ADLINK
LEADING EDGE COMPUTING

How mass deployment of real-time remote monitoring is becoming more feasible



Standalone edge device permits mass deployment of IIoT applications

Solution Brief

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How mass deployment of real-time remote monitoring is becoming more feasible

By Sheila Kennedy, CMRP, contributing editor

Manufacturers are pursuing the promise of Industry 4.0 through facility monitoring initiatives, yet persistent challenges have them seeking a more cohesive approach. Conventional tools and technologies have them deploying the digital transformation strategy incrementally, meaning targeted performance improvements spanning the plant or enterprise remain unfulfilled.

Machine condition monitoring (MCM) enabled by the industrial internet of things (IIoT) allows plants to proactively monitor, analyze, and act on the condition of critical machines and components. From continuously generated condition sensor data, signs of asset and process degradation and known precursors to faults or failures become evident. The appropriate personnel are automatically notified, decision making is accelerated, and timely corrective actions are taken.

The results of the actions are invaluable, whether it's predictive maintenance (PdM) to avoid the risks and costs of asset failure and unplanned downtime; machine or control system tuning to improve operational efficiency and performance; reducing environmental or other external stressors that affect reliability; or adjusting preventive maintenance (PM) work orders and standard operating procedures to reflect current realities.

Fully achieving this vision is complicated by the quantity and geographic distribution of machines targeted for monitoring, and the diverse types and brands of sensors, edge devices, and equipment installed at different points in time that are associated with the machines.

Companies want to leverage their existing investments while extending MCM into additional systems and environments. Modern edge-based data acquisition (DAQ) solutions are helping to close the traditional technology gaps and make the goal of mass deployment possible.

Key challenges / pain points to Machine condition Monitoring

- Quantity/geographic distribution of machines targeted for monitoring
- Device variety (sensors, edge devices, equipment)
- Protocol interoperability / network configuration
- Reliable field connectivity
- Ample computing power
- Software maintenance / management

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Several Opportunities for Improvement

Implementing MCM and PdM at a significant scale poses many challenges. The greatest opportunity lies in establishing a better means to effectively collect and transfer field data from IIoT sensors to IT/OT systems, as that is the key to adding operational visibility to remote locations. Meanwhile, manufacturers, systems integrators, and machine builders striving to increase MCM and PdM using traditional solutions are dealing with high costs, labor-intensive processes, and persistent risks, including:

- Device variety: Deployment scope and complexity increases as the number and variety of IIoT devices to be monitored grows.
- Protocol interoperability: A mix of proprietary and open-standards protocols complicates interoperability, and time consuming integration of diverse proprietary protocols increases development time and cost.
- Network configuration: Implementing remote condition monitoring on a large scale necessitates costly deployment or extension of networks with additional cables and network switches.
- Field connectivity: The ability to quickly identify machine problems and implement corrective actions requires reliable connectivity and bandwidth no matter where the machines are located.
- Computing power: Ample computer processing power and speed is essential to support the acquisition and analysis of massive volumes of condition data streaming from all the equipment and systems.
- Software management: Remote monitoring applications require periodic software updates and configuration, which is time-consuming and costly when it must be performed in person, at each device.
- Rugged reliability: Ensuring uninterrupted, long-term MCM requires rugged, fit-for-purpose technology solutions.

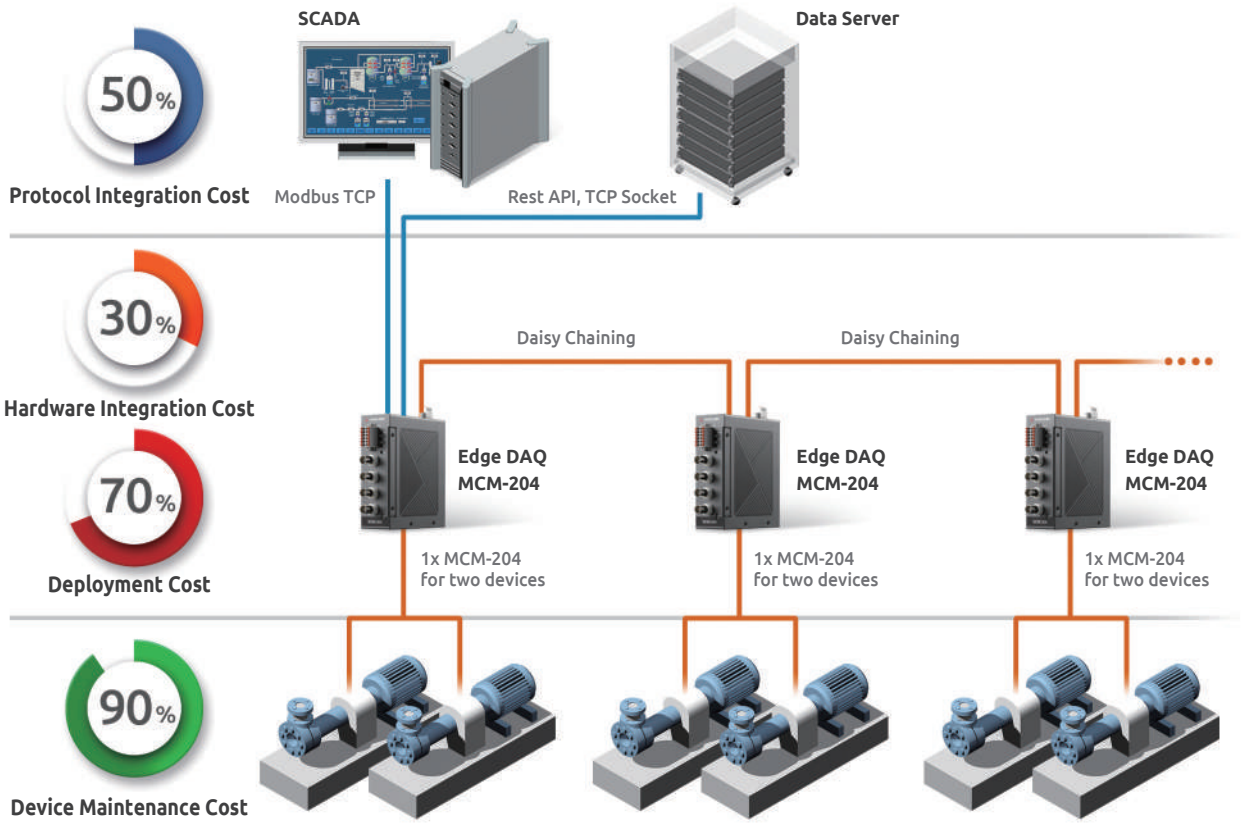


Figure 1. Estimated savings with MCM-204 edge DAQ. (Source: ADLINK Technology, Inc.)

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NEW Approaches in EDGE Computing solve Common Challenges

Innovative edge DAQ technology expedites MCM deployment, simplifies configuration and maintenance, and collects, pre-processes, and transmits sensor data with improved reliability and efficiency (see Figure 1). This novel approach allows plants to rapidly expand their scope of real-time operational awareness and improve their responsiveness to changing machine conditions, production processes, and environmental parameters.

Advanced edge DAQ solutions specifically optimized for mass deployment integrate sensor data collection, network connectivity, and edge computing in a single system. Operating as a standalone edge device, with no need for a host computer, they process, analyze, and filter data locally before it is transmitted to a centralized computer or the cloud. From there, condition monitoring software drives further analysis, problem notification, and initiation of corrective actions (see Figure 2).

Vendor-agnostic systems that support multiple data formats and protocols enable a wider range of options for remote equipment monitoring and control tasks. By integrating with the existing infrastructure, engineers can set up new MCM systems quickly. Those offering various I/O combinations for collecting data eliminate the need to purchase separate hardware from different vendors, reducing hardware integration costs.

Edge DAQ systems that enable daisy-chain connection of multiple devices can greatly reduce the length of the signal l ine, avoiding signal weakness and saving deployment time and costs. Systems with a built-in web-based device management console allow engineers to perform remote updates and configuration from a dashboard at any time and from any location. Systems designed for use in harsh environments and tested for operation in a wide range of temperatures ensure dependable performance in industrial settings, and lower device replacement costs.

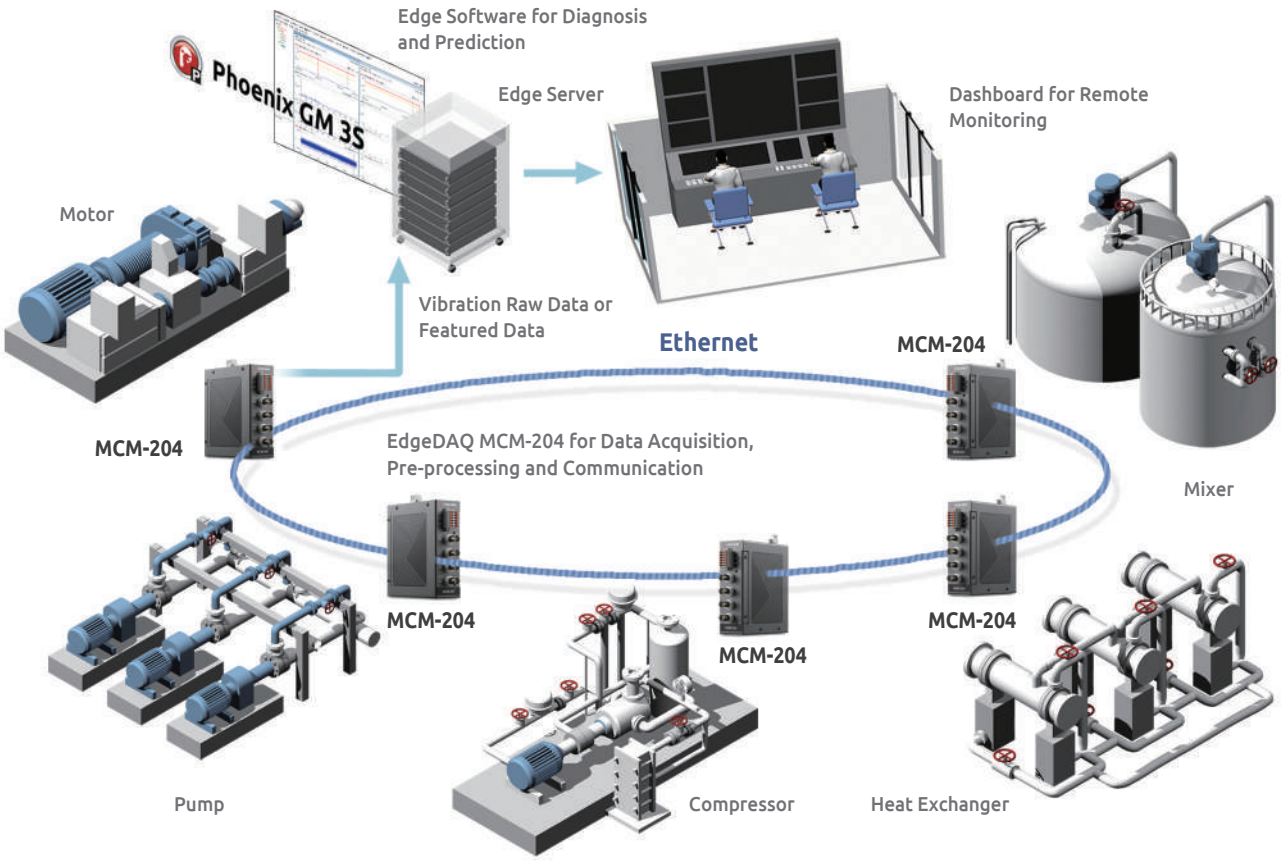


Figure 2. MCM-204 plays a central role in data acquisition, pre-processing, and communication. (Source: ADLINK Technology, Inc.)

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Using open-standard protocols, ADLINK's MCM-204 edge DAQ solution facilitates mass deployment of real-time monitoring, analysis, and control in a wide range of environments, without requiring programming skills.

Example Solution Highlights Smart Factory Potential

One provider offering such capabilities is ADLINK Technology (www.adlinktech.com). Its standalone MCM-204 ultra-compact edge DAQ solution is designed to provide a reliable, cohesive approach to data acquisition, analysis, and upload. Using open-standard protocols, it facilitates mass deployment of real-time monitoring, analysis, and control in a wide range of environments, without requiring programming skills.

Two embedded Ethernet switch ports enable a daisy-chained Ethernet topology, making the system easy to wire and maintain, and avoiding the costs of separate Ethernet switches. The two Ethernet ports can also serve as a backup link, providing network redundancy and stability.

Support for TCP/IP and Modbus TCP protocols allows field data to be sent to SCADA systems or PLCs without an extra protocol gateway, reducing the time and costs of protocol integration. Another feature of the all-in-one edge DAQ solution is its support for custom algorithm-based local data filtering, which reduces the quantity of data transmitted to centralized or cloud-based locations. From a built-in configuration utility, engineers can install their rule- based algorithms into the edge device and upgrade the applications remotely over the internet.

Consider how asset failures at petrochemical plants can cause costly unplanned downtime, safety hazards, and significant production losses. Machine vibration software provider Prowave collaborated with ADLINK to develop an MCM system for a Taiwanese petrochemical company. Prowave chose MCM-204 because its built-in Ethernet ports would significantly shorten cabling time for deployment across multiple production sites. The combined solution harnessed the 4-channel 24-bit 128kS/s simultaneous sampling rate to collect precise machine vibration parameters and analyze data collected from on-site petrochemical production equipment in real-time.

With the simplified, costeffective capabilities of innovative edge DAQ systems, manufacturers have a more-viable method to rapidly deploy MCM on a wide scale, enabling greater reliability, safety, performance for the plants, and associated improvements to the bottom line.

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