Dear Mr. Powder,

What do you think is the best way to degrease steel and aluminum prior to coating? I have seen various options out there, but there seem so many to choose from I was wondering what you thought was the best option? Specifically, when sand blasting is not an option due to the “coarse” surface area left. I know sand blasting can be fine, but it is still difficult to get a smooth surface.

Thanks in advance,
Jeff

Hi Jeff,

Here is the lowdown on preparing metal for powder coating:

First, the durability requirements of the finish must be carefully considered. If this is a basic indoor application that won’t see much wear and tear or moisture, heat, etc., then simple solvent cleaning and possibly media blasting will suffice. For anything that will reside outdoors you need more than that.

Powder chemistry has a large effect on durability and performance. For instance, epoxies and hybrids adhere well over blasted metal and can provide decent corrosion resistance with a minimum of surface preparation. Essentially all other chemistries require metal cleaning followed by chemical pretreatment. So if you are using a polyester, acrylic or polyurethane powder it’s best to clean the metal first with an alkaline solution, rinse well, then apply a chemical pretreatment. These are typically phosphate-based for steel and chromate-based for aluminum. Chromate is rather hazardous (actually carcinogenic) so I would strongly recommend that you investigate alternate materials if you need to pretreat aluminum.

Newer chemical treatment types are emerging that are based on zirconates, titanates and silanes. These are essentially non-toxic.

— Joe Powder

Do You Know Your Type?

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“Newer chemical treatment types are emerging that are based on zirconates, titanates and silanes. These are essentially non-toxic.”

Newer chemical treatment types are emerging that are based on zirconates, titanates and silanes. These are essentially non-toxic. Process control with these is critical and therefore it is necessary to carefully follow the supplier’s application parameters.

It is also very important to recognize that although cleaning techniques may be universally acceptable for both steel and aluminum, chemical pretreatments do not translate across these very different metals. Iron phosphate works well on ferrous substrates; however, it does not prepare aluminum adequately for high-performance powder coating performance. You will need chemistry specific to your metal type.

— Joe Powder
Mirror Mirror on the Wall, Who’s the Glossiest of All?

Dear Joe,

The thought below from some of my colleagues is close but not perfect. Anything you can share either from an ASTM specification or what the BIG companies use to follow specific protocol for DOI (distinctness of image) would be greatly appreciated.

“I conclude that either DOI or gloss the issue is the smoothness of the dried top coat. Which in turn depends on size and shape (of the filler particle) and how much resin is absorbed by each particle.”

Thanks,
Michael W.

Hi Michael,

Distinctness of image is more than just a gloss measurement. It refers to the crispness or distinctness of a reflected image. Initially this was assessed visually by projecting a series of different sized images onto a coated surface. This was accomplished by using a “glow box” that works by passing focused light through a slide containing these images of varying sizes. Kind of like a projected eye chart. See: (see: www.gardco.com/pages/gloss/doimeter.cfm). A little primitive, but it gets the job done.

DOI measurement has since evolved with an Instrumental technique. This method is described in ASTM D-5767. (see: www.astm.org/Standards/D5767.htm and www.elcometer.com/en/laboratory/appearance/distinctiveness-of-image/productmanager?prod=742). Instrumental assessment eliminates operator influence and is therefore more precise and reproducible.

DOI can be affected by both long (i.e., orange peel) and short (i.e., low gloss) wavelength surface texture. It is important to know how DOI is being measured and what the target is. Both low gloss and orange peel will reduce DOI. Hence large particles of filler in a powder formula that create low gloss will reduce DOI and also small filler particles with high oil absorption will reduce DOI.

I hope that this helps.

– Joe Powder

Not Your Average Joe...

Each issue, we take the padlock off the PCI® Test-Lab door for a few minutes so our favorite technical editor and “powder guru” Joe Powder can run in the yard. When he’s not digging holes under the fence, he loves to answer readers’ questions. Go ahead and send him one at askjoepowder@yahoo.com... he doesn’t bite. Maybe it’ll end up in the next issue!