Signature System™

Application

Industrial Process Management

Situation

Despite their differences, continuous-process industries share underlying characteristics: they maintain continuous operations in facilities that represent substantial start-up costs and time, but can be interrupted or disrupted by seemingly minor fluctuations in power quality. If the product stream is disrupted, lost productivity and lost product can create a large financial burden. For example, a voltage sag in a paper mill can waste a whole day of production and inflict a $250,000 loss, while a 5-cycle interruption at a glass manufacturing facility can cost a minimum of $200,000.

Lost productivity due to power quality events can create large financial burdens for continuous process industries

Duke Energy® is one of the most proactive utilities in providing power quality solutions for its customers. The company's Power Quality Group goes beyond the electric meter, right into its customers' plants, to help eliminate power quality problems.

Signature System Benefits

To document the interaction of power quality and process quality for continuous-process industries, Duke Energy and Clemson University developed a Webstand simulator in the Power Quality Lab of Clemson University in South Carolina. The Webstand, a portable, process-level power quality research tool, models the winding/unwinding (web) processes typical of the textile industry. The Webstand incorporates the Signature System to monitor and model the interactions between power quality and process quality, enabling improvements to the system's robustness without impacting the facility's production.

The Webstand was subjected to numerous dips of various magnitudes, durations and combination of phases. The resulting data provided the information necessary to:

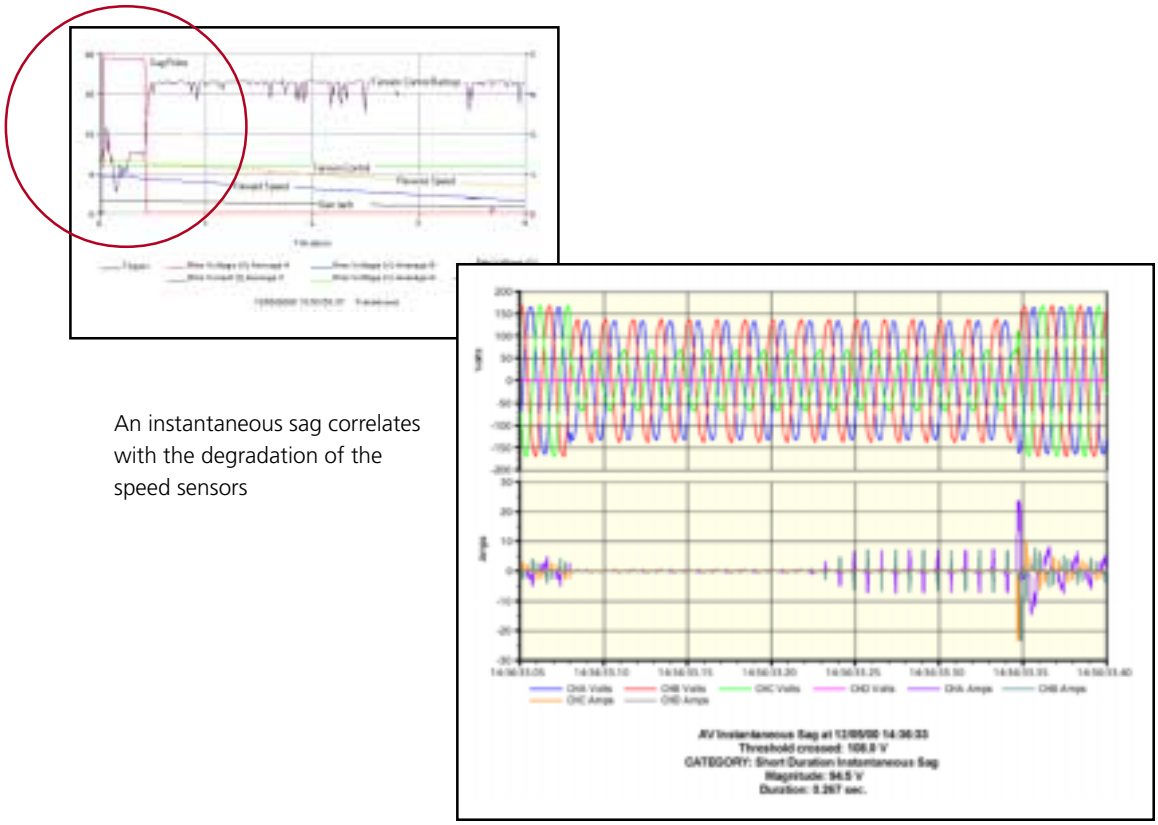
- Determine sources of potential process interruptions
- Validate control system models
- Anticipate the correct output for a given duration based on the magnitude of a sag
- Anticipate the speed of degradation for system components
- Establish individual quality of process and quality of power supply requirements to maintain consistent product quality performance

Signature System™

Results

Following the proof-of-concept, the Signature System configuration used at the Clemson Power Quality Lab was expanded for installation at a thin-film extrusion plant that operates with an allowable downtime of 4 hours per year. The resulting system is capable of monitoring critical points throughout the system, including the various winders/unwinders, laminators, infeed and accumulator load cells, metering roll, chill roll, fire alarm system and electric supply distribution system. Monitoring data can quickly identify whether a fault occurred on the distribution system or within the facility and the possible cause of the disturbance, along with correlating the effect in the production line.

Using the Signature System for quality of process monitoring helps ensure that critical process equipment is functioning properly, that industrial processes are not interrupted, and most important, that the quality of the final product consistently meets its specifications.



An instantaneous sag correlates with the degradation of the speed sensors

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