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PA Water Treatment Plant Improves Efficiency, Capacity with Variable Frequency Drive

BY SCOTT HINSCH

Analysis of the Yaskawa MV1000 installation at George R. Sweeney shows energy savings of ~$174,000 per year and demonstrates a capacity increase through reduced restriction and increased pump output capability by 200,000 GPD.

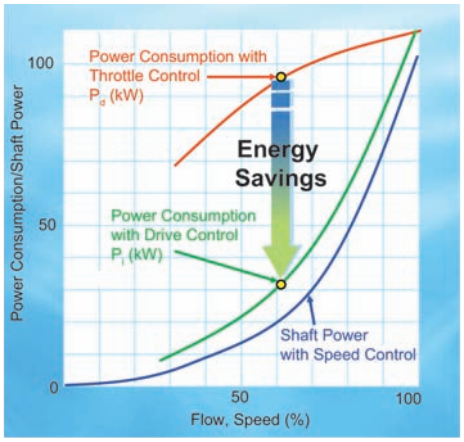
The Municipal Authority of Westmoreland County (MAWC) provides water to 125,000 customers across a five-county region near Pittsburgh, Pa. A recent upgrade to MAWC's George R. Sweeney Water Treatment Plant improved both efficiency and capacity.

The Sweeney plant, opened in 1996, initially used centrifugal pumps operating at full speed with flow controlled by throttling valves. This was the lowest installed cost alternative, commonly implemented at the time.

The cost of electric power is a major component of a facility's expense. Throttling control valves to achieve flow control is extremely inefficient when compared with controlling the speed of the pump with a variable frequency drive (VFD). Figure 1 shows a comparison of energy consumption with throttling versus VFD speed control.

MAWC researched alternatives and chose to invest in the energy-saving capability of a VFD. The application at Sweeney was a 4160 V, 700 HP pump.

Figure 1.
Energy Savings with Speed Control



Other than energy savings, additional considerations that are part of a VFD installation include:

- Input: Harmonic currents caused by the VFD can have negative effects on peripheral equipment (and neighboring facilities). It is important to meet the criteria of IEEE 519 — a measure of allowable input distortion.
- Output: The VFD synthesizes a more-or-less sinusoidal waveform (varying with the VFD technology), often requiring filtering to protect the motor. Retrofitting a VFD in an existing facility requires a careful review of the application.

MAWC consulted the expertise of DRV Incorporated, a Pennsylvania and Ohio Yaskawa America distributor, authorized service provider and drive system integrator that had served MAWC on other projects in the past. DRV suggested, and MAWC purchased, the Yaskawa MV1000 medium-voltage VFD as the optimum solution for a number of reasons:

- Input Harmonics: The Yaskawa MV1000 Smart Harmonics™ Technology results in input harmonic distortion of <2.3%, well below the IEEE 519 limit.
- Output Waveform: The 9-level output (17-level line-to-line) of the MV1000 is a high-quality sinusoid needing no filtering.
- Reliability: The MV1000 has a field-proven mean time between failures (MTBF) of >300,000 hours.

"Yaskawa and DRV were chosen due to the simplicity of the MV1000 VFDs and our experience with DRV Incorporated," said Jack Ashton, operations and production manager of MAWC. "DRV came out and assisted us in getting the drives running overnight into the weekend so that we were able to maintain water service to a highly-populated district. MAWC will continue to specify Yaskawa drives and DRV in future projects."

He also reported that initial analysis of the George R. Sweeney Yaskawa MV1000 installation shows energy savings of ~$174,000 per year. Further, it demonstrates a capacity increase through reduced restriction and increased pump output capability by 200,000 gallons per day (GPD). **WW**

The Yaskawa MV1000 medium-voltage VFD

About the Author: Scott Hinsch is Engineering/General Manager at DRV, Incorporated. He has over 25 years of experience in the drives and control systems industry.

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