



Electric Machinery Company



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Company Background

Founded in 1891, WEG Electric Machinery (WEM), part of WEG Group, custom designs and manufactures motors and generators that serve thousands of customers worldwide. Engineering cost-effective solutions for both simple and complex applications, they offer more than standard design- they build machines to their customer’s exact specifications. WEG Electric Machinery combines experience and innovation to deliver consistency and reliability in every unit.



“What I have learned is that there is no perfect solution to a problem. In school, we are taught to seek out the ‘right’ answer when in reality there never really is one. Solutions come from hard working individuals who gather as much information as possible and try to deliver a system that eliminates waste while still producing the desired outcome.” ~ BH

Project Background

Electric Machinery is currently using roughly 1.8 million gallons of water for cooling each year. The water is used to cool motors and generators during testing, and for cooling during welding. The current setup is single pass, non-contact water which is used for heat removal and then sent down the storm sewer. The company recognized the opportunity to save water in its cooling processes, and requested a MnTAP intern to look for solutions.

Incentives To Change

Electric Machinery Company recognized that single pass water cooling was inefficient and they sought a cost effective solution that would not only save water, but also time and money. Sending water down the storm sewer requires chemical treatment and special permits. The water also needs to be tested, documented, and reported monthly to the MPCA. This potential for water conservation and cost savings are the major drivers for this project.



“MnTAP allowed us to work on a identified project that we did not have the resources to focus on. Our intern was able to arrive at comprehensive and cost effective solutions. I would recommend the MnTAP program to anyone looking for support with environmental initiatives. With new solutions, there are many opportunities to benefit not only the environment, but also the business. We will likely be identifying additional projects and utilize the program again.”

*~ Nick Bergman, Continuous Improvement,
Electric Machinery Company*

Solutions

Eliminate Water with Air-cooled Heat Exchangers

Many of the current water cooled heat exchangers can be swapped out for electric air-cooled heat exchangers. These are less expensive to run, and result in zero water discharge for this process. In time, each of the water cooled heat exchangers will be upgraded to completely eliminate water use for non-contact cooling. For now, there are several specific areas that use more water than others and these areas should be upgraded first. Specifically, large quantities of water are used to cool the 12.5 gear-box and generator and the Elliot generator. These two processes alone contribute to nearly 40% of the average annual cooling water use, using roughly 700,000 gallons per year. Implementing this project will result in a water cost savings of \$6,400 per year.

Eliminate Water with Recirculation and Chillers

Another major area of water usage is the spot welder. On average, the spot welder uses about 700,000 gallons of water annually which is another 40% of the total water used for non-contact cooling. It is important to maintain the proper temperature in a spot welder to avoid damage to the machine. The best solution to save water here is to install an air cooled water chiller next to the machine so it can provide water at a consistent temperature and flow to ensure proper cooling. This water will recirculate through the spot welder to cool it, and will then flow back through the chiller to be cooled. Not only will this reduce water usage but it will provide more precise cooling for welder.

Install a Water Chiller for Enclosed Motor Testing

The last area that can be improved to reduce water usage is the tempering tanks used for the totally enclosed water-air cooled enclosures (TEWACs) and the lube systems used for the turbo generators. These processes are not used frequently, but have a large water load during operation. Currently, the tempering tank is used to pump water

through the TEWAC enclosures to control the temperature of air inside. The tank is filled with water that is temperature regulated by dumping hot used water and drawing in fresh cool city water. The solution to reduce water

is to install a water chiller to regulate the temperature of the water in the tempering tank. The chiller will draw water out of the tank, cool it, and then send it back to the tank. This tank will then be connected to the turbo lube systems to recirculate the water for cooling in these areas as well. In this way, there will be very little water consumption in these areas and Electric Machinery will make better use of equipment that they already own.

Automatic Flow Meters for Accurate Dosing

The non-contact cooling water used at Electric Machinery is treated before being sent to the storm sewer. The treatment removes chlorine that is present in tap water, but is unwanted in rivers and streams. The current dosing system is using more treatment chemicals than necessary to treat the discharge water, which is costly. The solution is to use an automated dosing system that will measure chlorine quantities in the water and vary treatment in real time to reduce the chlorine load. This automated system will save 390 gallons per year in sodium bisulfite, for a \$4,600 per year cost savings based on existing water discharges.



Recommendation	Annual Reduction	Annual Savings	Status
Automated chemical dosing	390 gallons sodium bisulfite	\$4,600	Implementing
Install air cooled heat exchangers	950,000 gallons	\$9,000	Implementing
Water chiller for spot welder	700,000 gallons	\$6,600	Implementing
Water recirculation for machine enclosures	130,000 gallons Labor and permit fees	\$8,400	Planned

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