Division of Environmental and Financial Assistance
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Metal Finishing Pollution Prevention

Many industries use metal finishing in their manufacturing processes. The economic benefits of metal finishing pollution prevention include reducing water usage and sewer fees. It also can help save you the time and expense required for spills and cleanup.

Many industries, including automotive, electronics, aerospace, heavy equipment, appliances, tires, and telecommunications, use metal finishing in their manufacturing processes. Without metal finishing, products made from metals would last only a fraction of their potential lifespan because of corrosion and wear.

Finishing is also used to enhance electrical properties, to form and shape components, and to enhance the bonding of adhesives or organic coatings. Electrolytic plating, electroless plating, and chemical and electrochemical conversion processes are typically used in the metal finishing industry.

What is Pollution Prevention?

Pollution prevention (P2) is the use of source reduction techniques to reduce risk to public health, safety, welfare and the environment and, as a second preference, the use of environmentally sound recycling to achieve these same goals. P2 addresses all types of waste and environmental releases to the air, water and land.

Supporting processes include degreasing, cleaning, pickling, etching, and/or polishing. Some materials used in metal finishing are solvents and surfactants for cleaning, acids and bases for etching, and solutions of metal salts for plating the finish onto the substrate.

Parts Cleaning

Parts should be pre-cleaned mechanically as much as possible before plating or other finishing operations. This helps reduce the amount of contaminant entering plating solutions and reduces the amount of waste generated. Determine the level of cleaning needed to allow the part to be properly plated. Excess cleaners can contribute to waste generation. Use non-hazardous or aqueous cleaners. Work with the parts supplier to use a corrosion inhibitor more easily removed or compatible with the cleaning system on site. Arrange for just-in-time delivery to reduce or eliminate need for corrosion protection.

Reduce Drag Out Losses

Drag out reduction and recovery involves returning plating chemicals to their original bath before they become part of the waste stream. The following techniques can be used to capture chemicals dragged out of plating tanks:

- Extend the drip time for parts being finished by installing drip racks to extend the life of plating solutions.
- Install drainage boards between tanks to route drag out into the correct process tank.
- Reduce workpiece withdrawal rates from the chemical bath.
- Install air knives or water misters to remove drag out.
- Lower the concentration of plating bath constituents, and increase the plating solution temperature. This reduces solution viscosity to enhance runoff.
- Rack work pieces being plated so that the cavities open downward to promote draining.
- Use non-ionic wetting agents to reduce solution surface tension which also improves draining.
- Use angled barrels technique to increase draining.
- Use a fog-spray tank, which recovers plating chemicals by washing them from parts with a fine water-mist. The solution that collects in the fog-spray tank is returned to the process tank as needed. The added water helps to offset evaporative losses from the process tanks.

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Maintain Chemical Baths

Maintaining chemical baths can reduce the amount of waste generated by allowing the bath to be used longer. Regularly monitor bath chemistry with pH and conductivity controls. Reduce drag out losses and drag in contaminants. Cover baths when not in use to minimize particle contamination. Install drag-out collection tanks or static rinse to capture bath chemicals for reuse. Filter chemical baths with a filter that can be unrolled, cleaned and reused. Use a bath maintenance technology to clean chemical baths or remove unwanted metals. Remove parts dropped daily.

Use de-ionized water instead of tap water for process baths and rinsing operations to reduce sludge generated. Use less toxic plating solutions (for example, zinc instead of cadmium, trivalent chromium instead of hexavalent chromium) to reduce the amount of hazardous sludge generated.

Reduce Rinse Water Use

Reducing the amount of rinse water conserves water, extends bath life and helps reduce the amount of waste generated. Reducing chemical drag-in helps reduce the amount of rinse water needed to maintain bath chemistry. Installing multiple rinse tanks in a counter-current series system allows reuse rinse water in multiple baths.

Install automatic flow controls, such as flow restrictors or conductivity sensors. Stop rinse water flows when not using the lines, if possible. Agitate the rinsing bath to increase efficiency. Repair leaking tanks, pumps and valves. Conductivity controllers on plating rinse tanks will help control water use. Use metal recovery techniques (such as ion exchange, reverse osmosis, electrolysis) or evaporators to reuse rinse water.

Benefits of Metal Finishing P2

The economic benefits of metal finishing P2 include reducing water usage and sewer fees. Extending bath life and reducing bath contamination can lower your chemical purchasing costs. Reducing the amount of sludge and hazardous waste generated can lower your disposal costs and reduce your regulatory requirements. Reducing chemicals and contamination in process water can lower wastewater treatment costs. It can also help save you the time and expense required for spills and cleanup.

Need more help?

Contact the Office of Compliance Assistance and Pollution Prevention at (800) 329-7518 for more information or check the Division of Environmental and Financial Assistance website at ***epa.ohio.gov/defa/***. For information about the ways other Ohio companies may be implementing pollution prevention, and possible ideas for your facility, please refer to our ***Encouraging Environmental Excellence (E3) webpage***.