



Eaton helps industrial manufacturer maximize power factor to achieve major utility savings

Location:

Indiana

Segment:

Manufacturing and industrial

Challenge:

Enhance electrical utilization to help eliminate power factor penalties and generate substantial utility savings

Solution:

Expert electrical system analysis leading to the application of a customized power factor correction system

Results:

Utility demand penalties reduced by more than \$8,500 a month, enabling a full return on investment in less than 16 months

“After applying the Eaton power factor correction solution, the plant increased its average power factor level from 68 percent to 99 percent, saving the company over \$100,000 per year.”

Background

An Indiana-based wire drawing manufacturer completed a 1.5-megawatt electrical infrastructure expansion to accommodate growing business needs. Shortly after the new electrical loads were energized, the local utility noticed the plant’s power factor was extremely low and implemented a power factor penalty.

Power factor is a figure that expresses a plant’s power consumption efficiency. Utility companies constantly track this metric and penalize companies with low power factor. The penalty provides an incentive to implement solutions that lead to more effective energy utilization through lessened demand on the utility and reduced energy waste. In this case, the local utility charged the manufacturing facility a penalty when power factor dropped below 100 percent.

To determine power factor (PF), the utility looks at the ratio of real power or “working” power measured in kilowatts (kW) to power measured in kilovolt-amperes (kVA), which is the total power capacity. Kilovolt-amperes includes both a kilowatts component and a kilovolt-amperes-reactive (kVAR) component, which is a wasteful, inefficient component included in the total kVA. For example, at 70 percent power factor, it would require 142 kVA to produce 100 kW. At 95 percent power factor, it requires only 105 kVA to produce 100 kW. Therefore, the utility is able to reduce waste and produce less energy to meet demand when its customers maintain a high power factor. The improved power factor reduces the overall customer demand charges, which in this case is the power factor penalty.



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Challenge

To solve the issue and prevent the plant from incurring inflated demand charges, the electrical utility recommended the manufacturer contact Eaton's local power quality team to conduct a power factor evaluation. This evaluation would determine if power capacitors could be installed to reduce the excessive demand charge.

The customer's plant utilizes multiple direct current (DC) drives to support the primary load of their manufacturing processes. DC drives produce harmonic currents that may be amplified by the addition of standard power factor correction equipment containing capacitors only. The completed power analysis indicated a de-tuned filtered bank with a combination of capacitors and reactors would be required to avoid amplification of existing harmonics from the DC drives to harmful levels.

Solution

Expert analysis led to the application of a harmonic filtered power factor correction capacitor bank to improve the system's power factor and avoid excessive harmonic amplification. The Eaton AutoVAR filter was selected as the correct solution for the customer.

Eaton's AutoVAR filter is an automatically switched, tuned frequency, freestanding power factor correction device that helps achieve target power factor levels in a very small footprint. The AutoVAR solution is programmable to automatically add/subtract filter banks to maintain target power factor levels, and can be tuned for maximum efficiency in reducing harmonic currents in three-phase environments with heavy nonlinear loads such as a DC drive.

Results

After applying the Eaton power factor correction solution, the plant increased its average power factor level from 68 percent to 99 percent. It also reduced the load on the main transformer, avoiding the purchase of a larger-sized transformer and saving tens of thousands of dollars.

In the three years following the application of the Eaton solution, the plant has recorded utility savings of more than \$8,500 per month, with total savings of more than \$300,000 (or \$100,000 per year). In addition, simple payback period calculation showed that the plant was able to recoup the cost of the Eaton power factor correction system, a complete return on investment, in less than 16 months.

In fact, the project was so successful that the manufacturer applied the solution at two of their other plants. The local utility also recognized the results and continues to recommend Eaton as a leading expert in solving power quality challenges through proven expertise and the application of Eaton's innovative power management solutions.



AutoVAR de-tuned filter

Low voltage switched capacitor solution with integral de-tuning reactors.

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For technical assistance regarding power factor applications, contact the Eaton Technical Resource Center (TRC):

1-800-809-2772, option 4, option 2

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