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# Ask Joe Powder

## It's Complicated

**Q** Joe,  
I work for a powder coating facility and we are trying to find research or any publications describing the differences between e-coating and underbody powder such as Interpon's A1000 series. Essentially, is underbody powder coating a viable alternative to e-coat? Any help you can provide would be greatly appreciated. Thank you.

Caleb C., Chillicothe, Ohio

**A** Hi Caleb,  
Thanks for your question. It's a good one. When it comes to e-coat vs. powder as an underbody coating, "it's complicated." Here's why. E-coat is a great coating that is applied by immersion in an aqueous bath of electrophoretic paint. The paint gets charged cathodically and seeks a ground, which in this process is the part to be coated. Cathodically charged paint covers virtually every surface of the grounded part. For the most part, it gets into every nook and cranny. It's difficult to get it into very narrow tubing, but other than that it coats every surface. Also, a characteristic of e-coat is the amount of film build possible. E-coat typically provides a very even thickness film that tops out around 1.2 mils. The resultant coating gives pretty good corrosion resistance, usually up to

about 750 hrs. salt spray if the metal has a good pretreatment ( $ZnPO_4$  is best). So, to summarize, e-coat gives excellent overall coverage at a relatively thin film with good corrosion resistance.

Powder coatings can be applied rather thick, easily depositing 3 to 6 mils in one pass. And powder coatings can provide incredible corrosion and chip resistance. In fact, epoxy-based powder over good pretreated metal can withstand up to 3,000 or more hrs. salt spray resistance. The thick films are also very chip and abrasion resistant, far more than a thin coat of e-coat. However, the electrostatic application of powder coatings provides good overall coverage, but not as extensive as e-coat. Tight corners and channels create Faraday cages that are difficult to cover. These lightly covered areas are sites for corrosive attack.

So, which is best? Like many a teenager laments: "it depends." If your parts are relatively simple in geometry, powder over a good pretreatment is best. If your parts have intricate configurations, e-coat provides nearly if not complete coverage. My vote for best underbody system is: good pretreatment, then an e-coat primer followed by a nice thick coat of powder. That's what most automotive OEMs do.

The problem is coming up with the cabbage to buy an e-coat line. I hope this helps.

— Joe Powder

## Oxide Blues

**Q** Joe,  
I don't know if you have covered this before. We notice that the cured powder does not stick readily to edges that have been cut by a laser. What are the causes of this and what can be done to overcome the adhesion issues?

Brian Gurney  
Quality Assurance Manager

**A** Hi Brian,  
We haven't covered this one yet. Cutting steel with a laser offers many advantages, including

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precision, speed, less rejects, and low labor costs. However, one of the problems inherent to laser cutting is the blue oxide edge it leaves on carbon steel. Powder coatings don't like to adhere to this oxidized surface. Conventional iron or zinc phosphate doesn't adequately penetrate the oxide to provide adhesion of the cured powder. This results in a loss of adhesion and the potential for serious corrosion problems.

There are a few paths to compensate for this shortcoming. One is to employ a more aggressive pretreatment process. Using a strong acid etch prior to the phosphate stage can attack the oxide layer enough to allow the phosphate to do its thing. Another option is to avoid creating the oxidation by using nitrogen in the laser cutting process. It's more expensive than using oxygen but it minimizes oxidation from the laser and therefore allows a conventional iron or zinc phosphate process to provide a surface more amenable to adhesion of a cured powder. A third option is physically abrading the edges. This can be accomplished either automatically (blasting or wheel abrading) or manually. If you opt for a blasting process, it is imperative to keep your media clean; otherwise you can contaminate the surface you are attempting to clean. ScotchBrite® pads or wheels work well but require additional labor. Keep in mind that these extra steps can be cost-prohibitive. I hope this helps. All the best.

— Joe Powder

## Cover Those Peaks!

**Q** Hi Joe,

We are having a problem with one of our texture paints. It is a light color and has areas where it looks like you can see the substrate through it. We do a mil thickness check and we get a reading of 2.5+. We have also done a MEK rub test on the area that looks light and passed (with no drop in the reading after). We are concerned since we have a customer returning product because it looks light. Any ideas? Thank you

Joe Hunt  
Manufacturing Supervisor, Freeburg, IL

**A** Hi Joe,

Thanks for your question. This is an age-old problem with textured powders, especially white or light-colored ones. And it's important

to qualify the descriptor "textured." In this case, we're talking about a very structured or grainy surface consisting of a micro scale of high peaks and deep valleys. Some might call these coatings "dry texture," or even "anti-skid" coatings. We are not referring to "mini-tex," "hammertones," "rivers" or "veins." You may want to consider purchasing a set of the official PCI Visual Texture Standards for use in describing "texture." (Visit [www.powdercoating.org](http://www.powdercoating.org), select Resources—Online Store—Quality Standards.)

You mention that your film thickness readings are over 2.5 mils. This measurement is a good place to start, but you have to take into consideration that the film gauge is measuring the tallest peaks. The "valleys" are significantly thinner than this reading. Consequently, 2.5 mils is probably too thin to provide complete coverage and opacity. I recommend that you increase the thickness of the coating by applying more powder to your parts (that seems rather obvious). Increasing the thickness of a highly textured powder is easier said than done. This may involve slowing down your line, lowering the current on the gun(s) and possibly preheating the parts. Once you find the film thickness range that provides acceptable hiding, use this as the specification for this particular powder coating.

Keep in mind that incomplete coverage not only affects cosmetics such as color and appearance, but also influences durability, in particular corrosion resistance. Please let me know if you have any further questions. Best regards.

— Joe Powder

*Joe Powder is our technical editor, Kevin Biller. Please send your questions and comments to Joe Powder at [askjoepowder@yahoo.com](mailto:askjoepowder@yahoo.com).*

**Editor's Note:** Letters to and responses from Joe Powder have been edited for space and style.

### 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 gnawing on a rawhide bone, he loves to answer readers' questions. Go ahead and send him one at [askjoepowder@yahoo.com](mailto:askjoepowder@yahoo.com)... he doesn't bite. Maybe it'll end up in the next issue!