

2008: The Year To Tackle The Big 3

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2008: The Year To Tackle The Big 3 **A comprehensive strategy can help improve energy efficiency, power reliability and electrical safety**



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It's no longer enough for industrial facility managers to simply be aware of their monthly power demands. Today, they must have a solid understanding of the electrical issues that are most likely to impact the bottom line, as well as the tools available to minimize that impact.

With that knowledge, facility managers must be prepared to take a proactive step toward the development and implementation of a comprehensive energy management program. Such a program, while addressing all areas of energy within a manufacturing operation, will typically focus on the three most common electricity-related concerns- energy efficiency, power reliability and electrical safety. Fully understanding how these issues and their respective solutions have changed in recent years is critical to successfully deploying them in a manufacturing plant.

Three Critical Areas

Energy efficiency has perhaps seen the greatest amount of change in recent years. Electricity costs have gone up 30 percent in the past four years alone, due largely to rising demand coupled with increased fuel costs. For example, the U.S. Department of Energy (DOE) reports the cost of natural gas nearly doubled from

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2002 to 2006.

Poor power factor within a plant is a common efficiency issue to address, particularly in facilities with significant loads from motors, welders and arc furnaces. These inductive loads reduce the plant's power factor, increasing the reactive power requirements (kVAR), and reducing the useful capacity of the facility's incoming power line. Without correction, manufacturers pay higher energy bills than necessary and can often incur penalties imposed by the utility.

Despite increasing energy costs, power reliability remains a vital concern among industrial manufacturers. The opportunity costs from an electrical supply disruption can run from tens of thousands to millions of dollars, due to lost production time, and damaged products and equipment. In some industries, such as pharmaceutical manufacturing, a prolonged blackout can be near catastrophic, leading to the potential waste of months of bio-pharmaceutical batches due to inadequate environmental control.

Power reliability in the U.S. has worsened in recent years as well. According to the Edison Electric Institute, the average power interruption duration in the U.S. nearly doubled from 2001 to 2004. Many believe much of the power reliability issue stems from deregulation and the resulting disconnect between the power transmission grid and the power generation grid.

Of course, power reliability can mean more than just a steady supply of electricity from the utility. It also means running equipment with high-quality power, free of spikes, sags, harmonics or other transients that can damage equipment or cause it to fail prematurely.

Electrical safety also continues to be a leading area of concern for manufacturers, and for good reason. Factory Mutual, which offers industrial fire and machinery insurance, reported that from 1987 to 1992 it had 1,471 losses associated with electrical failures. More than 11 percent of those cases were due to inadequate maintenance and resulted in a gross dollar loss of \$118 million (in 1992 dollars).

Arc flash incidents, which actually occur as frequently as five to 10 times a day in the U.S., according to a Cap-Shell, Inc. estimate, cost an average of \$1.5 million in medical costs for each survivor. However, that says nothing of the value of a human life.

Finding Solutions

Becoming familiar with these issues is the first step for industrial plant managers. Seeking out proactive solutions in each of the areas is the second.

When it comes to improving energy efficiency, for example, the starting point is most often a basic metering system. It's much easier to improve on performance once a baseline measurement has been taken, and that can't be done without first installing power meters and monitors.

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If placed strategically throughout a facility, energy and demand metering can tell managers where power is being used and how, and alert them to potential problems, which also begins to address reliability and quality issues that arise. Simply installing a metering system increases energy awareness and accountability that typically drives a five to seven percent improvement and provides operators with the tools to monitor their consumption more closely.

Other technologies, such as variable speed drives, automated load control, high-efficiency lighting, automated lighting controls, power factor correction equipment, and others, are saving manufacturers an estimated 10 percent a year on their energy costs, according to a 2006 DOE study.

Even more impressive, 70 percent of the projects identified by the study realized a payback period of two years or less.

Reliability And Quality

When considering power reliability, some of the most common solutions are automatic transfer or switching systems. Many facilities now install two electrical feeds from the utility or have on-site secondary power to run the plant in case of a utility failure. Stand-by generators with automatic throw-over systems and uninterruptible power supplies have also seen major technological advancements in recent years and have become important tools for ensuring reliable power throughout the plant.

When addressing power quality, advanced power monitoring systems not only monitor the power usage, but they will capture and analyze abnormal power quality disturbances and transient events so that problems can be analyzed and addressed to eliminate future outages. Also, by installing active power quality correction equipment, plants are able to adjust for transient problems, such as sags and swells that can negatively impact sensitive electrical equipment.

Ensuring electrical safety is a battle that never ends, and the most appropriate steps may be different for every plant. Most facilities can improve their total electrical safety control system in one or more ways. Typically, the place to start is with the development of a comprehensive electrical safety assurance system. Within that, training, maintenance and procedure reviews are key elements that will reduce the probability of risk to employees.

Getting Started

The first step toward establishing an effective energy management program is to engage a representative of a trusted expert in energy efficiency, power reliability and electrical safety. That might include power distribution equipment manufacturers, energy service companies, local utilities, or government agencies.

Work with the chosen source to define a list of opportunities for improvement in each area, and gain a clear understanding of the costs and the potential payback for each opportunity. More often than not, potential areas for improvement will

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outpace available budgets, so prioritize the cost reduction and/or cost avoidance that's to be gained with any potential program.

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