

Table of Contents

1. Introduction

- a. What is powder coating?
- b. Why should teams powder coat?

2. Materials & Tools

- a. What materials do I need to prepare the part?
- b. What is the minimum I need for powder coating?
- c. What do I want to have to improve the quality of powder coating?

3. Powder Coating Process

a. How do I powder coat?

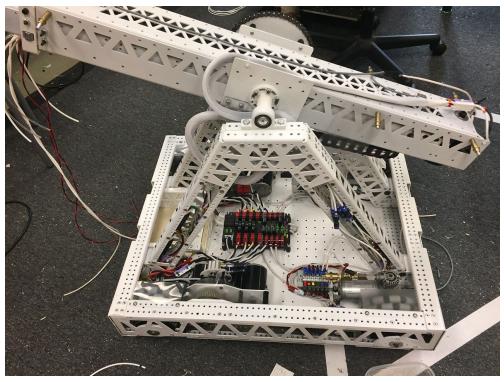
1. Introduction

What is powder coating?

Powder coating is the process of applying an extremely smooth, durable, protective, and attractive plastic film over metal parts, using an electrical charge and a compressed air supply, then melting and baking it permanently in place with heat. In contrast to liquid paint, it does not require a solvent to keep the binder and filler parts in a liquid suspension form. Powder coating is mainly used for coating metals like aluminum or bicycle parts, and we use it to powder coat our robot parts.

Why should teams powder coat?

Powder coating creates a very smooth and consistent coat on sheet metal. It also protects it from corrosion and scratches. Powder coating in house is faster and cheaper than sending it elsewhere. Judges are very impressed when they learn it is done in house. Wide ranges of color blending or special effects can be created, with only a teams imagination as the limit. Powder coating creates a personal robot that is both unique and distinct from other robots.



Spectrum's 2018 Robot Infrared - Powder Coated White

2. Materials & Tools

What materials do I need to prepare the part?

- 1. <u>Klean-Strip 1 Gal. Acetone</u> for cleaning part
- 2. Scott Shop Towels for cleaning part
- 3. HDX Disposable Nitrile Gloves to keep part from getting dirty while holding it

What is the minimum I need for powder coating?

- 1. Powder Coating Gun
 - a. We use an Eastwood Dual-Voltage Powder Coating System
 - i. Includes a Powder Coating Gun and Power Supply
 - b. <u>Harbor Freight also sales a model</u>
 - i. we have not tested this model
 - c. Craftsman used a sale a model that didn't require an air compressor as seen in this video
- 2. Air Compressor
 - a. Powder coating only requires 5-10 PSI
 - b. A small shop compressor or even possibly an FRC compressor could work for this in a pinch.
- 3. Oven
 - a. Any oven capable of reaching 450° Fahrenheit large enough to fit the parts you wish to coat.
 - b. We own two ovens
 - i. Eastwood Benchtop Powder Coating Oven
 - ii. Char Broil Electric Analog Smoker
 - 1. Our solution was to get a <u>Char-Broil Electric Smoker</u> and <u>use a piece of sheet</u> <u>metal</u> to hold fiberglass insulation on the bottom. Instead of the thermometer that came with the oven, we use a <u>meat thermometer</u> for better accuracy.
- 4. <u>Wire</u>
 - a. Used to make hooks to hang the part. It is cut and made into an 'S' (or tall 'C') shape.

What do I want to have to improve the quality of powder coating?

- 1. Compressed air to remove paper towel fibers from the part.
- 2. Heat Resistant Rubber Gloves
 - a. Can be used to remove the rack from the oven to let parts cool faster.
- 3. A box to hang parts in.
 - a. This helps to contain the powder and keep it from spreading all over your lab.
 - b. For larger parts, we have used a large cardboard box to contain the powder.
- 4. Green Polyester Powder Coating Tape
 - a. Used to mask certain areas of a part where powder is not desired. (I.E. threaded holes, or areas where thickness can not change.)

3. Powder Coating Process

How do I powder coat?

In addition to these instructions, please read the manual that comes with your gun and oven.

Put a glove on your non dominant hand to hold the part. Dip a shop towel into a small, plastic bowl of acetone, and thoroughly clean the part to remove any grease or dirt.

- a. Loose fibers may get stuck on sharp corners or edges. To remove them, you can either wipe them with your gloved hand, or spray them with compressed air.
- b. Make sure that each part is properly cleaned, as powder might fail to stick if there is residual oil.



2. Once the part is clean, cut a length of wire and make it into an 'S' (or tall 'C') shape. Hang the wire on the rack and hang the part on the wire.





- 3. Connect the clip to the hook and push the button to electrically ground the part. This attracts the electrostatically charged powder to the part. Make sure that the hook does not have any powder coat that has been baked on it.
- 4. In small bursts, spray powder onto the part until it is covered.
 - a. Make sure to stay at least 6 inches away from the part to prevent arcing between the tip of the powder coating gun and the part. Powder has the ability to catch fire and explode when mixed with air.
 - b. A good way to check if the coat is thick enough is to shine a flashlight on the part. If any area is shiny, spray more powder until it is completely covered.



- 5. The amount of time to leave the part in the oven depends on the desired shade. Typically, longer time means a darker shade. If the powder is white, leaving it in for too long will turn the powder yellow.
 - a. We typically leave the part in the oven for 5 minutes at 450 degrees fahrenheit, then 20 minutes at 400 degrees fahrenheit.
 - b. Finding what works for your color may involve trial and error.

- 6. When the oven is done, open the door to let the part cool for at least 5 minutes. Use heat resistant gloves to remove the part from the rack.
- 7. Here is the difference between a powder coated sheet metal part and a regular sheet metal part.

