

Customer Success Story: Massachusetts Water Resources Authority (MWRA)

Market segment
Water industry



Eaton's SC9000 drives provide the essential boost for the MWRA

Location:

Deer Island, Massachusetts

Challenge:

The medium-voltage motors and drives powering and controlling the pumps at NMPS on Deer Island were aging and at the end of their useful life

Solution:

Replace the aging drives with Eaton's SC9000 medium-voltage drives to enhance power reliability and energy efficiency at the North Plant Pump Station

Results:

Increased system reliability, improved system efficiency and enhanced safety for maintenance personnel

"For the MWRA, there was no room for error and all aspects of the project needed to work seamlessly from the start—that's why we teamed with Eaton. We were confident our combined history of successful projects would translate into timely positive results for the customer."

*Greg Sapochetti, vice president,
electrical division at J.F. White*

Background

The Massachusetts Water Resources Authority (MWRA) is a public authority in the Commonwealth of Massachusetts that provides wholesale drinking water and sewage services to municipalities and industrial users primarily in the Boston area.

More than 2.5 million people and 5,500 industrial users in 61 metropolitan communities inside the Boston area rely on the MWRA water system. In turn, the MWRA is reliant upon its Deer Island Sewage Treatment Plant to help protect the Boston Harbor against pollution from the region's sewer systems.

The Deer Island facility is the second largest sewage treatment plant in the U.S., with a capacity of 1.3 billion gallons per day and average flows of 350 million gallons per day (mgd) and average flows of 350 mgd. In line with relevant federal and state environmental standards, treated wastewater from Deer Island can be released into the marine environment.

The facility's North Main Pump Station (NMPS) serves the North System of the island. This pump station includes ten 3,500 horsepower (hp) pumps. A computerized system is used to help support the operations and maintenance of the entire

Deer Island facility. This system includes a Process Information Control System (PICS) or SCADA system, which provides real-time data from systems throughout the plant, including the NMPS.

In 2002, Eaton started to work with the MWRA to replace over 50 low-voltage (480 V) drives. Eaton engineers worked closely with the MWRA to hardwire and integrate field input/output I/O points and integrate logic on the drive to control the process through the drives, avoiding the cost of adding additional programmable logic controllers (PLCs) to control the drives.



EATON

Powering Business Worldwide

Challenge

The medium-voltage motors and drives powering and controlling the ten pumps at the NMPS on Deer Island were aging and at the end of their useful life. As a result, the MWRA began planning for system upgrades in 2011—with the ultimate goal of enhancing process reliability and capacity, reducing labor requirements and improving the availability of replacement parts to simplify future maintenance.

By far, the most critical factor driving the project was enhancing process reliability and increasing the capacity of the system. The existing equipment required extra labor and maintenance, and replacement parts for this system were becoming increasingly difficult if not impossible to obtain.

This project was far more complex in scope than the low-voltage drive system Eaton supported in 2002. Now, to integrate the control and field I/O points into the drive, it would involve approximately 200 field points. This challenge was compounded by a complicated motor design and limited space availability due to the existing footprint of legacy systems; meaning the new solution would need to fit within the original space.

Beyond the specific equipment specifications, the project and the MWRA's engineering team required rigorous and complex testing of the motor and drive system. In addition to basic equipment testing, the motors and drives would need to be connected and tested under full load conditions.

To support the scale of this project, the MWRA sought a supplier that could not only provide the medium-voltage drives, but also support the entire system with a comprehensive approach and turnkey engineering capabilities. Even if system components were not manufactured by a single organization, the MWRA wanted to ensure the system worked seamlessly with all involved manufacturers working closely together to deliver an effective, interworking system.

Solution

With the expert engineering support needed to integrate logic into medium-voltage drives, and a time-tested, compact solution, Eaton stood out among competitors to help the MWRA replace the drives supporting its pump stations. Further, Eaton identified a motor manufacturer capable of meeting the MWRA's requirements, and was able to coordinate and lead project management to ensure the motor and drive system would meet rigorous project and testing requirements.

To help the MWRA meet its goals, Eaton also collaborated with J.F. White Contracting. J.F. White has extensive experience in heavy/civil, design/build, electrical, mechanical and deep foundation systems. Based in Framingham, Massachusetts and founded in 1928, J.F. White brought a history of expertise and on-the-ground support to the table.

"Our organization is energized by the opportunity to take on difficult projects within the most challenging environments," said Greg Sapochetti, vice president, electrical division at J.F. White. "For the MWRA, there was no room for error and all aspects of the project needed to work seamlessly from the start—that's why we teamed with Eaton. We were confident our combined history of successful projects would translate into timely positive results for the customer."

At the heart of the new system, Eaton's SC9000™ medium-voltage drives would control the motors and help enhance the power reliability and energy efficiency at the North Plant Pump Station.

The drives have an encapsulated powerpole (EP) and modular design, which provides a high power density in a compact footprint while enabling the drive to withstand harsh environmental conditions. With a three-level neutral point clamped inverter topology, the drive also reduces the number of power switching devices in the inverter, improving reliability by cutting down on the overall components needed.

Additionally, the SC9000 EP drives are engineered to enhance personnel safety during maintenance by incorporating grounding stick to support safe access to the direct current (DC) bus and mechanical system interlocks; with less cabling, the SC9000 reduces the risk of failure at the connection points with the motor and cable insulation.

Eaton's application experts in medium-voltage drive systems navigated and successfully integrated the I/O points from the field to directly communicate with the SCADA system. By directly communicating with the MWRA's PICS system, the drive system is better able to help the MWRA have a real-time view of what's happening at the ten pump stations.

There are many mechanical and electrical contacts in the field that are feeding directly into the drive—helping the drives make smarter logic decisions based on information coming from the field and then feeding the PICS/SCADA system directly. Eaton experts embedded the logic in the drive to handle that input, streamlining communications and enhancing the overall reliability of the system.

"The process of integrating new equipment into the MWRA's existing infrastructure was a complex undertaking," explained Rick Adams, manager, engineering at the MWRA. "Every time you embed new technology into legacy plant equipment, you run into the risk of complications. However, J.W. White and Eaton were able to properly specify and install communications components from the start, avoiding any potential issues or difficulties that could have jeopardized the wastewater treatment process and project timeline."

To optimize reliability, Eaton's Asheville, North Carolina team provided vibration analysis as well as factory, submittal and witness testing. In addition, Eaton's engineering services team performed field harmonic studies before and after the installation to help ensure fault-free operation.

Results

The collaboration with Eaton, J.F. White's Electrical Division and the engineering team at the MWRA yielded a successful, on-time project completion in 2016. In addition, all stringent onsite acceptance tests proved successful for all ten motor drive systems.

The PICS/SCADA system integrated communications with the Eaton drives is also proving a worthy achievement—providing plant operations and maintenance staff with improved drive system reliability, the ability to instantly respond to real-time events and the power to quickly adjust operations to meet flow requirements.

Overall, with the Eaton solution in place, the MWRA was able to:

- Increase system reliability at its North Pump Station
- Boost system efficiency and reduce energy costs
- Enhance safety for maintenance personnel performing work on the drive
- Better respond to real-time changes to the flow in the system as a result of storms and other events

Eaton

1000 Eaton Boulevard
Cleveland, OH 44122
United States
Eaton.com

© 2016 Eaton
All Rights Reserved
Printed in USA
Publication No. CS083116EN / Z18835
December 2016

To learn more, visit Eaton.com/water

Eaton is a registered trademark.

All other trademarks are property of their respective owners.

Follow us on social media to get the latest product and support information.



Powering Business Worldwide