

Power factor correction yields savings for pharmaceutical distribution center



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Healthy savings for a major pharmaceutical distribution center were the result of an Energy Initiative by **PRES Energy**, Dayton, Ohio. The company was able to shave nearly \$40,000 (or 18%) annually from its utility costs due to upgrades to their HVAC control and correction of poor power factor. Not bad for a patient showing no symptoms.

Poor power factor, or inefficient use of supplied power, can often be overlooked because it has few outward signs. There are no blown fuses, tripped circuit breakers or failed electrical apparatus to alert plant personnel to the problem. The most visible symptom, increased utility costs, is difficult to determine based on the utility rate structure—whether it is per kVA, per KW or some other billing method.

While loss of some electrical efficiencies are inherent in the power system, the scope of the problem determines the extent of savings which are possible. Induction loads, in particular, where motors and transformers are found, along with other devices such as fluorescent lights and variable frequency drives, can use supplied power inefficiently. Facilities with many small-rated horsepower motors, like those required to power the multitude of conveyors moving product around the 165,000 sq. ft. facility, are particularly susceptible to poor power factor.

Once the extent of the inefficiency is known, utility invoices are scrutinized. Determining whether the savings will offset the equipment required to generate the savings is a straight financial calculation, as is the ROI/payback period.

Probing for vital signs

Pres Energy worked with equipment provider Staco Energy Products, who then commissioned a power quality survey (sometimes called an audit or study) to be completed for the facility. PowerEdge Technologies installed metering analyzers within the plant that were left in place to collect data for one week. The data collected was used to build a “load profile” that allowed engineers to determine the extent of the power-usage inefficiencies, and whether harmonics or other power anomalies were present. All of this information was then factored into the proper location-specific solution.

The distribution center had a power factor of 0.72 to 0.78—compared to the target of 0.95—so there was definitely room for improvement. While no harmonics were identified, a previously unknown phase imbalance was uncovered. Since the solution essentially involved installing capacitor banks on each phase, the phase imbalance had to be corrected (otherwise the power factor correction would actually compound the problem).

A 200-kVAR automatically switched capacitor bank was installed on the main 480-volt utility service. This solution was more economical and practical, while providing for simpler installation with maximum control for the facility engineer. Automatic switching allows the system to dynamically provide the necessary reactive compensation based on the load and demand at any given time. A 400-amp circuit breaker was also integrated as part of the power factor correction system, so that power can be disconnected for maintenance of the apparatus.

Total costs for the energy initiative, which included HVAC controls upgrades and the power factor correction equipment, amounted to \$100,000. Installation, which occurred in August, 2005, was a bit trickier than normal, because the plant had to schedule a time to transfer over to the emergency power generator while the power factor correction equipment was being installed. The facility operates 24/7 and is fully climate controlled for product storage requirements. Annual savings (based on their actual usage and per kVA rates) were estimated to be \$40,000, or 18%, for a 30-month payback.

Approaching the two-year mark after installation, PRES Energy Project Manager Tom Gerling said the estimates are being realized and verifiable: "The overall package is exceeding the savings estimates and performing as expected," said Gerling. Apparently making the changes called for in the Energy Initiative was just what the doctor ordered.

For more about power conditioning, power factor and harmonic correction plus single and three phase uninterruptible power supplies from Staco Energy, click [here](#).