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# Mitsubishi VFD Reduces Energy Bills While Improving Overall Equipment Effectiveness for Pumping Application

## Case Study

### Solution

- F700 Variable Frequency Drives

### NEWPORT AQUARIUM® Benefits

- Lower costs
- Reduced maintenance
- Rapid payback

### Mitsubishi Electric Value-added Advantages

- High-performance operation
- Improved energy savings
- Improved flow control
- Increased overall equipment effectiveness



*“This was a very easy decision once we saw the significant benefits from an energy savings standpoint”*

*– Marcus Barrett, NEWPORT AQUARIUM®.*

## BACKGROUND

NEWPORT AQUARIUM®, located near downtown Cincinnati, is well-known for their 380,000 gallon Sharks exhibit where visitors can immerse themselves in one of the country’s largest open-air viewing areas. Clear underwater tunnels make the experience magical as visitors can walk underneath large sharks, stingrays, and colorful reef fish. What visitors don’t see, however, are the operations taking place behind the scenes where the facility’s life support and engineering teams work hard to keep the tanks clean. There are four 25-horsepower pump motors circulating water through the tanks that operate 24/7 with a reverse flow operation that takes place 3 times a week to clean the filters. 30,000 gallons of water are pumped through 7 filters to be captured, cleaned and recycled. According to Emily Margolen, Lead Life Support Engineer, the pump motors ran at temperatures around 126° Fahrenheit with an upstream control valve to manually adjust the flow rate.

## CHALLENGE

Pump systems with electric motors are often inefficient with regard to energy consumption, especially when valves are used to modulate the required flow. According to the International Society of Automation, pump energy consumption accounts for nearly 20% of the total electrical energy consumed around the world. This figure can rise to nearly 50% in some industrial environments. To add to these large costs, valves in pumping systems are highly susceptible to corrosion, plugging, leakage or erosion, leading to frequent maintenance or replacement. When NEWPORT AQUARIUM® discovered these statistics, a plan was developed to reduce costs and increase overall equipment effectiveness.

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## SOLUTION

In order to improve the shark tank's flow control for significant energy savings, NEWPORT AQUARIUM® turned to Mitsubishi Electric's Variable Frequency Drive (VFD) technology. With the help of KingsMen LLC, an experienced industrial solutions provider in the area, NEWPORT AQUARIUM® was able to test an F700 Series VFD on one of their 25-horsepower pump motors. The installation and start up by KingsMen took place in less than 4 hours of work to mount, wire and commission the drive. Electrical installations like this are fast and typically deliver quick ROI.



F700 Variable Frequency Drives control 25-horsepower pump motors for NEWPORT AQUARIUM®'s shark tank.

## RESULTS

The F700 Series VFD from Mitsubishi Electric resulted in 30% energy savings for NEWPORT AQUARIUM® through modulating motor speed to match flow requirements. This reduced the operating temperature of the shark tank motor from 126° Fahrenheit to 112°. The modification also eliminated the need for a control valve, resulting in reduced overall maintenance and improved equipment effectiveness. Further analysis with Mitsubishi Electric's Energy Saving Estimator software revealed that the installation of 3 additional VFDs combined with a \$3,000 rebate from Duke Energy would pay for itself after just 2 months. NEWPORT AQUARIUM® also received an industry-leading 5 year extended warranty on the F700 drive by having the installation performed by a Mitsubishi Electric Automation Certified Service Partner. Marcus Barrett, the Facility Manager of Life Support at NEWPORT AQUARIUM® commented, "This was a very easy decision once we saw the significant benefits from an energy savings standpoint." NEWPORT AQUARIUM® is now using 4 Mitsubishi Electric F700 Series VFDs to control the flow of all shark tank pumps, resulting in thousands of dollars saved every year.



Four pump motors modulate flow control for NEWPORT AQUARIUM®'s 380,000 gallon shark tank.

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