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Ask Joe Powder™

Tag, You're It

Q Hello Joe,

I enjoyed reading your Technology Interchange article on polyester coatings. I am in the pet tag industry and searching for a powder which I can apply to my tags that can be sublimated with transfer paper using a dye sublimation process. We are presently buying a pre-painted aluminum material. The problem is the edges are not protected and it does not look like a quality product. I would like to powder coat the tags. We have had some local coaters apply a white coating which looks great, but the coating will not accept the heat transfer.

Frank R.
Johnston, RI

A Hi Frank,

Using powder as your base for dye sublimation is a good idea. The powder coatings designed to accept dye sublimation are specially formulated products - usually high-quality polyurethanes. Have your coater request a powder that can accept the sublimation process and see what he/she says. Most of the major powder coating manufacturers have a product. Check out the powder producer listings on the PCI website: www.powdercoating.org/PCImembers. Request a high-quality polyurethane powder coating. Tell them that you will be using it as a base for a dye sublimation process and I am certain that they can help you.

Let me know if you need more info.

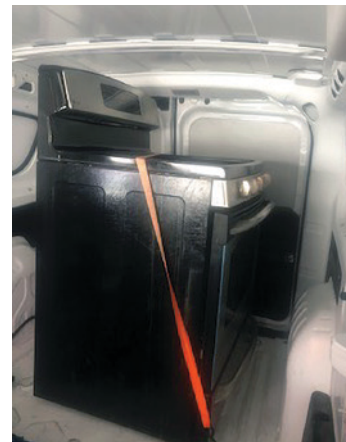
Thanks,

- Joe Powder

Frank's Response:

Hi Joe,

I am totally brand new to the process. Do you offer consulting? I really want to do this correctly and eliminate the learning curve as much as possible. I have purchased basic powder coating equipment for experimentation.



Frank's Research Oven

Our current volume is 5,000-10,000 tags weekly. The best seller is a 2x1 GI tag.

Do not laugh but this is our research oven. The GE is the most accurate in temp control. Not sure if the convection feature will help in keeping the temp even.

Hi Frank,

I may be smiling, but not laughing. The GE oven is not a bad idea. I prefer the electric convection over the gas one for temperature stability. Long story, but my wife started a custom cookie business out of our home and was having trouble with quality consistency which led me to investigate the temperature recovery time of our GE convection oven. What we found out was the recovery time with this gas convection oven was longer than the actual bake time. So Mary would open the oven to rotate the baking sheets full of cookies and then lose too much temperature. We really like a gas range top, so we settled on a combination oven - gas range combined with electric ovens. Voila, she was back making perfect cookies, first time, every time.

Regarding your operations - you need to get the proper powder chemistry and closely follow the bake conditions to ensure that the powder is completely cured. As for products, check the powder producers listed as members on the PCI website. The bottom line - you will need a polyurethane powder and they are not created equally. I would ask for a test panel from a prospective vendor and try it out with your process.

Good luck,

- Joe Powder

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On a Clear, Glossy Day You Can See Forever

Q Hi Joe,

Hope you are fine! Still hoping one day I get to meet you in Malta :)

I have a question for you. I often apply clear coat as a finish on wheels to achieve a higher gloss level. I notice that sometimes the gloss is not as clear as I wish. I have kept the coating around 100 microns, orange peel has a great effect and I am trying to do my best to avoid it. I also noticed that on satin colours, they affect the final look of clear, kind of mattes the finish a bit. I tried partial cure (60 percent) and also full cure.

I am using a polyester clear, with a cure schedule minimum of 160 degrees Celsius for 20 minutes or 180 degrees Celsius for ten minutes. What are your suggestions for minimal orange peel? kV, μ A, total air, powder output for base coat and clear coat.

I am normally about 60kV, 25 μ A, 3.5 total air, powder 50; second coat 45kV 5 μ A, 3 air, powder 55.

Let me know if you require further information. Thanks,

Matthew V.
Malta

A Hi Matthew,

Yes, I'm sorry I missed you on my latest trip to the Mediterranean region. I just ran out of time. I will be sure to catch you next time.

Regarding the issue of orange peel with polyester clearcoat on wheels - we need to dissect the potentially contributing factors. First question: Is the powder coating you're using inherently orange peeling? Best way to check that is to spray an uncoated test piece/panel and bake it at the required bake schedule. Make sure you give it adequate heat-up time to ensure that the metal reaches the specified temperature for the required amount of time. If you can't get a smooth surface with the powder under these conditions, either it is inherently too textured, or it may be old powder that has absorbed moisture or is chemically advanced. Then, either get fresh powder or a powder with more flow.

Too low of a temperature or not enough time can cause unexpected orange peel. Also make sure the film thickness is above the minimum recommended by your powder supplier. Thin films are more orange peeling than thicker ones. Also note that too thick (greater than 100 microns) may cause another type of orange peel. More on that in a moment.

Regarding application parameters, your settings are not bad. For the first coat, I would increase the kVs to 90-100 and also the charge to 60 μ A. If this creates back ionization, the first thing to check is whether you have a good earth on your part. You can check this with a megohm. You'll want <500 ohms, preferably <250

ohms. As for the second coat, try 90 kVs and about 15 μ A. If you have a poor ground or try to apply too much powder too quickly, you may encounter back-ionization. This is when the charge doesn't have enough time or a clean enough pathway to discharge to the earth.

Another trick of the trade, especially for heavy parts like alloy wheels, is to preheat the part before spraying. In this case heat the part to about 130-140 degrees Celsius and spray it while it is above 100 degrees Celsius. This will help with transfer efficiency, penetrating Faraday Cages and will also augment the melt flow of the powder. This applies to both the first and second coats.

I hope all of this helps and hopefully the next time I am in your neighborhood I can stop by and we can enjoy an Aperitivo.

Best regards,

- Joe Powder

Magnetic Personality

Q Hi Joe,

Can heavy rust under powder cause false readings on a mil gauge?

Todd H.
Tekamah, NE

A Hi Todd,

Yes, it absolutely can cause false film thickness readings. Here's why: Film thickness gauges designed for ferrous metals operate using magnetism to determine the distance between the probe and the steel substrate. Fe_2O_3 (ferric oxide), a.k.a. "rust," is no longer magnetic like non-oxidized steel and therefore fools the film thickness gauge into measuring the distance between the probe and substrate as a combination of the coating and the rust layer. Consequently, you are misled into thinking that this is the coating thickness. Theoretically it is possible to calibrate the film thickness gauge on a similarly rusted surface. The gauge will then take into account the oxidized layer and only measure what is on top of it. This is a bad strategy as the layer of rust probably varies.

Another means to measure the film thickness independent of the rust is to excise the layer of coating, gently remove any rust on the underside of the coating, then place it on clean steel. The film thickness gauge can then just measure the thickness of the coating.

Best strategy is to avoid coating rusted metal.

Best regards,

- Joe Powder

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