Ask the Experts

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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!*

Loss Prevention

I've observed changes in both the coating appearance and powder loss at the gun as the powder level decreases in the fluidizing hopper. Do you have data showing any changes in powder loss at various hopper levels, with a constant incoming air pressure? I can't speak for anyone else, but we do not adjust incoming air pressure to the hopper as the powder level drops. It is set, typically, with a full hopper and left there through the run. I'm curious if others adjust air pressure to the hopper throughout the run. This process would be very tedious and might require additional line downtime or an extra person while the line is running.

Below is a summary of the average gun output at a standard 60 pounds per square inch gage pressure:

Hopper level (unfluidized)	Average Gun Output (grams/minute)
10″	174.4
5″	166.7
3″	158.8

The level in the hopper has a greater impact on the powder being delivered to the gun than adjusting the hopper fluidization pressure. Basically, in this example, there is still a 9% loss of powder output. Adjusting the pressure of the hopper is just a step to keep the process in control, use less compressed air, make it easier for the operator to see in the hopper, and potentially reduce nuisance dust in and around the hopper. It is likely that most companies operate similarly to yours, setting the pressure and leaving it alone.

Cover Up

We operate an existing powder coating line that uses an overhead conveyor system and have been asked to provide a powder coating over the top of parts that have already been e-coated. What steps are necessary to coat these types of parts, and should we consider scraping or removing any of the e-coat to ensure proper grounding for the charged powder particles to deposit on the parts?

Begin by ensuring the e-coated parts are free from dust or contaminants. It's advisable to run these parts through the pretreatment washer, operating only the cleaner and rinse stages. This ensures a clean surface, allowing the powder to adhere effectively.

You are correct that e-coated parts have less grounding compared to raw parts. However, since the coating is thin (a couple tenths of a mil), the grounding is sufficient to attract the powder coating topcoat. There's no need to scrape or remove the e-coat, as doing so could create potential corrosion points. Powder coating over e-coat has been successfully practiced in the industry for many years.

Adhere to These Guidelines

We have noticed adhesion problems on our automatic powder coating line. We have a five-stage pretreatment washer using iron phosphate, a dry-off oven, one automated powder booth with reciprocators and a manual touch-up station, and a cure oven. Where can we look to find what is causing our issues?

Adhesion problems often come from poor cleaning or improper pretreatment application. However, there may be other factors to consider. You can look at the following areas to see if they are causing your adhesion problems. Check to see if you are getting proper mechanical cleaning in your washer. This includes ensuring proper spray pressure, nozzle alignment, and part hanging. The phosphate stage can cause issues such as low phosphate coating, powdery phosphate coating, and non-uniform coating. Verify the proper concentration is in the cleaner stage and that the temperature is not too low. It may be time to dump the stage and recharge it. Another area to check is the final rinse sealer stage. If the pH is too low or is contaminated, it can cause the metal to rust.

It is also recommended that you double check to make sure that no new lubricant or rust preventative is being used upstream of the powder coating line and not being cleaned off properly. If this is the case, you may need to use a different cleaner to remove these new soils or incorporate a detergent additive. It is best to talk to your chemical supplier and have them verify that the phosphate stage is charged correctly and that you are obtaining the proper coating on your parts. They can help guide you to ensure this stage is working properly.

Flash rusting can also cause adhesion problems. If the parts have a long trip from the exit of the pretreatment washer to the dry-off oven, then having a low coating weight will make the part more likely to flash rust. This can also happen if the parts dry between the phosphate stage and the rinse.

Many potential adhesion causes can be eliminated or prevented by performing routine maintenance and solution control. Being proactive can keep your system operating at its best performance.

The Space Between

We are preparing to manually powder coat 16-foot long, 4-inch x 4-inch square tubes, currently spaced six inches apart. To maximize efficiency, we're considering reducing the spacing to four inches, allowing us to hang an additional tube and increase throughput. However, before making this change, we need to ensure it won't affect the quality of the powder coating. How can I determine if four inches is okay other than running them through the line? Is there a formula or rule of thumb that could be referenced to help figure this out? We have not yet powder coated these tubes, but we plan to do so soon. How does one learn, know, or test how the Faraday effect may occur on parts to be powder coated?

Typically, the recommended spacing rule for powder coating is between one and one and a half times the width of the part. Given that your square tube has a diagonal width of approximately 5.65 inches, the current six-inch spacing falls within this guideline. To determine if reducing the spacing to four inches is feasible, you will need to conduct testing. This process will likely involve some trial and error to find the optimal spacing that balances efficiency with coating quality. Keep in mind factors like ease of coating and uniform film thickness when parts are closer together.

If reducing the spacing allows for an additional tube without causing other issues, it could potentially improve total part throughput. However, it's crucial to monitor and adjust parameters such as voltage (max voltage recommended, set current to max), air pressure (set low to avoid surging), and powder delivery percentage to maintain coating quality. Lastly, a slower coating process is recommended to allow for adequate film thickness build-up while minimizing operator fatigue, given the length of the tubes.

Cool Idea

Our company, located in the Northeast region of the United States, is considering the addition of an air conditioning unit to our cooling tunnel to expedite the cooling process of parts to room temperature. Currently, parts exit our cooling tunnel at 165 degrees Fahrenheit into the unload area, making them difficult to handle. With no space to expand the cooling tunnel, our options are limited. The primary concern is how quickly we can cool the parts and their coatings without causing damage such as cracking. Specifically, we are unsure whether the coating, once cured in the oven, can withstand rapid cooling. Are there specific restrictions for each type of coating?

Cooling the parts quickly should not pose a problem. Adding an air conditioner to your cooling tunnel would be no different than the outside temperatures you experience in the midwinter. You'll likely need a bypass duct and dampers designed specifically for this new AC unit or cooling coils. You will also need to calculate the AC capacity based upon the heaviest part loading per hour. The formula for this is as follows:

> Btu per hour heat removal = pounds/hour part loading X 0.12 steel coefficient X temperature difference in degrees Fahrenheit (your oven part temperature less the desired part temperature after the cooling tunnel)

You also may need to replace the supply fan with one that has a higher pressure rating to accommodate the cooling coils. During cooler outside temperatures, you can turn off the AC unit and adjust the dampers to use outside air. Most powder coatings typically handle this faster cooling cycle well, but it's advisable to confirm with your powder supplier.

Baby Got Back (Ionization)

I am getting defects in my powder coating that looks like small craters on the moon and not sure what is causing it. My parts are clean, so I don't believe I am having any contamination on the part.

It seems back ionization is the cause of the problem. As powder is applied to the surface of the metal, the strength of the electric field inside the layer of powder will increase with thicker film build. This results in a positive mirror charge building up on the metal. This intense electric field buildup generates small sparks that penetrate the powder layer. This repelling force forms microcraters on the surface.

Back-ionization can be caused by high voltage, the gun being too close to the part, excessive current draw, poor grounding, overly thick powder buildup, or a combination of these.

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