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Compliance & Improvement are Helping the System

A few months ago, this column focused on process related changes that affect the metal finishing industry. The subject revolved around EU directives and RoHS. As a practical approach, I would like to highlight considerations that may benefit the operation. These could evolve into general improvements, meeting the new directives, while enhancing quality and safety, maintaining effluent discharge limits, and generating cost savings. Let us consider surface preparation in a finishing cycle. This first step can become a giant leap forward to helping the system.

Cleaning

I have found two basic factors that help enormously. First, the loading of oils and grease on the parts. Just a sufficient amount of these materials from the manufacturing process should be coating the parts. I have seen shop pans and tote bins containing parts that are almost awash in oils. What happens to all that oil in the cleaning cycle? Basically, it becomes emulsified or displaced in the type of cleaner bath in use. This reduces the operating service life of the cleaner causing more frequent downtime, resulting in dumps and new make ups. The waste treatment system will also be affected by consuming more additives (such as emulsion breaker, coagulant, and flocculent). Sometimes too much oil in the system affects proper coagulation, resulting in too much floc that is floating. End of pipe discharge compliance becomes a critical issue. What happens to all that oil that has been separated? It has to be processed at additional cost for proper disposal.

The second factor is selection of the cleaner formulation to use. I have seen a lot of formulations, from "outta this world" concoctions, to streamlined, effective blends. No matter what cleaner is used, be assured that it can handle the load efficiently, and at reasonable cost. Powder and liquid concentrates offer good, on-going cleaning performance. Liquids have an edge in that they are typically 70–80% less sludging. This means less downtime and easier tank clean out. In waste treatment, heavy metals may floc out quicker, because of less dissolved salts in the spent solution. Liquid cleaners may also be metered in at selected dosing, based on maintaining a desired solution conductivity range. Liquid cleaners can also be supplied in returnable totes, eliminating the need to dispose of empty drums.

Getting back to the cleaner, be certain the formulation will clean the various parts. In general, stampings, washers, screws, rivets, wire goods, and other groups of parts, hold specific process oils. Cleaners have been formulated to specifically remove these soils adhering to a recommended operating procedure (time, temperature, and concentration). It should be routine to pre-screen selected cleaners for any process application. Cleaner concentrates are supplied as stand alone single products, or as additives that are combined in ratio with liquid caustic. Hard chelates, such as EDTA have been generally replaced with complexors, such as gluconates. Most of the surfactants used are biodegradable. Phosphated and non-phosphated blends are available.

Acid Pickling

Mineral acids, typically hydrochloric and sulfuric, are preferred for most pickling and activation applications. Additions of the acid are made based on performance requirement and analysis (normally by titration). The acid may be dumped when an observation is made related to operating quality. This could be the result of lack of pickling and descaling, etching of the base metal, or occurrence of immersion deposit (usually copper). Sometimes the acid may be applied to another surface treatment, thereby exhausting it further as a precursor to dumping. In waste treatment, the diluted spent acid might be metered in with diluted spent cleaner before conditioning to floc out the metals. During line downtime, the process tank is cleaned out and a fresh acid bath is made up.

Due to the corrosiveness and related handling hazards, proper care and compliant procedures must be taken to handle the acid. Improved safety and operating improvement can be realized by using acid concentrates in powder or liquid form. Powder concentrates also offer ease of handling benefits. These proprietary blends (liquid and powder) have been fortified with additives that include wetting agents, inhibitors, accelerators, buffers, and surface conditioners. A bath make up using one of these blends offers realistic operating improvements. These include:

- Lowering solution surface tension to better wet the metal surface for preferred conditioning and better penetration (such as derusting & descaling). This improved contact can result in using 20–50% less of this acid versus the plain mineral acid.

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science, is cheering Zambia's intransigence. And the willingness of Greenpeace, Friends of the Earth and the like to let Africans starve in the name of someone else's ideology is [remarkable]."[8]

So what if Americans have been consuming this corn for years (over 34 percent of all U.S. corn and 78 percent of its soybeans are genetically modified).[8]

More from the *Wall Street Journal*, "The eco-lobby has targeted the Third World with a five year $175 million campaign against GM foods. The Sierra Club is calling 'for a moratorium on the planting of all genetically engineered crops.' Greenpeace say it 'opposes all releases of genetically engineered organisms into the environment.' an act it calls 'genetic pollution.'[9] This is a lot of money and effort to help starving people continue to starve."

Summary

"Environmental activists 'romanticize poverty, then they fly to 'eco summits' like one in Johannesburg, where they stay in five-star hotels, talking about poverty but not giving options to the people who are actually poor to come out of poverty. And for this, they are deemed to be 'responsible,' concerned about the poor, moral and 'passionate about the environment.'"[10]

Greenpeace co-founder Patrick Moore, now an outspoken critic of the group he once led, looks at it this way, "I helped start the environmental movement to protect people, as well as our planet," he said. "Unfortunately, too many policies today ignore the needs of the Earth's poorest people. That's not just unnecessary. It's eco-imperialism. It's counter-productive, and morally wrong."[11]

Ironic isn't it? Folks who worry and protest about the latest parts per zillion of some contaminant in our air or food, because they claim it will kill people, choose to ignore environmental issues in developing countries that could save millions in real time.

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Finishers' Think Tank

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- Inhibitors that form a protective barrier on the surface. This prevents over pickling or etching of the base material, after preferred conditioning has been accomplished.
- Buffers maintain optimum solution activity, prolonging the bath service life.
- Chlorides and fluorides may be incorporated in the blended acid (more commonly in powders). Dissolving the concentrate, forms additional acidic agents, for more powerful and effective surface conditioning.
- Wetting agents provide additional cleaning to remove oils and grease. They also generate and maintain a light foam blanket, which effectively eliminates corrosive misting.
- Another class of inhibitors extend the acid service life by preventing the immersion deposition of metals, such as copper on the parts being processed. Some of these additives also precipitate metal contaminants, in another way to extend the acid bath.

Extending the acid bath service life minimizes the interruption of production schedules, required to drain the old acid and make up a new one. Less acid dumps also reduce demands and consumption of additives in the waste treatment system.

The proprietary acids are available in forms that vary according to the needs of the metal finisher. The plain mineral acids can be supplemented with additive packages, containing wetters and inhibitors. Powder concentrates usually contain any or all of the candidate additives mentioned previously. Handling the powders is safer and less hazardous compared to the liquid mineral acids.

It makes practical sense to improve and streamline the surface preparation segment. This will only enhance the finishing steps (electro/electroless plating and post finishing) that must now accommodate new stricter regulations and mandates. But, the cleaning and activation steps should also indicate these treatments improve safety and contribute to environmental stewardship.

Next month we check up on trivalent chromates. ***P&SF***

Advice & Counsel

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in place. Don't allow the cassette to flop around as the worker walks, if at all possible.

Have the worker complete a "diary" of his working day so that you can use this information to identify any activities that may contribute to high readings. Stress to the worker how important it is to put entries into the diary as he/she is working, not at the end of the day. The diary should include the time of day, activity and duration of activity.

Depending on how dependable your workers are, you might want to conduct a "dry run" before doing the actual test. You can clip an empty box with tubing onto the worker and have them complete the diary. When you are satisfied that all is going according to Hoyle, you can do the actual test. Don't do too many dry runs, or the workers will get tired of completing the diary over and over.

When the sampling period is complete you will need to send the cassette off to a laboratory equipped with an Ion Chromatograph set up for OSHA method 215 for hexavalent chromium. This newer method was approved by OSHA in 1998. The older method (OSHA ID-103) does not have sufficient sensitivity to detect the low levels OSHA proposes. ***P&SF***