Shrihari Naik
Concord Technologies
Office No. 109, Orient Plaza,
Pune-Solapur Road, Ramtekdi,
Hadapsar, Pune – 411013
Phone: 020-64007778, Cell: 9881143690
Email: Shrihari.naik@concordtech.co.in

Energy Management Approach

Background

Awareness about importance of energy conservation is increasing in day-to-day life. This is evident from the fact that most of us have instilled the habit to switch off the lights and electric equipment that are not required. Considerable amount of energy is utilized in today's production/manufacturing setup. Energy conservation in such setup is achieved by systematic approach.

Importance of Energy Conservation

Both Electric Utilities and End Users are becoming increasingly concerned about the Consumption and quality of electric power. Energy is no longer a minor component of production costs. Even though increased energy prices have become a larger influence on the balance sheet, many facilities do not take advantage of opportunities to better manage these expenses. Those without power monitoring systems likely have no understanding of their energy usage; those with them may not be using their systems to the fullest potential. In order to optimize a power monitoring investment, it's important to understand both the intended application and energy usage priorities within the facility. Energy management system is a strategic asset, a means to achieve competitive edge through bottom-line savings. Saving electricity doesn't just save money, it also saves the planet. This is news to a lot of people. After all, when you plug something into the wall, it seems clean enough you don't see or smell any pollution, like you do with your car. But the pollution is there. It just happens at the power plant. Most electricity is generated by burning coal at power plants. Every time you turn on the lights, you create a little pollution. So saving electricity doesn't just put money in your pocket, it helps keep the air and water clean, too. The need of the hour is to use energy in a responsible and economical way from an ecological and economic perspective.

Energy Conservation Approach

Rationalizing an investment in a facility's infrastructure can be a difficult prospect for any plant engineer or technician, often requiring extensive justification. Investments that are deemed "low-risk" by upper management and have a fast return on investment (ROI) are typically the easiest to substantiate. One

such investment that will pay considerable dividends over the course of its operating life is a comprehensive power management system.

With the advent of technology, sophisticated power management systems can be devised based on tried and trusted Six Sigma principle 'Detect-Measure-Analyze-Improve-Control' principle. Following section elaborates how this principle can be applied for industry at large

Detect

Energy saving potential is more where the consumption is more. Thus attacking the biggest energy-guzzlers rather than worrying about items that don't use much energy is the key. With that in mind, first address the big energy users. For instance cooling and heating system, utilities, lighting etc; Also Point of saving should be the applications where energy is being wasted or exhausted. Traditional approach of energy metering which gives snapshot data of energy consumption is insufficient tool for effective monitoring and gathering the accurate data for analysis. Instead a monitoring system with capabilities of real time data logging and reporting can be applied.

Different grounds to determine where the power monitoring system should be installed

1. Install high-end monitoring system at the main electrical switchgear and less sophisticated metering devices further into the electrical system. The high end system, in addition to measuring electrical parameters can also measure power quality parameters. This approach is taken when you want to understand the quality of the energy provided by the electric utility while also grasping basic electrical parameters within your facility.
2. Monitoring large loads may allow you to identify energy savings opportunities while simultaneously identifying electrical parameters that could damage the load or affect the product. It should be apparent that more monitoring points will provide a better model of the electrical system.

Measure

After detecting which loads to monitor, it is time to measure the energy consumption. A properly installed and configured monitoring system is a valuable asset to almost any type of energy consumer. Energy usage/cost and the reliability of the electrical system are major concerns for most energy consumers. A power measurement and monitoring system contains one or many discrete metering points that are interconnected.

The three primary components of a power monitoring system include:

1. Metering devices to measure data,
2. Software to accumulate, manage, and display the data, and
3. Communications interface between the software and metering devices.

The monitoring system components should be compatible to ensure that the greatest benefits are realized from the system. There are certain advantages of "permanently installed" power monitoring systems. They operate on a 24/7 basis. Continuous logging of real time energy-related data provides information on the operational characteristics of an electrical system. This includes where the energy is being consumed, when the energy is being consumed, how the energy is being consumed, and what loads are consuming the energy. This knowledge can help you reduce the energy delivered to and consumed by your electrical system.

Analyze

The data that is gathered from the measurement system is used for analysis. The analysis is carried out for Consumption and Quality of electric power. The parameters of interest will be current and voltages during startup of the equipment, Power factor, and energy consumption. Rated parameters of the equipments can be compared with the actual readings for identifying deviations. Reports generated from the power management system will help identify consumption; for instance consumption pattern for a particular shift can be analyzed from the data presented by the shift report of the system. Analysis will aid Production Engineers with consumption pattern for planning shift activities accordingly thereby reducing the production breakdown, Maintenance Engineers to identify equipments due for maintenance and Planners for appropriate sizing of equipments.

Improve

Analyzed data will be used in applying sophisticated power management strategies for optimum plant operation, including:

- Calculating and planning for tolerable energy interruptions
- Enable the end user to predict the energy consumption pattern in manufacturing and processing facilities
- Benchmarking the energy consumption pattern for different cost centers within the plant
- Planning when to shift operations to off-peak times. This particularly applies to our Indian scenario where load shedding from electricity board is prevalent.
- Knowing how lower power quality will affect equipment and when this option can be utilized as a cost-saving mechanism
- Implementing strategies to improve power quality and energy efficiency

Control

The increasing emphasis on overall power system efficiency has resulted in continuous growth in the application of devices such as high-efficiency, adjustable-speed motor drives and shunt capacitors for power factor correction to reduce losses. Power management strategies discussed above could be applied to reduce the consumption.

Advantages of Power Monitoring Systems

There are many benefits to installing a power monitoring system — some of which strongly interrelate with each other. A properly designed and installed monitoring system offers a deeper understanding of the operational parameters of the facility's electrical system. A close appraisal of the data generated by a monitoring system can reveal a variety of overt and subtle opportunities, including:

- Environmental — A better knowledge of how energy is used within a facility allows you to identify an array of prospects to improve efficiency, minimize waste, and reduce energy consumption, thereby allowing the facility to be a better steward of its allotted natural resources.
- Reliability — Assessment of data from the monitoring system can reveal existing or imminent issues that can adversely affect the operation and product within a facility. Historical data from power monitoring systems can help locate and correct both acute and chronic problems, resulting in increased productivity.
- Maintenance — Data trends can forecast and notify the appropriate people when discrete equipment parameters may be exceeded, allowing you to plan ahead instead of facing an unscheduled shutdown.
- Safety — Monitoring systems can limit the exposure of personnel to potentially hazardous electrical environments by providing remote status and operational parameters of equipment within hazardous areas. Some monitoring devices also offer a variety of additional parameters (temperature, pressure, flow rate, vibration, status indicators, etc.) through the use of transducers.
- Financial — Each benefit discussed above either directly or indirectly influences a business's bottom line. In most cases, the monetary impact from even one or two benefits can quickly justify the purchase and installation of a power monitoring system.
- Additional advantages offered by power monitoring systems may include features such as accurate evaluations of spare electrical system capacity, billing allocation and validation, or optimum placement of mitigation devices. Once you decide if a power monitoring system makes sense in your particular situation, the next step is narrowing the field of choices.

Conclusion Remarks

There always lies the question: Is the investment worth it?
Our actual work with few organizations proves that such elaborate and well thought monitoring systems are very effective and prove very cost effective to individual organization and help them to contribute for national growth as well.