A Penturners Guide to Powder Coating

Powder coating can be used to change the color of pen kit parts or to cover them with a very durable clear coating. Powder coating is not difficult, but does require some practice. Once you get the hang of it you will be looking for anything metal to powder coat. I got into it because it seemed like an interesting way to add some variety to the existing pen kits. It does provide a durable finish that can be used to protect lower quality kit finishes. In my opinion if that is your only aim, spend the money on higher quality kits. The cost to get into this, while not huge, will buy a lot of nice pen kits.

The hardest part for me was figuring out what to do with the equipment. My very initial attempts proved less than stunning. I tried following some of the tips in the yahoo penturners group, but powder coating process makes a lot more sense with visuals. I am fortunate to live near one of the Pen Maker's Guild elders, Jay Pickens. He graciously invited me to his house for a Powder Coating tutorial after I emailed him a few questions via email and we discovered we both lived in Fort Worth. He demonstrated the process that he had developed on his own. The process now looks pretty easy, but Jay did the hard work and spent a lot of time and effort with trial and error. I was not able to find any helpful books on small scale powder coating. So thank you Jay! The steps and devices described below are taken from what he shared with me during our visit. The mistakes mentioned below are mine. When I left, I had a bundle of cool blanks, aluminum to make the jigs, a lazy susan and thousands of ideas rushing through my head. I left feeling quite inspired and burnin' to do some turnin'! Jay is as generous as he is talented.

My motivation to create this page was to describe and illustrate what Jay taught me. I hope it provides some clarity on the "black art" of powder coating. There are questions every once in awhile about powder coating or "PC" on the penturners list. Jay's methods described below will hopefully help prospective powder coating pen turners get started or decide if they even want to get started. Something like this with pictures would have helped me were it not for Mr. Jay Pickens sharing his knowledge. Learning to powder coat takes practice. Your first attempt will probably not be spectacular, but with this as a guide, your first attempt will most certainly be better than mine. My first attempt was before Jay showed me a FAR better way.

What is powder coating?

Powder coating is a process whereby powdered paint is applied to conductive metal parts. The metallic parts are electrically charged and this causes the sprayed powder to stick to the parts. The spray gun looks like a large air brush. Once the powder is applied the parts are cured in an oven at around 400° for about 15 minutes. Depending on the type of coating used, times and temps will vary, but most powder suppliers have decent instructions. The first thing I associate with powder coating is engine parts, but **anything** made of conductive metal can be powder coated

What do I need to get started?

Depending on what you already have, getting started in powder coating will probably run you between $100.00 to $300.00 minimum. You can get fancier if you have a couple of thousand dollars to throw around. This is more of a bare bones but very effective method for doing small scale powder coating described here.

Equipment:

1. Powder coating gun ~$70.00
   Harbor Freight has a good basic powder coating system
   Columbia Coatings also has several kits that include the same Chicago Electric Powder coating system as Harbor Freight, but they include some powder.

2. Compressor $50.00+
   Main concern with is pressure. Needs to be able to maintain ~20psi while you work although you will not be spraying with more than 5 to 10psi at most. If all you are going to do is powder coating then get something with a smaller tank if that helps get cost down. Another thing that will make a difference is type of compressor oil lubricated or a oil less (universal) motor. Oil lubricated is quieter, but requires some maintenance. An oil less compressor really requires no regular maintenance, but is LOUD.

3. Oven $5.00+
   A small toaster oven works well for doing pen parts. Check out a thrift store for a used one or find one on sale somewhere. The interior sizes of these ovens vary a great deal. You will need about 3" vertical clearance or a little more from the rack to the top. I think the more height inside the oven educes the chance of accidentally knocking the parts while inserting rack into oven.
   Look for an oven that has a broiler tray (holes) as well as solid tray. This is not critical thing, but is useful.

   Once this oven is used for curing powder coating **DO NOT** use it for food again.

A great deal more money can be spent for these components. A lot of pen turners may already have a compressor, so your main investment to get started is the Powder Coating System and the oven. Other "professional" powder coating systems are available in $5000.00 range! The Chicago Electric model is a very functional and affordable way to get started. Harbor Freight also has an oven made for Powder Coating for around $400.00, but this is not necessary.

OK great, so that's all I need?

Well no, there are some other things that are needed, but you can improvise for most of these things or get away with minimal expense. *(Click on photos below for enlarged view)*

A spray booth

A cardboard box is low tech, but works great and is portable. Another box inside provides a platform to elevate things to eye level. Jay and I talked about hanging a small fluorescent lamp in the top. This would provide needed illumination and free up a hand. I haven't gotten around to mounting a light yet, but intend to. One thing to think about when doing powder coating is that the airborne powder is flammable. So use care in choosing a light and smoking while you are spraying is probably not a good idea.

Spray jigs

I first started by hanging parts from wire, but that turned out as a disaster for me. I stole the design for my spray jigs from Jay using aluminum angle and self taping machine screws. These are inexpensive, durable and easy to build. Two key considerations in selecting jig material is that it conduct electricity and that it support your parts steadily. At some point it may be easier to just retire your jigs as they get layers of cured powder coating, so don't sink a bunch of money or time into making them. The whole jig design is one thing that hung me up in the beginning. I had plans of threading some steel rod into tapped holes in a steel bar, but these aluminum ones are a WHOLE lot easier. Glad I got educated before jumping off that bridge.

Be sure to measure vertical clearances inside the oven before starting the jigs. The first one I made was too tall and I ended up with some black "burnt brown" chrome because they cured too close to the oven element. Glad I didn't do a bunch at once.....

This rack to the left is better suited for coating kit parts as opposed to tubes. The holes are drilled as close as possible to the edge using a 17/64" size bit. The drilled holes may need to be reamed out a little bit. The parts should fit easily, but not too loose that they might fall out when moving to oven. The clips are suspended by inserting the finial into the hole. The nibs just sit upside down. A similar design could be used for larger kits such as Cigar pens. 1/2" 10-24 machine bolts were used on these to fasten the various pieces of aluminum together. Self tapping machine screws will also work.

The photo to the left shows the same kit rack and another one for spraying tubes. The tube spraying jig is just some 2-1/2" 10-24 machine screws stuck through a hole drilled in an aluminum channel. A bolt on the top side holds the screw relatively tight. I used the same 2-1/2" bolts as support wings, but another piece of aluminum could just as easily be used instead. The day of our visit, Jay was powder coating some brass tubes black so they do not show through acrylic blanks. Coating tubes will add some thickness to the tube so you will probably have to ream out the 7mm hole in the blank just a bit. The cool thing is that powder coating is not going to rub off when you glue it in the blank.

These two photos below, illustrate a jig Don Ward's adaptation of the aluminum angle jigs with an aluminum stud cutoff for a base. Drill small holes in the aluminum stud and use machine screws and bolts to create support for the various parts. This works well for spraying tubes, or as shown here, shell casings with gloss clear coat.

The craftsmanship in making these racks is not critical.

The main thing to look at in making them is:

1) they are stable and won't fall over.

2) the holes for finials and nibs should be as close to the edge as possible. This leaves less kit covered and thus easier to get to.

3) At some point it may be easier to just build new ones and toss the old ones. Every time you use them and cure the kit parts a layer of cured PC builds up. The excess can be ground off with a file or a wire wheel on a grinder. I have been lazy on one or two occasions, and not cleaned off the excess real well. The pen parts were firmly fused to the rack. I got them off, but I was reminded that PC provides a tough durable finish.....

Spray jigs

A small Lazy Susan and some magnets is another Jay Pickens invention he clued me into. This is an extra one he gave me during our visit. This is not really a must have, but it is **very** nice to slowly rotate the parts while spraying. Once you try it you won't want to get rid of it. A wire is soldered to the base so that the charge clip from the Powder Coat control unit can be connected and not interfere with rotation. The oven pan (broiler pan if your oven has one) is placed on this and held in place by the magnets. This allows the entire assembly to carry a charge and be rotated as you spray. Once you are done spraying, turn off the Powder Coat unit, gently remove the jig from the spray booth and carefully insert your sprayed parts into the pre-heated oven. If your oven came with a broiler tray in addition to a solid tray, the broiler tray is probably best used on the lazy susan. Cover the solid tray with foil to use in the oven. The foil will keep the cured Powder Coating from building up on the tray. Once again, powder coating provides a very durable finish.

The powder is conducted to the metal parts by the electrical charge. Once the powder coating unit is turned off the parts no longer have a charge. The powder will still stick, but you want to be careful in moving them to the oven. "Gentle" is the key word here and wind is a bad thing.

Powder Coating colors

Here you can go pretty crazy. There are all kinds of colors to choose from. Check the links at the bottom for two suppliers. (If there are others I have missed let me know) There are clear coats, metallic, candy apple red, prismatic blue, textured rust and much more. The metallic powders are not going to be true metallic so don't expect chrome PC to look like true chrome. Your imagination is the limit. You can order by the half pound, pound or greater. A half pound costs $6.00 to $12.00 depending on what you get. My first order I took Jay's advice and ordered in half pound sizes of some metallic powders and a pound of clear coat. Harbor Freight has some basic colors, but they are $10.00 for a pint can. Mail order is a better deal. So far I am finding a half pound is going to last me for a very long time.

Check out the following web sites to get an idea of colors available:
http://www.columbiacoatings.com
http://www.caswellplating.com

I am ready to go! What now?
Assuming that you have gotten all the equipment, you should be ready to go. The process described below is as Jay taught me.

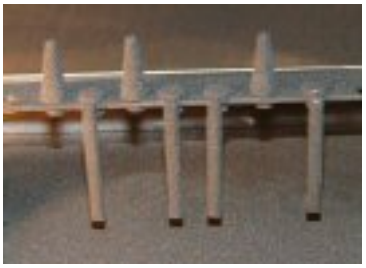
Before moving onto pen parts, I experimented with powder coating some of my metal tools. I figured these would still be functional with a bad powder coat finish, but pen kits are another story. So before leaping off and trying to powder coat all of your pen kits the first time practice on something else first. I do have a one of a kind, yet functional, Crescent Wrench. My significant other did not appreciate my offer to PC the old silverware Candy Apple red though. That would have been so cool. ☺

- Pick out your parts. Only do a few parts at a time. Sometimes things go wrong and it stinks to ruin 5 pen kits.
- Get your equipment laid out.
  - Set up the "spray booth" out of the direct flow of air.
  - Plug in the Powder coating system. Connect the conductor to the wire connected to your lazy susan.
  - Make sure your compressor is ready to go.
  - Find a place for the oven. Preferably close to your spray booth. Go ahead and preheat the oven as it will be needed shortly.
- Prep your kit parts
  - With a clean rag wipe down the parts with Denatured alcohol. Try not to handle surfaces to be coated too much.
  - Place the parts in/on the jig or whatever support you have created and then set this on the foil cover oven pan.
  - You did turn the oven on, right? Well set the oven to about 400° F and place the prepped parts and rack in the preheated oven. Set the timer for about ten minutes. (This will burn off most residual matter on the parts. You may have gotten some skin oil on the parts from handling. This will be burned off.) *The preheating is something I found on one of the PC vendor sites. The theory made sense to me, but I am still debating whether it is critical.*
- While the parts are preheating in the oven, get the spray gun ready.
  - Select your powder coloring and fill the powder jar about half way.
  - On the Chicago Electric Powder Coat gun there is an air control knob at the bottom of the handle. Turn this all the way off and then connect your compressor hose.
  - Set the pressure regulator on the compressor to between 15psi and 20psi. In actuality, you will only be using 3 to 5psi with the pressure being regulated at the powder gun.

  Once the timer goes off on the oven, open the door a crack and let it cool for about 5 minutes.
- Remove the tray with the parts rack and parts on it (use hot pads) and move this into your spray booth atop the rotating Lazy Susan.
- Take your spray gun and very slowly release the air control knob on the gun. You should see a small puff of powder and then a light cloud coming from the tip.
- Step on the foot pedal to generate an electrical charge.

- Slowly move your spray gun toward your parts. Adjust the air control knob if needed, but keep the cloud pretty light. You want to apply as light a coat as possible using slow sweeping motions. To apply a good coat will require several passes. The powder should be applied just until the metal color underneath disappears, then STOP! If the base metal disappears in the first pass or two you are applying to heavily. If you are using jigs similar to those shown above pay special attention to the surface parts that butt against the jig (the top of the nib for instance.) It may be necessary to change the angle of the PC gun to get the powder into some spots.
- Rotate the rack and slowly coat all surfaces. The back of the clips can be a little difficult, but don't get too worried about that part. It is not really going to be seen.

Below is a photo of just coated, uncured parts using Black Chrome powder coat from Columbia Coatings. Next step is to put them in the oven. (The fresh out of the oven shot is absent because I experienced horrible failure.) ☺ If the powder coating just doesn't look right or appears too heavy, this is the time to back up and start over. Blow the powder off with your compressor and wipe them down then spray again. Don't try to "touch them up" The PC gun is large and it is pretty easy to overcoat these tiny parts.



The coating in the photo to the left is a little thick. The clip on the right side of the photo is not properly coated at the bend and the edge of the finial plug. It helps to use a flash light and make sure all surfaces are covered. Use slow sweeping motions and continue just until the base metal is completely covered. Then STOP. If they look over coated or unevenly coated this is the time to start over. Remove the sprayed powder from the parts and wipe clean again and re-spray. The PC gun is designed for much larger parts than pen kits so it is easier to overcoat than not. If you do not get everything covered, after the coating cures it is VERY difficult to get off. Another bad idea is to try to recoat a coated part, trust me. There are some PC colors that a base coat with clear coat over it is advised by the suppliers. I have not tried any of these two coat finishes so I really can't comment one way or another.

Once all parts are coated, turn your oven back on and set it to between 375°F and 400°F and slide the sprayed parts into the oven. Check with the powder coating supplier for specific temps and times as they will vary somewhat. Use a flash light to check the parts. The powder will start to turn slightly glossy as it begins to melt. Once you see this glossiness, set your timer for 15 minutes

Before you start spraying make sure you have some ventilation. The airborne powder is not good for you

- Once the timer goes off, open the door of the oven a crack and let it cool for 15 to 20 minutes.
- After a cool down, remove the tray from the oven and admire your durable powder coating work!

- You may need to force the parts a little bit to un-stick them, but so far I haven't fused anything together permanently.

Cleanup

Yep, you have some cleanup to do once the spraying is done. Remove the powder jar from the powder gun. You can usually shake a fair amount of powder out of the intake tube back into the powder jar. Once you get that fairly cleaned out seal up the powder jar tightly. Unplug the Powder Coat unit and release the air line from the gun. Attach an air nozzle to the compressor hose and turn the pressure up higher to blow out the PC gun. Open the air regulator on the gun all the way and spray through there. Also check the business end of the PC gun, a lot of powder will have built up in the barrel. To avoid contamination of the next color you use make sure to clean out the intake area where the jar screws in. A thorough cleanup is necessary to avoid contaminiation.

Credits

This is by no means an authoritative "professional" resource. Use at your own risk and don't run with scissors. My intent in this small tutorial was to illustrate what Jay taught me about his PC methods. Hopefully those thinking about diving in to PC to give their pen kits a little different look, will have a better idea what is involved before "buying the ticket" so to speak. Not everyone has a Jay Pickens living nearby to show them the ropes! Jay came about this knowledge the hard way… trial and error.

I was a little apprehensive at peppering a Guild member with some of my basic questions on PC. For some reason when I think of PC and penturners I think of Jay Pickens. So in my mind he was the man! My apprehension was quickly dispelled. Jay was very willing to share his ideas and techniques and help a PC newbie find the way. I owe him great thanks for tutoring me in his process and allowing me to share this with everyone. Thank you Jay!

LINKS

http://www.columbiacoatings.com/
http://www.caswellplating.com/
http://www.eastwoodco.com/
http://www.powdercoating.org/

Suggestions, corrections or links email me at AshWebb@GeckoWoodWorks.com