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!

Breath of Fresh Air

One of my company's powder coating operators has filed a complaint with OSHA about powder dust. Should we be using a respirator program for powder coaters? Also, is it required by OSHA?

A respirator program is a best practice and may be a requirement depending on the exposure level of powder to the operators. It would be best to have an industrial hygienist do an air monitoring/exposure level testing for your powder process. Many states offer free resources to do this testing. If you have a proper powder booth and follow industry standard practices, typically, most powder coating processes will be below all OSHA occupation exposure limits. However, if you wish to avoid testing, then a respirator program is recommended.

Some things to keep in mind if you require the use of respirators:

- You will need a written respirator procedure that complies with all OSHA requirements.
- All employees who wear a respirator will need to complete the respirator medical evaluation questionnaire, complete a respirator physical/pulmonary function test, and perform a respirator fit test (if it is a tight-fitting respirator). A loose-fitting hood style doesn't require the fit test.
- Each coater needs to have a medical evaluation on file before they can be fit tested or go through the training to make sure they are healthy enough to wear a respirator. These medical evaluations expire and must be updated per each person's individual health requirement.
- If a fit test is required, the employee will have to be clean shaven to complete the test.

The most common types of loose-fitting hood style respirators used for powder coating are the battery powered stand-alone unit (PAPR) and a supplied air respirator (typically runs off the supplied air in your shop).

- A PAPR is battery powered, filters the air, and then supplies it to the hood. It doesn't require a compressed air line but requires a battery and frequent filter changes.
- A supplied air respirator requires the operator to be hooked up to compressed air. This means they are dragging an air hose around with them. However, they don't require batteries and the filters on the compressed air last at least three months. They contain a carbon monoxide alarm on the supplied air lines. If the operators spend a lot of time in one spot, the air hose isn't much of a hinderance. If they move around a lot, it may be more of a problem. There are air flow devices that have climate control for the supplied air and the operators typically like them. It can help make the change an easy sell.

A safety company that sells respirators should be able to look at your process and help you select the best option for your needs. They can typically also help with writing a respiratory protection program that meets OSHA requirements.

Turning Over a New Leaf

Our company has an old liquid spray paint system that needs to be replaced and we are trying to decide between a new liquid line or a new powder coating line. We have talked to several coating suppliers, and they have told us that they have a powder coating that will meet our performance requirements. Where we need some help is to understand the economic analysis between powder coating and liquid finishing.

The economic review would begin with a comparison of the new equipment required. The pretreatment system and dry-off oven would be the same for either powder or liquid, so this can be considered a draw. The liquid system will require spray booths with air make up units, application equipment, a paint mix room, exhaust ducts and stacks, and a sludge recovery system if you are spraying a higher volume of

paint that dry filters cannot handle. If you plan on using water-based liquid coating, you will need to include humidity control to the spray booths. Also, if you are in an area that requires volatile organic compounds (VOC) abatement you will need to include a thermal oxidizer. In comparison, for a powder line, you will need the powder booth (no air make up required), powder storage room, and powder application equipment. The cure oven might vary in length depending on the required cure time of the powder vs. the liquid coating.

PCI Technical Brief #21, which can be found in *Powder Coating: The Complete Finisher's Handbook,* has economic analysis worksheets that can be used to complete a cost comparison of powder coating vs. liquid finishing. The first comparison would be the applied material cost per square foot of coated area. The applied cost of materials is a function of the cost and solids content of the coating material as it is applied, and the utilization efficiency of the material. The easiest way of doing this is to visit the PCI website (www.powdercoating.org) and use the coatings comparison calculator in the drop-down menu under the Resources tab. Values can be entered into the calculator to obtain results. Otherwise, a worksheet is provided in Technical Brief #21.

The next step would be to compare the energy costs involved in the operation of the finishing systems. In Technical Brief #21, worksheets are provided to calculate the costs of liquid vs. powder for the application booth, cure oven, conveyor and part heat loss, and solvent incineration (if required). These are added together for a total energy cost. Next, labor and maintenance costs will be calculated. The material, energy, and labor costs are totaled from all the worksheets to provide a total annual operating cost.

The final step is to add in additional cost elements that may be significant such as depreciation, some energy and/or tax considerations, reject or rework costs, and the costs of safety and/or health considerations such as personal protective equipment. A final comparison of the equipment and operation costs can then be reviewed to make the decision on whether a powder or liquid finishing system would be best.

Spring Cleaning

My company has been experiencing several dirt or contamination issues in our powder coated product that we process through our conveyorized line. We have done some troubleshooting, isolating the pretreatment, powder application, and cure oven from each other, and determined that the issue is occurring in the oven. What steps should we follow to correct our contamination issue?

There are several things you can consider to eliminate your contamination issue. The most important thing is to clean the entire interior of the oven, including the duct system and heater box(es). This can be done by utilizing a vacuum and tacky cloth. Note that it is good practice to mark the position of any dampers or nozzles prior to the cleaning to make sure the oven remains properly balanced after cleaning. All filters on the burners, fresh air, make up, or recirculation filters (if used) should be replaced. The area around the oven should also be cleaned so dirt is not carried into the oven.

Be sure to check the condition of your conveyor chain and clean, lubricate, or replace as needed. Ensure proper lubricant is used. If your oven has air seals on the entrance vestibule, it is recommended that the velocity exiting the slot nozzle be checked with a velometer. It should not exceed 800 feet per minute velocity, so powder is not blown off the product as it moves through the area. If it is, the air seal should be adjusted.

Not All It's Cracked Up to Be

We have a part that we hang on our powder coating conveyorized system, and we are having a defect issue at the very top horizontal surface of the part. The powder looks like it is bonded to the metal, but it appears to crack away during the curing process. Would you be able to assist in what might be the problem and how we can fix this issue?

It looks like the rinse tank solution contains salts and/or solids that evaporate on the horizontal surfaces. As the parts dry, the solids condense on these surfaces. This rarely, if ever, is an issue on vertical surfaces as the solution tends to run off and not puddle. One suggestion would be to determine if the parts can be racked in such a fashion as to allow the horizontal surfaces to be sloped backward in the direction of travel. This will help flat surfaces to drain rather than puddle. Another way to eliminate this issue would be to install or direct an existing blow-off nozzle at this surface. The blow-off should be located at the end of the washer or prior to the dry-off oven. A third option would be to have a fresh reverse osmosis (RO) or deionized (DI) water rinse halo as the final spray riser of the washer. This will remove excess solids that might be found in the final rinse tank due to extended use or if the tank cannot be overflowed.

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