

Case Study:

To achieve \$7K in annual energy savings, and optimal operation of water-filtration pumps at peak efficiency, South Windsor, CT Community Pool Complex retrofits with ABB variable-frequency drives

(Drives protect motors and save thousands of dollars a year in energy costs)

In the town of South Windsor, Connecticut, the community swimming pool complex is a much-loved summer hotspot for children and adults. Once merely a pond, the local swimmin' hole evolved over the years into a full-fledged aquatics center, which was completed in the spring of 2002. The modernized complex houses three separate outdoor swimming pools: a training pool for children; a lap pool; and the main pool. The pools stay open from the first weekend in June until the last weekend in August, and they attract an average of 600-800 visitors per day during the hottest months.

The High Cost of Keeping the Pool Water Clean

While the pools themselves are a relaxing escape for members of the community, keeping the more than one million gallons of water utilized in the three pools clean is a demanding, round-the-clock task. Since the pool water constantly must be kept flowing through a system of purification filters, the three pools are equipped with high-power pumps to pull the water from the bottom of the pool, through a series of gutter systems and into surge tanks – one tank per pool. From each tank, the water then is pumped through a series of chemical-purification filters and back into the pool.

To meet the high demands of this constant flow, the 152,000-gallon lap pool draws water through the system with a 10 HP, 200V, 3-phase pump. The 156,000-gallon training pool uses a 20 HP, 200V, 3-phase pump, and the 755,000-gallon main pool uses two (2) 30 HP, 200V, 3-phase pumps.

Recognizing the Opportunity for Significant Cost Savings

As one can imagine, the electricity required to run four pumps on a 24/7 basis is by far the pools', and city's budget for it, largest operational expense. Accordingly, Tim Friend, plant supervisor, constantly is looking for ways to improve efficiency and reduce costs. With tens of thousands of dollars worth of utility costs each season, Friend wanted to address the high-energy usage resulting from always running the pumps at full power. So he evaluated ways to reduce energy consumption while still maintaining water purity.

“We wanted to lower our high power bills,” says Friend, “We knew we were wasting energy via running the pumps at full power -- especially after hours. Fewer impurities are in the water when nobody is swimming, so by slowing the flow at night we knew we could still maintain adequate filtration in the pool and the same levels of water quality.”

Initial Efforts to Improve Pump Efficiency

In an effort to save energy at night, Friend and his team tried implementing several strategies with limited success. The first attempt they made was to shut off completely the pumps each night for a period of time; but doing so



made it so difficult for them to maintain water quality that they had to abandon the tactic altogether. They then tried throttling the valves to achieve the proper flow rate through the pumps, but since the pumps ran on single-speed motors, doing so also drove up the motor amps, back-flushing the equipment.

ABB VFDs Succeed Where Other Methods Failed

Knowing better alternatives existed, Friend drew on similar situations he had experienced in the past while working with water treatment and purification plants. To find the best solution for the pools, he turned to FlowTech Inc., a South Windsor, CT based distributor for ABB products who had assisted him on a number of previous projects. Friend worked closely with Brian Robinson, FlowTech sales engineer, and upon thorough examination, they determined that ABB VFDs could provide a major power savings.

“The excellent service and the expertise provided by Brian and the FlowTech staff have kept me coming back to them,” says Friend. “Brian turned me on to ABB VFDs a long time ago. We saw how great they worked in similar applications on several previous projects of mine. By installing ABB VFDs at the pool, we could reduce the motor speed, but still run our system with the valves completely open - all the while, achieving the full-flow rate we need to run the filtration systems. The drives created the perfect solution in that regard.”

Installation of the VFDs Completed in Record Time

Upon the recommendation of FlowTech, Friend and his crew selected an ABB ACH550 VFD for the 20 HP motor and similar VFDs for both 30 HP motors and the 10 HP motor. FlowTech also provided bypass panels for the pumps so that the pool engineers could bypass the VFDs if the need ever arose. FlowTech delivered the drives, along with the bypass panels, and Friend’s experienced maintenance staff – Charles Albert, David Geng and Bruce Lundie – handled the installation on their own, beginning with the smallest pump first.

“The Lap Pool was our guinea pig,” says Friend. “Our goal was to demo the existing flow system, install the bypass and VFD and get it back up and running the same day. Since it was the smallest pump, we had the most physical space with which to work, and we were successful in accomplishing our goal.”

With the first one under their belt, Friend’s crew then completed installation on the 20 HP pump in a day, and spent another day on both 30 HP motors. “We were thrilled at how quickly and smoothly the installation process went. Although we spread it out over a couple of weeks, it was basically only three days worth of work.”

After installation, the pump speeds were set back using the on-board time clocks that initiate pre-programmed, pre-set speeds in the VFDs. Pumps were programmed to run at 90 percent power during open-pool hours, and to ramp down to 60 percent for 12 hours each night after pool close. These settings were anticipated to yield an energy consumption reduction of over 65,000 KWH per season -- and save the pool more than \$7,000 in operational cost annually!

ABB VFDs Provide System Protection; Eliminate Hard Starts and Stops

Since the drives were installed, the pool recognized not only a dramatic reduction in energy costs, but also far less noise from the pumps. “Now we can actually stand in the pump house and hear each other talk, whereas before, we were never able to do that,” says Friend.

The drives also enable the pool engineers to eliminate hard stops and starts. When the strainers need to be cleaned or other maintenance needs to be done, the engineers can ramp the motors down, shut them off, perform the necessary tasks and then ramp the speed back up - all without the high-demand and across-the-line surges from hard stops and starts.



The ABB VFDs also serve to protect the pumps and the motors from over-current and the under-current, shutting down the system if problems occur, instead of allowing the motors to spin themselves into the ground.

“A major problem occurs when our pumps lose prime,” explains Bruce Lundie, facilities mechanic. “We are stepping the speed down at night to save power, so if the strainer baskets become clogged with leaves or debris, we could essentially not draw enough vacuum from the pump. This happened to us before where we lost prime during the night. We came in the next morning to find the pumps red hot and steam boiling out of the strainer baskets, because we had nothing in place to protect the motor or shut down the pump.”

With the drives in place, an ABB tech was able to “User load curves” as a preventative safety measure, using the Drives WindowLite program. They determined the amperage draw when the pumps lost prime, padded the number a little, and programmed the drives to trip on a fault whenever that low amperage limit is hit.

VFDs Anticipated to Pay for Themselves in Two Years

For the role Brian Robinson of FlowTech played in generating efficient and cost-saving solutions for the community, the town of South Windsor awarded him with the 2007 South Windsor Public Works Business Partnership Award. And with the energy savings the pools complex now is experiencing, Tim Friend anticipates recouping the entire project budget, the cost of the VFDs and their installation, in two seasons.

“We don’t have the final numbers back from this season yet, but between the energy we are saving and State of Connecticut energy grants, we’re thinking the retrofit will have paid for itself by the end of next year. This is by far the best decision we could have made – ABB drives and FlowTech have come through for us once again.”

Other Applications to Apply Energy Savings via Drives To

Based on their continual record of success, Friend already is evaluating ways to incorporate ABB VFDs into other applications in the future. Working with FlowTech, he has begun designing plans for upcoming projects, including a large water treatment plant renovation. “I’m so pleased with ABB VFDs that I’m specifying the rest of the treatment plan upgrades around incorporating them,” says Friend. “We’ve had nothing but top-notch results from the drives in every experience, and we are extremely confident using them in future projects.”

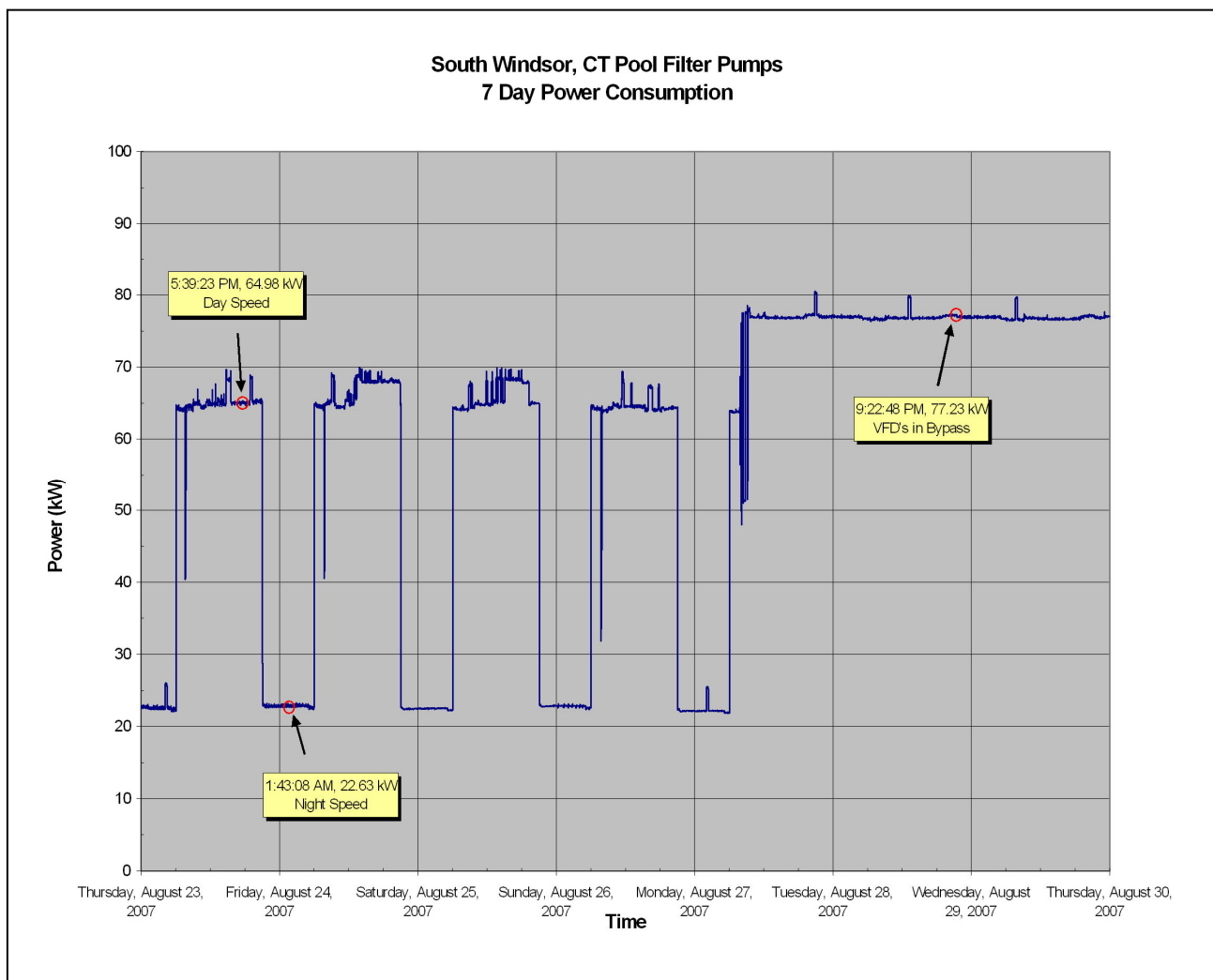
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ABB (www.abb.us) is a leader in power and automation technologies that enable utility and industry customers to improve performance while lowering environmental impact. The ABB Group of companies operates in around 100 countries and employs about 115,000 people. The company's U.S. operations employ about 9,000 in manufacturing and other facilities in 40 states.



Tag	HP	KWH Full Speed	KWH W/VFD	Savings (KWH)	Savings (\$)
Main Pump	30	66,825	44,726	22,099	2,431
Main Pump	30	66,825	44,726	22,099	2,431
Training Pool	20	38,519	25,829	12,690	1,396
Lap Pool	10	26,390	17,684	8,706	958
Total		198,559	132,965	65,594	\$7,215

(Above): A calculation of energy savings, utilizing drives to run the filter pumps serving three pools in South Windsor, CT.



Actual KW readings taken after the installation:



ABB drives added to operate varying pumping requirements of pools at Windsor, CT.



Charlie Albert, Dave Geng, and Bruce Lundie (left to right) handled the installation of all the ABB drives, operating the filtration pumps for the three pools in Windsor, CT.



South Windsor, CT, opens three pools to the public; water now is filtered via pumps controlled by ABB drives; water is filtered according to the cycles of actual use.

For more information please contact:

For Questions Related to Story

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