Setting up a powder coating test lab: Why? How?

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Most quality powder coatings manufacturers test their powder coatings in a variety of ways during production. Some end users rely on the manufacturer to perform and document the tests for each powder coatings shipment. The tests might not tell the entire story about how the powder coatings were handled before they entered a plant, however.

For instance, a powder coatings shipment might have been subjected to extreme temperature and moisture conditions during transport. Some powder coatings have also been known to arrive at a plant in a condition that is not exactly conducive to spraying in production. Often the material remains unchecked until it's used on the production line. That's when problems become evident and production stops. Can your plant afford that? Probably not. For that reason, it's a good idea to test each batch of incoming powder.

Determining what tests to conduct

Your first order of business is to determine which tests to conduct on the powder coatings delivered to your plant. Some of the most important ones are listed below:

- Color match
- Surface appearance
- Fluidizing characteristics
- Sprayability characteristics
- Charging characteristics
- Physical performance
- Functional performance
- Special postcoating manufacturing processes, such as silk-screening, postforming, machining, and assembly

Test procedures and other requirements should be written and discussed with your powder coatings supplier before you start testing. It's wise to test only for characteristics that the powder coatings were formulated for in the first place. The Powder Coating Institute has approved and published many test procedures. These are available to you for reference.

You should also be aware that testing for some of the physical and functional performance characteristics requires specialized equipment and may therefore not be practical to conduct in your plant. These characteristics are affected by formulation, not shipping and handling.

Equipping a powder coating test lab

The first requirement for any powder coating test lab is a spray booth. Equipment manufacturers offer small-sized lab versions of their standard powder spray booths. The booth opening should be adequate for spraying test panels and possibly some samples of your production parts. Spraying production samples allows you to test the special postcoating manufacturing processes mentioned earlier.

Besides the booth, you need a manual spray gun. These are also available from equipment suppliers. Your test-lab gun should be similar to the type you use in your production line.
For example, if you use tribo-charging equipment, you should use the same type of equipment to test your powder coatings. The same applies if you use internal or external corona-charging equipment.

The powder feed hopper should be sized for the task at hand. Small (5 pounds) and medium-sized (50 pounds) hoppers are suitable for a test lab. Because they are easy to clean, small hoppers are great for color-match and appearance testing of large numbers of powder lots. However, they don’t adequately reflect the fluidizing characteristics of the powder coatings that are being tested. For testing fluidizing characteristics, a 50-pound hopper is more suitable than a 5-pound hopper.

Another piece of equipment you’ll need is a sufficiently sized oven to cure not only test panels but also part samples. An electric bench-type oven or a floor-mounted, gas-fired batch-type oven can be used, depending on sample part size and your testing needs. Many equipment suppliers specialize in this equipment; cost varies by manufacturer and oven style. A timer that signals when cure time has elapsed would be very helpful. These timers can be separate or incorporated into the oven controls.

Other equipment you buy for your test lab depends on the tests you want to do and the size of your wallet. Some examples of other test equipment follow:

- Microscope for surface defect analysis
- Lab test screens for particle-size testing
- Laser-type particle analyzer for intense particle-size testing

**Using a test lab for correcting on-line problems**

If you have a laboratory spray gun, spray booth, and cure oven, you can conduct many tests designed to correct on-line coating problems. Following are a variety of things you can do to isolate problems in your powder coating line:

- You can do tests with raw-substrate test panels to check your surface preparation equipment for problems.
- You can skip your on-line surface preparation equipment and use pretreated test panels to isolate the surface preparation equipment from the on-line process.
- You can pretreat parts on line, spray them in the lab, then cure them on line to isolate the spray equipment from the on-line process.
- You can pretreat and spray parts on line and cure them in the test-lab oven to isolate the cure equipment from the on-line process.

Isolating a problem in the on-line process is the first step in determining an appropriate solution. When you have a powder test lab available for spraying, curing, or both, you can make problems relatively easy to solve.

**Conclusion**

Part of the beauty of a powder coating is that it’s already mixed, adjusted, and modified to your specifications once it reaches your plant. If something is wrong with the formulation, or something has gone wrong during shipment, you should find out before the powder is dumped into your on-line system.

It’s not a pleasant task cleaning a bad batch of powder from a system—take my word for it.

Eliminating costly production downtime and system cleanup can be the best reason to invest in a powder test lab. Work with your powder coatings supplier to develop test methods and procedures. That way you can all share in the success of a trouble-free powder coating system.

**Editor’s note**


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