



All Flex Solutions Inc.



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Organization Background

All Flex Solutions was founded in 1977 and manufactures flexible and rigid circuits as well as flexible heaters for a variety of industries, including aerospace, defense, and medical. All Flex Solutions has several locations in and around the metro area. This project was focused on the Northfield location, which is the center of All Flex Solutions' flexible circuit manufacturing.



"My summer with MnTAP and All Flex Solutions was an informative and exciting introduction to the industrial sector. I was impressed by All Flex's openness to new solutions, and it was inspiring to witness my ideas manifest into tangible change. Through this program I learned to approach engineering with a more creative and holistic perspective, and I also developed numerous technical skills. I am incredibly grateful to have had this opportunity. Thank you again to All Flex and MnTAP!" -NT

Project Background

All Flex Solutions uses over 15,500,000 gallons of water every year at their Northfield facility in the wet room which has the machines that process the circuit boards. Currently, the machines use single-pass cooling for their cooling water lines, which means water is only used once before it is sent to waste treatment. This project involved creating a comprehensive water map and water balance of the wet room at the facility and identifying ways to reduce water use.

A water map of the wet room was created by outlining the floor plan and following the water lines. Flow rates were measured with an ultrasonic flow meter. The rinse water and cooling water flow rates for each process machine were measured. Additionally, the type of water (city water, soft water, reverse osmosis (RO) water) was recorded. Using the flow rates and annual run times estimated based on previous water use data, the annual water use in each machine was determined. A water balance was created based on these quantities which showed how much water was used for different processes.

Incentives to Change

All Flex Solutions is motivated to improve their sustainability including reducing water use. Additionally, the City of Northfield would like facilities to shift away from single-pass cooling in the next 1-2 years. All Flex Solutions is also opening a new facility in Bloomington which provides an incentive to reduce costs and where some of the solutions may also be applied.

SOLUTIONS

Recycle Cooling Water to RO System

All Flex currently uses 3,300,000 gallons of water each year for single-pass cooling in process machines. To move away from single-pass cooling, recycling the cooling water through an RO system is recommended. The recycling system involves sending the cooling water to a storage tank after it passes through the machines. Then, the water is pumped to a new RO system to be processed when the water level in the RO tank is low. After passing through the RO system, the water collects in the existing RO tank for use. This recommendation would save 3,300,000 gallons of water and \$27,000 each year.

Solutions

Reduce Flow Rates and Install Flow Limiters

Reducing the rinse and cooling line flow rates on the machines and installing flow limiters to ensure the flow rates are maintained is recommended. During the internship, testing was completed on three machines to determine the minimum flow rates and the flow rates were reduced to save 1,100,000 gallons of water and \$9,500 annually. Flow limiters still need to be implemented. Additional testing could identify other machines with flow rates that are too high.

“All Flex Solutions and I were very excited to have an intern from MnTAP over the summer. During his internship, Nile performed critical analytical data collection for our water usage, defining many areas for water reduction and improvement potential. Nile also designed systems to reuse some of our waste streams creating a significant annual water usage reduction. I was grateful for the opportunity to provide guidance for Nile’s internship regarding our water conservation project.”

*~Jon Gilligan, EHS Engineer
All Flex Solutions, Inc.*



Recommendation	Annual Reduction	Annual Savings	Status
Recycle Cooling Water to RO System	3,300,000 gal water	\$27,000	Planned
Reduce Flow Rates and Install Flow Limiters	1,100,000 gal water	\$9,500	Partially implemented

MnTAP Advisor: Laura Sevcik, Associate Engineer