

Metal Finishing Pollution Prevention Opportunities Checklist

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Pollution Prevention Opportunities for Metal Finishing

The keys to pollution prevention in metal finishing are to minimize chemical dragout; minimize the amount of water used for rinsing; and recover, reuse, and recycle plating chemicals.

| Y/N | Opportunities | Comments |
|---|-------------------------------------|---|
| I. Material Handling and Storage | | |
| | Control inventory | Do not allow material to exceed shelf life. Use materials on a first-in, first out basis. |
| | Buy appropriate amounts | Buy materials in small quantities if only small amounts are required. |
| | Cover outdoor storage | Divert clean stormwater away from storage areas. |
| | Install spill containment | Spills can be contained and managed. Reduces wastewater treatment upsets. |
| II. Dragout | | |
| | Lengthen dragout time | Allows more chemical to drip back to process tank, so reduces the amount of chemical introduced in rinsewater. |
| | Establish dragout timing | Post dragout times at tanks to remind employees. |
| | Install drain boards or drip guards | Boards and guards minimize spillage between tanks and are sloped away from rinse tanks so dragout fluids drain back to plating tanks. |
| | Install drip bars | Drip bars allow personnel to drain part hands free without waiting, so |

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| | | personnel will not use too short a dragout time. |
| | Mechanize dragout | Eliminates possibility of employee using too short a dragout time, maintains product QA/QC standards if timing is set properly. |
| | Reduce pockets on parts | Place parts on dragout rack to minimize chances of chemical pooling in corners or in other pockets. |
| III. Rinsing | | |
| | Use static rinses | Static rinses usually follow the plating bath and capture the most concentrated dragout for returning to the plating bath or for metal recovery. |
| | Use countercurrent rinses | These rinses dramatically reduce the amount of water required for rinsing and therefore reduce the amount of wastewater to be treated or sent for metal recovery. |
| | Use conductivity sensor | This sensor gives an indication of the cleanliness of the rinsewater. Sensor can be designed to trigger clean rinsewater flow when the tank water gets too dirty. Also allows better QA/QC. |
| | Use spray or fog rinsing | Reduces rinsewater amount required and can also be used over plating baths. |
| | Use foot pump or photosensor to activate rinse | These items allow use of sensor to activate rinsewater only when processing parts. A photosensor may be used on automatic plating lines. |
| | Agitate rinse bath | Agitation promotes better rinsing. Agitate water or part. |
| | Install flow restricters | |
| | Install flow control meters | |
| IV. Material Recycle, Reuse, and Recovery | | |
| | Reuse deionized rinsewater | Depending on product, this rinsewater can be reused in a plating bath as evaporated water makeup. |
| | Ion exchange on rinsewater | Ion exchange can be used to concentrate metals in rinsewaters and metal can be recovered from the ion exchange acid regenerant stream. |
| | Reuse spent acid/alkaline | Spent acid can be used to neutralize an alkaline waste stream. Spent alkali can be used to neutralize an acid waste stream. |
| | Reverse osmosis | Concentrate dragout for reuse in plating bath; the water stream can also be reused. |
| | Evaporation | Concentrate dragout for reuse; the water condensate can also be reused. |

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| | Electrodialysis | Recover chromium from hard chromium plating baths and rinsewaters. |
| | Electrowinning | Recover metals from spent plating baths or ion exchange acid regenerant streams. |
| | Reuse mild acid rinsewater | Use mild acid rinsewater as influent to rinse following alkaline cleaning bath. Improves efficiency of rinse, so less rinsewater is required. |
| V. Process Modification | | |
| | Reduce chromium emissions | Switch from hexavalent chromium to trivalent chromium or some other coating. Cover the surface of the bath with polypropylene balls. Use mechanical agitation instead of air sparging. Add surface tension reducers to minimize surface bubbles. Add fume suppressants to create a surface foam blanket. |
| | Eliminate cyanide baths | Change to a noncyanide plating bath. Alternate chemistries are available with the exception of copper strike. |
| | Use deionized (DI) water | Use DI water in plating baths, static rinses, and if practical in running rinses. DI water reduces impurities in the plating bath to extend its life and minimizes the precipitation of minerals in water as sludge. |
| | Segregate waste streams | Increases recovery and treatment technology efficiencies. Acidic/alkaline. Chrome/non-chrome. Concentrated/dilute. Chelated/non-chelated. Cyanide/noncyanide. |
| | Use different process | Replace toxic cadmium plating with relatively nontoxic aluminum ion vapor deposition to achieve metal hardening properties. |
| | Eliminate intermittent jobs | Stop performing small plating operations that generate intermittent waste streams that personnel are not familiar with treating. |
| | Convert to dry floor | Reduces chances of spills reaching floor drains or causing upset in wastewater pretreatment plant. |
| VI. Process Operation and Maintenance | | |
| | Increase bath temperature | Evaporates bath water so relatively clean waste rinsewater can be reused as bath makeup water. Reduces solution viscosity so more chemical drains back to process tank during dragout <i>Do Not Use On Cyanide or Hexavalent Chromium Baths.</i> |
| | Optimize bath concentrations | Only replace plating chemical when necessary. Lengthens bath life. |
| | Install bath filter | Filter can remove particulates and trace contaminant organics in the process bath, lengthens bath life. Use a filter that can be unrolled, cleaned and reused. |
| | Raw material purity | Use high quality raw materials in bath so bath will not become contaminated as quickly. |

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| | Reduce bath dumps | Optimize bath operation so bath dumps are infrequent. |
| | Spill cleanup procedures | Establish procedures for what to do with a Spill. Mitigates chance of spill being discharged to wastewater treatment plant. |
| | Perform preventive maintenance | Routinely check for leaks in valves and fittings. Repair immediately. |

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