

GE Water & Process Technologies



Nikola Trukov
Chemical Engineering
University of Minnesota Twin Cities

Company Background

GE Power & Water Technologies is a division of GE that focuses on providing clean and sustainable sources of power and water to customers by emphasizing efficiency and productivity. On the power side, GE focuses on producing equipment such as generators and turbines. On the water side, the company focuses on water treatment and wastewater purification in order to optimize water resources. With the production of many types of membranes and filters, GE is able to help provide high-quality water to businesses and homes, earning it the award of “Water Company of the Year” by the Global Water Intelligence.



“This MnTAP project provided me the opportunity to apply the knowledge I have gained in the classroom to real-world processes. It was an amazing experience which allowed me to develop project management and communication skills that will be crucial to my future career. It was great to expand my knowledge and gain valuable experience while making an impact by reducing water use and cost for the company.”

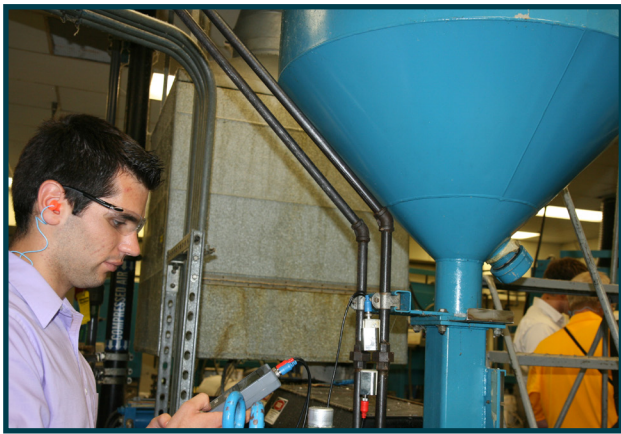
Project Background

Six different lines are used to produce filters from polypropylene beads. The beads are conveyed to a hopper on top of a heated extruder. Non-contact cooling water controls the extruder bearing and barrel temperature and prevents heat from rising into the hopper. The water flow is extremely important in preventing the polypropylene from melting prematurely and clogging the hopper as it drops into the process. The extruder barrel drives the polypropylene through progressively hotter zones which melt the material. The extruder and the hot polypropylene are driven by several motors to the production machines where the polypropylene is made into a filter. The production machine has a motor and uses non-contact cooling water to remove heat from the newly formed filter.



Incentives To Change

GE is strongly committed to reducing waste production and creating more efficient processes. As part of the production process of depth filters, non-contact cooling water is used in a single-pass cooling system. Being able to analyze and understand the water flow through the process allows for a possible reduction and regulation of the amount of water used. Creating an efficient way to use the water will not only reduce the cost of the overall process, but can also help reduce wastewater. It is a change that will benefit the facility and advance its goal of protecting the environment.



down. Implementing this change will lead to additional savings of about 173,000 gallons. These savings are hard to estimate because they are dependent on the demand for the product, which changes every year.

Place Thermocouple On The Gear Box

The gearbox is an exposed surface that can cause a serious safety hazard if it overheats. A thermocouple will allow the operators to keep track of the surface temperature and make sure the process is operating around a safe temperature of 120° F as the water flow and water temperature fluctuate.

Implement The Same Changes To Line 6

Right now, tests are being conducted on line 6 to learn about the current state of the line. The flow rate for this line has been recorded. Collecting water temperature data over a three-week period showed there was an opportunity for water reduction. Based on the data collected so far, it has been estimated that the water flow can be reduced by a total of 2 million gallons per year, corresponding to \$4,500. More concrete numbers and recommendations can be made when more data has been collected.

Solutions

Install Metering Valves And Flow Meters

The flow rate of the cooling water is related to the temperature profile throughout the extruder. Currently, a total of 3.3 million gallons are flowing through extruders on lines 1 through 5. By collecting temperature data over a three week period, it was concluded that the flow rate through multiple extruders is high. Installing a metering valve on the water supply pipe on each extruder will provide the ability to control and reduce the water flow. The flow meters will be used to monitor the flow rate and confirm the presence of cooling water. Implementing these changes can reduce water consumption by 1.45 million gallons, providing up to \$3,100 in savings.

Install A Solenoid Valve With An Interlock Mechanism

Usually, the lines are constantly operating, so a continuous flow of cooling water is needed. However, sometimes a line can be turned off for a specific period of time. When a line is not operating, there is no need for water flow. A solenoid valve can be used to turn the water flow on and off. An interlocking mechanism consisting of a switch and a relay will connect the solenoid valve to the heaters and ensure that the cooling water is automatically turned on once a line is started up and turned off when the line is powered



Recommendation	Reduction	Annual Savings	Status
Install metering valves and flow meters	1,450,000 gallons water	\$3,100	Proposed
Install solenoid valve with an interlock mechanism	173,000 gallons water	\$370	Proposed
Place thermocouple on the gear box	N/A	N/A	Proposed
Implement the same changes to Line 6	2,050,000 gallons water	\$4,500	Testing