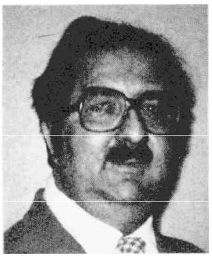
FINISHERS' THINK TANK

By Ronald Kornosky



Got a problem on the finishing line? To send in your question, use the handy, postpaid form on our Readers' Service Card or send a letter to: Finishers' Think Tank, 12644 Research Parkway, Orlando, FL 32826-3298.

Plating on Ceramic

Q: I need a procedure to plate electroless nickel on alumina-containing ceramics. Also, could you suggest a preplate cycle for such ceramic surfaces treated with aluminum silicate to seal pores prior to finishing?

A: We checked with Don Baudrand, CEF, of Allied-Kelite, Melrose Park, IL, for comment on this one. His remarks are capsuled below.

Alumina-containing ceramics can be processed as follows: (1) alkaline clean* to remove fingerprints and soils, preferably with ultrasonic agitation to help dislodge ceramic fines entrapped in pores; (2) rinse (ultrasonic preferred); (3) etch in fluoride-containing solution,* equivalent to about 10 percent HF, for 2 to 20 rein, depending on the nature of the ceramic; (4) rinse, preferably with ultrasound, to remove fines produced by etching; (5) sensitize in solution* such as 5 g/L stannous chloride acidified with 1-3 mL/L HCl; (6) rinse; (7) catalyze in a solution* such as that containing 0.5 to 1 g/L palladium chloride; (8) rinse; (9) electroless nickel plate to obtain properties desired; (10) rinse; (11) electroplate if desired; (12) rinse and dry.

Mr. Baudrand concludes by saying he "has no experience plating on aluminum silicate sealants; however, the process suggested may work if sufficient micro porosity can be developed during the etching step."

"Proprietary processes suggested.

Phosphate on Cadmium

Q: We were asked to cadmium plate steel and subsequently apply a zinc phosphate coating, which is coming out very thin and uneven. Is this a common and acceptable process sequence? If so, do we need to activate the cadmium plate before phosphating?

A: Cadmium-plated parts are commonly phosphate and, in fact, the combination is considered a Type Ill coating per QQ-P-416, a federal specification.

What is probably happening is that you're using a very aggressive, heavy zinc phosphate coating (3000 mg/ft^2). The solution that produces this coating contains a high concentration of phosphoric acid, which is likely "chewing away" the cadmium plate. A special mild zinc phosphating bath is required for cadmium- or zinc-plated surfaces. The coating thickness is just 150 to 250 mg/ft^2.

Now to address your question on activation. After cadmium plating, bright dipping, and baking, activate by alkaline cleaning, water rinsing, and immersing in a mild (say, 1.5 percent by Vol) sulfuric acid solution for about 15 sec. Afterwards, rinse thoroughly with cold water.

Gold on Kovar

Q: What surface preparation and plating cycle is recommended for depositing gold on Kovar? The gold must withstand a blistering test that calls for heating at 480° F for 30 min.

A: The low-expansion iron-nickel alloys such as Kovar and Invar can be prepared for nickel and then gold electroplating by the following two methods.

The first employs an anodic treatment in a 17 percent by Vol solution of sulfuric acid for 10 min at a current density of 20 A/ft^2 followed by a 2-min anodic treatment at 200 A/ft^2 in the same solution. A final cathodic treatment for 2 to 3 sec at 200 A/ft^2 activates the previously passivated surface. Lead anodes are used.

A second method uses an anodic treatment in a 240-g/L solution of $NiCl_2 \cdot 6H_2O$ that also contains 31 mL/L of hydrochloric acid (1.16 g/m L density) for 2 min at 30 A/ft^2 followed by cathodic activation for 6 min at the same current density. In this case, separate tanks are recommended for the anodic and cathodic baths. A gold strike can then be used over the nickel electroplate before the final gold deposit is applied.

Anodizing vs. Chromating

Q: What is the most cost-effective conversion coating for aluminum that will give consistent results?

A: Although some finishers do not consider anodizing to be a conversion coating, it is classified as such. Furthermore, anodizing is a long-lasting, wear-resistant finish that is readily applied at a relatively modest cost using a conventional sulfuric acid bath and a hot water or nickel acetate seal. By comparison, chromate conversion films, although frequently less costly to apply, are relatively fragile and provide little or no resistance to wear or abrasion.

So the answer to your question depends on the application. If your aluminum product is subject to wear or abrasion, select an anodized finish and a thickness in the range of 0.0002 to 0.0005 in., depending on the degree of resistance required. If only short-term corrosion resistance is needed, a yellow chromate would probably be preferable to other chemical conversion coatings.

When comparing the cost of anodizing with chromating, you should take into account the cost of waste treatment and disposal, too. Waste from anodizing can be converted rather inexpensively to a saleable byproduct. On the contrary, wastes from chromating baths are more costly to treat and dispose of in an approved landfill. •

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