ROSENBOOM

SHELDON

DAYTON WRIGHT
Major: Chemical Engineering
Iowa State University

COMPANY PROFILE

Rosenboom is a family-owned business started in 1974 by Lary and Viv Rosenboom. They have become the leading manufacturer of custom crafted hydraulic cylinders for consumers large and small. Their corporate headquarters is located in Sheldon, Iowa, with manufacturing plants in Sheldon and Spirit Lake, Iowa, and Bowling Green, Ohio. Rosenboom currently employs 934 people who are all focused on delivering a quality product at a competitive price. The company is dedicated to sustained growth through continuous improvement, exceeding customer quality and service requirements, and minimizing environmental impact.

PROJECT BACKGROUND

In Rosenboom's efforts to limit their environmental impact, hazardous waste reduction was a top priority for Rosenboom's 2019 intern project. Two primary areas of focus were the metal finishing area and the paint line, the plant's two largest hazardous waste producers. The metal finishing area utilizes chrome plating machines which generate hazardous waste in the form of chrome contaminated debris and mop water. The paint line produces waste in the form of washer sludge, paint booth paper, and solvent still bottoms. It was the intern's goal to limit hazardous waste in both of these areas.

INCENTIVES TO CHANGE

Rosenboom's commitment to continuous improvement includes an unfailing focus on minimizing their environmental footprint. Currently, Rosenboom is a large quantity generator (LQG) of hazardous waste, producing more than 1,000 kilograms of hazardous waste per month. Efforts to reduce hazardous waste generation onsite will support their goal of continuous improvement and reduce Rosenboom's environmental impacts, moving them closer to a goal of achieving small quantity generator (SQG) status. Additional benefits would include the health and safety benefits of reduced hazardous materials onsite, and reduced costs associated with management and disposal of the hazardous materials.

RESULTS

Mop Water Reuse: When the metal finishing area was built, Rosenboom saw an opportunity to recycle rinse water from the end of the chrome plating machine using a designated water treatment system. The specialized system would be able to filter the chrome from the rinse water and reuse the filtered water in the tanks for the chrome plating machines to make up for evaporative losses, provided a set purity standard for the water could be attained. Working with the system vendor, a system was customized that could provide an opportunity for water reuse and reduce hazardous waste generation of the chrome mop water. This project is awaiting management review and approval.

Washer Automation: The current multistage washer used by the paint line runs continuously while the plant is in operation, even when parts are not being run through the washer. Energy is lost when the pumps operate needlessly, and increased evaporative losses occur. Water losses also occur when the washer's makeup water stream runs during these downtimes. Motion controlled or on-demand flow control switches that detect when a part carrier was about to enter the washing unit could offer significant water and energy savings in the washer process. There is some automation infrastructure in place to support this recommendation. A photo-eye sensor or a whisker switch could be wired to the existing automation processor with timers and counters so that each stage would smoothly and systematically turn on and off as needed. This project has been approved and added to the company's implementation schedule.

Paint Process Consistency: The intern spent a considerable amount of time observing the paint line processes, noting parts, colors and color changes, and painting techniques. It was noted that, while skilled, the painters use varying techniques and styles in terms of stroke length, direction, and duration on the same parts. Adopting a unified painting method that incorporates best management practices has been proven to increase transfer efficiency in industrial paint applications. Customized programs are available that include classroom instruction, virtual painting training, and in-booth training and observation. Case studies from the recommended training program have shown it to increase paint transfer efficiency by an average of 30 percent and reduce paint time by 3 percent. These efficiency gains lead to less paint waste, reduced hazardous waste generation and increased production efficiency. This project is under consideration and awaiting management review and approval.

Solvent Recycling: Still bottoms from the solvents used on the paint line account for most of the hazardous waste generated in that department. Used solvent is collected into a 55-gallon drum and the solids are settled to the bottom. The liquid solvent is recycled onsite, which results in recovered solvent that can be reused and additional solids that must be disposed of as hazardous waste. Using an offsite recycling vendor would allow used solvent to be recovered in a larger, more efficient system, leading to increased solvent recovery. The used solvent could be collected from both the Sheldon and Spirit Lake production facilities for the recycling and recovery process. Reclaimed solvent could be returned to both plants for further use. A sample of the solvents needs to be analyzed to determine economic feasibility. This sample analysis is in progress, and upon completion, results can be reviewed and next steps determined.

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
Mop Water Reuse	$2,738	8.5 tons of mop water	Recommended
Washer Automation	$9,643	35,583 kWh 1,022,254 gallons 16,988 therms	In Progress
Paint Process Consistency	$853	1 ton paint booth paper	Recommended
Solvent Recycling	TBD	TBD	Further Analysis Needed