

Application Story

The Industrial Internet of Things Meets Automated Grain Operations

Riceland Foods deploys a Profinet system devised by TempuTech that monitors hundreds of sensors to boost operations and safety, reduce downtime, and deliver operating intelligence for continuous improvements.



Introduction

When you think about how to keep grain operations running smoothly with zero downtime and no undetected safety hazards or unnecessary operating costs, the Internet of Things is probably not the first answer that comes to mind. But that's the approach TempuTech used in developing a cloud-based system for Riceland Foods' grain facility in Jonesboro, Arkansas. The system is designed to provide continuous monitoring and actionable information to help operators proactively prevent problems by managing both grain and equipment conditions.

Read this Application Story to find out what they achieved.

“For the first time, grain operators not only have real-time access to information, but 24/7 data trending that helps them to understand not only what’s happening, but why,” says TempuTech’s Adrian Merrill, vice president of operations and corporate development. “This trend analysis gives Riceland operators and managers at all levels a context for decision-making that is far superior to the point-in-time, daily reports they used to get.”

The TempuTech system combines GE’s Equipment Insight (a hardware and software system for data collection, analysis and remote management of equipment) with a Profinet industrial Ethernet network connected to the hundreds of sensors and other equipment in the grain storage facilities, as well as on conveyors and bucket elevators. The system provides data transmission and analytical tools that enable valuable operating information to be accessed over the Internet, on site or remotely, by operators and company managers at all times.

Beyond providing data for analysis, the information provided by TempuTech’s system can be used to proactively manage grain and equipment conditions to identify problems before they cause a hazardous situation and shut down equipment to maintain a safe environment. This ability allows operators to perform preventive maintenance by anticipating equipment breakdowns or deteriorating grain environments.

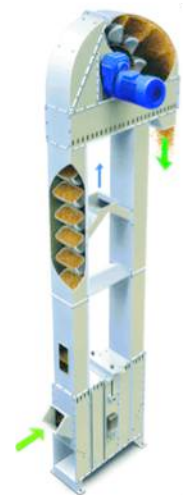
“At harvest time, it’s not uncommon to have 25 trucks loaded with grain waiting to off-load at a big storage complex,” explains Merrill. “If an elevator breaks down or gets jammed, you have truckers, farmers and operators all standing around for hours losing money until it gets fixed.”

Deployment Leads to Discovery

The system was initially installed on two units at the Jonesboro facility and involved the monitoring of 296 sensors, including bucket elevators, feeder conveyors, bearing sensors, rub block sensors, proximity sensors for motion, motor sensors, shutdown circuits and alarm circuits.

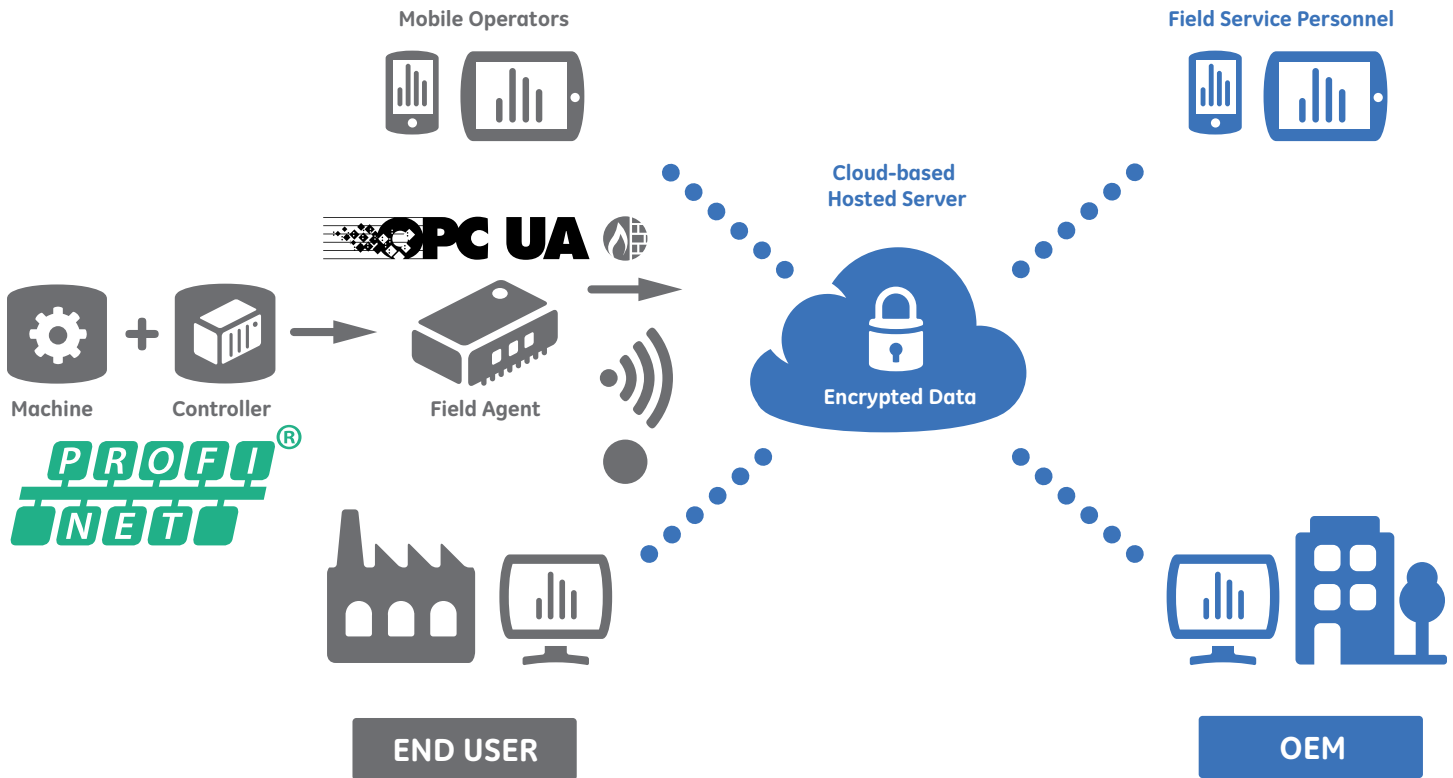
“In our first deployment in April 2014 at Riceland’s facility, we found that the feeding conveyor to one of the bucket elevators was running faster than the bucket elevator could handle the grain, causing it to fall below the 80 percent OSHA 1910.272 limit. When this happened, workers have to dig the grain out of the bucket elevator so it can be restarted—a task that can take several hours,” Merrill says.

“We can now sense this condition building and, when the bucket elevator hits the 90 percent level, the feeding conveyor is stopped automatically and sounds an alarm, which allows the bucket elevator to clear



without clogging before restarting the feeding conveyor.” Then, after a quick inspection, the feeder is manually restarted.

The integration of disparate device sensors and equipment monitoring software is combined in the system via a single real-time platform for proactive alarming in GE’s Equipment Insight, which provides the in-depth data behind those alarms. Plus, the automatic backup and redundancy features, as well as the ability to access information and insights on mobile devices anywhere, highlighted for Riceland the system’s power to transform how grain operations are managed.



With the system installed, the 2014 harvest marked the first time that Riceland reported not having to stop operations to dig out grain, according to Merrill. He says auditors from insurer Factory Mutual were impressed with the new system during an audit at the facility and were encouraged that Riceland was looking to expand this technology into other facilities.

Broad Applicability

The TempuTech system’s modular hardware and pre-packaged software enables even small grain operations to improve their operating efficiency, says Merrill. Based on the success of the system at Riceland, TempuTech has begun to quote retrofit projects for additional facilities and is developing a scaled down version for smaller farm bin operations.

One of the main reasons the system is affordable for even small operations is the elimination of control wires. With the TempuTech system, Profinet cables are used to connect the sensing devices throughout a facility to the operators. “Using Profinet we were able to eliminate the traditional control wires that had to be run back from each grain bin to a central point,” says Merrill. “We replaced literally thousands of feet of control wire and conduit with one Ethernet cable. You can imagine the savings when you realize that some of these big facilities have hundreds of grain bins that can stretch for a half-mile or more.”

Merrill also points to the intelligence built into the Profinet technology to assure network reliability as being a key feature of the system. “The fault-tolerant Profinet technology provides its own diagnostics and alarms, which allows us to know if we’ve lost a communications path and, with a little help from the controller, provides a redundant path so we never lose communications. This is key to maximizing uptime, since the Profinet network alerts the customer as well as our service technicians no matter where we are if we have communication errors.”

Because it’s possible to acquire all the data from each of the sensors via Profinet’s real-time platform, Merrill says, “We can be confident that the right information will be available on our HMIs or other devices in a fast and monitored format to enable predictive maintenance. Our technicians can rule out communication issues and focus on the real problem that caused the service request in the first place.”

In the near future, the TempuTech system will be able to provide different slices of the operating intelligence in reports customized to the unique needs of individual managers.



“With these new capabilities, we’ve moved from a reactive break/fix company to a proactive software analytics company,” says Merrill. “The operations intelligence provided by this system can not only transform the management of grain operations for our customers, but it also has the potential to transform our own business by enabling us to provide them with proactive analysis as a revenue-generating service.”

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