CASE STUDY

OMRON
AUTOMATION & SAFETY

Want to optimize manufacturing production? Exorcise your ghosts with power conditioning at the point of control.

Ghosts are real – for the operators of most modern manufacturing facilities. Except these ghosts are not of the spectral variety. Instead, they take form as intermittent, micro- to millisecond-long surges, glitches, sags, spikes, shorts, and impulses in your plant's electrical distribution system.

Ghosts, or transients as they are often called, are changes in voltage, current, or voltage and current. When they occur on a production line, the result can be a costly equipment breakdown or significant workpiece scrap. They are very common in modern manufacturing environments – and very bad for the bottom line.

Transient and brownout events are elusive and expensive

"Modern plants have lots of switches, capacitors, and electric motors," says Omron Regional Sales Manager Michael Sayre. "Grid power also can be highly variable. These devices and conditions cause transients and brownouts that are nearly impossible to detect and fix."

Transients and brownouts degrade even industry-hardened electronics, decreasing their meantime between failures. They are a particular threat to the printed circuits in automation systems components such as machine automation controllers, programmable logic controllers, remote inputs and outputs, and human machine interfaces.

Damage leads to uncontrolled shutdowns and time-consuming repair and restart procedures. Partially assembled or machined components often end up in the scrap bin, and complex production equipment sometimes has to be repaired or reset before stopped lines can be returned to service.

Providing uninterruptable power for the automation equipment can minimize transient and brownout events and greatly enhance production efficiency by reducing downtime. But implementing a cost-effective solution that works with common control equipment has been challenging – up to now.

Automotive customer challenges Omron to improve uptime

Sayre and Omron Industry Account Manager Scott Harvey were asked to provide a compact, turnkey power quality solution (switch mode power supply, voltage monitoring relay, and direct current uninterruptable power supply) to support automotive assembly line automation.

"The customer wanted a power quality management system so they could ride through transients and brownouts; and complete a controlled shutdown if necessary," says Harvey. "They wanted to reduce the downtime these events were causing. But I think they did not expect us to come up with a workable solution. These types of electrical ghosts have been a long-standing problem in automotive manufacturing environments.

The company provided internal personnel to work with Omron and facilitate the testing and acceptance process. The two teams agreed on a shared objective, which was to create a proof of concept solution that could deliver consistent voltage to

Business Need

Power quality is a requirement in modern manufacturing environments. Transient harmonic distortion, brownout voltage sags and swells, voltage reductions, momentary disruptions and interruptions, and current spikes are an increasingly common problem.

Unique Solution

Omron's S8VS 24 VDC external power supply combined with our NJ301-1100 MAC, NX-ECC201 EtherCAT coupler with NX I/O, W4S1-05B Ethernet switch, and NA5-15U101B HMI for visual monitoring provides a compact, turnkey power quality management solution for production automation systems.

Customer Benefits

Downtime, equipment breakdowns, and workpiece scrap hurt bottom lines. Omron's solution allows manufacturers to ride through transients and brownouts and complete a controlled shutdown if necessary potentially avoiding potential downtime while preventing costly equipment breakdown or scrap.

an automation system. Consistent power would maximize the service life of control devices and assembly equipment and enable production to continue with less unplanned downtime. Monitoring for transient overvoltage and brownout under voltage conditions that exceeded predefined limits also was a priority since this information would enable the local maintenance personnel to isolate and troubleshoot ongoing electrical events.

Power quality team zeros in on workable strategy

An automation system typically includes a machine automation controller (MAC) or a programmable logic controller (PLC), a power supply, a networking input and output (I/O), and a human machine interface (HMI).

The teams decided to design their power quality solution around the Omron NJ301-1100 MAC since this unit is used throughout the customer's facilities. It is typically configured with the Omron S8VS 24 VDC external power supply, NX-ECC201 EtherCAT coupler with NX I/O, W4S1-05B Ethernet switch, and NA5-15U101B HMI.

Designing to specific components might seem limiting, but the teams were confident they could modify the concept to support any number of industry standard automation systems.

In theory, adding power management was fairly straightforward. It required a relay to monitor power conversion and an uninterruptable power supply to bridge any transients that might affect the normal operation of the automation system. Until recently, availability of a powerful and compact UPS has been the limiting factor for delivering a workable solution.

"With the new Omron S8BA UPS, we had all the components for an effective power quality management system," says Sayre. "Unlike a traditional AC UPS, the S8BA installs easily on a DIN rail inside a standard control panel. Its compact lithium-ion battery delivers standby 24 VDC through numerous charge and discharge cycles."

Omron delivers power quality management where it's needed most

In late 2015, the two teams deployed the new power quality management system in a live production environment.

"This was a typical plant with old infrastructure," says Harvey. "It had lots of electrical interference, lack of shielding, and voltage ghosts."

Brownouts and transient spikes were common, but the system's new Omron S8BA UPS reliably kicked in whenever conditions varied from preprogrammed set points in the Omron K8AK relay. This intelligent monitoring enabled the line to either ride through power issues or complete an orderly shut down in preparation for a quick restart.

"The power quality system was very effective," says Sayre. "Its ability to ride through transients and brownouts created immediate cost savings. The system effectively pays for itself after just seconds of operation."

By installing two Omron K8AK monitoring relays in the system, the teams also were able to create a process for eliminating hard-to-detect electrical shorts. Omron and the customer now are discussing implementing the power quality management system on an accelerated schedule.

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