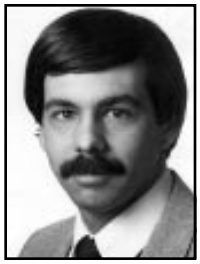

Finishers' Think Tank

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Have a problem on the finishing line? Please e-mail your question (aesf-journal@worldnet.att.net), use the postpaid form on our Readers' Service Card, or mail to "Finishers' Think Tank," 12644 Research Pkwy., Orlando, FL 32826-3298.

Aluminum Blistering Problems

Q. We have problems plating over 413 aluminum castings. If we plate it with bright nickel and chrome, then heat it to 44 °C, the parts blister, although they look fine beforehand. Can you help us?

A. I have never plated over 413 alloy aluminum, but I have plated over many different aluminum alloys and have been successful as long as I varied the preparation cycle to accommodate the particular alloy. One of the interesting things about working in a jobshop is that, oftentimes, you never get to know what alloy you are dealing with—so I will address your problem as I would for an unknown alloy. Aluminum castings must be dealt with very carefully because they are adversely affected by most preparation cycles. I keep the parts out of alkaline solutions altogether. My recommendation is to first degrease the parts, and then use a neutral soak cleaner to wet the surface. Finally, etch with an acid etch. The cycle is as follows:

- Acid etch in 8 oz/gal ammonium bifluoride at 110 °F
- Rinse
- Rinse
- Deoxidize the surface in solution of 40% nitric acid/40% sulfuric acid with 4 oz/gal ammonium bifluoride to remove most alloying agents from surface
- Rinse
- Rinse
- Zincate in an alloy zincate
- Rinse
- Rinse
- Rinse
- Electroless nickel plate at least 0.7 mils of EN mid-phos
- Rinse
- Rinse
- Rinse

After the EN coating is applied, you should have no problem plating bright nickel and chrome on the surface of the castings. The EN will fully remove the zincate and allow for good adhesion on any further deposits on the castings.

EN on Cast-iron Parts

Q. We process heavy cast-iron parts weighing as much as 700 lb. We use electroless nickel

Platers Gotta Eat in Detroit!

A Restaurant Review
By Marty Borruso

Detroit is an old city, steeped in tradition and bursting with ethnic culinary treasures. Entire areas of the city are devoted to Greek, Italian or Mexican food, and nearby Dearborn is home to the nation's largest Arab-American community. In fact, you'll find nearly every nation in Europe represented somewhere. Great Lakes fish is a local staple, especially the pickerel and whitefish, and prices are as diverse as the ethnic mix.

The Whitney—One of my favorites, although expensive. It is the showplace mansion of 19th-century lumber baron David Whitney. Exquisite antiques and meticulously restored furnishings are matched only by the food, which includes excellent lamb and veal dishes, fresh breads and *killer* chocolate desserts. 4421 Woodward Ave.

The Elwood Bar & Grill—Art-deco showcase, rescued from dusty oblivion and turned into a trendy, diner-style eatery in the center of the theater district. Salads, basic seafood dishes, meatloaf. 2100 Woodward.

Fishbone's Rhythm Café—A smash-hit restaurant in Greektown, with a second location in Southfield. Lively atmosphere and adventurous Cajun menu: Jambalaya, muffaletta sandwiches and alligator appetizers with dozens of hot sauces on your table. The food is wonderful, even if it's not what you'd expect in America's heartland.

Lafayette Coney Islands—If you missed one in New York, you can still get a pretty good hot dog (or hamburger and fries) here. Open 24 hr/day as a rule. 118 W. Lafayette.

Lelli's—Old-fashioned, crowded and loud, with food served up in staggering quantities. Main dining room, as well as smaller, more intimate nooks in the original building. Serving Sicilian-style dishes—the regulars drool over the Steak Lelli. Family-owned in the New Center-GM Building area at 7618 Woodward; second location at 885 Opdyke Rd., Auburn Hills.

Roma Café—Downtown in the Eastern Market area, it is the oldest restaurant in the city. Operated by the Sossi family for 75 years, it is famous for first-rate veal and pasta dishes. Located at 3401 Riopelle.

House of Hunan—In a bank building in the bustling neighborhood of Southfield, it specializes in Szechuan and Hunan dishes. Minimalist decor. At 26400 W. 12 Mile Rd.

Hakata—Traditional Japanese: Sushi bar, tatami room. Quiet and tasteful. Monday–Friday lunch. 32443 Northwestern Hwy., Farmington Hills.

Brazil Coffee House—Great java and delectable desserts in this Royal Oak oasis. Silk-covered couches, occasional (quiet) live music. 305 S. Main.

The Rhinoceros—An intimate restaurant warehouse district, moments from downtown. Great for a drink or late dinner. Often a pianist and singer. 265 Riopelle.

Cadieux Café—One-of-a-kind in the city's old Belgian neighborhood. Colorful and informal. Mussels are the big attraction. Feather bowling (like bocce ball) in a side court. 4300 Cadieux, south of Ford Frwy.

with as much as a one-thousandth-thick deposit. After removing the parts from the rinse solutions, it only takes a matter of minutes for them to turn brown and stain in the non-machined areas. How can we prevent this problem?

A. Cast-iron parts, especially large ones, are very porous and fairly difficult to coat properly. The porosity problem is compounded by the fact that the surface may contain silicates from the casting operation. It is also difficult to descale because of the usual high concentration of carbon in the casting alloy.

Preparation of Cast Iron

This is a difficult matter because of the surface imperfections and the alloy makeup. Cast iron will act as a sponge and soak up all of the preplate solution into the surface, causing further processing problems. It is very easy to either over-prepare or under-prepare the parts. Too little preparation will result in the surface containing dirt, oil, grease and silicates, and will present a problem with plating. Too much preparation will result in a smut being raised on the surface of the parts, causing an inefficient, non-adherent coating to form. The best way to prepare the surface is to include highly chelated cleaners to handle most of the cleaning and scale removal. Acids will tend to overreact because of the surface characteristics and lower concentrations of acids should be used after loosening the scale in alkaline systems. Sulfuric acid-based materials with a reasonably high fluoride concentration is the best for descaling because of the affinity to remove both iron oxides and silicates from the surface. Because of the surface porosity of cast iron, it is important that a dynamic rinsing system be used. Flowing rinses alone will not remove the process solutions from the pores. High-pressure sprays or ultrasonic rinses are in order to provide the best, most reliable rinsing.

Cast-iron parts are usually structural in nature, and their mass and strength are the rationale for their use. There are three main reasons for plating cast iron: Corrosion resistance, functionality (hardness) and cosmetic. It is important that you identify the functionality of the coating before deciding on the preparation cycle and thickness of the deposit. The color change to the surfaces represents a premature failure of the coating in terms of corrosion resistance. The immediate color change is tantamount to a flash-rusting condition. There is probably exposed iron surface that, because of the high porosity, will cause oxidation of the surface at a high rate.

The proper thickness of the coating must be determined based on filling of the pores. The coating should be tested at various thicknesses and corrosion responses should be made. Because EN protects by virtue of creating a continuous coating over the surface, it becomes ineffective in terms of protection if the surface is flawed and not completely covered. A graph should be made, with plating thickness on the X axis and corrosion response on the Y axis. The response of the parts to this kind of test will be quite evident as to the proper thickness of deposit. A break in the graph will inevitably occur at the point in which all of the pores are covered. Plating to thicknesses below that point will be useless, and the part will fail in service.

If corrosion of the surface is not a factor in the job you are plating, then you may want to prevent that brown flash-rusting from occuring by passivating the exposed iron with a chromium passivate, or by covering the surface with an organic coating, such as light oil, polymer or a fatty-acid-based soap. All of these will lead to better cosmetics, but unfortunately, they will not drastically increase the corrosion-resistant response from the coating.

A sample cycle with detailed descriptions of the process chemistry is below. Keep in mind the proper rinsing should be conducted between each step. A sample cycle with detailed descriptions of the process chemistry follows. Keep in mind the proper rinsing should be conducted between each step.

- Soak clean with a highly chelated, low-alkaline, detergent-based cleaner, which should have the ability to remove oils, greases and be able to dissolve iron oxides and scale.
- Electroclean with a low- or non-forming, highly chelated cleaner to loosen and remove scale from the parts. It should be free-rinsing to allow the solution removal from the surface.
- Rinsing at this point should be dynamic with high-pressure or ultrasonic rinses to completely remove process rinsewater from the surface.
- At this point, the acid pickle should contain both sulfuric acid and high concentrations of fluoride to remove all the final scale and silicates from the surface.
- The last step before EN is a station that has one of the primary salt complexors contained within the EN formulation. The complexor should be able to remove loose iron oxides, as well as operated at a pH close to that of the EN bath.

This should act as a primer to cast-iron plating. To obtain the actual best cycle will require a great deal of trial and tribulation. **P&SF**