WHITE PAPER

Connected Reliability: Simplifying Maintenance by Joining Sensors and Software

Connected reliability marries IIoT sensors, data acquisition tools, and software with diverse systems across the enterprise, from SCADA and PLC to EAM and ERP. It breaks down silos to revolutionize maintenance management.

For as long as there have been machines, people have pushed to make them more reliable. During World War II and the Cold War that followed, reliability engineering emerged as a true discipline to keep pace with the U.S. military's need to accurately understand how long equipment might last. As a result, the post-war generations developed skills and techniques that pushed reliability to new heights.

Recent years have brought about a reckoning. The tradespeople who shaped the industry have retired in droves, creating expertise constraints. Yet persistent labor shortages mean that even fresh talent is scarce and in high demand. It's not just the industrial workforce that's graying, the average age of assets has also risen. New regulations and sustainability concerns have only added complexity.

Meanwhile, economic factors like inflation and supply chain shortages have driven the industry toward greater predictability, standardization, and efficiency. Reactive maintenance is no longer acceptable. Maintenance teams must help drive the bottom line. Understandably, today's MRO (Maintenance, Reliability, and Operations) teams are struggling to keep up.

The solution to these challenges lies in "connected reliability," a framework that lets maintenance teams combine a wide-ranging array of hardware and software in one cloud-based ecosystem.

Current Solutions

New tools and the systems that support them have already helped reliability engineering weather the storms of recent decades. However, thanks to single-solution providers and procurement cycles, so far these tools have only offered improvements to discrete elements of MRO practices – not holistic solutions.

For example, computerized maintenance management system (CMMS) software was introduced to replace paper-based maintenance management systems. Procurement of these systems is often led by IT. Online vibration monitoring systems were introduced to supplant infrequent, route-based data collection for critical assets and hazardous, hard to reach environments. These systems may be selected and procured by an individual plant manager. And handheld inspection tools are often selected by individual maintenance technicians. This approach frequently leads to incompatibilities within the same facility.

Beyond those traditional maintenance data sources, many facilities also have other dedicated-purpose systems with useful information. MRO teams rarely tap into insights from these systems. For example, production data helpful for understanding stress on an asset may already exist in a manufacturing execution system (MES). Operating parameters useful for understanding asset operating conditions are locked up inside of a distributed control system (DCS) or historian.

In this time of unprecedented demand on maintenance organizations, many are calling for a new approach to reliability. This approach must bring together all of these disparate data sources, incorporate cutting edge technologies like IIoT and artificial intelligence, leverage the power of the cloud, and serve as the Ginsu knife to empower the reliability engineers of tomorrow in novel ways.

To overcome today's challenges, tomorrow's operations will need a holistic maintenance and reliability strategy that ensures technologies are connected to maximize maintenance effectiveness. That way, they'll be able to increase uptime and avoid costly failures despite expertise constraints.

What is Connected Reliability?

Rather than focus on a single technology, connected reliability joins hardware and software systems across the enterprise into one ecosystem, providing a comprehensive view of asset and production reliability.

A plant's work management system sits at the core of modern reliability strategies. From managing preventive maintenance work to tracking spare parts, standardizing maintenance best practices, and monitoring KPIs, the foundational activities of a strong reliability program are all managed through a CMMS. In fact, 80% of industrial companies already link their CMMS to greater productivity. That's why CMMS sits at the center of the connected reliability ecosystem.

Connected reliability is made possible with CMMS software that not only connects to handheld smart tools, IIoT sensors, and condition monitoring data, but also integrates with other essential software. CMMS should integrate with everything from financial systems like enterprise resource planning (ERP) software to customer resource management (CRM) software and chat apps, as well as production line data like supervisory control and data acquisition (SCADA) systems, programmable logic controller (PLC) systems, and building management systems (BMS) systems.

By marrying a host of software, sensors, smart tools, and systems, leadership at all levels will gain previously unthinkable visibility across the enterprise to implement standardization and gather insights into asset health. Rather than push one strategy, connected reliability props up a range of maintenance approaches, from preventive to prescriptive.

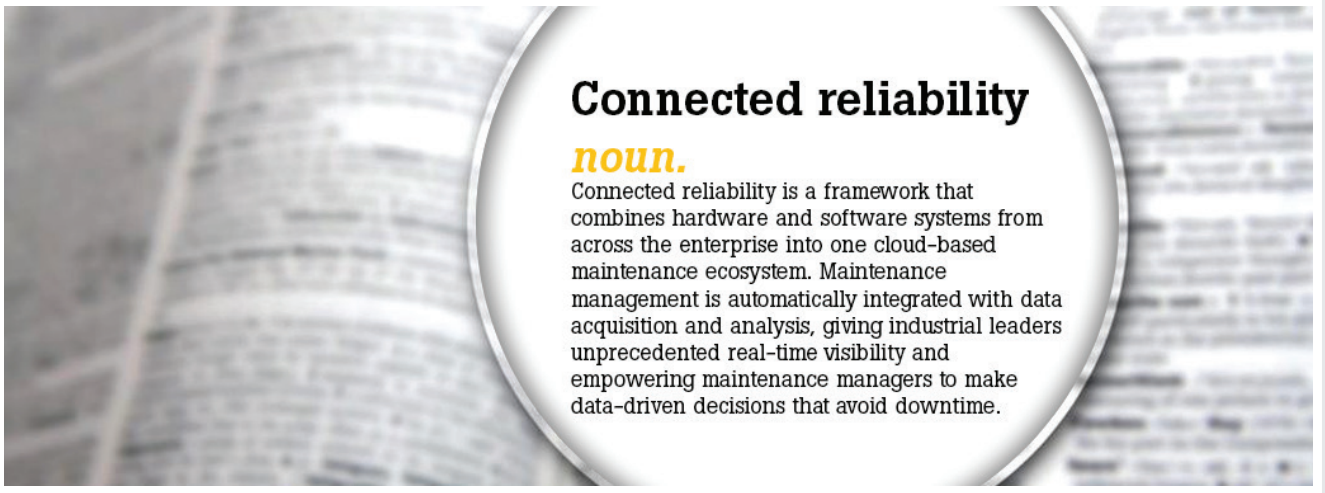
IIoT sensors can automatically measure condition and process-related data. Teams can use integrated handheld smart tools to conduct routes. That information flows readily to the condition monitoring platform, where algorithms and advanced analysis software predict machine failures and trigger automated work orders, so maintenance managers catch problems sooner.

This combination empowers maintenance teams with real-time communication between machinery, data systems, and people. Rather than replace maintenance personnel, connected reliability empowers staff at all levels. Armed with more business intelligence than ever before, teams can make enterprise-level maintenance decisions that prevent machine failures, reduce costs, boost production, improve worker safety, and maximize operational effectiveness.

"The most common win with a connected reliability approach is cost savings," says Chris McNamara, Editor-in-Chief of Smart Industry. "By following the connected reliability framework and looking at it from a holistic point of view, you deploy a single standard rather than using a mix with different protocols and then adding endless additional converters and poorly documented DIY solutions that don't reliably work."

Smart, Actionable Data vs. Big Data

Many companies are already collecting abundant data that, in the end, is not analyzed or used. In a recent industry survey Fluke Reliability conducted with Plant Services magazine, nearly half of CMMS users reported using asset condition monitoring data to generate much of their work.



However, more than half of those same respondents also said their CMMS was "not effective" or "needs improvement," reporting that the software wasn't scalable for the future.

A Plant Engineering report from 2021 found similar results. Some 48% of plants already use connected devices to capture, analyze, and improve maintenance. A further 30% is looking into it.

Reliability engineers need to focus on data that can be analyzed or actioned on, rather than collect data without a plan to use it. And they need software and tools capable of supporting that.

For example, in a plant with data streaming in from 100 assets, only one or two of them may show signs of a problem. Typically, a human must analyze the data from all 100 to find the problematic machines, then strategize how best to fix them.

CMMS software can unlock the potential of this data to streamline notification and action. Artificial Intelligence is also opening a door to a world where computers can finally offer predictive capabilities. Previously, machine condition monitoring data was too complex and context-rich for AI to handle. However, recent advances mean that AI-driven, automated analysis software is starting to hit the market.

With connections to sensors and CMMS, this AI-driven asset health software can use rule-based algorithms to recognize machine fault patterns quickly and efficiently. As the software spots a potential problem from historical trends, it can automatically create a work order request in the CMMS for maintenance teams to validate, eliminating the dependency on one person's manual analysis of 100 assets. This predictive maintenance future will be a game changer in time and efficiency for maintenance teams. According to a CXP study, business who implement predictive maintenance report a 91% reduction in repair time and unplanned downtime.

"With connected reliability, organizations don't have to have on staff vibration, thermography, or ultrasound experts," says Fluke Reliability Chief Revenue Officer Joe Rich. "All they need are maintenance technicians who can do the preventive work, which alleviates expertise constraints while driving cost savings by shifting to proactive maintenance."

How Connected Reliability Solves Modern Maintenance Challenges

1. Connected Reliability Moves Maintenance from Reactive to Proactive

A maintenance program that leverages connected reliability has the technology and the data to perform predictive maintenance – identifying future machine failures and performing maintenance at the optimal time.

Until now, most maintenance teams have used reactive or preventive maintenance strategies, where repairs are done either after machines fail or based on an arbitrary, time-based or usage-based cadence. Today, many organizations are moving beyond these methods to adopt condition-based and predictive maintenance approaches, which in turn save money, time, and unnecessary manual labor.

Predictive maintenance relies on monitoring real-time data on asset condition and creating maintenance work orders when normal parameters are exceeded, preventing failures before they occur. When teams know the condition of every asset in real time, they can proactively identify and prevent failures.

2. Connected Reliability Improves Cross-Functional Visibility and Communication

Research has shown that the most successful organizations are the ones that work well across their functional boundaries. MRO is no different. To be successful, all stakeholders – from technicians to reliability engineers to operations teams – need visibility, transparency, and a source of truth.

With the power of a CMMS that can tap into a connected reliability network, a maintenance & reliability team can become that single source of truth.

Cloud-based maintenance management software is the central hub that makes this possible. A CMMS system connects hardware and software, breaks down organizational silos, and gets information to the right person at the right time.

With a CMMS and a connected reliability framework to gather data from, team members gain increased visibility into asset management and operations. Teams can prioritize their work effectively, focusing on skilled tasks rather than manual data management, balancing needs that support the overall business strategy.

Meanwhile, maintenance leaders and plant managers are informed about what's happening at a glance. This is especially useful for those managing multiple sites with large staffs and hundreds of assets to monitor.

3. Connected Reliability Encourages a Strategic Approach to Adopting New Tech & Systems

Companies that ignore the rapid technological advances in maintenance and reliability, like integrating IIoT tech for continuous monitoring, will lose their competitive edge. A recent study by McKinsey suggests that companies that implemented Industry 4.0 technologies before the pandemic were better equipped to manage disruptions.

"It's critical for organizations to understand maintenance and reliability's changing landscape," says Fluke Reliability Chief Technology Officer Aaron Merkin. "Successful organizations will thrive in an era of change by realizing the benefits of emerging tools and technologies. The ultimate goal of maintenance is still keeping things up and running, but these technologies will let maintenance teams work smarter, not harder."

However, those that simply chase the latest trends without considering a broader vision for the future are also unlikely to benefit.

Rather than obsess over the technology itself, connected reliability enables a holistic approach to maintenance. Connections between team members and hardware, software, and business systems can enable a proactive strategy. With a connected culture, people at all levels of the organization become more aware of and responsible for reliability. Then, leadership teams are informed enough to not simply follow the pack when it comes to new technologies and trends. They can forge their own path forward, seeking the sensors, software, and systems that are best for their business.

"There are technician shortages across every single one of the skilled trades that impact manufacturing," says Rich. "In order to stay productive, today's organizations will have to deploy technologies that make them more efficient. Otherwise, they face the risk of significant downtime incidents from which they can't easily recover."

4. Connected Reliability Moves the Needle on High-Impact KPIs

Connected reliability provides maintenance teams quick, at-a-glance insights into high-impact KPIs. Tracking the right maintenance KPIs helps teams trend performance over time and identify areas that need improvement. A few common maintenance KPIs include:

- Overall Equipment Effectiveness (OEE)
- Production Uptime Percentage
- Maintenance Overtime
- Maintenance Backlog
- Mean Time to Repair (MTTR)
- Mean Time Between Failures (MTBF)
- Overall Equipment Effectiveness (OEE)
- PM Compliance
- Planned Maintenance Percentage

Connected reliability enables teams to prioritize work that moves the needle on the most important KPIs – including avoiding unplanned downtime, the biggest pain point for most organizations.

When they adopted Fluke vibration sensors together with eMaint, Martinrea International, a major auto-parts manufacturer, managed to reduce downtime while also saving $30,000 a year per site in expenses for route-based monitoring. Yet they also have better insights into where the problems are. When technicians know what to focus on in the field, they can resolve issues and get operations up and running again faster.

5. Connected Reliability Improves Maintenance Through Standardization

Organizations that don't standardize their workflows often struggle. Connected reliability makes it easier to standardize workflows, align teams, and achieve consistency.

Connected reliability allows maintenance teams to build robust preventive and predictive maintenance programs with documented, repeatable standards no matter who is doing the work.

Bottom Line: Connected Reliability Brings Cost Savings and Boosts Production

Every machine inside an organization has an operating cost. There's also a cost to that machine being down, typically in lost production. In some cases – in final assembly, stamping, or machining in the automotive industry, for example – downtime can cost a million dollars an hour.

As a result, a connected reliability strategy can bring significant savings for every incident it lets maintenance teams predict and proactively address. And in certain industries, there's not only a financial impact, there's also a human safety impact. If a line goes down, it can result in injury or even death. Connected reliability keeps operations safe and reliable.

Embracing connected reliability doesn't require mass adoption all at once. Teams can start small and demonstrate ROI, then build from there.

For example, a single plant run by a major food and beverage manufacturer was losing nearly $20,000 per month in downtime costs on just a few specialty machines. They embraced connected reliability and combined their CMMS with a continuous condition monitoring program. This meant they were able to catch problems with wireless vibration sensors, schedule the appropriate PMs to correct, and avoid costly unplanned downtime. In just six weeks, the project paid for itself.

Getting started with connected reliability is about taking the first step. That step differs based on organizational needs. However, the best path to success is to start small with a pilot project. For some teams, that could mean deploying an initial batch of integrated wireless vibration sensors on semi-critical assets. Others may look to experiment with leveraging production data from SCADA system integration. Some may need to simply start by having a services provider assess their needs.

About Fluke Reliability, Sponsor of this White Paper

Fluke Reliability is uniquely positioned to help customers on this connected reliability journey. Our cloud-based CMMS software, eMaint, connects seamlessly to our mobile CMMS app, which works even when teams are offline. We also offer asset health solutions that integrate with our CMMS and includes AI-powered analysis features. We are the OEM behind condition monitoring sensors and other smart tools that cover a range of modalities. We have a staff of lauded subject matter experts with decades of experience. We offer expert services that can help organizations bridge their knowledge gap. No one can cover as broad a range of modalities or offer the same level of support.

Our team of experts partner with customers to define their unique problems and develop custom solutions based on their needs. Fluke Reliability analyzes the solutions a team has in place, identifies gaps, connects technologies, offers tailored expertise and services, and brings everything into one place. The support doesn't end there. Our customer success managers maintain close relationships, correcting any problems and collecting feedback for improvement. Our training and services teams teach user skills and best practices, and they can also be contracted to troubleshoot and repair as needed.

Through connected reliability, we deliver the entire workflow that teams need to succeed in today's challenging maintenance environment.

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