

ECO Finishing



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Company Background

ECO Finishing is an electroplating shop in Fridley was established in 1994 and has about 100 employees. ECO Finishing offers electroplating, anodizing, phosphating, and electroless nickel plating services to its clients. Parts come from a wide variety of industries, including the automotive, aerospace, military, and manufacturing industries. ECO Finishing strives to meet its customer's requirements and demands in both plating quality and lead time.



“This experience gave me a chance to use my classroom knowledge in a real-world setting, improve my communication skills, and manage a project – all while making a positive impact on the environment and the company.”

is a risk of exceeding the service availability charge (SAC) baseline for sewerage of wastewater. In 2014, one-time SAC fees in the metro region were \$2,485 for every 274 gal per day increase.

Project Background

Two large production expenses at ECO Finishing (and most plating shops) are water usage and sludge generation. The majority of water usage at ECO Finishing is used in rinse tanks that remove plating and cleaning solutions from parts. Heavy metals end up in the rinse water, and need to be removed before water can be discharged. Through a treatment process, these heavy metals are precipitated and manifest themselves as sludge, which is a hazardous waste that ECO Finishing pays to be disposed of in a landfill. Sludge can also form in process tanks, and this sludge is removed and disposed of periodically as well. I examined ways in which water usage and sludge generation could be reduced and identified four methods that reduce water and waste related costs.

Incentives To Change

ECO Finishing uses nearly 36 million gallons of water per year, and generates approximately 700,000 pounds of electroplating sludge each year, costing \$240,000 and \$98,000 per year respectively. Additional money is spent to purify some of the water by softening and reverse osmosis (RO). If production expands in the future, there



Solutions

Install Conductivity Control Systems For Rinses

Production is very sporadic on some process lines, so water entering the rinse tank may not clean any parts. Conductivity control monitors the contaminant level in the rinse tank, and activates a solenoid to supply water only when contaminant levels get too high. ECO Finishing could save 1,520,000 gallons of water and \$8,600 per year by implementing conductivity control on four rinse tanks. An additional 10 tanks have been identified that would be the next most promising for conductivity control as costs change in the future. If all recommended rinses were implemented, ECO Finishing could save up to 5,810,000 gallons of water and \$33,400 per year by installing conductivity control on all 14 rinses.

Convert Cleaner Baths To Soft Water

ECO Finishing currently uses softened water for plating bath make-ups and rinses where ferrocyanide can be an issue. In initial, small-scale experiments, the intern found that making up cleaner baths and cleaner rinses with soft water kept the cleaning chemical in solution more effectively and also led to cleaner parts. Estimates include a reduction of 4,000 lbs of sludge per year, a reduction in cleaning chemical additions, and savings of \$6,100 per year in sludge disposal and labor for implementing soft water cleaner baths on three process lines.



Increase Drip-Time Of Parts

Dragout is the process solution that drips into the tank during carryover or adheres to the parts as a thin film.

Dragout is the main contributor to sludge in the shop. One test on the small zinc line showed that by waiting 5 seconds for parts to drip before moving to the next tank, there was a 25% reduction in dragout.

Implementing this procedural change can reduce ECO Finishing's sludge generation by approximately 116,000 lbs per year which, along with chemical savings, would save about \$28,275 per year.



Recycle Hot RO Rinses

ECO Finishing uses RO water for ultrapure, hot, final rinses on six lines. Currently these very pure rinses are being sent down the drain. A currently unused RO system in-house could be used to recycle these hot rinses, saving approximately 1,700,000 gallons of water per year. Additionally, the system would have a heat exchanger that would protect the RO membranes and recover approximately 19,000 therms per year. The system would cost about \$14,640 in equipment and labor, and would save the company \$25,620 in water and energy.

Recommendation	Reduction	Annual Savings	Status
Install conductivity control systems for rinses	5,810,000 gallons water	\$33,400	Testing
Convert cleaner baths to soft water	4,000 lbs sludge	\$6,100	Implementing
Increase drip-time of parts	116,000 lbs sludge	\$28,275	Implementing
Recycle hot RO rinses	1,700,000 gallons water 19,000 therms	\$25,620	Under review