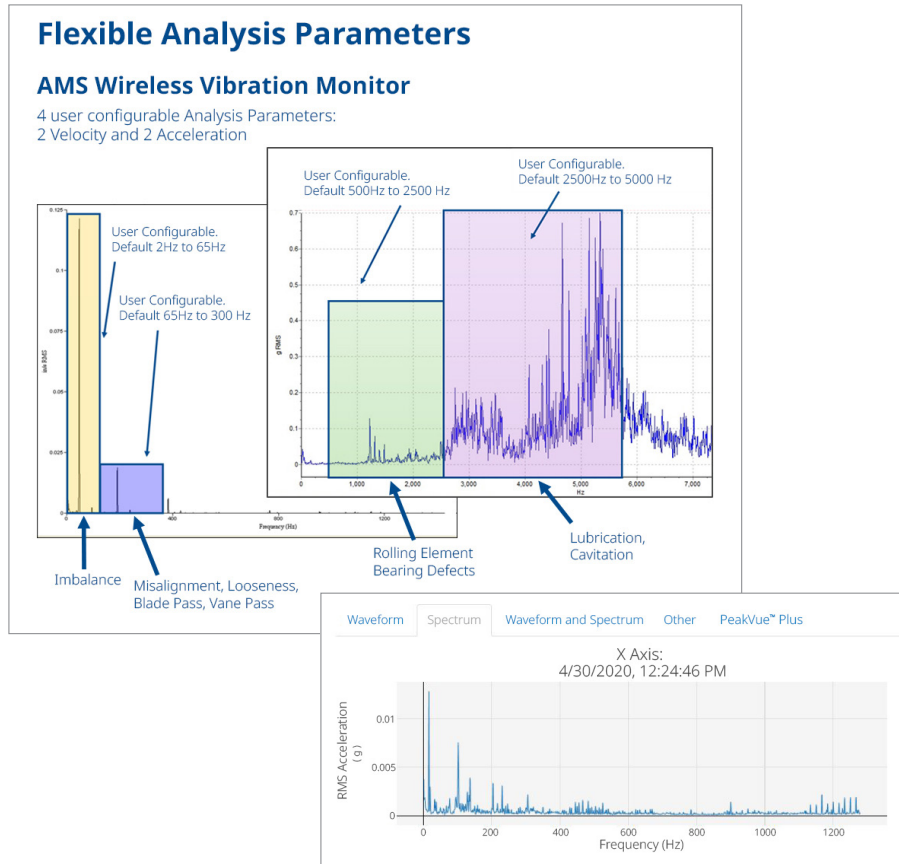
On-Demand / On-Alarm / On-Schedule

In addition, not only is rich data returned at user-configurable intervals, but it can be gathered on-demand. Need real-time data with a sample right now? No problem. And to ensure you never miss an important waveform, whenever the sensor detects a parameter exceeds alarm limits, it gathers not only scalar values but full waveforms – even if a waveform capture hasn't been scheduled.

<u>Hourly Scalar Values (13)</u>	<u>Daily High Resolution Spectrum (4)</u>
X-axis Overall	Z-axis PeakVue
Y-axis Overall	Z-axis Acceleration
Z-axis Overall	Y-axis Acceleration
Z-axis PeakVue	X-axis Acceleration
Bearing/Mechanical Severity	
Lubrication Severity	
Calculated Speed	
Skin Temperature	
Supply Voltage	
Velocity Parameter 1	
Velocity Parameter 2	
Acceleration Parameter 1	
Acceleration Parameter 2	

A rich data set of scalar values is delivered every hour along with daily (and on-demand) full waveform data to ensure deep-dive diagnostics are never hampered by a lack of data.

¹ See page 8



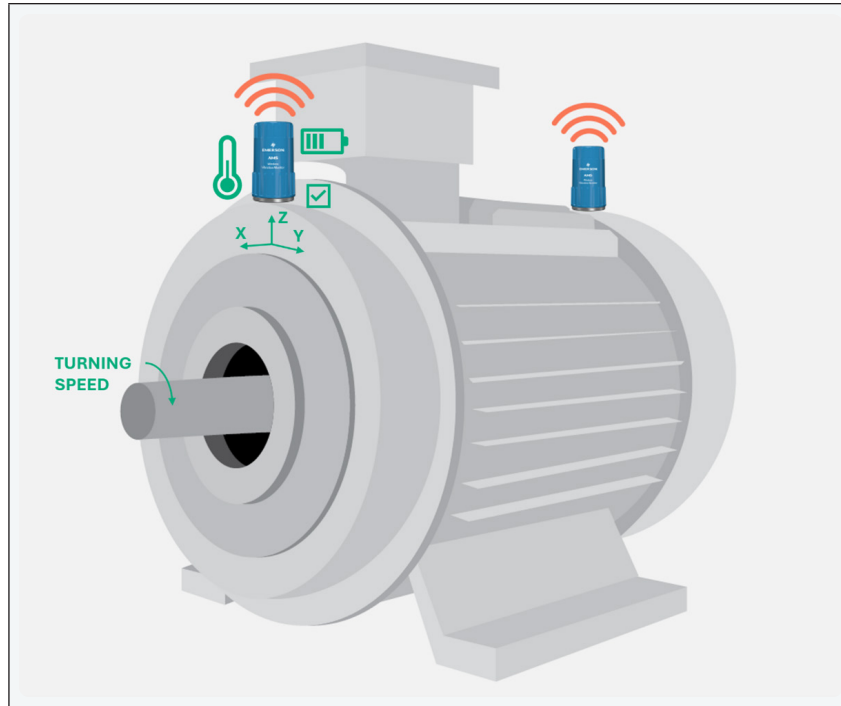
The AMS Wireless Vibration Monitor delivers a richness of data comparable to wired sensors – but at a fraction of the installation cost. 1600-line spectra and 51.2 kHz sampling rates ensure that nuances like separating running speed from line frequency aren't blurred and the ability to precisely isolate different kinds of malfunctions is never compromised.

Multiple Measurements

A wireless vibration sensor should be capable of delivering more than single-axis vibration. For the majority of applications, vibration in all three axes (X, Y, and Z) is needed for a more complete picture of machine health. But vibration isn't the only parameter needed. Temperature is often vital as well. Speed cannot be overlooked either – as variable-speed machines need a way to normalize the data for speed fluctuations. And don't forget about sensor and battery health – ensuring you can isolate sensor issues from machinery issues.

Mind the Gap

But as basic as these measurements may be, not every manufacturer can deliver them. Some lack speed sensing capabilities, requiring you to import it from another system – adding integration costs and the imprecision of time stamps that may not align, meaning you can never be certain of the speed at the moment the vibration data was captured. Others lack robust sensor health checks or battery condition. Still others lack temperature sensing, resulting in an incomplete picture of the machine.



At minimum, insist on a sensor that measures vibration in all three axes, along with turning speed, surface temperature, and battery condition so that not only can machine health be assessed, but sensor and battery health.

Battery

Not all sensors have user-serviceable batteries. Or they require you to physically remove the sensor from the machine to replace the battery. Or, they may provide battery life estimates that don't reflect realistic usage where waveforms are required – not just scalar data. None of these are acceptable options when selecting a best-in-class solution.

More is Better

One of our customers switched from their incumbent provider to the AMS Wireless Vibration Monitor because not only was the sensor incapable of sufficiently rich data, it had very poor battery life. With the AMS Wireless Vibration Monitor, the customer saw a 200-fold increase in the number of readings before a battery had to be changed. Whereas the incumbent system could deliver only 100 readings, the AMS Wireless Vibration Monitor could deliver 20,000 readings – translating to a battery life of anywhere from 3-5 years for typical hourly/daily data collection intervals.

Speed When You Need It

When conditions demand it, rapid data acquisition takes precedence over battery-life considerations. For example, if a machine is clearly in distress but you are trying to reach a planned outage several months in the future, it may make perfect sense to collect data at more frequent intervals – perhaps every 10 minutes for scalar data and every hour for waveforms – so the machine can be watched much more closely than usual. The battery can then be changed during the scheduled outage while the machine is watched as part of “intensive care” in the interim. The AMS Wireless Vibration Monitor can indeed be configured for such scenarios.



A design that allows a battery to be replaced in-situ without removing the sensor from the machine is one of many convenience and usability factors to consider.

Domain Expertise

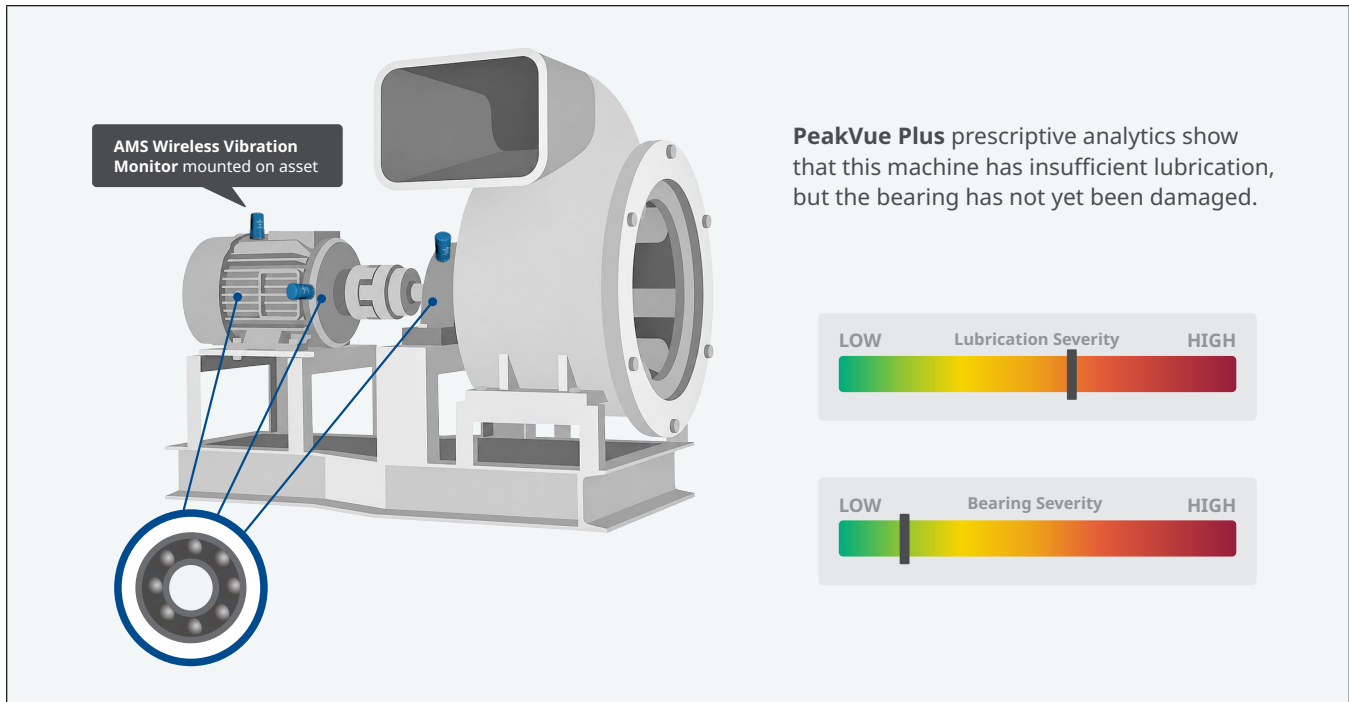
We have always believed that the only way to develop quality products is by deeply understanding machinery, bearings, and the application of our products – not just designing software and electronics.

Four Decades of Experience...

Our pedigree extends back to the mid-1980s with development of one of the industry's first portable data collectors – the CSI 2100. We quickly emerged as the leader in the space of route-based data collection and analysis of the rolling element bearing machinery these instruments monitor.

...Versus “Not Exactly”

Contrast this with many of the companies recently appearing in the wireless condition monitoring space. They're likely in their first iteration of product development. And, if you ask them about their experience, you'll likely get an uncomfortable pause, shuffling of feet, and perhaps some words about venture capital and AI. Or perhaps some words about how they've “partnered” with somebody. What you won't get, however, is the quiet confidence born from more than four decades of both designing and using condition monitoring products themselves, teaching others, and propelling the industry forward through more than 100 patents.



PeakVue Plus

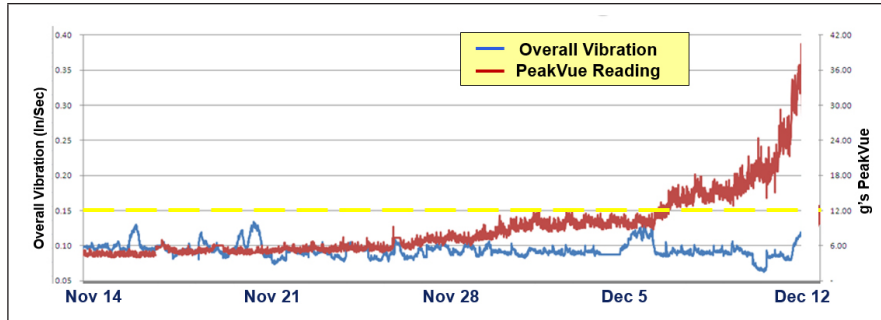
In the quest to make things both simple and effective, vibration analysis can inadvertently turn into something that resembles magic more than science. In fact, that's how some providers treat it by shipping everything to the cloud, operating on the data with AI, and keeping you in the dark when it comes to "how" instead of just "what".

Science-Based Analytics

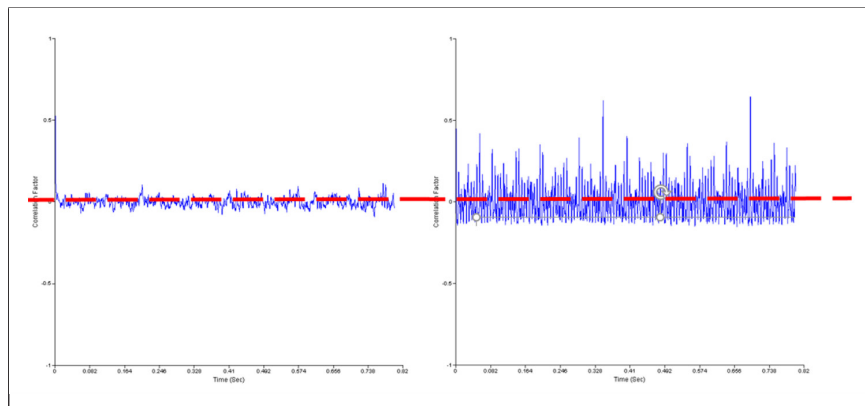
Our philosophy is different. If you prefer to remain insulated from the details, we can deliver the simplest possible results of our analytics with actionable information advisories using simple green/yellow/red severity. But for many customers, the underlying details are important – building trust in the advisories and how they work.

Bearing Condition PLUS Lubricant Condition

At the heart of our analytics is our patented PeakVue technology – a highly reliable method of detecting, trending, and analyzing the characteristic impacting that bearings make as they wear and metal surfaces begin to degrade. In fact, this technology has been so successful that many competitors have attempted to duplicate it – the highest form of flattery. But none have combined it with the other facet of bearing monitoring: lubrication condition. For this, we use a technique called autocorrelation and we call the resulting combination of PeakVue and autocorrelation technologies "PeakVue Plus".



PeakVue processing is a sophisticated yet easy-to-understand technique that allows the impacting of a bearing to be isolated – a highly reliable indicator of degradation. Notice in the trend above how the PeakVue measurement changes dramatically over the course of a month while the overall vibration measurement remains virtually unchanged.



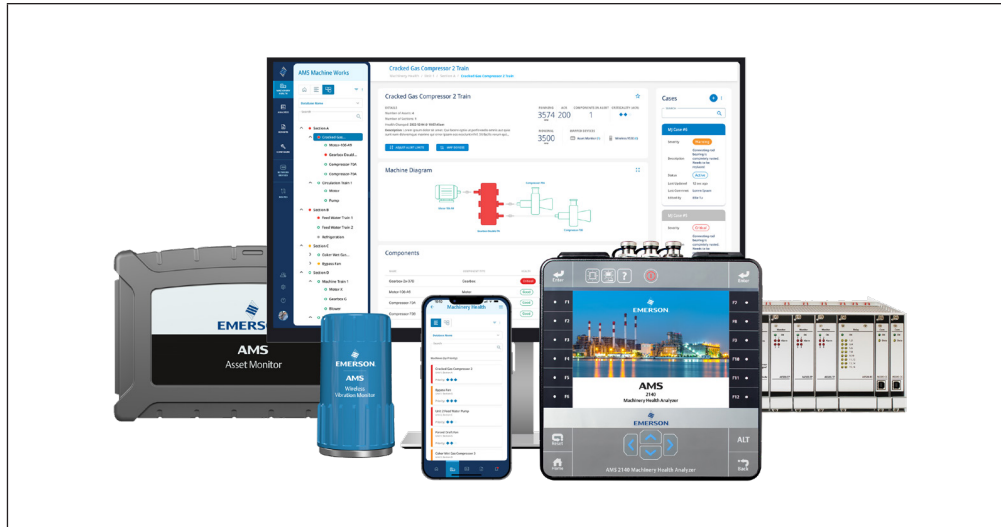
Autocorrelation is a measure of periodicity in a signal. An autocorrelation value hovering near zero is indicative of random signals (no meaningful periodicity) and is typical of purely lubrication issues (left). Larger autocorrelation values (> 0.1) are indicative of periodicity in the signal, consistent with the rhythmic impacting that is also detected via PeakVue signal processing.

Integration

While your phone may have dozens of stand-alone apps, do you really want your assets to reside in different stand-alone systems just because of the way they are monitored? That's like having a different TV depending on whether you're watching sports, movies, or concerts.

Get It Together

Many wireless providers are the equivalent of a separate TV: no ability to monitor the wirelessly monitored assets with your other assets in a common environment. In fact, Emerson is one of only a handful of providers that can even combine data from a handheld route-based analyzer with that from wireless sensors – let alone permanently wired systems like API 670 protection platforms. When you reduce the list of providers to those that deliver a true ecosystem, combining online and offline, the list becomes exceptionally small. And when you look for a provider that can address not only rotating assets but fixed assets like heat exchangers and field instrumentation like valves and transmitters, that list becomes even smaller and consists of a single name: Emerson.



Emerson's AMS Machine Works combines wired, wireless, portable, and API 670-conforming machinery protection systems into a truly integrated ecosystem that is agnostic regarding the data source – allowing you to seamlessly monitor every asset in a common, powerful environment. No need to learn, maintain, and use different systems – and with the flexibility of both desktop and mobile apps.

Asset Performance Management

Integration of your condition monitoring data sources into a common ecosystem may be important, but condition monitoring doesn't exist in a vacuum. It must instead work with the other systems that enable your reliability and maintenance activities – systems like your ERP / CMMS, your process historian, collaboration tools, intelligent AI agents, and more. This is where Asset Performance Management (APM) systems fill an important role – by bringing disparate systems and tools together.

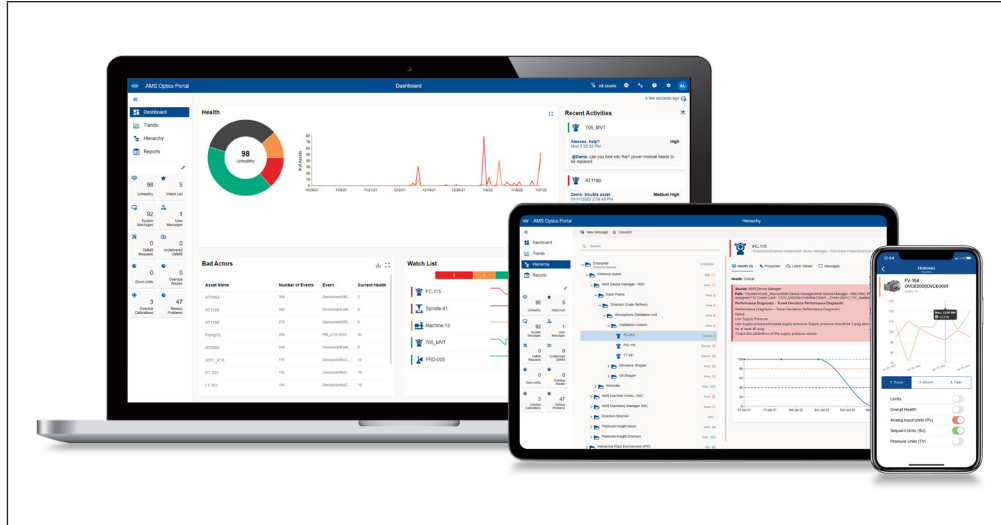
Some providers will downplay the role of APM by stating such systems are agnostic and can accept data from any underlying system. Unfortunately, that's only half the truth.

Compromised Data, Compromised Results

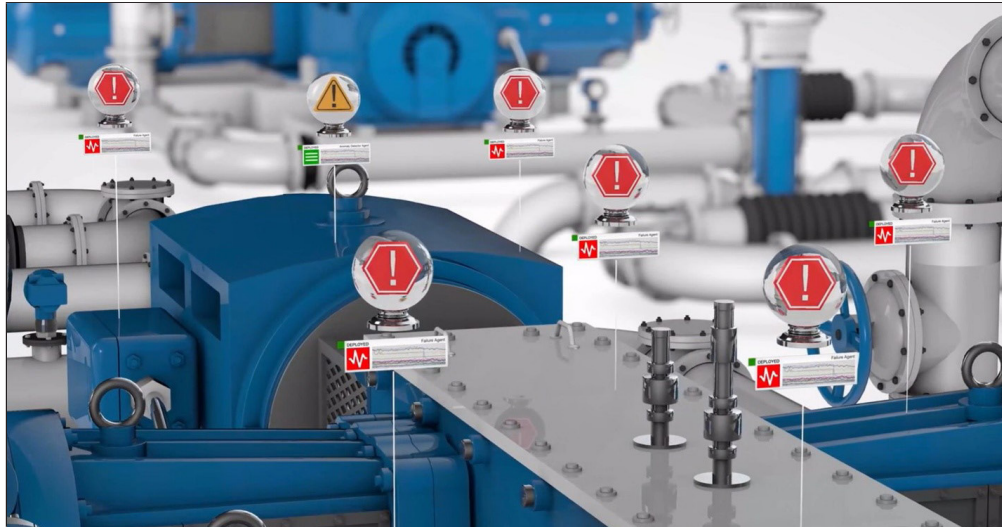
When an APM system doesn't have tight integration with the underlying data sources – including vibration waveform data and analytics – it's hampered. Vibration data is reduced to little more than a process variable that can vary in amplitude but strips out everything else. Instead of being able to leverage everything your sensors and infrastructure can deliver, it becomes a least-common-denominator compromise that lacks the sophistication necessary to deliver top-tier results.

Take a Vertical View

An important aspect of choosing a wireless sensing solution is to look at the entire vertical technology stack and ensure that you aren't painting yourself into a corner. It's very likely that an APM system will eventually be a part of your business – even if it isn't today – and paying attention to this important facet of managing asset reliability is likewise important.



Emerson's AMS Optics is an APM solution that unifies disparate data sources into a common asset dashboard and workflow management tool that instantly tells you where to focus – and why. It allows you to initiate and track work, compare results against KPIs, and ensure you are working on the right things at the right time.



AMS Optics brings the power of Aspen Mtell® to your APM program by deploying “agents” that monitor asset health / performance and predict potential failures. Agents use any combination of rules and conditions, advanced first principles models, AI/ML models, and even custom code created by data scientists.

Wireless Protocol

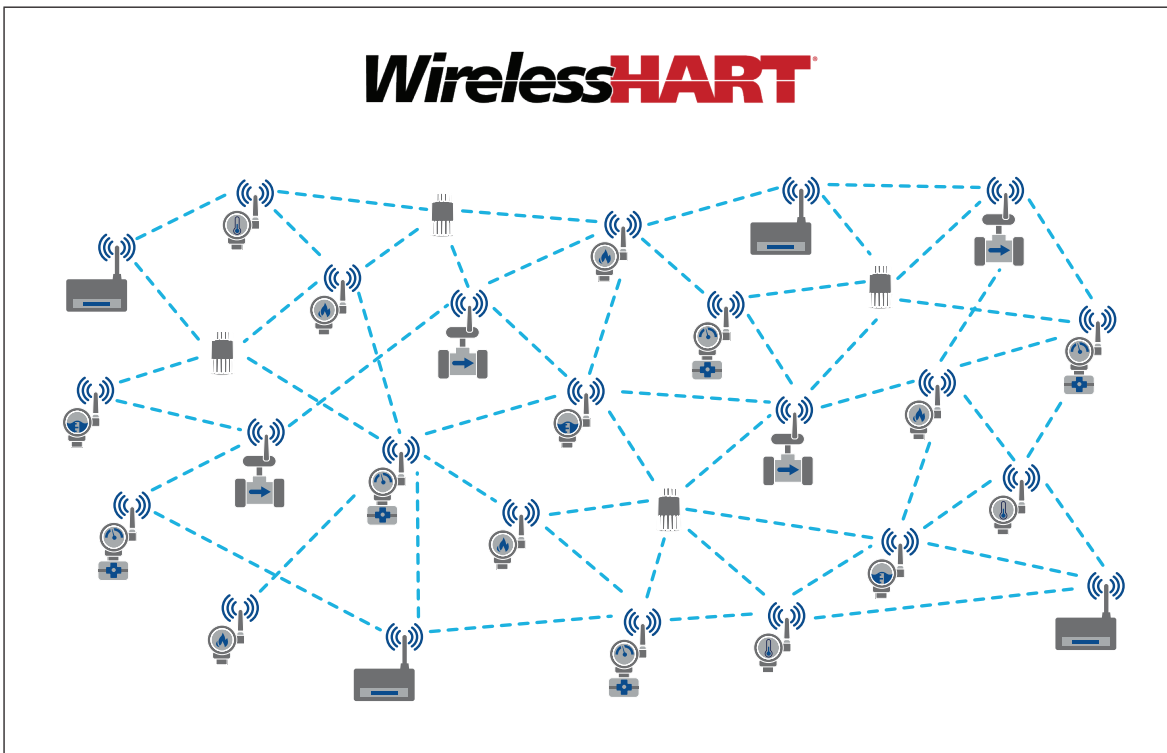
While there's a place for consumer-level wireless technologies, an industrial process plant is not one of them. There's simply too much at stake. You need proven, industrially hardened technology that is fully cybersecurity. You need a self-joining, self-healing mesh network, all in an ecosystem that is entirely open - supporting hundreds of different industrial devices on the same network - versus a proprietary protocol that limits your network to literally a single manufacturer's devices.

The World's #1 Choice

WirelessHART is the world's leading wireless protocol developed specifically with the needs of industrial process plants. With over 30 million field devices deployed, you are assured of a network that not only withstands the rigors of industrial environments but has a plethora of compatible devices that can co-exist on the same network as your vibration sensors.

Capable and Compatible

The main reason that many competitors choose to move away from industrial wireless standards and towards consumer wireless standards is bandwidth. They reason that vibration data is more like audio data and to handle the larger bandwidth requirements the only option is to embrace consumer-level technologies. However, with the Emerson AMS Wireless Vibration Monitor we've harnessed the robust, industrial technology of *WirelessHART* while also adapting it to the needs of high-bandwidth waveform transmission. As a result, you get all the benefits of a standard, open technology that is compatible with thousands of other industrial sensors while still ensuring the waveform data that you need to manage assets is available at industry-leading resolution.



WirelessHART delivers compatibility of dozens of different sensor types from hundreds of different manufacturers, industry-leading cyber security, and the robustness of technology purpose-built for the industrial process industries. Thanks to our innovative adaptation of this open protocol, the AMS Wireless Vibration Monitor can deliver even complex waveform data in a way that coexists with all the other sensors in your network and without requiring closed, proprietary protocols.

Approvals

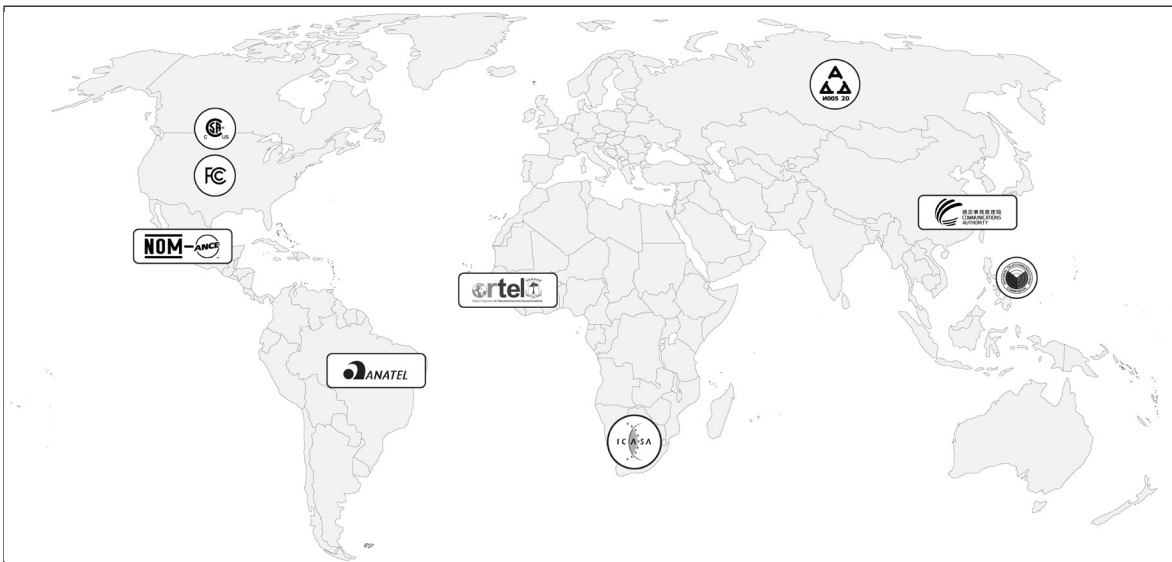
For the oil & gas, hydrocarbon processing, mining, and even some agricultural / food processing sectors, flammable atmospheres are a fact of life. And because wireless sensors live “at the edge”, the likelihood they’ll encounter flammable atmospheres is even higher than instruments designed to live in a control room. But flammable atmospheres aren’t your only concern. No matter what environment you find yourself in, wireless communications mean radio frequency signals and thus country-specific conformity requirements. When selecting a wireless sensing solution, it is essential that it carry the approvals you need – and if you operate on multiple continents – that you can standardize on a single device across every facility.

Safe by Design

Emerson’s AMS Wireless Vibration Monitor features North American (CSA), European (ATEX), and Global (IECEX) hazardous area approvals. As an intrinsically safe device, it is suitable not only for use in Zone 2 / Div 2 environments, but the more stringent Zone 0/1 and Div 1 environments where the ignitable atmosphere can be present continuously or quasi-continuously.

Every Region, One Device

Operating in the 2.4 GHz band, the AMS Wireless Vibration Monitor is approved for use in not just North America, but Europe, Latin America, Asia, and Africa. Refer to our **Quick User Guide** for a partial list of countries and **consult the factory** for a comprehensive list.



Wireless technology compounds the issues of approval because each country generally has its own standards and regulatory bodies for allocation of the electromagnetic spectrum. There are also the issues of hazardous area approvals for explosive atmospheres and acceptance within trade zones like the EU (CE mark), UK (UK CA mark), and Eurasia (EAC mark).

Your Data, Your Way

One thing you'll immediately notice with many wireless providers is a rigid commercial model. Some offer only sensors and a DIY approach where the onus is on you to install the sensors, use them, and interpret the data with your own analysts. Others offer only a subscription model where everything is done for you.

One Size Fits None

In the real world, one size never fits all. Some customers prefer DIY and everything from a CAPEX budget. Others want to outsource everything into a monthly subscription payment that comes from their OpEx budget. Some customers have analysts in-house. Others do not. Some want to use their own OT/IT infrastructure while some want to leverage an SaaS model. Some want everything on-prem while others want a VM in the cloud. Some want an outcome-based service while others want to simply own all the infrastructure and use it themselves. Some want to outsource the installation and/or maintenance of the infrastructure, while others are perfectly capable of doing that in-house.

The Commercial Flexibility You Need

Emerson's asset management solutions are designed to be flexible, allowing us to build a bespoke offering that fits your precise needs. Where others inflexibly insist on a subscription, or use of their own analysts, or everything in the cloud, we're able to work around your precise needs to offer tailored solutions. This can vary from outsourcing everything as part of a subscription model to a nearly 100% DIY approach. It can put everything in the cloud, everything on-prem, or a hybrid model. The key is that we work with you to leverage our respective strengths and ensure that not only are you getting the very best technology – you are getting a commercial model that reflects the way you want to do business.



AMS Machine Works Connect is just one way that a delivery model can be tailored to suit your needs. In addition to cloud-based solutions, we offer on-prem solutions. Also, because wireless almost never resides alone in a plant, but instead coexists with many other types of vibration technologies, the ability to address the entire ecosystem of data acquisition devices with flexible delivery models is an important consideration.



Size Is An Advantage

Every company had to start somewhere and there's nothing wrong with small beginnings. But you have a business to run and with so many companies vying for business in the wireless vibration space, can you really afford to nurture a seedling when you can simply enjoy a vibrant, mature tree with established roots?

Ask the Right Questions

If you're considering a wireless monitoring solution from a niche provider, ask yourself these questions:

- Are these engineers – or venture capitalists?
- Will they be around next month? Next year? Next decade?
- Do they have 135 years of history, 70,000 employees, and \$18B of stability undergirding them?
- Do they understand machinery?
- Are they everywhere you are – speaking your language and in your time zone?
- Are they innovators – or merely “me too” providers?

Think Big Picture

In addition to the predicted longevity of a provider, think in terms of the larger portfolio of assets in your operations and the mix of technologies required to monitor those assets effectively. It's unlikely your condition monitoring journey is starting from scratch – but even if it is, is it likely that it will remain entirely constrained to wireless? Are you thinking in terms of all of the technologies you will eventually need – wireless, wired, and portable – and even whether some of your machines will warrant protection in addition to condition monitoring? That's what we mean by thinking “big picture” and ensuring that you're thinking beyond wireless to the other technologies you'll undoubtedly need.

Get In Touch

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