Lean, Energy & Environment (LE2) Assessment for Gleason Works

Client
Gleason Works designs and sells gear manufacturing equipment and manufactures to-order gears. Part of their gear manufacturing includes hard chrome plated gears. The chrome plating process includes parts rinsing resulting in waste water containing hexavalent chrome and other chemicals from the plating process. Gleason also must use an exhaust fume scrubber to eliminate any chromium mist from the exhaust ventilation of the chromium plating tanks.

Opportunity Areas
Gleason Works has been using an electro-chemical treatment system that removes the chromium and other metals from the plating rinse water and returns the water to the rinse tanks for reuse. The treatment system generates a metal sludge and uses large amounts of compressed air as part of the process. The treated rinse water gradually builds up salt levels until it can no longer be used and is sent to the local water treatment facility.

The fume scrubber requires removal of the mist collecting scrubber balls once they build up a biofilm. The labor and disposal costs are high to dispose and replace the scrubber balls. It is believed that the biofilm grows rapidly due to organics from the cleaning operation. The existing electro-chemical treatment system does not remove organics.

Objectives
Identify energy and environmental alternatives for both the treatment system and the scrubber.

Work Performed
Electrical use data was collected on all the pumps and equipment associated with the electro-chemical treatment system. Costs for scrubber ball and sludge disposal were determined. The use of reverse osmosis (RO) for incoming water and the use of an ion exchange system (DI) for each rinse were evaluated as a replacement system for the electro-chemical treatment process. Also, conductivity measurements were taken for the various rinse tanks immediately after part rinsing. This provided an estimate of ion loading on the ion exchange system and provided some estimates of ion exchange life. The new system would also remove organics with a carbon filter.

Results
By implementing the recommended improvements, the following annual reductions are estimated:

- $11,328 in electricity costs and 141,596 KWH of electricity in converting to the RO-DI treatment system
- $14,385 per year in other costs such as sludge disposal and scrubber maintenance

This project was funded in part by a grant from the New York State Energy Research and Development Authority (NYSERDA).