Is Poor Power Factor Performance Costing You Money?

Power factor problems are a common occurrence at facilities that operate heavy loads such as induction motors. Most often, plant managers discover the problem when the utility bill arrives with an unpleasant surprise, a costly power factor penalty or peak demand (kVA) billing element to compensate for the "total power" required by a customer. Other signs of power factor problems are motors and transformers running hotter than usual.

"A low power factor means heavy motor loads from induction motors as well as HVAC equipment," says Rich Zuccaro, Power Factor Program Manager, Staco Energy Products Company, Queensbury, NY. "When motors run at low voltage, they require additional maintenance and are more likely to burn out." Correcting power factor problems with capacitors is the answer, and as evidenced by the experience of a mining company that relied on large diesel generators for their power, the savings on fuel and maintenance make for an astounding return on investment.

Noranda Jamaica Bauxite Partners mines bauxite for aluminum and operates two 1.6-MW, plus two 2-MW diesel generators. Fuel expenditures can exceed $5 million a year, so when Richard M. Reid, planning superintendent, Maintenance and Engineering, determined that they could see savings with power factor correction capacitors, he was ready to launch a project. "I was surprised when we did the calculations, and at how fast the payback can be realized," recalls Reid. "That's what got the management on board. They asked, 'What are we waiting for?'"

Noranda is expecting to save $650,000 per year from the project, so the investment will pay for itself in less than a year. "Yes we save on fuel, but also maintenance," adds Reid. "We have a lot of generators that we alternate when we need power, and this will allow us to use the generators less per day, so the operating hours and operations will benefit." The plant's power factor before the project was 74%, a relatively normal low power factor, according to Zuccaro. A correction to 90% to 95% is typical to avoid utility penalties, and Noranda chose to correct to 95%.

As for the actual installation, there were two issues to address because Noranda generates their power at a medium voltage of 41/60 V, but most of the plant runs on 4/80 V. "In the end, we agreed that it made sense for both the medium- and low-voltage side," says Zuccaro. "We put seven different capacitor banks on the 4/80-volt system, and nine banks on the 41/60-volt system, with those at individual large motors. The interesting thing was that they had asked us to look at a number of variable frequency drives, and those drives generate harmonics. Capacitors and harmonics don't get along very well, so we use specially tuned banks to protect the capacitors."