MIDWEST TUNGSTEN SERVICE

Tips

COLORING TOPCOATS

Published, now and again

Most decorative metallizers deposit aluminum because it is easy and gives a bright reflective surface which can pass for silver or chrome. Colors are a different matter. Copper isn't too hard to deposit, and the color is consistent, but gold tones can be difficult. Gold tones need larger and more filaments for proper deposition and coverage. Color matching and color consistency are difficult to achieve. Usually a more skilled operator is needed to fire them. Gold tone alloys are more prone to tarnish and oxidation and may require a different basecoat/topcoat system.

Given these conditions, how can a metallizer quickly, consistently, and cheaply deposit colored metal surfaces? He can't, but he can do the next best thing. He can get the world to look at his part through "gold colored glasses" so to speak by covering an aluminum metallized part with a colored coating. There are two common ways to do this.

COLORED TOPCOATS - The topcoat lacquer itself can be colored and then applied to the part. For instance, a yellow/orange lacquer will make an aluminized part appear to be golden. Exact color matches and exotic colors (think Christmas ornaments) can be easily obtained. Colored topcoats have limited use, however, since their color deepens with film thickness. So color control is a problem. Anywhere the film is thicker, the color is deeper (Fig. 1). Manual spray operators may have trouble laying down a consistent film thickness on all areas of the part, or keeping film thickness consistent from part to part. Flowcoating colored topcoats gives a wide range of film thicknesses, especially along edges, bosses, and ridges. It can also be a problem on large flat areas if rotation is inadequate, or viscosity is not properly controlled. In general, avoid flowcoating colored lacquers.

Figure 1.
Color variations due to variation in thickness of colored topcoat.

So should one avoid colored topcoats altogether? No. Colored topcoats eliminate the need to apply color separately, a process which involves more steps and has its own pitfalls. Colored topcoats are best applied via automated spray operations, where film thickness can be precisely controlled and repeated.

DIP DYES - Can be used on either sprayed or flowcoated parts where film thickness varies. Dip dyes are liquids which penetrate the topcoat and impart color to it. Since the dye penetrates all surfaces equally, the color is consistent regardless of the topcoat thickness

(Fig 2). The only times this would not be true are if the part was left too long in the dye or if an area had a very, very thin topcoat film. However, these two cases cause other problems as well, and we will assume they are avoided. Dying often takes place after a partial cure of the topcoat. Coating is less likely to be damaged or attract dust, but will take dye more readily. Part may appear milky until cure is completed.

Dip dye solutions generally consist of dyestuff, water and acetone. Some metallizers mix

Figure 2.
Uniform part color due to even penetration of dye into uneven topcoat.

Color intensity as seen from above.

Cross-section of metallizing, coating and dye.

their own dyes and some purchase dye premixed. Premixed dyes are easier and more stable, but are more expensive to buy and ship. Dyes may shift color in steel tanks. Use poly, brass or stainless instead. Cover tanks when not in use or return dye to sealed containers to avoid color shift from evaporation. A typical gold colored dye is actually a combination of red and yellow dyes mixed together. This gives an orange color that turns shiny aluminum into shiny gold! Of course, dyes come in many colors. Although gold is very popular, reds and greens are used extensively in Christmas decorations and many colors are used in the toy industry.

Color drift and water spotting are two of the problems encountered when dip dying. As dye is used up from the solution, the color changes. This is more of a problem when multiple colors are present, as in gold dyes. If the topcoat has a greater affinity for one color over the other, the color gradually shifts. For example, if a part soaks up more of the yellow dye from a mix of yellow and red, over time the color tends to become redder. Obviously some mixes are better than others, and some topcoats, are more uniform in dye absorption. Remember that the longer a part is left in the tank, the deeper the color will be. Too much time in the tank, and the dye will attack the topcoat. Consistent dip time is essential. Proper agitation and maintenance of the tanks will promote consistent results, too.

Water spotting is another problem. In addition to the dye tank, one or more tanks are used to set the dye and rinse the part. If the water used is high in minerals or anti-spotting surfactants are not used, water spots can develop. Distilled water is best, perhaps with a surfactant added, followed by proper drying and topcoat curing.

The latest thing in dip dyes is water-based solutions. Most of these work rather well, but the technology is still developing. Remember also, that dip dyes and colored lacquers are fugitive, that is they fade. This is especially true if the part has exposure to sunlight.

Questions? Call us.

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