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Ask Joe Powder

Murphy's Law

Hi Joe,

Q I am James the Quality Technician from a finishing house in Northern Ireland. I am currently in the process of doing some R and D with powder coating on top of chilled iron grit blasted material and we are currently experiencing problems. I thought you might have a good knowledge of the subject after reading your Q&A's with other powder coaters.

The system we have in place is the SA 2.5 grit blasting then coated with APP120 (a zinc rich primer) and cured at 110°C for 30 minutes. However after this stage the top coat refuses to adhere to the primered substrate and when it does it generally "stars up" during spraying. I have tried spraying it hot (metal temp greater than 150°C), changing cure times for the primer (shorter bakes at higher temps), lowering gun kV's and changing the base primer but none of it gets satisfactory results. I was just wondering if there was anything basic that I could be missing or a variable that I have overlooked in order to give better results. I understand if you aren't willing to divulge such information and if you have any questions for me, please do not hesitate to ask.

Kind regards,

James B., Quality Technician

A Hello James,

Thank you for your question and it's great to hear from Northern Ireland. I hope all is well in Newtownabbey. It sounds like you're getting rather frustrated in getting good parts off your finishing line. You are wise to select the materials and process you are trying to make work. Blasting the metal is a good idea and the dual coat approach gives a very durable finish. To make this work, the devil is in the details.

The biggest problem seems to be getting a good second coat on these primed parts. The first place to investigate is "are you getting a good earth to your parts?" If you are seeing starring and poor film build, you probably have poor electrical continuity to the earth. Checking for earth requires a megohmmeter which not only measures resistance but also provides up to 500VDC which helps define resistance more accurately. You want to have 1 megohm or less resistance. If it is greater than 1 megohm, start looking for poor contact points including hooks, hangers, racks and conveyors.

Regarding the powders, I would stick with the original powders and work on the application process. It is wise to undercure (or "gel") the primer prior to applying the second coat then fully bake the two coats. This provides the best inter-coat adhesion.

I hope this helps. Please let me know if you have any further questions.

— Joe Powder

Haters Gonna Hate

Hi Joe,

Q I hope all is well. I have my yearly million dollar question for you. I would like to put clear acrylic powder coat on polished brass for an outdoor light fixture. I have been told that it cannot be done. One reason is that the brass discolors in the cure process. Is this true, and if so what is the safe temperature to powder coat this?

Another reason, I was told, was that the clear powder coat is too porous and does not hold up well outdoors. Well this does not seem accurate to me as I am well aware of car companies using clear acrylic and that has complete outdoor exposure. The whole thing seems kind of silly since I know the durability of the technology. Is there any advice or facts that you can give me that will support my idea of doing this?

Thank you in advance for any help that you render.

Bonnie C., Manufacturing Engineer

Hi Bonnie,

A You ask the best questions. Thanks for this one. Acrylics can be used on polished brass—but you have to be careful. Brass does darken with temperature. It's an oxidation process. You would have to use a low temperature cure acrylic— something around 275°F cure. It will take a longer bake, probably around 25 to 30 minutes. The powder coating will not be porous and will hold up to the weather. You are correct that acrylic powder had been used on car bodies (BMWs) for years and certainly on aluminum alloy wheels for decades.

I would strongly recommend that you test out the acrylic clear on a scrap piece of polished brass to confirm that the metal won't discolor. It's also important to make sure that the brass is clean— no residual polishing compound. I've seen discoloration due to interactions with certain polishing compounds, especially tallow based ones.

Tell the naysayers they're being silly, but back it up with some real data.

Let me know how things come out.

— Joe Powder

A Fine Question

Good morning Joe,

Q I work for a powder manufacturer and have a question about PSD (particle size distribution) and our particle size analyzer. My first question is what causes fines and how do we fix it? My second question is on our particle size analyzer. We have the air pressure to 1500 mb. Is that a high number and will it cause to break our particles and create more fines?

Ivan R., Lab Technician

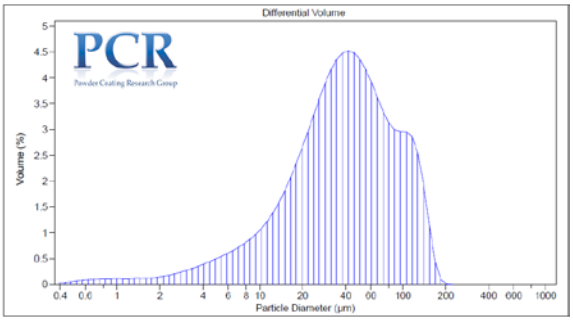

Figure 1. Particle size distribution of a non-ideal powder coating. Note the high volume of "fines."

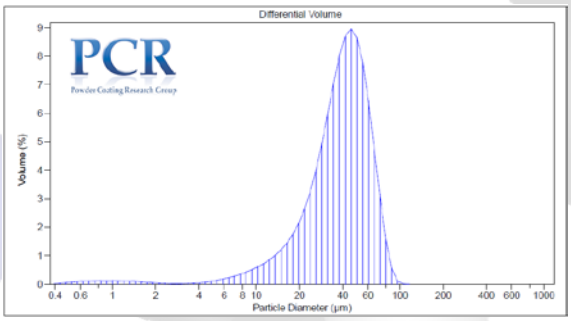

Figure 2. Particle size distribution of a good powder coating. Note the low volume of "fines."

Dear Ivan,

A Excellent question. The short answer is "hammers." During the manufacturing process, extruded flake is introduced into the grinding chamber via windswept suction created by the fan on the baghouse. The flakes enter the grinding chamber and are smashed by the hammers (or pins) on the rotor. In addition, they are flung centripetally into the corrugated liner of the grinding chamber. Particles don't exit this chamber until they are small enough to pass through the air buffer created by the classifier wheel. The faster the classifier wheel, the smaller the particles.

From a materials standpoint - certain polymers fracture more readily than others thereby creating more "fines." Basically, lower molecular weight ones break more readily and conversely higher molecular weight ones create less fines. Typically, polyurethanes generate more fines as well as epoxies. Polyesters typically create less. These are general rules but fines generation is really formulation specific.

As for the air pressure on your particle size analyzer, this will not cause particle fracture resulting in more fines. It will however de-agglomerate agglomerates. This is a good thing as it is wise to measure the primary particles rather than a mixture of primary particles and agglomerates.

I hope this helps answer your question.

— Joe Powder

Joe Powder is our technical editor, Kevin Biller. Please send your questions and comments to Joe Powder at askjoe powder@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 drinking out of the birdbath, 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!