Hands On

Mark Zahn, CEF • Mid-Atlantic Finishing, Inc.
4656 Addison Road • Capitol Heights, MD 20743

Good Practices Get Good Results

We're well past the time of year for fertilizing the lawn, and you have no doubt seen the results of spreading nutrients around your house. If you weren't very careful when applying the fertilizer, you may have areas where the grass grows like crazy ... and other areas where there are pale green stripes cutting through the rich green that you wanted. You used a good product, but if it rained right after you applied it, or you tried to spread it a little too far, the results weren't the best.

You know what I'm getting at: Even when you start with the best material, the technique and care employed while doing your part affects the outcome. There are many ways of getting fertilizer onto the lawn, and each method can be used correctly or incorrectly. As a metal finisher, you know this is true, because you experience it every day.

In July's column concerning chromates, some of the points that were made about corrosion resistance, appearance and waste minimization brought to mind the importance of knowing how to process when applying post-plate finishes. This is not to say that technique isn't important elsewhere, of course, but a good look at chromating may help to show the importance of good practice. Incidentally, note that in salt spray tests of zinc plate, red rust constitutes a failure only at the edges of a specimen; otherwise, all you need is white corrosion products of zinc and you've failed the test (ASTM B633).

It shouldn't come as a surprise to anyone that general cleanliness is something that will contribute to better workmanship—and is something everyone can do, without much more training than their mothers provided. In an area that is used for racking and unracking parts, allowing the table to become contaminated with oils, chemicals and general clutter is not going to contribute to quality. Unracking freshly chromated parts and laying them in oil, dirt, acid, etc., degrades the appearance—if not the corrosion resistance—of the parts. A cluttered work area can lead to accidents, such as dropping parts on the floor because they're stacked too high. Even a novice at surface finishing can avoid these unnecessary pitfalls by keeping the work area clean.

When rinsing, don't forget that racks drag chemicals along on the splines and hooks, too. Rinse the entire rack; it can be very disappointing to be admiring your craftsmanship on some parts as you take them out of the last step in the process, only to watch a couple of innocent drops of plating solution turn them black.

Chromates cannot be treated like plating baths. It is a little more difficult to keep chromates working consistently, because you use up the contents of the bath without replenishing it like an electroplating bath. Don't ignore the temperature of the bath, either. As the temperature rises and falls, the bath will speed up and slow down.

Another important element is the pH. A yellow chromate may look the same in the tank with a pH of 1.8 or 2.4, but it sure will act differently! Naturally, manufacturers of the products use buffers to keep the pH from changing as rapidly as it otherwise would, but it still has to be checked. Unfortunately, it isn't easy to check the pH of a chromate with pH paper, because the chromium stains the paper instantly. A pH meter must be used to check it, and decent pH meters aren't cheap—especially if they are sent "swimming" in the tank on a regular basis, or if the probe keeps breaking. If your only pH meter gets broken, there is nothing you can use immediately to check the pH. You are on your own until a replacement arrives. Working without one for awhile, and continuing to get good parts, can lull you into a false sense of security. Then you get lazy about replacing the meter, and one day you start to get junk because you are operating by the seat of your pants and destroyed the chromate bath. Then you're late finishing a job, and make a command decision to dump the old bath and make a new one. Now you've created: (1) rework and (2) unnecessary F006.

Fortunately, you can usually judge a chromate by how it looks and how well it adheres to the part. I don't mean to say that you don't need to test it by applicable standards, but you can sure tell when something has gone wrong. Clear chromates usually polish the surface a bit and have a pleasing blue hue—they are not iridescent at all. When applying a clear chromate, if it looks yellowish when dry, something is wrong. Fix it before proceeding. It is difficult to tell how well a clear chromate is adhering, because it is practically colorless. There is a drop test that's relatively painless and quick, and will give you an idea of the quality of your work.

Yellow chromates, however, will break off in chunks that are hard to hide if not properly applied. In the last "Hands On" column (July 1995, p. 43), it was noted that chromates build thickness on a part by slowly dissolving metal from the surface of the part. If this process proceeds at too fast a rate, or goes on for too long, the bath will dissolve the surface on which the chromate has been depositing. In extreme cases, it simply falls off. If the adhesion is inferior, but not catastrophically bad, you will still be able to pull the chromate off with tape. Strictly speaking, this tape test is only legitimately done after parts have

Hints & Kinks In Chromating

Do you have any "Hints & Kinks" in chromating that you would like to share with our readers? If so, please write to Mark Zahn, "Hands On," *P&SF*, AESF, 12644 Research Pkwy., Orlando, FL 32826-3298. Your comments and questions will be addressed in upcoming columns.

cured for 24 hours, and it is usually hard to pull any chromate off immediately after the part has dried.

Most yellow chromates are iridescent, no matter how hard you try to avoid it. Some people claim that they can avoid iridescence in a yellow chromate, but I've never been able to do so without applying, for example, a lacquer over the chromate. If you use a heavier "bronze" chromate, you can avoid iridescence, but the parts will not have that nice yellow color anymore. Rather, they will appear to be more brown than anything else.

Black and olive drab (OD) chromates are the most difficult to apply properly from one bath over a period of time. They usually come in a two-part mixture, and require constant surveillance. With a black chromate, if there is too much of one component or another, the color of the finished product will range from brown to a streaked shade of grayish-black, much less pleasing to the eye than a nice uniform glossy black.

OD chromates act in an analogous fashion, with a progressively more narrow window of operation as the bath ages. Sounds like fun, huh? In addition to that, they are the most expensive chromates, especially the black. Despite all of that, it is still true that OD provides about the best corrosion protection you can get from a chromate, but it is the "ugly duckling" of corrosion preventive finishes on plated parts. The black chromate isn't hard to look at, gives good corrosion protection, and doesn't scratch very easily, compared to using a black dye as an alternative.

Dye? Sure, chromates can be dyed to many different colors, although that is typically done only to differentiate between a right- and left-handed widget on the assembly line. The dyes are usually not opaque, especially on aluminum (unless it's anodized first), because it is difficult to put enough chromate under them to soak up sufficient dyestuff to completely hide the surface under it. Dye baths are pretty easy to control, but the role that the chromate plays is so important that you have to watch it closely.

One major problem with chromates is most pronounced on automatic lines. If the racks are tall, the time it takes to fully immerse the rack in the chromate—combined with the time it takes to get it back out—can leave the parts at the top looking more-than-noticeably different from the parts at the bottom. This makes control of the chromate more difficult, because it has to deposit at a rate where the relays of immersion and removal of the rack won't affect the thickness of the chromate to the point where it is not uniform, while still getting the coating onto the part in a short enough time to avoid slowing down the entire finishing process. My sympathy to those of you with that problem. The best resolution is to design the process line differently ... or to eat antiacids like candy.

When working on the process line:

- ***Look*** at the parts as they are run;
- ***Check*** the bath regularly, especially pH and temperature;
- ***Test*** the parts frequently to avoid problems before they occur;
- ***Rinse*** the entire rack before and after the chromate, to keep contamination from ruining parts;
- ***Clean*** your unloading station regularly for the same reason;
- ***Learn*** the characteristics of the bath and you'll get along with each other much better.

Life is too short to spend time making junk. ❑