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!*

## Second Time is a Charm

***We have a new powder coating shop and want to know if we can recoat our parts if we have a defect and how we would go about this.***

Fortunately, the application of powder coating lends itself fairly well to various rework methods. One of the advantages of powder coating is its ability to be recoated. Typically, a second coat can be applied over the first, without detrimental effects on the appearance or physical properties of the coating. Recoating is essentially an iteration of the same process used to apply the first coat. However, it may be necessary to adjust the application parameters in order to successfully correct the coating defect.

If the initial coating has rough spots from gun spitting, fisheyes from back ionization, or small protrusions from contaminates, it is necessary to sand those areas prior to recoating. If the initial coating that needs to be recoated is not smooth, this condition most likely will be detectable even after the second coat. Depending on the severity of the condition and the coating type, a coarser grit will remove the defect faster. However, care must be taken to ensure that sand marks are not evident after the second coat. Therefore, it may be necessary to utilize fine sandpaper (400 grit) during the final sanding operation to create a smooth surface condition. Feathering is necessary to blend the reworked area into the adjacent surfaces.

If you wish to learn more about the recoating of parts, PCI publishes *Powder Coating: The Complete Finisher's Handbook,* which has an entire chapter on the "Repair of Rejects." The handbook can be purchased through the PCI website store found on www.powdercoating.org.

## Storage Instructions

***My company has been powder coating for several years, but we are now in the process of setting up a new quality manual for our powder coating operations. I was hoping you could help with what we need to consider in our powder storage and handling. What do we need to include in our new manual?***

Various factors should be considered when planning the purchase, storage, and movement of powder coatings prior to application. First, it is important to fully understand the storage properties of each powder coating material that is used before placing an order. Considerations should include the maximum short-term and long-term temperatures that the material can survive without adverse effects. If the material has a short-term sensitivity to temperatures that can exist during transit, it may be necessary to ship the material in a refrigerated trailer or control the delivery schedule to avoid delays in hot weather such as over weekends. Long-term temperature sensitivity should be contrasted against the available storage space, conditions, and material production usage rates. Avoid the purchase of more material than can be properly stored for a safe period. It is recommended to develop an understanding of the manufacturer's lot number system and how they may indicate the actual age of the material. This information can be useful in the control and rotation of purchased and stored powder materials.

Ideally, the powder should be stored in the optimum conditions of less than 80 degrees Fahrenheit and approximately 40–60% relative humidity. Under these conditions, most powder coatings should be readily usable for at least a year. Avoid placing powder inventory in close proximity to any heat source such as an oven, washer, or space heater. It is also good practice to set up and use a first in-first out (FIFO) process to rotate inventory and use the oldest powder first to ensure trouble-free powder application.

Powder coating is designed to be free-flowing, easily fluidized, and capable of accepting and maintaining a good electrostatic charge during application. Powder left in a hopper overnight can absorb moisture, thereby preventing its proper application. If this occurs, it will be necessary to remove the moisture prior to application by fluidizing it with

dry compressed air or adding some virgin powder. During non-production times, it is recommended to utilize tight hopper closures or tie the plastic bags. Powder should always be returned to the storage room rather than being left out overnight.

## Trials and Tribulations

***I am in the process of building a new powder coating shop and am having difficulty with the local Fire Marshal. The Fire Marshal is quoting some paragraphs from the International Fire Code on what classification a powder oven is and is insisting that a wet sprinkler system be installed in the powder oven. Can you help clarify or point me in the direction of what is required?***

Sorry to hear you are having trouble with your local Fire Marshal. It's very difficult for Fire Marshals, or any Authority Having Jurisdiction (AHJ), to be knowledgeable in all areas for which they are called upon to make judgments regarding policies. They do their best to rely on the information they have at their disposal, Safety Data Sheets (SDS), other standards, the internet, etc., to try to make an informed decision. In most cases, they are spot on, but in other cases, they err on the side of safety (which doesn't always seem like the logical choice).

You might take a non-confrontational approach towards resolving the issue. Explain that you are not there to change their mind or tell them what decision to make but would simply like the opportunity to educate them regarding finishing operations. When it comes to ovens, there is so much confusion about the combustibility of powder, and the true fire load (a term they often refer to) is minimal. You can point out that the auto-ignition temperature of powder is over 800 degrees Fahrenheit and that the cure ovens typically only operate at between 300–450 degrees Fahrenheit. A detailed list of different powder coatings can be found in Table C.2.1 of the National Fire Protection Association NFPA 33 Standard.

## Calculating Capability

***Our business has increased and like many companies, we are struggling to find additional shop workers. Because of this, we are considering modifying our existing powder booth by adding 10 automatic guns while keeping our two manual guns. How do we determine if the existing booth is capable of handling the additional powder guns?***

There are a couple of things you will need to check and calculate for your booth. First, if you are adding openings in your booth for the automatic guns, you need to determine the total opening square footage of the booth including the part openings, touch-up openings, gun slots, and conveyor slots. The typical face velocity required to capture the powder in the booth is 120 feet per minute. Multiply the total opening square footage times the 120 fpm to obtain the required exhaust volume. Your existing booth would need to meet this minimum to contain the powder in the booth.

If you are using a remote collection system that utilizes ductwork such as a cyclone, then you need to perform one more calculation to ensure there is enough airflow in the ductwork to keep the powder concentration below 50 percent of the lower explosion limit (LEL). This safety air requirement is determined by the following formula:

$$\text{Safety Air Required} = \frac{\text{Maximum gun output (ounces per minute per gun) x Number of guns}}{\text{0.5 (safety factor) x LEL (ounces per cubic feet)}}$$

Whereas:

- Maximum powder output = 14.0 oz. per minute (Verify with powder gun manufacturer)
- Lower Explosion Limit = 0.03 oz. per cubic feet (Or verify with the powder manufacturer)

The existing booth would need to meet whichever is larger, the containment or the safety air calculation.

## Breath of Fresh Air

***I am sure you get this a lot but what are the requirements for compressed air supplied to powder equipment using the ISO 8573 classification system? What do I need to consider?***

ISO 8573 specifies the purity classes of compressed air with respect to particles, water, and oil. The compressed air for all powder coating operations should be clean, dry air of sufficient volume to handle all the connected devices plus additional capacity to handle any future additions and leaks in the system. That being said, here are some other key requirements for the compressed air:

- 100 pounds per square inch pressure.
- 38 degrees Fahrenheit dew point or less.
- Contains less than 0.1 parts per million of oil.
- No particulate contaminants greater than 0.3 micron.

It is also good practice to have a water and oil coalescent filter just before the powder booth as a final filter.

The *Powder Coating: The Complete Finishers Handbook* published by PCI has a complete chapter on "Compressed Air Systems and Requirements."

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