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How to Maximize Facility Automation System Data

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How to maximize the value of facility automation systems.

As the use of facility automation spreads throughout the feed and grain industry, users are beginning to look for benefits beyond simply running equipment electronically. Removing operations from manual control is an undeniable advantage to automation systems, but there is also value in their often overlooked secondary function: nearly constant data collection.

"Data collection is showing to be of increased importance to today's feed and grain facilities," remarks Josh Coder, vice president, Control Stuff Inc., Cologne, MN. "As the technologies and tools for data collection and analysis become more cost effective, and with shorter payback periods, there has been a surge in requests for collection and analysis of data related to the various processes."

Automation systems can log everything from electrical demand to inventory to equipment run time and temperature, and the sophisticated reporting tools available with many of today's options can be used to streamline operations and make better management decisions.

The mechanics

In order to understand how facility data is collected, it's important to identify the components of an automation system, and how they communicate with one another. Coder outlines the basic components:

HMI – Human Machine Interface

- The user's connection with the automation system, which allows for control and monitoring capabilities. Common HMIs include panel boards and desktop computers.

PLC – Programmable Logic Controller.

- The "brain" of an automation system. It processes real-world information to make logical, timely decisions based on the "if/then" principle. Also capable of monitoring, recording, alarming and more.

I/O – Inputs and Outputs

- **Discrete Inputs** – Information collected from devices like limit switches, plug switches, hand-off-auto switches and other equipment that return a signal that is either on or off.
- **Analog Inputs** – Information from devices like CTs, level sensors, flow meters and other field devices that return a signal that is variable.
- **Discrete Outputs** – What the PLC uses to control devices like relays, motor starters, solenoids, actuators and other field devices that require an "on" or "off" state to function.
- **Analog Outputs** – What the PLC uses to control devices that require a variable signal to operate, such as internal screener gates, turnheads and Variable Frequency Drive (VFD) speed controls.
- **Communication Cards** – While not technically inputs or outputs, they're used to "talk" to other devices, such as computers, smart sensors, scale systems, HazMon systems and other devices.

Data-based decisions

Once the various inputs, outputs and control devices are integrated and begin collecting data, how can management use it to improve facility operations? Alan Berndston, director of sales for New Berlin, WI-based WEM Automation, Inc., lists some examples.

“In the past, most users’ data needs were based around inventory, quality and production totals,” begins Berndston. “These are all still very important, but feed mills are also demanding true mill performance data. So, Key Performance Indicators have become an essential element of our reports. Mill managers need to know the average time it takes to unload a truck, how many times an ingredient bin has jogged, how many batches per hour are produced, the number of trucks loaded, etc. These graphic reports establish performance goals that can be measured and reported instantly by date, shift or formulation”

Heath Roker, project manager/sales engineer of Salina, KS-based Kasa Controls & Automation, explains another way to use data to track performance.

“Look for utilization patterns to measure how efficiently the equipment is being used,” Roker says. “In a grain facility, a leg or a bucket elevator is a critical component in moving grain, and you need it to run at optimal operating efficiency. You can determine if a leg is meeting that level, running below efficiency, or being over-driven by collecting the averages of the flow of grain on the legs and how full the buckets are.”

Roker says operators at non-automated facilities may run an elevator leg up to 30% less efficiently than its potential so as to avoid plugging, which results in longer lines at the dump pit and reduced throughput.

Doug Forst, president of CMC Industrial Electronics, a HazMon provider based in Burnaby, British Columbia, says removing the human element is part of the appeal of facility automation.

“One of our customers has an internal mandate for their conveying equipment — bucket elevators, conveyors and drag conveyors — to have engineering controls added by the end of 2015,” Forst says. “That means if there is an out-of-safe parameter on the machine, it will automatically stop. The alternative requires someone to manually touch the bearing, or use a thermal gun to get a heat reading, but this company wants the entire process 100% monitored in real time, tied back to a control system that will stop those machines automatically.”

Forst advises using automation system data as part of a preventive maintenance program. Reporting could reveal, for example, an overuse of lubrication. “If you over-lubricate, the bearing will run hot because it has to push the grease around, which can damage it and potentially lead to equipment shutdown.”

Integrating the facets of a facility allows automation system users to remove human decision making from their basic operations, track equipment and operations performance goals, and can assist in a preventive maintenance program.