

Industrial IoT-Enabled Remote Monitoring Improves OEM Service Performance

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Keywords

SPM, FSM, IIoT, OEM, Ingersoll Rand, TCS, Coherent, Fisher Valves, Seeq

Overview

The prime reason most industrial plants still have internal, on-site maintenance staffs is to reduce repair times and unplanned downtime, which negatively impact revenue, customer satisfaction, cost, and other key business metrics.

Subscription-based, IIoT-enabled predictive maintenance services are becoming increasingly attractive for manufacturers and other industrial organizations. This report explains why and how, and includes three case stories.

Owner-operators should include IIoT-enabled services as a critical selection criterion for sourcing equipment, particularly with more complex devices.

In most plants today, contracting with the equipment manufacturer for maintenance usually results in unacceptably long periods of downtime for critical equipment while waiting for a technician to arrive – particularly with the typical two passes required for inspection and repair.

However, emerging Industrial IoT (IIoT)-enabled condition monitoring and predictive maintenance approaches allow manufacturers to re-consider outsourcing to the OEM. Faced with the current skills shortage and other constraints, many will find OEM supplier-provided services appealing.

Outsource Maintenance to OEM?

An ARC Advisory Group survey indicated that the primary driver for IIoT adoption involved the need to reduce both downtime and mean time to repair (MTTR). Poor asset reliability and downtime negatively impact a variety of key metrics for manufacturing including revenue with lower capacity, customer satisfaction due to missed on-time shipments, quality, yield, and inventory turns with increased buffers to mitigate risk of equipment failure.

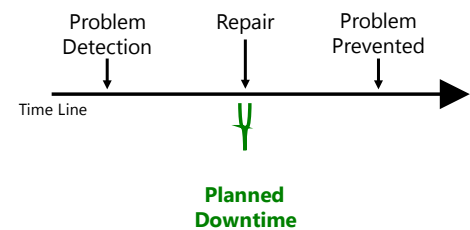
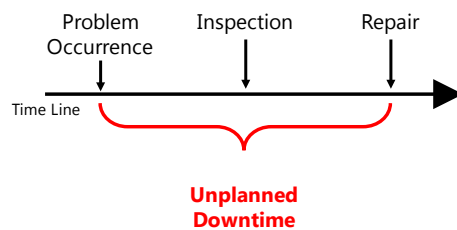


Common “Two-Pass” Repair Has Unacceptable Downtime

When an OEM or third-party service provider performs maintenance, a “two pass repair” is often needed – one visit for inspection to identify the needed parts and skills, and a second to actually perform the repair. This could easily turn into over a week of downtime for critical equipment, which is usually unacceptable. To be able to respond quickly to equipment issues, many manufacturers instead choose to have their own on-site, general-purpose maintenance staffs.

Two Pass Repair Without IIoT and Remote Monitoring	
Complaint call	Call center
Inspection	On-site
Manage work order	Call center
Repair	On-site

One Pass Repair With IIoT and Remote Monitoring	
Problem Detection	Via web
Evaluate	Via web
Manage work order	Via web
Repair	30 to 80% via web



Comparing Field Service without and with IIoT

Predictive Maintenance with IIoT and Analytics

Now, with remote asset health monitoring using IIoT and well-crafted analytics, OEM’s can obtain advance warning of a failure and provide services for near-zero unplanned downtime. The OEM has an intimate understanding of the operating performance of the equipment it designed and built, enabling it to develop algorithms for successful early detection of issues – sometimes up to six months prior to failures.

With this advance warning, the OEM can either alert the end user or schedule repair with its own field service technician. In the latter case, the OEM technician’s deep understanding of equipment performance and repair knowledge typically translate into a higher first-time fix rate and longer mean time between failure (MTBF) compared to work by on-site, general-purpose technicians. IIoT-enabled remote monitoring and analytics make outsourcing maintenance to the OEM a practical business choice for manufacturers.

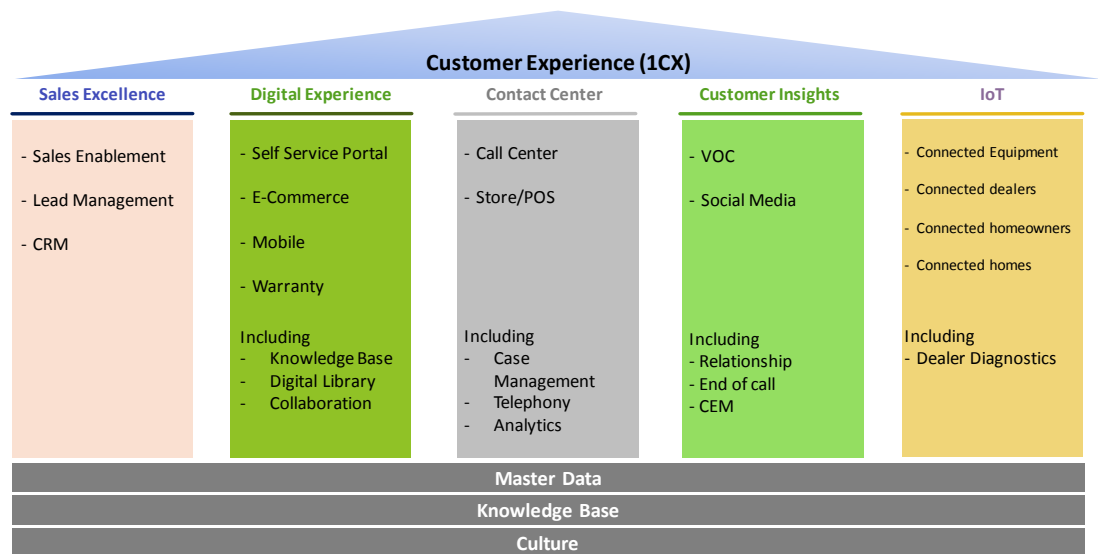
Business Transformation Case Stories

During the “Service Performance Management by OEMs with Industrial IoT” session at a recent ARC Industry Forum, we saw three case study presentations for improved field service by OEMs. Emerging technologies – especially IIoT and analytics – have opened an opportunity for competitive advantage and revenue growth.

Ingersoll Rand “One Customer Experience”

The presentation by Matt Orcutt, Director, Customer Experience, Ingersoll Rand Residential HVAC, provided insights for melding IoT into the broader customer experience. The Internet has created transparency that extends across the systems that touch the customer and increases the need for brand protection. Mr. Orcutt described Ingersoll Rand’s approach for integrating the “touchpoints” from awareness (search), initial engagement, purchase, and installation, to post-sales support. This has an omni-channel approach involving both Ingersoll Rand and its dealers. The methodology includes a “customer journey map” which is a process flow chart like Lean’s value stream mapping to identify pain points and unmet needs. Entering duplicate information into multiple systems is particularly problematic.

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Framework for Ingersoll Rand’s “One Customer Experience”

Mr. Orcutt then focused on IoT with a use case for a better customer experience. Here, a consumer with a newly installed air conditioner returned

home to find the temperature in his house warmer than set. The traditional approach would be to send a service technician to troubleshoot and repair – inconveniencing the customer and expensive. However, using the new [Nexia Home Intelligence](#) system, the dealer was able to tap into the system and determine that the air conditioner was recovering from a recent power outage. The customer’s issue was immediately answered and resolved without sending a technician.

For part of the “One Customer Experience” initiative, Ingersoll Rand engaged with [Tata Consultancy Services](#) (TCS) for consulting and implementation services. TCS helped improve the ease of doing business with channel partners. This included applications across multiple strategic business units (SBU) and geographies. TCS also provided strategic consulting for improving the connected services in the customer portal.

Coherent “Smart Product Journey”

Ron Zielinski, Service VP at [Coherent, Inc.](#) provided insights for remote equipment servicing using IIoT. Coherent has 12 business units providing lasers and laser-based technology for the scientific, commercial, and industrial markets. Particularly for the industrial applications, the laser provides a critical part of material processing for which downtime is a key factor in determining customer satisfaction. Mr. Zielinski reminded session participants that, “It is five to ten time more expensive to acquire a new customer than to bring back a previous customer.”

To improve customer satisfaction, Coherent’s goal is higher uptime by avoiding needlessly sending the laser back to the factory, avoiding unnecessary field visits, and increasing the first-fix rate. The products are intelligent and often connected for remote health assessment. Guiding the customer through a repair reduces downtime by eliminating the need to wait for a technician to arrive on site or return to the factory. Mr. Zielinski covered two scenarios:

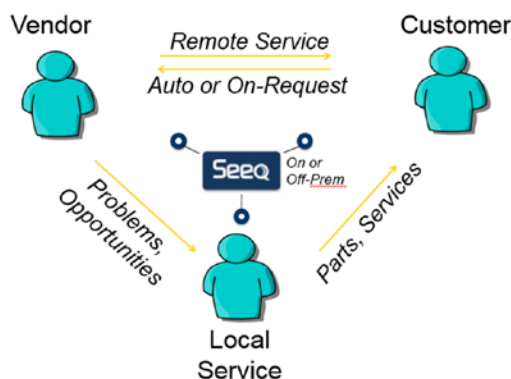
- Call response: Declining laser power output provides a good indicator of a pending problem. Coherent service people used this indicator to initiate a process to remotely assess condition and remotely recover performance or guide local personnel through the repair.

- **Condition Monitoring:** A “health check” using software running on a PC connected to the laser provides an assessment of its condition. Again, the company guided a local person through the repair.

In the future, Coherent will offer a condition monitoring and predictive maintenance service built on Microsoft Azure. The laser equipment will be attached to a PC that runs diagnostics and then sends the results to Azure. Analytics in the Azure cloud assesses condition and, when an issue is identified, notifies the assigned people among Coherent’s customer service, distribution channel, and/or the end customer.

Emerson Remote Valve Monitoring

As discussed in detail in a previous [ARC Insight](#), Shawn Anderson, Senior Research Specialist for [Fisher Valves](#), a division of Emerson Process Management, gave a presentation on using IIoT to help end users reduce valve-related unplanned downtime. Mr. Anderson’s group initially began looking at adopting IIoT as a way to collect more valve health data from the field and provide more realistic valve failure information than could be generated in a lab. ARC refers to this as “closed-loop product lifecycle



Connecting the End User with OEM's Predictive Maintenance

management (PLM).” It soon became apparent that IIoT technologies were a natural fit for a remote monitoring service to help optimize customers’ valve maintenance practices and uptime via predictive or prescriptive maintenance services for critical assets.

Emerson partnered with software company, [Seeq](#), to improve the data visualization tools used to predict future valve alarms. Seeq used its expertise with time-series data to help Fisher Valve Division build a collaborative environment connecting customers with local Fisher services experts and global valve experts.

This environment enables data from multiple sources to be visualized and aggregated. It allows people located around the world to look and work on the same data for predictive maintenance and operational improvements.

Recommendations

To borrow Geoffrey Moore’s terminology for the lifecycle of technology adoption, the application of IIoT with analytics for predictive and prescrip-

tive maintenance has clearly “crossed the chasm.” With this in mind, ARC recommends the following actions:

- If they have not already done so, OEMs should develop and deploy predictive/prescriptive maintenance services using IIoT. Being an early adopter is important with a significant first mover advantage, enabling closed-loop PLM for a better product and high-margin revenue growth with prescriptive maintenance subscriptions.
- Owner-operators should include IIoT adoption by their equipment suppliers as a critical selection criterion when sourcing equipment. In particular, this applies to the more complex devices for which on-site, general-purpose technicians do not have the specific expertise, skills or tools required for dependable trouble shooting, problem isolation and repair.

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