



Metal Finishing Sector

EPA Region 2

Pollution Prevention

Insights
Bulletin

The U.S. Environmental Protection Agency is working to reduce releases of toxics from small businesses during extreme weather events (e.g., flooding and storm surge events). This bulletin highlights pollution prevention opportunities for increasing the success, competitiveness, and overall resilience of your business. Pollution prevention strategies which include the use of environmentally friendly products and practices, can reduce the risk of improper chemical management, limit liability, save money, and increase worker and customer satisfaction.

Did You Know?

The heavy metals and cyanides used in the plating industry are dangerous to the health of employees and can be brought home on clothing thus affecting others. Children and pregnant women are more susceptible to the health risks of heavy metals.

Dangers associated with exposure to heavy metals are specific to the type of heavy metal and amount of exposure. Some health risks associated with specific heavy metals are listed:

- Hexavalent chromium is a known human carcinogen. Inhalation can cause adverse effects on the respiratory system; and long-term exposure can cause lung cancer.
- Lead can cause damage to almost every organ and body system; especially affecting the cardiovascular, central nervous, and immune systems, and the kidneys.
- Cadmium can cause damage to the kidney and lung and can even cause failure in these organs.

Nickel, zinc, and silver also cause health hazards. Health effects of these common plating metals range from abdominal pain to damage to major organs and even cancer.¹

¹OSHA: <https://www.osha.gov/SLTC/metalsheavy/index.html>

Additional Information:

EPA Region 2 Pollution Prevention Toxics Mitigation Program,
http://www.epa.gov/region02/p2/other_p2_prog_init_actv.html

Metal Finishing Industry Manual (NEWMOA):
http://www.wmrc.uiuc.edu/main_sections/info_services/library_docs/manuals/finishing/toc1.htm

EPA Sector Notebooks: Profile of the Fabricated Metal Products Industry:
http://www.epa.gov/compliance/resources/publications/assistance/sectors/not_ebooks/fabmetnsn.pdf

National Metal Finishing Resource Center:
<http://www.nmfrc.org/subs/calcs.cfm>

National Association for Surface Finishing: <http://www.nasf.org/index.php>

A Success Story

Technical Plating Brooklyn Park, Minnesota

Reducing wastewater

Technical Plating wanted to reduce wastewater in order to cut down on water costs and SAC fees. This also helped reduce the release of toxins to the external environment that were being discharged through this excess wastewater.

Technical Plating decided to reuse effluent by installing a sand filter and two holding tanks. One holding tank was used to recirculate the water through the sand filter and the second tank held the filtered effluent until it was needed. This system costs \$800 a year to operate, but **saved the company \$3,800** in annual fresh water costs and SAC fees by **decreasing water use by 5,500 gpd**.

Three flow meters were added to the internal barrel rinsing operation. This addition had a one-time cost of \$450, but **saved the company \$4,100** in water costs by **decreasing water use by 5,000 gpd**. It also saved the company **\$21,000 in one-time SAC fees**.

A new system for internal rinsing was developed. This **saved the company \$3,800 a year in water costs** by **decreasing water use by 1,400 gpd**.

CREDITS

Special thanks to the Wyoming Department of Environmental Quality for providing the case study information.

Metal Finishing Insights



Housekeeping and Maintenance

- Remove dropped parts from baths quickly to prevent metal impurity buildup.
- Use corrosion resistant tanks made of materials such as polypropylene, fiberglass, and stainless steel.
- Improve air pollution control with add-on control devices, like condensers, carbon absorbers, scrubbers, & tank lids with blowers.

Materials Usage and Storage

- Replace toxic material process inputs such as cyanide, cadmium and chromium with less-toxic alternatives.
- Minimize the use of solvents or use water-based solvents for cleaning.
- Regularly test process baths for pH and metal concentration to know when contaminants should be removed or chemicals added.
- If your shop employs nickel baths, then they can be purified by activated carbon adsorption.

Process Control

- Hard water can decrease the effectiveness of a cleaning system. Use deionized, distilled, or reverse osmosis water as rinse water to reduce the presence of contaminants.
- Examine incoming water quality to see if treatment is required, such as filtering or deionizing, prior to use in process baths.
- Use counter-flow rinsing for acid rinse and alkaline rinse tanks.

Operations Management

- Parts should be properly cleaned and rinsed before plating to minimize contamination.
- Changing process parameters, such as viscosity and surface tension can help minimize drag-out.
- Drag-out can be minimized by increasing solution temperature, decreasing chemical concentration and/or using nonionic surfactants which reduce surface tension.
- Accidental bath overflows can be prevented by installing high-level alarms and/or float level controllers.

Invitation

You are invited to share your own success stories and insights with the EPA Pollution Prevention and Climate Change Section for consideration in our next bulletin!

Tell us what problem or challenge your small business faced, what steps you took to overcome it and how or why it resulted in a successful outcome. Provide details like the ones you see in this bulletin that explain how your actions resulted in cost savings, operating efficiency improvements, or other measurable successes.

Your story could be featured in our next bulletin to serve as an example for other small businesses.

For more information and to find out how YOU can submit your success story, send an e-mail to us at: Region2_PollutionPrevention@epa.gov or visit us at: <http://www.epa.gov/p2/comments.htm>

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<http://www.broward.org/EnvironmentAndGrowth/EnvironmentalProgramsResources/Publications/Documents/MetalFinishingFacilities.pdf>

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