POWDER COATING FAQs

1. What is powder coating ?

Powder coating is an advanced method of applying a decorative and protective finish to a wide range of materials and products that are used by both industries and consumers. The powder used for the process is a mixture of finely ground particles of pigment and resin, which is sprayed onto a surface to be coated by corona or tribo charging technique. The charged powder particles adhere to the electrically grounded surfaces until heated and fused into a smooth coating in a curing oven. The result is a uniform, durable, high-quality, and attractive finish. Powder coating is the fastest-growing finishing technology.

2. Why pretreatment required for powder coatings?

Powder coatings can provide improved performance over liquids when applied to a properly pretreated part. Solvent-borne paints are usually more forgiving of organic soils left on the work piece by sub-par cleaning. Because powder does not have solvents, you need to make sure the washer does a good cleaning job. This is just good operational practice and is not an unusual requirement. Iron phosphate is the most frequently encountered pretreatment used with powder coatings. However, if the highest level of performance is required, zinc phosphate will work admirably with powder as well. PROPER PRIOR PREPARATION PREVENTS POOR POWDER PERFORMANCE.

3. What is the best cleaner for powder coating?

There is no stock answer for this question. Many factors go into deciding which cleaner is the best for your application. Base metal of the work piece, soil being removed, bath temperature, contact time, oil removal capabilities, environmental considerations, etc. must be taken into account when deciding. The bottom line is that you need to get your parts clean, safely, so the steps following in the pretreatment process will function properly. Check with your pretreatment supplier to determine your best course of action.

4. What different technologies are available for cleaners?

There are powdered and liquid cleaners. There are acid cleaners that may be best for inorganic (metallic) soils. Alkaline cleaners are often recommended for organic soils. Neutral cleaners may be used to remove soils on substrates that react with strong acids or alkalies (aluminum or zinc). Oil splitting cleaners may be desirable where high levels of oil build quickly in the process bath. Work with your pretreatment supplier to determine which cleaners are best for your application.

5. What is phosphating and why do I need it?

The generic term “phosphating” is a process where an acid attacks the metal of the work piece and re-deposits a material that is a combination of the metal substrate (and other metals - like zinc) along with phosphate. This process creates a surface that is tightly adherent to the base metal, has more surface area, provides improved corrosion inhibition,

and helps the powder coating stick better. It provides a good coating base so the finished part has increased usable life.

6. What causes powder to fall off parts in the oven?

If powder is stored in a non-air-conditioned environment and the ambient air humidity in the storage area exceeds 60 percent, the powder particles can accumulate moisture on their surfaces. This moisture will affect the resistivity of powder particles and their ability to retain charge for a long period of time. If the charge bleeds off the powder-coating layer before it is cured, the electrostatic attraction between the powder particles and metal substrate weakens and the particles can fall off the part. An easy way to check for excessive humidity is to take a handful of powder and squeeze it. If the powder lumps together and does not break apart easily, a moisture problem exists. Excessive coating thickness. This may result in poor electrostatic attraction of the powder particles on the top layer of coating. This problem can occur if powder coating layer thickness exceeds 125 to 150 micron.

7. Why does powder build up excessively around edges of parts?

This phenomenon is quite common in electrostatic powder coating and is referred to as “picture-frame effect.” It is caused by concentration of the electric field around sharp edges or protrusions. Picture-frame effect is most pronounced in conventional corona-charging systems where the electric field near the part’s surface is particularly strong. However this phenomenon can also be observed, to a lesser extent, in tribo-charging systems.

8. Why, at times, powder doesn’t adhere to a part?

Many factors affect powder deposition on a part. However, there are some more common reasons for poor powder transfer efficiency. With corona-charging systems, a poorly grounded part is the most common cause of low transfer efficiency. In tribo-charging applications, insufficient charging of powder particles is the most common reason for poor powder deposition on a part. Insufficient charging is caused by several factors including powder formulation is not suitable for tribo-charging applications. Poor grounding of parts, Among other factors causing poor powder deposition on a part in both corona and tribo-charging systems are. very close gun-to-part distance;

9. Why are inside corners or channels sometimes difficult to coat?

The difficulty experienced when coating recessed areas is commonly called “Faraday cage effect”. It is due to the fact that an electric field always goes to the nearest grounded surface and is strongest around sharp edges. The electric field from the gun concentrates on the edges of a recess and does not penetrate into deep corners, compromising powder deposition in those areas.In addition, aerodynamic turbulence inside a recess often works against effective powder deposition in that area.

10. What are the air humidity and temperature requirements in a powder coating operation?

Ideal ambient conditions are temperatures between 15° to 27°C with 40 to 60 percent

humidity. Temperature and humidity of the compressed air are even more important. Here, for corona-charging systems, the pressure dew point of the compressed air should not exceed 3°C @ 100 psi line pressure.

11. Why do I need to add virgin powder to my reclaim?

As virgin powder is applied, the larger particles more readily stick to the part. This leaves the over sprayed powder with a lower average particle size. As this occurs during each cycle through the system, the recovered material may become laden with fine particles. Eventually, the reclaimed material will be nearly unmanageable in both fluidization and application.

12. What does proper fluidization look like?

The fluidized material should take on fluid-like characteristics. It should have an appearance similar to that of water simmering on low heat. The material should not be boiling hard.

13. Is powder hazardous waste?

Practically all powder coatings are not hazardous waste, disposal methods for waste powder are the same as for non-hazardous wastes. However, there may be some exceptions and your powder supplier should be contacted regarding proper disposal.

14. What is the best way to store my powder & How long can powder be stored?

Powder storage for many months is often normal practice. Ideally, powder should be stored in the optimum conditions of less than 25°C and approximately 50 - 60% relative humidity. Under these conditions most powder should be readily usable for
at least a six month from date of manufacturing. Avoid placing powder inventory in close proximity to any heat source such as an oven, washer, furnace, space heater, etc. Powder packaging is designed to protect the contents from compression that can result in lumps that are not readily broken. Do not stack packages that are broken or collapsed. Some powders with special appearance, performance, or cure properties may have greater sensitivity to storage conditions, and should receive greater attention when stored to ensure the desired results.

15. How do I get good powder coverage into Faraday areas?

Faraday cage effect defines a condition that occurs when parts are coated that have recesses, inside corners, channels, or protrusions on their surfaces. The Faraday cage is the area of the part where the external electrical field does not penetrate. Powder coating of recessed areas is often complicated. For the successful coating of Faraday areas, the following conditions must be met: powder has to be well charged, airflow must be sufficient to deliver the powder inside a recess but not excessive to preclude powder deposition, and the external electric field must be controlled to reduce the “push” for powder particles to deposit on the edges of a Faraday cage. Because most Faraday areas involve some type of “pocket “ areas, it is important that the method for direction the powder flow in allows for displacement of the air in the pocket area to allow penetration.

16. How do you know if powder is cured?

There are two conditions that must be met to achieve proper cure of a powder coating. The first is temperature, referred to as metal temperature, and the second is time. The time/ temperature requirements of a particular powder material must be achieved to obtain a full cure. A cured thermoset powder coating will not re-melt upon further heating. To ensure proper time and temperature it is often best to test using a Datapaq or similar device to provide actual performance data.

17. Are there powders for interior or exterior use?

One of the most important considerations in defining the end use performance is weatherability. Outdoor exposure results in absorption of ultraviolet energy. This energy can attack the organic binder and result in gloss loss and color change. Due to a tendency to chalk, epoxies and epoxy containing hybrids are generally not recommended for outdoor use when aesthetics is a primary concern. Polyesters and acrylics on the other hand provide excellent UV light stability and typically find use in architectural, automotive, lawn and garden as well as outdoor furniture markets.

18. What is the difference between oven cycle time and dwell time?

The oven cycle time is comprised of the bring-up time plus the dwell time for a proper powder cure. The bring-up time is the time required to attain the desired substrate cure temperature of the part. The dwell time is the time required to hold the substrate at cure temperature. These times and temperatures are available from the cure schedule for the powder coating. In some applications, shorter oven cycle times are possible by rapid heating of the substrate to a higher cure temperature for a shorter dwell time.

19. How clean should my compressed air be?

Next to proper grounding, clean compressed air is the most important thing. Oil and water do not mix with powder. In a powder system, air plays a big role. Powder is fluidized with air, pumped to the guns with air, and the cartridge filters are back-pulsed with air. The equipment and powder manufacturer should be consulted regarding the air quality for optimal performance. In general, a minimum 2°C dew point and less than 0.1 ppm contaminate or oil is a good starting point.

20. How often should I clean my gun & powder hose ?

Guns should be cleaned after each color change. At the end of the day, you should purge the gun, pump, and hose to prevent moisture from settling in the powder and clogging things up for the next use. Depending on the volume of powder sprayed and time between color changes, deep cleaning and worn part replacement should be reviewed weekly. It is recommended that you change your powder hose at least once a six month, depending on wear caused by the powder or if you are having contamination problems. Frequently inspect for cracking or impact fusion that may shorten the hose life.