REDRAVEN™

Evolving Instrumentation and Monitoring Make IIoT More Viable

White Paper

FLOWSERVE

REDRAVEN™

Evolving Instrumentation and Monitoring Make IIoT More Viable

Oil refineries and petrochemical facilities are excited about the potential for industrial internet of things (IIoT) technologies.

Specifically, these operations are leveraging IIoT to detect performance anomalies days or sometimes weeks in advance, thereby improving asset availability and reliability.

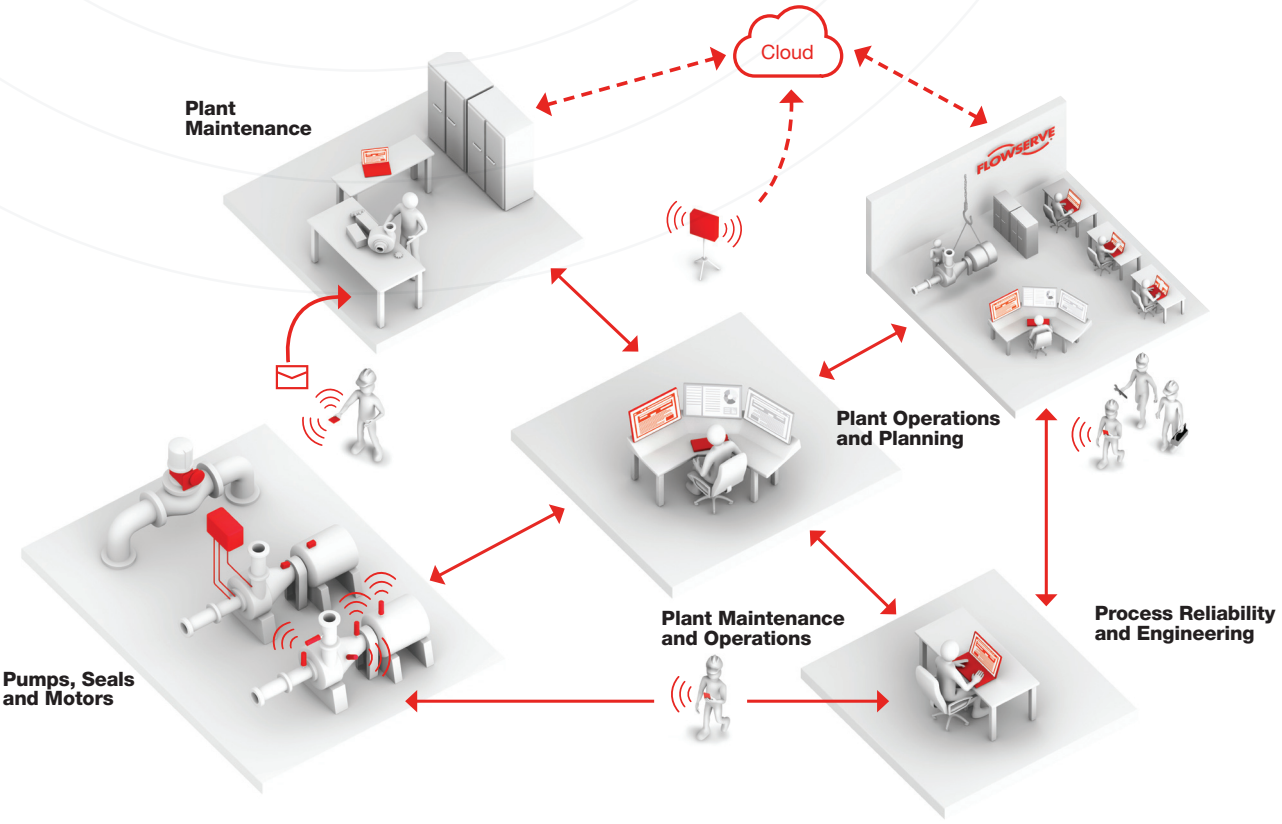
Improving equipment reliability requires equal parts instrumentation (to capture near real-time and equipment performance information) and monitoring (to determine what all this data means). Before IIoT, only highly critical rotating equipment assets were instrumented. Moreover, 90% of the collected data was never analyzed because of the sheer volume of data and lack of resources. The advent of IIoT is now helping these operations to collect, analyze and diagnose equipment problems in near real time. Breakthroughs in technology are helping these operations to collect data from thousands of assets in minutes. Intelligent algorithms are running 24/7 and processing terabytes of data to provide plant-wide visibility of equipment health to key personnel. Plant operators, reliability managers and maintenance teams can now maximize their time by focusing on critical assets that need the most attention.

Emerging instrumentation advancements

Capturing and transmitting equipment data are critical: without an accurate baseline, it's difficult to measure any deviations in performance.

Today's instrumentation technology leverages advancements in signal conditioning, transmission and reception, wireless manufacturing and industrial environments. These reliable and user-friendly technologies use open and secure architectures and have seamless interfaces so facility operators can easily expand their instrumentation devices as their needs evolve.

Wireless instrumentation systems can capture and transmit a variety of equipment data. This includes, but is not limited to: temperature, pressure, flow, vibration, torque, thrust and other conditions. This data can be transmitted wirelessly either by "single-point" sensors that are self-powered or self-transmitting devices that do not require a line of sight.



REDRAVEN™

Evolving Instrumentation and Monitoring Make IIoT More Viable

Incorporating wireless technologies into existing facilities

Companies often question how they can integrate these new technologies into existing infrastructure. Interfacing new instrumentation technology often requires only a serial port connection. Hard-wired connections for either analog or digital signals can also be incorporated.

Most systems are configurable to meet a facility's specific requirements. If an existing hard-wired system requires additional data points, reliability engineers can connect more wireless devices (via plug and play) into the host IIoT gateway. One or more IIoT gateways seamlessly move the data from thousands of wireless field devices to smart algorithms running on secure servers.

Each transmitting data point would be configured to establish high and low thresholds, addressable I.D.'s and specific clock settings, which allow the transmitter to send packaged data at certain times. This enhances the collection of data, as facilities no longer have to "poll" plant instruments, which can be a time-consuming process. Instead, the gateway merely acts as an aggregator of transmitted packaged transmissions. Each gateway receiver is capable of moving data from 2,000 wireless devices.

Wireless instrumentation offers additional functionalities via an encapsulated programmable logic controller (PLC), which can be configured to monitor commands should a condition fall outside of a pre-defined threshold.

Unlike wired instrumentation that require running electrical connections and cables, wireless technology provides up to three years of battery life and can be deployed in less than a week.

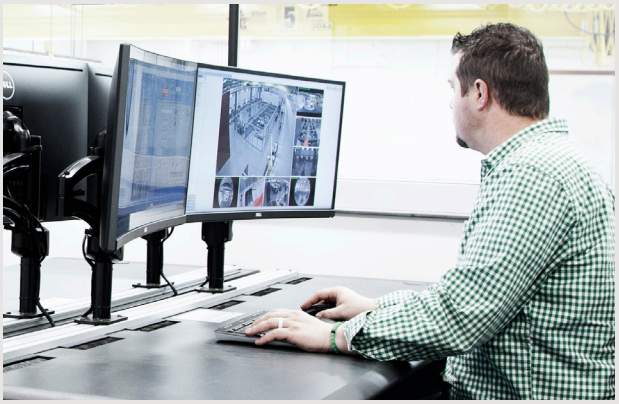
REDRAVEN™

Evolving Instrumentation and Monitoring Make IIoT More Viable

Detect conditions and predict failures before they happen

Accurately capturing equipment performance is only one part of the IIoT puzzle. Over time, instrumentation devices capture thousands of datasets. Effectively monitoring this information and analyzing it for trends are how operations can unlock IIoT's predictive analytics capabilities.

Data trends and algorithms analyze equipment performance data, detect fault conditions, predict imminent failures, and recommend corrective actions. By reviewing this information, reliability engineers can instantly see when a pump's vibration, temperature or other conditions begin to deviate from the norm. Observing these trends enables reliability engineers to assess and repair failures before they happen. It's important to understand that algorithms are based on proprietary models, methodologies and industry experience, so the company providing the algorithms has a significant impact on what an operation can achieve by using them.



Rotating equipment manufacturers are developing sophisticated predictive analytics offerings that go far beyond trend analysis to identify specific equipment failures before they occur. Proprietary analytic models compare the data captured by these sensors to give companies a complete view of their equipment's remaining life, most likely failure modes and recommended actions. With this information, operations can take preventive actions to respond to adverse equipment conditions before they impact their organization.

These technologies provide the abilities for reliability engineers to monitor equipment and predict behavior on a large scale. By connecting equipment monitoring across the network — not just across a plant, but across all operations globally — companies can apply advanced algorithms to compare interconnected datasets from multiple systems to discover operational improvements, predict equipment failures, evaluate equipment life, and plan equipment change-outs.

From reactive to predictive

Years ago, IIoT seemed like a dream, given the high cost of incorporating wired instrumentation systems into existing infrastructures. The labor — which included breaking up concrete, burying wires, and filling it all back in — was cost-prohibitive. Add in the high cost of instrumenting and underwhelming analytics capabilities and you can understand why IIoT wasn't a viable option for most operations.

Today, wireless instrumentation can be installed and bring in hundreds of data points in a matter of weeks, not months. Implementation costs for materials and labor are minimal when compared to most hard-wired systems. Project schedules are dramatically compressed, making it easier to meet project milestones, system integration and startup dates.

IIoT instrumentation and monitoring capabilities have converged and are now a reliable and reasonable way for reliability engineers to bring predictability to an otherwise unpredictable process and avoid equipment failures, downtime and costly repairs while maintaining high levels of productivity.

REDRAVEN™

Evolving Instrumentation and Monitoring Make IIoT More Viable

About the author

Shashank Khandavalli, MBA

Global Product Leader, IoT

As a graduate of the University of North Carolina, Shashank has spent time learning and mastering the IoT industry. His years of experience and passion for innovation are unmatched. His expertise is leading Flowserve into the future of IIoT.

Flowserve Corporation
5215 North O'Connor Blvd.
Suite 700
Irving, Texas 75039-5421 USA
Telephone: +1 937 890 5839

SEWP000378-02 (EN/AQ) August 2021

FLOWSERVE