

Variable Speed Drives/Premium Motors



power™

PPL ELECTRIC UTILITIES

Case Study

The Municipal Authority of the City of Sunbury

2010

Snapshot



Objective: The Municipal Authority of the City of Sunbury provides its customers water, wastewater, flood control, recycling services and solid waste management. Its 50-year-old major pumping equipment performed with reduced efficiency and reliability even with regularly scheduled maintenance. The Authority needed to increase system reliability, have more accurate process control, and reduce maintenance and electricity costs.

Solution: After consulting with PPL Electric Utilities and coordinating with various vendors, the Authority retrofitted a treated and untreated-water pump with new NEMA (National Electrical Manufacturers Association) premium-efficiency motors and variable-speed drives. This combination provided the most efficient operation of technologies and the desired results. As a result, the City of Sunbury plans to replace other pump motors with similar energy-efficient units.



Results

Energy savings: a 25 percent reduction in electric energy consumption by the motor/drive combination amounting to 250,000 kWh per year, a project payback of 4 years based on \$0.125/kWh.

Flow Control: Precise speed- and flow-control that reduces the chance of water hammer and eliminates wear on throttling valves.

Starting Restrictions: Elimination of the starting restrictions of no more than 3 starts per hour on the old equipment recommended by the Authority's maintenance contractor. The restriction was put in place to save on mechanical wear incurred at each start because of the age and condition of the units.

Data Collection: Accurate data collection of motor parameters and performance via new communication software that's part of the new drive unit. Maintenance can now be scheduled on a performance versus time basis, which results in lower overall maintenance costs.

Reliability: Increased reliability to meet the water needs of the public.

Applications

Pumping • Fans • Material Conveyance • Air Compressors • Refrigeration Compressors



Background:

The Municipal Authority of the City of Sunbury provides water, wastewater, flood control, recycling services and solid waste management to Sunbury and parts of Upper Augusta Township in central Pennsylvania. The Authority serves more than 10,000 residential and business customers, with a stated mission of serving these customers in a professional and responsible manner while protecting the environment and natural resources. This effort hinges on having a trained staff dedicated to operational excellence with a highly reliable infrastructure.

The Water Department's filtration plant is permitted by the Pennsylvania Department of Environmental Protection to pump up to 5 million gallons per day. Current pumping averages 9 hours (or about 2.5 million gallons) daily.

The filtration plant consists of two sets of pumps, each capable of handling the city's load. The average age of the plant's major pumping equipment was about 50 years. Even with increased regularly scheduled maintenance, age and use had reduced the efficiency and reliability of the plant.

To address its increasing concerns regarding its pump motors, the Authority consulted with PPL Electric Utilities and coordinated with vendors to investigate the use of variable-speed drive technology.

Application:

This project retrofitted a 350-hp, 1200-rpm treated-water pump and a 60-hp, 865-rpm untreated-water pump, respectively, with new 350-hp, 1200-rpm and 75-hp, 900-rpm National Electrical Manufacturers Association (NEMA) premium-efficiency motors and variable-speed drives. A 75-hp motor replaced the existing 60-hp motor to match the new motor's output more closely to the 50-year-old motor's output. This turnkey operation consisted of the removal of the existing equipment, fabrication of mounting plates, programming and interfacing the variable-speed drive control to the existing pump control scheme, start-up and motor laser-alignments.

Motor technology has evolved over the last few decades. Premium-efficiency motors are made with more iron and copper and have bigger diameter wire and better bearings, the combination of which produces a motor with less energy loss in the form of heat and directs more of its energy into doing work.

Variable-frequency drives control the rotation of a motor by controlling the frequency of the electrical power supplied to that motor, altering the supply according to what is required to achieve the job being performed. This results in a reduction in total electrical power needed and, accordingly, energy savings.

Choosing a NEMA premium-efficiency motor coupled with a variable-speed drive for an application like the filtration plant provided this customer with the most efficient and best-operating combination of technologies.

Conclusion:

The operators see an increase in system reliability, more accurate process control, a reduction in maintenance costs over the old units and energy savings.

Information on PPL Electric Utilities' E-power rebates and incentives is available at www.pplelectric.com/e-power. Rebates are retroactive for projects that were installed after July 1, 2009.

Next Steps:

As a result of this demonstration project, the City of Sunbury Municipal Authority has targeted its other set of pump motors for replacement. The benefits seen from this project make this measure an attractive and cost-effective decision.

The Authority is planning to change its other set of motors with similar units using PPL Electric Utilities' E-power rebate and incentive programs for energy-efficient equipment, including premium efficiency-motors and variable-speed drives.

Alternative Applications:

This technology offers improved efficiency and a relatively quick payback for any older municipal water-pumping applications. It is also a viable option in other applications where customers would benefit by replacing older motors that have variable loading with premium efficiency motor and variable speed drives. Uses that may merit consideration include pumping, fans, material conveyance, air compressors and refrigeration compressors, all of which have rebates available under PPL Electric Utilities' E-power programs.

