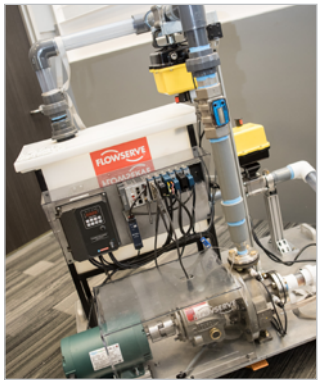
Increase Uptime With Better Asset Health Information

An NI Industrial IoT Lab Demonstration

Unexpected downtime costs industries billions of dollars each year, and the challenges of aging assets combined with many experienced professionals at or near retirement age have companies looking at the promises of Internet of Things (IoT) technology for answers. Many companies are talking about Industrial IoT technology and solutions, but NI, Flowserve, Hewlett Packard Enterprise, OSIsoft, and PTC are showcasing it live.

Condition Monitoring and Predictive Maintenance Demonstration

The condition monitoring and predictive maintenance demonstration, built on a pump/motor setup with a water tank, applies IoT technologies to heavy assets by combining data acquisition, analytics, edge computing, and software technology platforms. This helps businesses make more informed decisions to keep their operational assets working while lowering maintenance costs.

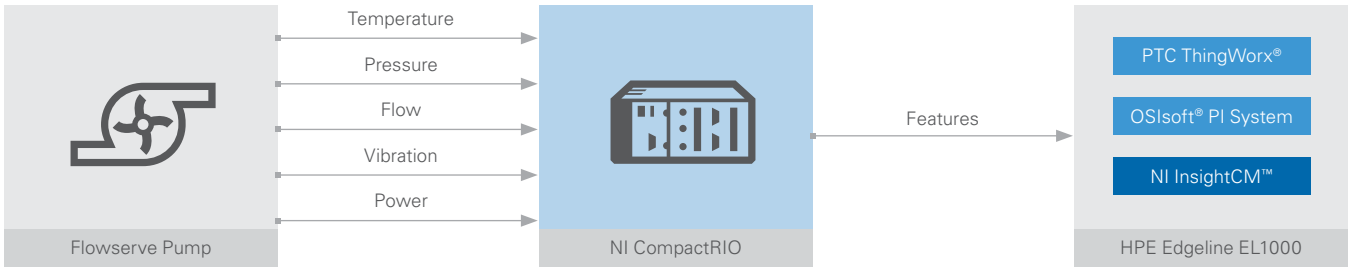


You can manually create shaft misalignment or cavitation on the smart pump demo that holds 30 to 60 gallons of water.

This mashup shows sensor data and health features from a web-/cloud-based UI.

Augmented reality (AR) for enterprise uses data from the system to help troubleshoot and repair the system on-site.

DEMO BLOCK DIAGRAM



Technology Collaborators

- NI—Data acquisition and feature extraction
- Flowserve—Complete flow system solutions
- HPE—Deep edge compute and remote systems management
- PTC—IoT platform including analytics and AR for enterprise
- OSIsoft—Data management and historian

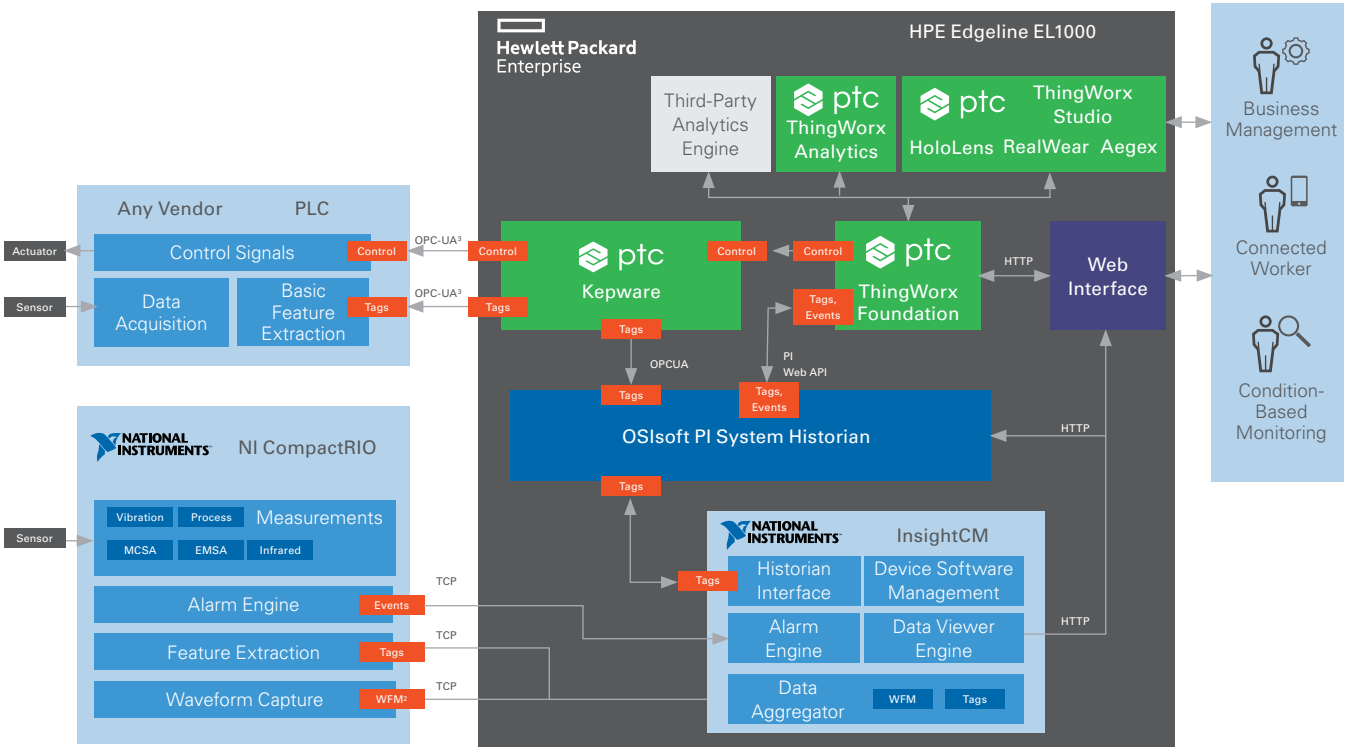
Technology Demonstration Features

- Sensor input and feature extraction with on-asset data acquisition (featuring Intel Atom processors)
- Diagnostics on bearing, seal, and impeller failures
- Remaining usable life (RUL) calculation for the isolated component
- AR for enterprise to assist on-site troubleshooting and repair
- Deep compute at the edge with converged IoT systems (featuring Intel Xeon processors)

Theory of Operation

Sensors are connected to the pump/motor setup to measure vibration, temperature, voltage, current, flow, and pressure. A CompactRIO measurement system installed on the asset constantly converts the analog signal from the sensors to digitized data, which is then processed into industry-standard features, such as RMS, pk-pk, 1X Mag, 2X Mag, and so on, for condition monitoring. When features exceed a preset limit or time elapses, the dataset is transferred to the NI InsightCM server and the OSIsoft PI System historian database, both of which are hosted on an HPE Edgeline EL1000 Converged Edge System. Combining the two software data management systems provides long-term access to feature calculations as well as diagnostic waveform data records. The PTC ThingWorx platform, also hosted on the EL1000, communicates with the PI System historian database, performs diagnostic analytics on the features, and drives the mashup for user display.

SOFTWARE ARCHITECTURE



Industry Impact

Intelligent edge-to-cloud predictive maintenance system technology, like the smart pump demonstration system, help workers be more productive, lower the cost of maintenance, and improve overall uptime. Applicable industries include power generation, materials production, food and beverage, oil and gas, and many aspects of discrete manufacturing.

Industrial IoT Lab Sponsors

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Learn more about NI and the IoT at ni.com/iiot-lab.