Intern Name: Bella Aguirre
Major: Industrial and Systems Engineering
School: University of Washington - Seattle
Business: Valence Surface Technologies
Industry: Aviation/Aerospace Component Manufacturing (NAICS: 3328)
WASI Project: Wastewater Reduction

Company Description:

Valence Surface Technologies is the world's leading aerospace product finishing company. They provide surface finishing processes including metal etching, chemical treatment, and painting of titanium, stainless steel, composite, aluminum, and plastic parts to the commercial and business aerospace, military and defense, space and satellite industries, and medical sciences. With over 200 employees, their two Seattle locations process small to medium-sized precision parts for the aerospace industry.

Incentives to Change:

Valence Seattle has two wastewater pretreatment systems, which include a pH Neutralization System and a Batch Treatment System. Their wastewater discharge volume is approaching their maximum discharge limit. Valence wants to reduce their water usage and hazardous wastewater generation to ensure they stay below their permit limits and avoid costly non-compliance.

Project Description:

The WASI internship project analyzed data and examined processes to optimize the water flow rate and chemical additions into the tanks including:

- Identifying areas for water conservation through the analysis of the daily wastewater flow and total dissolved solids (TDS) levels for individual rinse tanks.
- Analysis of both an automatic and a manual method to reduce water usage.

Water usage is measurably decreasing using this new process, with an estimated reduction of approximately 1540 gallons of water per day and a potential savings of about $1550 per month.

Recommendations

Flow meters and increased mixing:

The intern chose a single process tank to analyze for this project; if successful Valence can implement the changes to the rest of their 52 process tanks. Two simple changes could save Valence nearly 400,000 gallons of water a year:

1. Adding inline flow meters to five rinse tanks to monitor usage and add water more accurately. Valence used ball valves to control flow rate on the tanks.
2. Attaching a PVC pipe to extend the water inlet lower in the tank. This allows the fresh water to mix thoroughly instead of remaining at the top where it originally entered.

Countercurrent Flow:

Countercurrent flow could reduce water usage and wastewater generation by over 430,000 gallons annually. The WASI intern proposed adding countercurrent flow in two sections of the Anodizing Process Lines, which would connect three rinse tanks (currently plumbed individually) with fresh water inflow. This would allow the last rinse tank to receive additional fresh water while the previous tanks would receive the overflow water from the cleaner tank.

Dragout Reduction:

The chemicals that cling to a part as it is removed from a process path are cleaned off in the following rinse tanks. This dragout can be reduced by removing the parts from the process bath slowly or increasing the hang-time to allow the process chemicals to drip back into the tank. This results in fewer chemicals on the parts, which means fewer chemicals to rinse off, and cleaner rinse tanks. The WASI intern recommends:

- Adding a 5-second increase in hang time which can result in a 25% reduction in dragout chemical loss.
- Adding guards in between tanks to catch excess liquids that drip off the parts and direct them back into the process tank.

Table 1: Recommended Pollution Prevention Actions

Recommended P2 Actions	Initial Costs	Annual Savings	Hazardous Chemical Reductions (per year)	Wastewater Reductions (gal/year)
Flow Meter + PVC extension	$1,150 (parts only)	$18,600	n/a	396,600
TDS Controller	$10,000	$18,600	n/a	(see above)
Counter-Current Flow	$400	$20,160	n/a	433,164
Drag out Reduction: Decrease process chemistry and water	$0	unknown	25% reduction	25% reduction