

Powder Coating Booth Tool Tutorial

Safety and Procedures

Dustproof safety goggles and a NIOSH-approved respirator are recommended

Never touch the tip of the gun to the part while coating it. This may cause a painful static discharge or even ignite the powder coating media

Powder coating dust can ignite, so do not coat parts near an open flame

The powder coating system uses extremely high voltages so members with pacemakers are not permitted to use the system.

Typical curing temperatures are around 400 degrees F. Anything that cannot handle such temperatures (rubber seals, grease, paint, etc.) must be removed before putting it in the oven

Overview

While powder coating seems like a relatively recent invention, it has been around for about 50 years. Powder coating yields a superior finish with excellent durability. Powder coating is recognized as an environmentally friendly method of applying a quality finish. Unlike paint, powder coating releases almost no volatile organic compounds (VOCs) into the environment. The powder is easily cleaned up with a broom and dust pan or vacuum cleaner.

Powder coating is a process in which a dry, powdered polyester resin is sprayed on to the item to be coated. The powder is positively charged as it exits the powder coating gun. The item to be coated is grounded and attracts the positively charged particles to the surface. Once cured in an oven, the surface is smooth and tough.

Virtually any type of metal can be powder coated, including steel, aluminum, magnesium, cast iron, brass, copper, bronze and titanium.

The key to a long-lasting and good-looking finish is the preparation of the metal. The best way to prep the surface is by abrasive blasting it down to bare metal with aluminum oxide or glass beads. Once the part is bare metal, the part is washed with a chemical cleaner to remove any dirt or leftover abrasive from the blasting process. The part is then baked in the oven for a short period to fully dry it before coating it.

Part Prep: Abrasive Blasting

Abrasive blasting cleans paint, rust or corrosion, and other finishes from the part quickly and easily. See our [Sandblaster Tool Tutorial](#) for details on sandblasting your part.

Part Prep: Chemical Cleaning

Once the item has been cleaned down to bare metal, it will need a chemical cleaning. The chemical cleaning helps remove any dust or other media left over from the abrasive blasting as well as any skin oils left where you may have picked up the part with your bare hands. Clean steel parts with an alkaline cleaner such as soda ash or trisodium phosphate (TSP), while aluminum, brass and zinc may be cleaned with Simple Green.

1. Preheat the powder coating oven to the temperature specified by your powder media. See our [Powder Coating Oven Tool Tutorial](#) for details.
2. Fashion hooks from steel wire to hang your part from in both the paint booth and the powder coating oven. Once your part is clean, you don't want to get any oils on it that may make for a poor finish.
3. Rinse your part under running water thoroughly. Spray it generously with the appropriate cleaner, scrub it well with a brush, and then rinse it thoroughly under running water again.
4. Holding the part by the hook, hang the part in the preheated powder coating oven for five to 30 minutes, depending on the size, thickness and porousness of your part. Open the oven door slowly to avoid a blast of hot air in your face.



Powder Coating Setup

While your part is drying out in the oven, it's a good time to get the powder coating gun and surrounding area set up.

1. Turn on the booth lights
2. Connect the air hose (on the wall) to the control box (via the transparent tube)
3. Turn the control box on
4. With no powder loaded, confirm the control box has correct KVA and air pressure:
5. Remove the powder gun from its holster and bring it to the control box
6. Point the gun away from you and any electronics, then squeeze the trigger
7. Adjust the displayed air pressure to between 2-4 PSI
8. Adjust the KVA as recommended by your powder's spec sheet (default: 70KVA)
9. Replace the powder gun in its holster
10. Inspect the gun, ground clamp wires, and other areas of the booth for leftover powder and perform any missed cleanup steps as needed to prevent cross-contamination.
11. Insert your powder into the cup (no more than 1/3 full)
12. Screw the cup into the lid that's mounted on the side of the booth.
13. Turn on the air filter
14. Test the spray pattern of the powder coating gun. It should come out in a light fog. Adjust the air pressure as necessary.

Powder Application

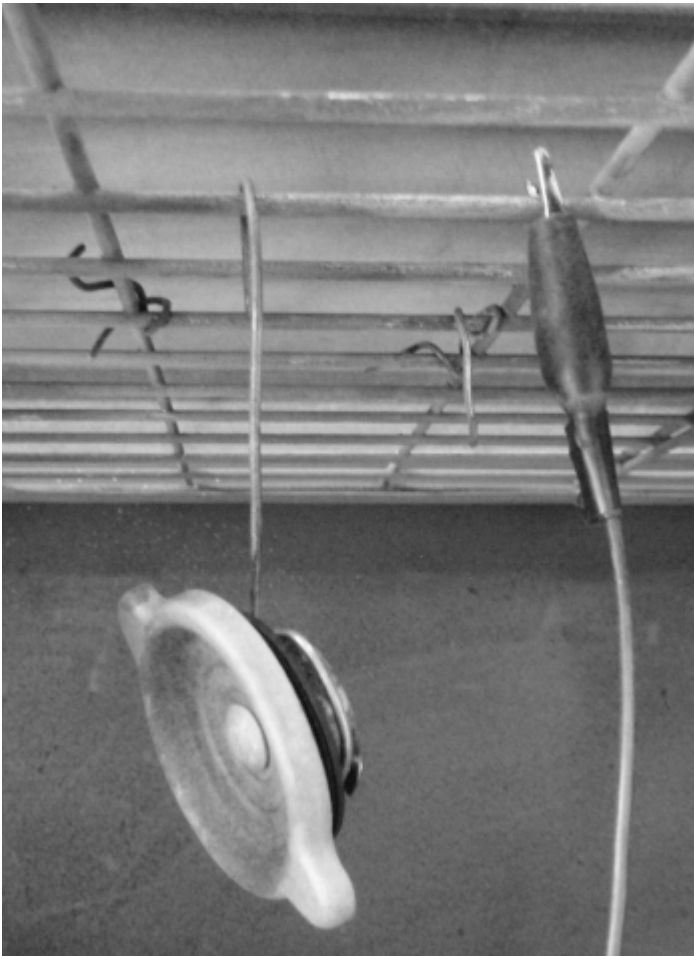
TODO picture of powder coating controls

Once your parts have dried and the powder coating gun is set up, you can remove your part from the oven and powder coat it.

1. Open the oven door slowly, use a pair of heat resistant gloves to remove your part from the oven, and hang it in the spray booth. If you have any masking to do, let your part cool before applying any tape.
2. Attach the ground lead to something metal that makes a complete circuit to your part. Since powder coating is an electrostatic process, it's very important that the part be properly grounded. If powder does not stick to your part, then it's likely the part is not well grounded.
3. Move the tip of the gun to between six and 12 inches from your part, click the voltage switch and pull the trigger, and move the gun to apply powder to your part. Similar to using spray paint, keep the gun moving while applying powder to make an even coat.

SAFETY NOTE: The tip of the powder coating gun is holding a very high voltage charge. Due to this high voltage, it is extremely important that you **do not bring the tip of the gun too close to the grounded part.**

At distances less than six inches, electricity may arc between the gun and part. If powder is being applied when an arc occurs, it could result in a flash fire of powder. If this happens, immediately release the voltage switch and trigger to stop the flow of powder. Unplug the powder coating gun and clean any fused powder from the gun. You may also have to remove fused powder from the part.



Curing

Once your part is coated, it will need to be placed in the oven. Each powder has different cure times and temperatures, so be sure to read the directions carefully - see our [Powder Coating Oven Tool Tutorial](#) for details.

Transfer your part from the spray booth to the oven. Be careful, since knocking parts into each other may create a poor finish.

Applying a Second Coat

When applying a second coat or re-coating a part, modifications in equipment settings and/or technique are needed. The electrostatic charge should be reduced (either by lowering voltage or limiting current) and/or the gun-to-part distance should be increased.

Be aware that the application will require more time. The equipment will not be as efficient (i.e., transfer efficiency will decrease when doing re-coats), but the application can be achieved. Sanding the base coat prior to powder application can aid in second-coat adhesion.

Applying a second coat to a part that has a cured powder coat finish requires adjustments in charge setting, time and technique. With patience and proper technique, you should be able to achieve the finish you desire.

Coating Hot Parts

Powders can be applied to hot surfaces. To use this technique, pre-heat the part to cure temp, 10 to 40 minutes, depending on size. After pre-heating, remove part from oven and immediately apply powder.

You will notice that powder will flow immediately upon contact. Exercise care to avoid drips and runs.

Place coated part back into pre-heated oven set at cure temp for an additional 20 minutes to complete the cure.

Cleanup

Keep the air filter running during cleanup to contain airborne powder!

1. Turn off the control box.

2. Detach the cup, return remaining powder to your supply, then wash and dry thoroughly. Store the cup upside-down on the conical drying rack next to the control box.
3. Detach the air hose from the control box. With the air filter running, use the air hose in a sweeping motion to push any loose powder towards the filter at the back of the booth.
4. Place the gun on the floor and oriented towards the rear wall, then use the air hose to blow air into the intake of the powder gun (the larger opening in the cup mount) for 2-3 seconds to eject remaining powder from the line.
5. Using a slightly damp paper towel, wipe down any loose powder on the ground clamp, cable, and all surfaces of the powder gun and its hoses. Holster the powder gun.
6. Use the shop vac to clean up any remaining loose powder from the filter, booth walls, floor, powder cup mount area, ground clamp and cable, and anywhere else you find it.
7. Turn off the booth light and the air filtration system, and tidy up any cables.

Care of the Finished Part

A powder coated finish requires very little care. Powder coating produces a very scratch resistant finish.

If you get scratches in a powder coated finish, gently sand the affected area with 600-1000 grit wet sandpaper. Then use a buffing wheel with appropriate compound to remove the sandpaper scratches and achieve your desired shine. Generally, waxing is not recommended for powder coated finishes. If you contaminate the powder finish with wax, you can no longer re-coat the part with powder and will have to strip the part back to bare metal and start over.

Removing Powder Coating

Most organic solvents (acetone, thinners, etc.) are completely ineffective for removing powder coated finishes. Aircraft remover is generally effective at removing powder coating, as is abrasive blasting, though this is a time-consuming process due to the adhesion quality of powder.

Troubleshooting Tips

Pitted Finish

1. Make sure the gun is thoroughly cleaned before starting or changing to another powder.
2. Make sure the part is completely cleaned of all contaminants.
3. After cooling, wet sand the areas with 600-1000 grit to level the pits. A second coat of powder can then be applied to the entire part.

Coating Porous Materials

In some cases, contaminants in porous materials will cause pits in the powder. Porous cast iron, die-cast metal, cast aluminum, and magnesium parts trap contaminants that outgas when heated and cause porosity problems as the powder is curing. To avoid this, preheat the part to 400°F for 30-60 minutes.

Die-cast metal and solders vary widely in formulation, many of which can be difficult to powder coat and, in some cases, may even melt at the 400°F typically used to cure most powder coat media.

Orange Peel

Orange peel is when the coated surface resembles the surface texture of an orange or other citrus fruit. A certain amount of orange peel is unavoidable, especially with polyester-based powders.

Orange peel can often be removed by sanding the part with 400-600 grit sand paper (wet or dry) and then buffing the part to achieve a good shine.

The main causes of orange peel are insufficient coating, over-baking or excessive powder buildup. Powder buildup is easy to see because the powder will start to stand on its end like hair. If this happens, stop applying powder and, with light air pressure, blow off some of the powder. If the powder does not apply evenly, replace moisture trap on the gun and use fresh powder.

Poor Spray Pattern

If the gun does not spray, the air pressure could be too low or moisture may be clogging the filter. The level of powder in the cup should be at least one inch deep to flow efficiently through the gun.

No Coverage or Poor Coverage in Recessed Areas

Hold the gun so that the side or peripheral discharge of powder goes into crevices, recesses and sharp angles. Exercise care to maintain at least a six-inch clearance from the part being coated in order to avoid an arc.

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