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!*

Should I Hire a Housekeeper?

I have been operating my powder coating booth for many years but now there seems to be a lot more powder on the floor surrounding the booth. We have a manual batch cartridge booth with one gun. It is taking me longer to clean up and is being tracked to other parts of the plant. Is there anything I can do to fix this, or do I just have to live with it?

There are definitely things you can check to reduce your clean-up problems. Begin with a process of elimination focusing on the low-hanging fruit. First, make sure that your operator is not spraying too close to the booth opening or pointing the gun in the direction of the opening as this might not allow the capture velocity at the opening to contain the powder. Also, make sure the operators are not blowing out of the booth when they clean the booth with compressed air. Next, verify that you don't have any building drafts such as open garage doors that run across the opening, which can cause a venturi effect and pull the powder out of the booth.

The final step is to verify that you have the correct containment air velocity at your booth opening by using a velometer. It is recommended that you have a minimum of 100 feet per minute velocity at the opening. If you do not, then you should next check to see if the booth cartridge filters are getting plugged, which will reduce the air volume the fan can provide. Check to make sure the cartridge blowdown is working properly, and the compressed air pressure is as the booth manufacturer recommends. If the cartridge filters are clogged up, consider replacing them and then check the air velocity again.

Simmered, Not Stirred

We have an opportunity to work with a customer who wishes to have parts coated utilizing a fluidized bed process. Can you explain how this type of coating process works?

The basic fluidized bed is an open top container with a porous membrane that separates a pressurized plenum located at the bottom of the container. This air moves through the membrane, lifting the powder particles and fluidizing them. The powder appears to be lightly simmering. The parts to be coated are cleaned, pretreated, and preheated in an oven up to a part temperature that is above the coatings fusion temperature to ensure that when the part is dipped, it achieves good flow and coating thickness. Typically, this is 600 to 800 degrees Fahrenheit (315 to 426 degrees Celsius), depending on the product thickness and type of powder. Once the part is in the fluidized bed, it must be moved around to help coat hidden or hard to reach areas and to prevent pinholes in the coating. In addition, as the parts are removed from the fluidized bed, the hangers should be hit to remove any excess powder. The part then is placed in a post-cure oven to completely fuse and flow out the powder. This oven will operate at 250 to 500 degrees Fahrenheit (121 to 260 degrees Celsius). The parts can then be cooled and unloaded.

Cooking with Gas

My company is a custom coater job shop that powder coats a wide variety of steel parts. Recently, we received new parts that are made from a galvanized (zinc-coated) sheet metal, and we are having imperfections in the coating. We have double-checked and are cleaning correctly and applying the correct film build. Are we doing something wrong? I don't know what we should check next.

When you powder coat galvanized steel, you have to consider that outgassing may occur. Outgassing is a term that describes the release of entrapped air or gas from a substrate material that is heated. The heat expands the air and may force it up through the molten film during curing and cause imperfections in the coating. These imperfections can reduce the quality of the finish by providing a path for moisture

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to pass through the film to the substrate, causing coating failure. The process of applying the zinc to the steel substrate produces gasses that can be entrapped within the surface coating. This is especially true when "hot dip" galvanizing is used. Galvanneal does not have this problem because the surface has been annealed to relieve the stresses and release the entrapped gases.

To reduce or eliminate this problem, it is recommended to preheat the part to allow the entrapped gas to be released prior to powder coating. The dry-off oven or preheat oven can be used for this purpose. The temperature must be approximately 50 degrees Fahrenheit (10 degrees Celsius) higher than the final powder cure temperature.

Multiple Choice

I just started a new powder coating shop and do not have a lot of experience. Before I began, I noticed there are several different types of powders available on the market. I was hoping you could help me understand how I should select which powder to use and what makes them different.

The selection of a coating should be undertaken as a cooperative effort between you, the end user, and the powder coating supplier. There are a wide variety of coating types available, each with its own strengths and weaknesses. In developing a coating for a particular application, the coating supplier (formulator) must make a series of compromises. As an example, if the desired coating requires a high pencil hardness and mar resistance along with weatherability, then flexibility may be reduced. If superior chemical resistance is desired, then weatherability and overbake yellowing resistance can be compromised. Other considerations may include cure time and temperature, substrate type and treatment, and application method. Only when all requirements of a particular application are considered can a coating supplier recommend the proper powder coating type.

Measuring Up

We have been in business for several years, but still have some quality issues. Also, the applied film thickness seems to vary from day to day and operator to operator. What can we do to alleviate this problem?

Quality issues can be caused by myriad factors, so we will focus on the film thickness portion of your question. A primary step in providing quality service and meeting customer specifications is the use of properly calibrated instruments for measuring things like dry film thickness (DFT). Just as important, is training to ensure you are getting proper measurements. This includes ensuring employees are zeroing out the device prior to every use for best accuracy, and having it calibrated by the manufacturer as recommended. Also, depending on the type of substrate and shape of the part, the operator must be trained on using the correct device or probe. Once you are confident in your readings, if your DFT is not consistent, a process to accurately track what your operators are doing is recommended.

As an example, to apply a minimum DFT of two mils with a target range of 2-3 mils, in many cases, to avoid rework, operators may apply 3-5 mils "just to be safe." While the intention is to avoid costly rework, this doubles material cost and can harm coating integrity if curing times aren't updated to account for the extra powder. By monitoring DFT readings in real time and analyzing this data over a period of days and weeks, an organization can fine tune their operation and save money while ensuring that customer requirements are being met.

Many instrument manufacturers provide computer and app software for real time data analysis. Collecting this type of data allows you to see how your line operates on a day-to-day basis, which can help with training, saving you money on consumables and rework. If you refine control of your DFT and are still having quality issues, then you will need to turn to your other suppliers to do more detective work.

Walking on Air

Our company is growing, and we need to relocate our operations to a new larger building. It was decided that when we do this, we will install a new air compressor dedicated to the powder coating operations and have the air piping installed before we move. What do I need to determine the size of the unit and are there any specifications I need to include when purchasing the new air compressor?

There are several important steps in selecting the correct air compressor for your new powder shop. First, you must determine the minimum capacity size of the compressor by totaling all of the planned devices. Be sure to include any potential future additions. A safety factor of at least 25% should be allowed to compensate for lowered efficiency, leaks, and unforeseen contingencies. The total of the above will give the designer the required capacity to select the compressor. It is also recommended that the minimum pressure for this compressor be 100 pounds per square inch (psi).

Since this unit will be providing air to the powder area, it is extremely important that the compressed air be cooled, dried, and cleaned before it is distributed for use. Powder coating equipment requires compressed air to be provided at +38 degrees Fahrenheit dew point or lower, contain less than 0.1 parts per million (ppm) oil, and have no particulate contaminants greater than 0.3 microns. In other words, it must be clean, dry air so it does not cause defects in your powder coating.

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

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