

Monitoring & Metering

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Installing an energy logger on equipment that uses large amounts of electricity can provide clear and revealing information about energy use

Clamp down on inefficiency

Julian Grant looks at the instruments available to the engineer and maintenance staff that are designed specifically to help identify and address problems with energy efficiency

There are proven business benefits in addressing energy efficiency. According to the Carbon Trust 20 per cent of a business' annual energy costs are wasted through the use of energy inefficient equipment.

Monitoring power and energy usage in a facility or installation can often identify hidden issues that affect both operational and environmental quality, can pinpoint the reason for higher than desired energy costs, and can reveal the causes of more frequent equipment repair and replacement.

The fundamental piece of kit required here is a power and energy logger (PEL). Whether for troubleshooting a known problem, or proactively seeking opportunities to optimise power distribution systems, PELs, and their accessories, should be as common in a building maintenance technicians' arsenal of tools as a multimeter or thermometer.

Modern portable power and energy loggers are compact, lightweight,

battery or mains powered, electronic monitoring instruments used for collecting electrical data without the need for operator intervention or presence. They can be installed in distribution panels or around the facility without difficulty, and removed as easily without the need to shut down the installation or office building first. They are capable of storing several million readings, and can be programmed to collect data on a sub cycle basis or store averages at user programmable aggregation periods. They are available with or without displays and can transmit their recorded data locally or remotely.

PELs gather electrical data such as current and voltage, power and energy and are also able to indicate phase angle $\cos \phi$, $\tan \Phi$, power factor THD and harmonics. The most versatile loggers employ separate sensors for each parameter to be recorded and will automatically recognize those sensors and set the ratio and measurement parameters accordingly.

Multi-channel data loggers will collect data from several input types

simultaneously. So, for example, a six or eight channel logger may be set up to monitor three-phase power systems. Mathematical capabilities provide the ability to calculate power and energy, as well as the cost associated with that energy consumption.

Remote access to the data collection process from the office, or at remote locations with wireless or Internet access, provides the ability to track several consumption points around the facility, or multiple facilities, without the expense of travel to retrieve the data.

Data analysis software

To fully understand what is happening on an electrical installation with regards to energy consumption, etc. requires some form of data analysis software giving a picture of the monitored data over time and the ability to download to a computer for analysis. Most software packages are capable of displaying in line graphs often referred to as X/T plots with time on the X axis and amplitude on the Y axis.

When evaluating harmonic data, it is often easier to view it in a bar graph format rather than a line graph. The ability to look at several channels of data on the same graph such as three voltage phases or three current phases provides a convenient way to easily troubleshoot power systems. Also, the ability to zoom in and analyse smaller time sections or compare this week's data to last weeks is an invaluable tool.

In the energy game, you can't manage what you can't measure. Energy consumption takes place over time and therefore should be recorded over time. PELs increase the technician's ability to manage energy by providing the tool to measure and analyse that energy over time.

Energy waste is an ongoing issue and is often undetected. Installing an energy logger on equipment that uses large amounts of power or in electrical panels can provide clear and revealing information about energy use when the facility is in a non-operating state.

Energy managers often track monthly bills to understand a building's energy use, and while good energy reviewing practices will sometimes indicate that a problem exists, it does not always help in understanding where, at what time, and why the increases are occurring. The use of power and energy loggers along with energy reviewing practices provides the missing information necessary to properly evaluate energy problems. Power and energy loggers can help identify and document when and where energy waste is occurring, which allows the technician and manager to proactively make improvements and cost savings.

Performing preventive maintenance alone is not always enough. No matter how well technicians maintain equipment, if it operates inefficiently, or more often than needed, energy waste will occur. The cost of not paying attention to operational issues along with the maintenance issues can be significant.

Measuring and recording the performance of energy-using equipment over time is the only way to verify whether the equipment or system performs optimally. Use here of power and energy loggers will prove invaluable to service technicians and will increase their ability to locate costly building operation problems quickly. Periodically, monitoring critical machinery and high energy consuming equipment should be as important as other periodic maintenance tasks. ■