Energy management of electrical equipment

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The cost of doing business is not getting any cheaper, especially for energy-intensive industrial businesses. To remain competitive in an environment of ever-increasing operational costs, large processing plants and factories are finding new ways to do more with less.

Whether processing petroleum or manufacturing automobiles, the goal is the same: improve efficiency, reduce costs and increase productivity. One way to do all three is through improved electrical energy management practices. Although the cost and quality of electricity can significantly affect operations and profits, it has traditionally been accepted as a non-negotiable business expense--the utility bill is paid each month without question and the cost goes unchallenged. But energy is not a fixed cost--it can be controlled. In fact, recent advances in enterprise energy management (“EEM”) technology are helping businesses to control costs, optimize processes and prevent downtime.

Energy management systems use a combination of advanced metering hardware and software to monitor a facility’s electricity usage, identify inefficiencies and pinpoint potential threats to reliability. This type of system can provide facility managers with the information to make informed decisions, from both a functional perspective and a financial one.

On the functional side, plant managers can efficiently monitor power quality and energy usage in real time to increase productivity, improve efficiency and maintain reliability. On the business side, corporate energy managers can review the historical consumption data provided to predict energy usage for the month, allocate costs by department and identify waste. A detailed understanding of the facility’s electrical energy requirements over time also can help managers spot recurring trends, simulate alternative rate structures and negotiate better power-supply contracts.

Regardless of the type of facility monitored, the tools used to effectively manage and control electrical energy usage on a full-time basis usually consist of three main components: meters, software and communications.

EEM system components An enterprise energy management system typically consists of a network of intelligent energy meters linked to a centrally located server running the EEM software.

Each meter monitors a specific location or activity, while the head-end software continuously retrieves, aggregates and processes the information.

The system logs the information in an historical database, responds to any alarm conditions by relaying notifications to operations personnel and displays the real-time status of each monitored area on the screens of one or more networked workstations. In short, the software compiles and analyzes data from multiple sources

and acts as the central intelligence for the entire system.

The type and location of each meter is determined by the electrical system itself. For example, an advanced, utility-grade meter can be installed at the main substation to verify the quantity and quality of power delivered to the site. Simpler sub-metering devices can then be installed at key points around the facility to monitor individual buildings or processes.

Typically, the distributed meters communicate with the head-end software across the facility’s existing Ethernet-based local area network. If, however, the operation is geographically dispersed over great distances, telephone, wireless, even the Internet can be used. In some cases, the meters can use e-mail to send system updates or alarm notifications directly to facility personnel or even host a built-in web page accessible over any standard web browser.

Understanding how a factory or plant is currently using electrical energy is the first step to controlling the cost, quality and reliability of its power.

Controlling energy costs The benefits of informed energy management increase with the amount of energy used and the relative cost of any interruption to productivity. By their very nature, industrial applications tend to incur considerable electrical energy costs during the course of business--with energy-intensive operations such as aluminum and chemical processing plants experiencing energy costs between five and 10 times higher than industry averages (Source: Department of Energy, Office of Industrial Technologies). Like any large business, industrial plants and factories need to take active charge of their electrical energy management and procurement, but however, to do so requires a full understanding of ongoing energy needs, and the ability to manage its use.

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