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Ask Joe Powder™

Bit by Bit

Q **Dear Joe,**

We are utilizing two separate grinder/mixers for premixing and chips milling in the powder coating laboratory. Can you explain why using separate grinders is so important to prevent craters or other surface imperfection formation? Is cleaning of only one extruder for premixing and chips milling insufficient to overcome the crater formation?

Best wishes,

Cüneyt A.
Turkey

A Dear Cüneyt,

Thank you for contacting me. This is a good question.

The reason for using separate mixer/grinders for premixing and milling (pulverization of extruded chips) is to avoid contamination of one product into the other. Specifically, contaminating chips with premix will probably result in film defects such as craters and extraneous "bits." The reason for this is that the unprocessed raw materials in the premix are not compatible with the extruded material. For example, some of the additives in the premix (e.g., the flow agent) can cause craters in extruded chips or the final powder. In addition, dry pigment and fillers may not be dispersed (de-agglomerated) and could cause "bits" in the final film.

Extrusion (aka compounding) melts and mixes the resinous components in a powder formula thereby making them compatible. The shear caused by the extrusion process also disperses pigments which are typically in agglomerate form. This provides better color development and consistency.

If you really wanted to use the same mixer/grinder for both premixing and milling, you would have to thoroughly clean the equipment between processes, especially going from premixing to milling.

I hope that this helps.

Kind regards,

– Joe Powder

Epoxy Exposed

Q **Hi Mr. Joe Powder!**

I have a question: we have a powder coating process here in our facility and we use an epoxy powder from a reputable manufacturer. This powder doesn't pass an accelerated exposure test. Question is, does this kind of powder (epoxy) pass the QUV test? I ask because we are having troubles with our customers.

Thanks for your time.

Tito M.
Monterrey, Mexico

A Buenos días Tito,

Thank you for the question, this is a good one. The QUV test simulates the exposure a coating will experience in a high intensity UV environment like South Florida or Mexico. The wavelengths are close but not identical to the sun. It can be used as a decent comparative test for similar formulations. Epoxies will not last long in a QUV chamber without fading and chalking. Similarly, a hybrid powder coating which also contains epoxy resin will not resist degradation in the QUV cabinet. Based on this testing and experience in the field, epoxy and hybrid powder coatings will fade and chalk very quickly when exposed to sunlight.

Powder coatings that have good to excellent QUV and outdoor performance are based on the following chemistries: polyester TGIC, polyester HAA, polyurethanes, acrylic (automotive), and fluoropolymer (high end architectural). Pigmentation and additives in the formulations also have a strong influence on UV resistance. You must discontinue using epoxy and/or hybrid powder coatings for any parts that will be exposed outdoors.

If you need more guidance, please let me know.

Best regards,

– Joe Powder

Outside the Box

Q **Hi Joe,**

I hope things are going well with you. As you know, most industrial powder coating systems have about 60-70% transfer efficiency on average; that means about 30-40% of the powder does not adhere to components being powder coated. Therefore, they tend to work on reusing the excess overspray powder, known as reclaimed powder, in order to increase efficiency and cost-effectiveness.

Consequently, we have started evaluating the possibility of reusing reclaimed powder in a thermal spray (flame spray) coating process. We prepared some sprayed metal components with 100% reclaimed powder and tested them against some sprayed metal ones with 100% virgin powder. The results showed no differences between them, and in terms of other parameters such as coating adhesion, wear performance, etc., they were similar. Also, chemistry of the reclaimed powder remained within our spec.

As we are still evaluating this I would like to get your opinion and thoughts on reusing reclaimed powder. I know you are very experienced and have seen many different applications. Have you seen others using reclaimed powders in a flame spray coating process? Is this something that you recommend? If so, what mix ratio of reclaimed powder vs. virgin powder would you recommend?

Thank you for your time and your answer to my question will be greatly appreciated.

I am looking forward to hearing from you.

Thank you,

Reza E.
Tulsa, OK

A Dear Reza,

Thank you for your question. You offer an interesting path to managing overspray powder coating. You are correct that typical application systems operate with 60-70% first pass transfer efficiency. Of course, this is really dependent on what you are spraying and the quality of your application equipment and controls. For example, transfer efficiency is poor when spraying wire racks (mostly air), but pretty good when spraying flat panels.

As for flame spraying reclaim or a mix of reclaim and virgin powder—it sounds like a good idea and may work. Here are my comments and concerns:

1. Powder "sprayability" is mostly tied to particle size distribution (PSD). Virgin powder, if properly manufactured, will have an ideal PSD. Reclaim contains the less than desirable particles, such as a higher concentration of fine and coarse particles. This makes the reclaim a bit more difficult to fluidize, transport, and electrostatically charge. Consequently, recycling reclaim powder involves blending it with virgin powder. How much is dependent on how the blend behaves in the application process, namely fluidity, transport, and charging. With flame spray you obviously eliminate the requirement to charge the powder.

2. To be honest, I'm not a big fan of the flame spraying powder process. Why, you may ask? I just think it's a bad idea to create a cloud of fine organic particles with lots of air (i.e., oxygen), move it through space, then pass it through a flame. I can see the generation of a flamethrower effect or worse yet, rapid combustion (Ka-BOOM). That said, there may be alternate thermal spray processes such as plasma or high intensity IR that may be safer, but I am not sure.

3. Regarding the ratio of virgin to reclaim powder, you can probably incorporate a fluid-flow additive to help the non-ideal PSD fluidize and transport better. This can impart lousy electrostatics; however, if you're using a thermal spray process that should not be an issue. Fluid-flow additives are typically fumed silica or fumed alumina and should be incorporated at low levels, say 0.1-0.2% by weight.

Good luck with your inventiveness. It's always good seeing someone thinking outside of the box… of powder.

Kind regards,

– Joe Powder

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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... he doesn't bite. Maybe it'll end up in the next issue!