

Integrating P2 into the Permitting and Enforcement Processes

Metal Finishing Industry

Metal finishing processes can be very diverse, depending on the types of cleaners used, solvent or aqueous; the type of metals being plated or treated; and the type of treatment being applied. The following general P2 opportunities offer savings in raw materials, and reductions in emissions, wastewater contaminant loading, and hazardous waste generation, while improving the state of compliance for metal finishers:

- Rinse water recovery and conservation technologies
- Bath maintenance practices
- Wastewater recycling
- Drag-out control/reduction

Rinse Water Recovery and Conservation: Countercurrent rinse systems can reduce water use and wastewater generation by as much as 95% if three tanks are used and 90% with two tanks. The first rinse tank can be piped to the bath for chemical recapture for further savings.

Use of restriction orifices, conductivity sensors, and automated water controls can reduce water use and wastewater generation. Flow orifices are inexpensive to install and can reduce water use by 50% or more; conductivity systems start at \$700-\$4000 and are associated with higher maintenance needs for beneficial operation.

Metals can be removed from rinse water by using several technologies such as membrane filtration, ion exchange technology, or electrolytic metal recovery. Cost is dependent upon metals to be removed, flow, and technology used but is usually associated with high up-front spending and operational and maintenance costs. One company installed an electrolytic recovery system for \$12,000 and saved \$17,000 the first year in avoided treatment costs.

Permitting: Units can be included in a discharging permit as a method to control contaminants.

SEP: Contaminant reducing technologies be used to achieve compliance, reduce contaminant loading, water use, and the amount of sludge generated.

Bath Maintenance Practices: Maintaining purity of the chemical baths prolong the life of that material, yielding considerable savings in raw materials, hazardous waste generation, and on-site and off-site treatment costs. Depending on the bath type the following technologies are used to prolong bath life:

- Particle and carbon filtration
- Carbonate freezing
- Metal precipitation
- Dummy plating

Carbon Filtration for Organics Removal: Activated carbon filtration can be used to regenerate plating baths. This method consists of a holding tank, a mixing tank, and a specific filter. One company reduced the volume of plating baths disposed and the amount of virgin chemicals purchased by 47%. Capital cost for the activated carbon filtration unit was \$9,192 and operational/maintenance costs were \$7,973 per year. Savings came from \$67,420 in reduced waste disposal costs and \$55,000 in chemical savings. Waste generation was reduced by 10,800 gallons a year. The payback period was three months.

SEP: Installation of equipment and adopting operating practices would provide nexus to hazardous waste SEP.

Drag-Out Reduction: Reducing the amount of process chemical lost or “dragged” out of the bath and into the next tank represents one of the greatest areas for low-tech P2. Drag-out can be reduced by 40% by allowing at least a 10-sec drain for some parts. Installation of automatic “hang” systems and drip bars, use of “dead” rinse tanks, and air knives are other methods used to reduce drag-out losses. Savings is dependent on many factors: bath viscosity and temperature, process line speed, part geometric complexity, and racking technique (barrel plating typically will carry 10X the amount of solution out of the bath).

Installation of dead rinse tanks can save up to 50% rinse water use and greatly reduce chemical losses. Cost depends upon tank size. Installation of air knives use air to blow excess liquid off of parts and can represent significant savings in chemical use and reduce wastewater significantly. One company recaptured 75% of its bath chemical by using air knives. Capital costs depend on existing infrastructure but can be as low as \$500 per bath.

Permitting: These methods can be included in a metal finisher’s discharging permit to reduce contaminant loading.

SEP: These can be used as part of SEP to reduce contaminant loading to the POTW. A Company support a third-party workshop/seminar on dragout reduction and host the workshop at their facility.