Ask the Experts sponsored by Gema

Your questions answered by PCI member experts.

You have questions, we have answers. In each issue of PCT, *our extensive network of powder coating experts provides information to help you with your powder coating challenges. Let us know what's keeping you awake at night, and we'll do our best to help you get a good night's sleep!*

How Long Can You Go

We have a brand new powder coating system being installed as I type this, and I have been online watching some of the webinars you offer on your website. One thing I saw was that the parts should not be higher than 125 degrees Fahrenheit before going into the powder coating area to prevent gelling and excessive film thickness. Our system is only about ten feet from the drying oven to the wall of the powder coat room. How are the parts supposed to get down to or below the required temperature? Is this normal? Other lines I have seen have a few hundred feet of conveyor to allow the parts to cool before the powder is applied and then reheated, or they have a cooling tunnel. Also, if a cooling tunnel is used, do we need to be concerned with flash rusting on any carbon steel parts if humid air is drawn in?

Yes, you are correct that it is recommended parts not be higher than 125 degrees Fahrenheit. Typically, most new systems that do not have the line space to allow ambient cooling (the long line space you mentioned) will have a cooling tunnel between the dry-off oven and the environmental room to accelerate the cooling of the parts. These cooling tunnels draw outside ambient air and exhaust it back outdoors. The length of the cooling tunnel is predicated on two things: the thickness of the parts and the conveyor speed. Thinner sheet metal parts can typically cool in five to ten minutes. Thicker parts may take longer. In addition, the type of substate will impact cooling time as aluminum will cool quicker than steel due to its thermal conductivity.

Regarding humidity causing flash rusting, you do not have to worry about this. This is the very reason for getting the parts into the dry-off oven quickly after the pretreatment washer—to prevent flash rusting due to the water on the parts.

Bonding Over Bodywork

On some of our parts we are required to fill in some areas and sand them to make them smooth to the surface prior to powder coating. I remember fixing my old car with Bondo® and sanding it prior to repainting my car. Is there a product that is similar that would work with powder coatings? I am concerned that the heating of the part to cure the powder might possibly damage and make the filler come off the part.

Yes, there are a few products on the market that can be used as a filler, sanded, and then powder coated that will handle the heat of the dry-off and cure ovens. The product you use must stay conductive to allow the attraction of the powder coatings during the application stage. One product is called Lab-metal from Alvin Products, and some have also used JB Weld with some success. It would be important to test your parts and collaborate with your customer before deciding on a solution.

Containment Constraints

Our system is an open powder booth for batch application. It was designed with a much higher cubic feet per minute (cfm) exhaust volume of air than a closed booth. Is there data (literature) that you are aware of that suggests risk one way or the other? We only use one or two powder guns at one time.

The exhaust volume of a powder booth is determined by two things: the first is powder containment, and the second is to maintain sufficient airflow to keep the powder concentration less than 50% of the minimum explosive concentration (MEC.) Typically, an air velocity at all the openings should be between 80 to 150 feet per minute (fpm) depending on the opening size. A batch booth is normally around the 80 to 100 fpm face velocity. Since you have a smaller batch booth and only use one or two powder guns at any one time, you will not have enough possible volume of powder to get anywhere close to the MEC. Typically, the calculation is not even done unless you have an automatic, multiple-gun system. All of this, including the calculations, is

shown in *Powder Coating: The Complete Finishers Handbook* that is published by PCI.

Also, OSHA 1926.66 states that a spray booth with electrostatic spraying operations should have an open-face velocity of the booth not less than 60 fpm depending on the finishing material being applied and its flammability and explosion characteristics.

Inside Out

My company's powder coating operation has been running for several years utilizing a conveyorized line. We primarily have been coating lighter, flat, sheet metal parts and curing with an infrared (IR) oven. A new customer would like us to coat square channels and rectangular tubing that are 3⁄16 to ¼ inch thick. Knowing that IR cures primarily by line of sight, what are the chances that the rectangular tubes will be fully cured on the inside of the product?

You are correct that with infrared (IR), the primary curing is through the line of sight. However, as the area of the part receives the heat from the IR, it will also spread the heat throughout the part via conduction. The key to curing the inside of the part will be the heat intensity of the IR and the time the parts are in the IR oven. With appropriate IR lamp intensity and sufficient dwell time, conduction will transfer the part temperature and achieve proper curing conditions inside the part, facilitating the curing process.

It is recommended to either test the parts as they run through your system or test them at an IR manufacturer's lab. This is the ultimate method to confirm the powder will cure on all sections of the parts (inside and out). Through this testing, you can determine the time required to reach the correct metal temperature on the inside of the part for the various thicknesses. Once established, you may need to adjust the line speed for the conveyor to achieve the proper time for curing.

Smooth Operator

We currently use the PCI and ACT smoothness standards across multiple plant sites. Could you please help me understand the difference between the two? Our quality leaders at a few of our sites are trying to understand the callout for a certain level. Also, is there a difference between the two standards besides one being for powder coat and the other for liquid paint? I look forward to your feedback and thank you for the support.

PCI offers smoothness standards for powder coating and ACT offers smoothness standards for powder coating (the same product as the PCI standards) and orange peel standards for liquid coating, so first it is important to identify which standards you have and ensure you are using the applicable standards for the coatings you are testing. Both sets of standards, powder and liquid, have a rating of one through ten. However, a number seven from the PCI or ACT powder standard is not the same as a number seven from the ACT liquid standard. Anyone using either standard should reference the smoothness level they desire for either powder coating or liquid coating. Due to how the powder is manufactured and flows when cured, it typically cannot achieve the same smoothness level as a liquid coating.

One additional comment on both sets of standards is that it is recommended that like any quality control device, they be sent back to be reviewed and recalibrated every five years. Due to handling and storage, the panels can become scratched or otherwise damaged, and if this has occurred, they should be replaced. You can contact either PCI or ACT to set up this recalibration.

Cover Up

Our shop deals with a lot of accessory parts for the automotive industry. For different reasons, customers ask about using liquid paint on top of powder coating. We've heard various opinions on this, so we thought we'd ask PCI.

We're glad you came to PCI as a resource. We assume this question is related to surface repair, and not because your customer simply wants a different color on their accessories? If the latter is true, you should completely remove the powder coat using blasting or chemical methods and prep the metal for liquid paint as you normally would. If it is for repair purposes, the short answer to your question, is that yes, you can apply liquid paint over top of a powder coated part. The opposite, however, is not true; you cannot effectively apply powder coatings over top of a liquid finish.

To apply a liquid paint over top of a powder coating, paints will generally adhere best to epoxy and polyester powder coated surfaces, as long as the powder formulations you are using do not contain slip control agents such as wax additives. If you have a very smooth finish, that can also cause adhesion issues. Check with your powder supplier to learn which powder formulations may be used in your specific situations. You will also want to choose a liquid paint that has similar performance qualities as the powder coating used, even though the performance of the liquid paint will generally not hold up as well as the powder coating.

With all that in mind, it is recommended to abrade the area using a light grade sandpaper and use a solvent cleaner to remove any soils. Next, apply the proper primer indicated for the substrate. At this point it is prudent to spot test the primer, allowing it to dry for approximately 30 minutes before trying to wipe it off with a damp cloth. If you see smudges on the cloth, you need to return to the sanding phase and abrade the surface further. When you are ready for the liquid paint, enamel and epoxy-based paints typically adhere well to most powder-coated surfaces, and also work well with primers designed for metal alloy surfaces.

Have a question for our powder coating experts? Send it to asktheexperts@powdercoating.org.