Smart Fracking with ADLINK Edge IoT

Use Case Spotlight

Edge IoT monitors fracturing machinery and equipment for better, safer oil & gas drilling

ADLINK Edge IoT Use Case Spotlight

Optimizing hydrocarbon recovery while managing safety and environmental responsibilities is critical to effective fracking operations. Exceeding contractual uptime agreements by preventing costly unplanned shutdowns is key. ADLINK's Edge IoT solution for machine condition monitoring enables real time data to be streamed securely from the edge to Microsoft Azure IoT Centural where analytics can detect problems before failures occur.

Fracturing Challenges

As the preferred method for oil & gas extraction, hydraulic fracturing is causing increased scrutiny and a number of increasing challenges:

Business Challenges

- Decreasing environmental risks and worker injury
- Upholding contractual uptime agreements while also decreasing invisible loss time
- Optimizing hydrocarbon recovery through machine performance and maintenance
- Maximizing fleet availability to meet market demand
- Creating new sources of revenue by offering new chargeable services to operators and increasing service rates
- Maintaining positive seamless relationships with oil & gas operators

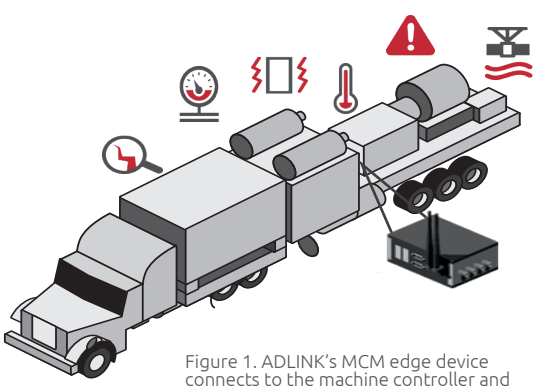


Figure 1. ADLINK's MCM edge device connects to the machine controller and extracts data from sensors across the fracking pumper vehicle

Information and Operational Technology Challenges

- Maintaining connectivity and ability to compute even when offline
- Reducing latency of machine and system communication to/from the cloud(s) and employees
- Generating new data sources and combining them with other data to make decision real-time
- Ensuring foolproof infrastructure, network, and device security
- Engineering constraints to build data models and algorithms
- Creating new sources of revenue by offering new chargeable services to operators and increasing service rates
- Maintaining positive seamless relationships with oil & gas operators

ADLINK Leading EDGE COMPUTING

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The Solution Edge IoT with ADLINK Edge®

ADLINK's Edge IoT solution for machine condition monitoring includes edge hardware and real-time data streaming software to enable smarter, more effective and safer fracking by integrating data collection, equipment analysis algorithms and real time streaming to Microsoft Azure IoT Central in a single, ultra-compact edge device.

How it Works

1. **Connect** the Unconnected

ADLINK's machine conditioning monitoring edge device, MCM-100 with an Intel Atom® processor embeds and connects within the fracturing pump and truck collecting vibration, rotation, temperature and pressure data real-time. The edge device computes the data being collected on the fracturing pump with other data coming from things such as the triplex pump, diesel engine, transmission and control systems with no internet connection necessary actively monitoring the pumps output and health. The previously unconnected fracturing pump truck is now connected.

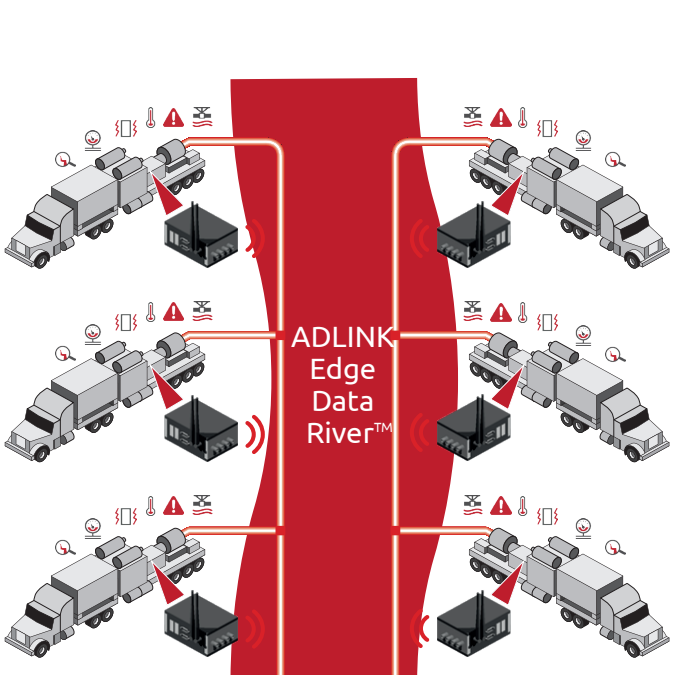


Figure 2: ADLINK streams data from multiple units through the ADLINK Edge Data River creating a holistic view of fracking operations

2. **Stream** Data Anywhere Real-time

ADLINK Edge automates communication across the fracturing fleet with instant automatic data logging for continuous monitoring. At the same time pump data is being collected, the fracturing pump can also communicate its health to other fracturing trucks and equipment, like the slurry blender. This data can then be published in real-time to Microsoft Azure IoT Central to easily combine all equipment data with other existing data, such as micro seismic data and proppant pressure downhole. This creates a holistic view of the overall fracturing operation to predict the likelihood of pump failure. Such commercially valuable data can then be sold on a subscription basis to operators and other stakeholders.

3. **Control** the Edge

Leveraging a suite of included apps ADLINK Edge can be managed securely and centrally. Engineers and other personnel can receive real-time alerts and notifications remotely on mobile devices, visualize health reports and statistics with user-friendly dashboards, and securely manage any data subscription services to operators or other stakeholders.

Benefits Edge IoT Made Simple

- Real-time warnings and event alerts into fracturing equipment and operations
- Simple and fast setup, preconfigured to stream raw data to Microsoft Azure IoT Central
- Sell relevant fracturing data as value-added subscription service to operators
- Offline data acquisition, computing, and upload
- Non-invasive approach allows for implementing without disturbing existing environment
- Modular architecture allows for easy upgrading and changing as needs evolve
- Decreased latency of data communication to/from the cloud with edge computing
- Rugged edge hardware built to withstand extreme industrial environments

intel IoT Solutions Alliance **Premier**

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Value Creating New Business Models

ADLINK's Edge IoT solution for machine condition monitoring increases overall competitiveness with safety, productivity, and costs. Fewer unplanned fracturing equipment failures reduces the time spent by maintenance engineers attempting repairs on the drilling site as well as reducing fracturing fluid leak off, lessening the safety and environmental risks. Reducing equipment failures also allows hydrocarbon extraction to increase, allowing contractual uptime agreements to be met, or exceeded, increasing services revenue while also decreasing the cost of invisible risk. With the additional ability to monetize data by selling pertinent fracturing operations data to operators, new value-added services revenue can also be obtained.

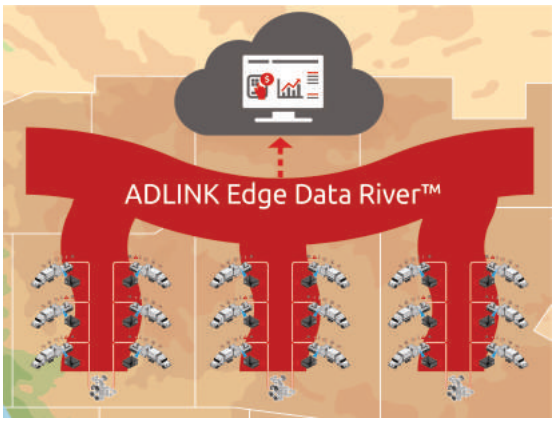


Figure 3: Multiple fracturing sites stream data simultaneously to one cloud location sending alerts and insight as they happen

ADLINK Solution Components

ADLINK's Edge IoT Solution for Machine Condition Monitoring includes:

Edge Hardware

- ADLINK MCM-100

Edge IoT Software

- ADLINK Edge® and real-time data streaming on the ADLINK Edge Data River™

Edge IoT Apps

- ADLINK Edge® Visualization
- ADLINK Edge® OT Connect
- ADLINK Edge® Cloud Connect for Microsoft Azure IoT Central

Existing IT and OT Components Can Include

- Fracturing pumps, fracturing trucks, slurry blenders, hydrators, data van
- Microseismic monitoring systems
- Pressure transducers
- Cloud analytics
- Proprietary process historians
- PLC controllers, modular IO racks, and SCADA servers
- Enterprise resource planning (ERP)
- And more*

*ADLINK's Edge IoT solutions are all vendor-agnostic, built on open standards, and architected with modular components which allow for easy integration with any existing IT and OT system

Model Number	Description	List Price
MCM-100/MA KIT	ADLINK Edge IoT Solution for Machine Condition Monitoring with Microsoft Azure Connectivity (MS Azure subscription required)	$3,999

Hardware Specs

- *MCM-100 Intel Atom x7-E3950 Processor-Based Machine Condition Monitoring Edge Platform with built-in 4-ch 24-bit DSA, 4GB RAM, and 128G mSATA SSD*
- *ICP Accelerometer IMI_603C01 100mV/g, 0.5 to 10kHz, 2-pinn conn. w/ 10-ft cable and magnetic mount*
- *A C-DC ADAPTER 40W Power Cord*
- *WIFI/BT KIT – FANGTEC WIFI/BT KIT(EA) WLAN 802.11ac 2T2R+BT4.0 Half Mini Card*

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