

DECEMBER 1993

# Metal Finishing

The background of the cover is a deep blue gradient. Scattered across it are various metal components, some appearing to be in the process of being finished or coated. These include several cylindrical rods of varying lengths, some with a dark, possibly oxidized or coated surface. There are also several square or rectangular pieces, some with a similar dark finish. A prominent feature is a circular component with a gear-like or multi-spoke design, also showing a dark finish. The metal parts are arranged in a somewhat chaotic but artistic manner. Overlaid on the blue background are several thin, white, hand-drawn scribbles that form loops and swirls, adding a dynamic and technical feel to the composition.

THE INDUSTRY'S RECOGNIZED INTERNATIONAL TECHNICAL AUTHORITY SINCE 1903

## Aluminum Finishing

# A Status Report on Art Form and Decorative Applications for Color Anodizing

by Peter Kellett,

P.K. Selective Metal Plating, Inc., Santa Clara, Calif.

Just a few years ago, the P.K. Selective Metal Plating job shop was an anodizing facility doing solid but limited production.<sup>1</sup> An active, creative research program explored many new avenues of decorative and expressive art form production, where one-of-a-kind pieces could be created. An adventure with a sideline Art Gallery featuring creative and exploratory anodized works of art and mixed-media paintings, constructions, collages, sculptures of industrial parts, and rich color pieces were introduced to the Santa Clara Valley.

My colleagues and I did a wide variety of exploratory works with textural machined parts and hammered-surface treatments. Some of the in-bath items would be failures in a regular production line, but interesting and wonderful effects were pursued, and in many instances art form pieces with delightful qualities resulted. No experience went untried, and this research and development provided a good learning process that expanded our capabilities.

Although standard practice was related to anodizing, in the dye baths we worked with temperature and chemical additives to give even greater variety to decorative treatments. Art form jewelry, small containers, boxes, and desks sets provided the opportunity for even greater exploration. This exploratory work, alongside standard production, resulted in our developing the capability to include hard and soft anodizing. Using the latest research and development, a new, expanded operational facility was designed to include the state-of-the-art technology.

The complete redesigning of the plant facilities using a full-spectrum approach transformed the small job shop into a complete facility that enabled us the freedom to design in a variety of directions with unlimited horizons. One aspect of this is the graphics shop, where computer-generated clear-text transmission of lettering and diagram transfers are generated by a silk screen process in which the



Figure 1. Collage formed by decorative color anodizing.

images become an integral part of the product after processing. This is especially desirable in medical as well as many military products. Because burned- or etched-in lettering and designs are integrated into the finished product, they will not flake or wear off as might result with a painted silk screen process. Safety requirements are therefore met, and a clear, clean product results.

The tanks are large enough to handle the highly designed, decorative, colorful surfaces of bicycle frames and sports wheelchair equipment for paraplegic teams. The range of colors available in dye lots and 14 different color tanks provide a complete facility that can handle medical equipment, military contract products, and furniture for which clearly defined surface treatments are required.

In the development of patterns or free-form designs, resists are used, and dyes are applied to enhance expression. There may be half a dozen or so new dye immersions and appropriate solvents to dissolve the resist, resulting in a clean design treatment. The sealing phase of the process makes the product complete. Ongoing design technique research helps to expand the capability to provide distinctive effects. Random designs are always one of a kind, but patterns put in place using the silk screen process can result in standardizing a grand run. Jewelry, trinket boxes, tissue box covers, clocks, lamps, pen sets, and wall plaques are just some of the items that can be made. Wind chime sets of anodized and decorative treatments have been produced in great variety. One of the new anodizing adventures that we have embarked on



Figure 2. Collage formed by decorative color anodizing.

is the fabrication of aluminum guitars and guitar pick guards for both aluminum and wood guitars.

Another exciting outlet is the artistic field. We are doing work with artists who want a new look to their art and the opportunity to work with aluminum. Anodizing offers a new and creative approach as well as brilliant colors not available in other media. Artistic projects range from large hanging mobiles to paintings, sculptures, and furniture. Many possibilities are available to the artist because of the wide range of techniques that anodizing can employ. We enjoy doing this alternative type of work at our facility

and have a diverse set of customers.

Many easel painters have found a new medium by using dyes for anodized aluminum panels.<sup>1</sup> The dynamic processes of surface treatment, texturing, and pattern application before anodizing prepare the panels for later phases. Bead blasting, satin surfacing by the use of different grades of abrasive materials, machined stippling, chasing, repoussé, and press impressions of foreign materials under heavy weights or roller impressions by roller mills are all ways of treating panels. Engraving and etching can add many varied dimensions, and with the use of anodizing and dyes, very significant

expressive treatments can be realized.

Collages and assemblages add to these effects. Aluminum parts can be the embellishment for fine art gallery pieces. In our explorations we have worked on many art pieces that show great richness (see Figs. 1 and 2).

A commission for a large hotel this year resulted in a series of sculptured forms 3 x 6 ft. These reflected distinctive, rich qualities with a finish and character that are expressive and unique. Mixed-media treatments with oil paints, acrylics, and other materials in combination with anodizing and dyeing have expanded the potentials for artists in many directions.

A pulsing system and additives allow us to run the hard anodizing as high as 80°F, although deeper colors can be obtained at lower temperatures. This system has specially designed chillers resulting in good temperature control. The pulse system and additives allow us to run at higher temperatures, resulting in lighter values: tighter pores, superior hardness, and rich color capabilities.

One tank is set up for hard anodizing at 60°F, and the resulting coating passes the Taber test. If the customer wants a traditional dark color, the tank temperature can be lowered to 50°F. The process runs automatically at 8 V and ramps the current and voltage at a predetermined rate.

#### Reference

1. Kellett, P., *Metal Finishing*, 86(12):19; 1988 **MF**

