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Finishing Fired Metal Clay

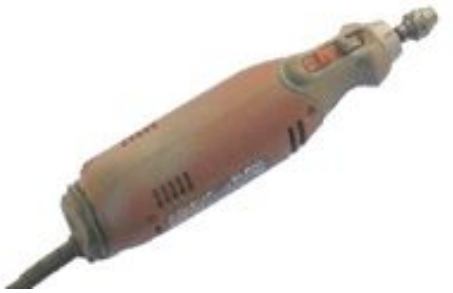
by Hadar Jacobson

Preparing a piece for firing (pre-finishing) makes it easier to finish after firing, but does not make finishing unnecessary. Because of the porosity and shrinkage of metal clay, surfaces that looked smooth prior to firing can look rough and grainy afterward. Now that the clay has turned into metal, it needs to be sanded and polished with various tools, just as in traditional metal fabrication, to produce the desired final finish.

The earrings above have still not lost their color, but they have never been worn either.

Sometimes, pieces come out of the kiln with beautiful colors. Unfortunately, this effect is not predictable or repeatable, and has nothing to do with the type of carbon used. Furthermore, there is no reliable way to preserve these colors; they will fade away with wear and tear, and sealing the piece will most probably alter the colors. My suggestion is: enjoy the colors while they last. Otherwise, just follow the finishing process.

A rotary tool makes the finishing process easier and quicker. A flex shaft machine is a good professional tool, but is can be expensive and is not portable. It's best to get the portable tool not as part of an expensive kit, since most of the accessories that you will need are not included in the kit and need to be purchased from jewelry suppliers.
The attachments to the rotary tool have shanks that come in diameter of 1/8" or 3/32". The rotary tool usually comes with a collet that accepts 1/8"shanks. You can purchase a 3/32" collet at hardware stores, or a universal chuck, which accepts both sizes, and makes it unnecessary to switch collets when moving from one size shank to another. Sources for the rotary tool and attachments can be found on my blog, in the document entitled "Personal Toolkit," accessible from the right-hand pane.



Collets

Universal Chuck

1. **Check for sintering.** The first thing to do after taking pieces out of the kiln is to check if it is fully sintered. Bending the pieces is **not** recommended as a test, since if the piece breaks, there is no way to salvage it.

   Instead, sand the back of the piece with 220-grit sandpaper mounted on a slotted mandrel. Here is how to prepare the slotted mandrel:

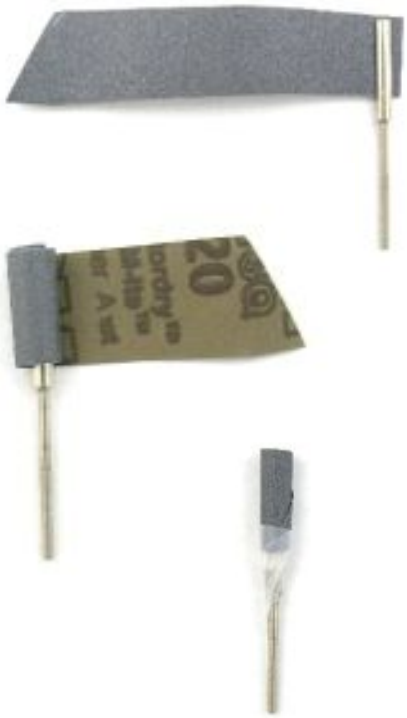
   Slotted (or Split) Mandrel, straight head

   a) Insert a 3" long piece of 220-grit sandpaper into the slot so that most of its length protrudes from the left side of the mandrel with the abrasive side facing you.

   b) Cut the strip at the top of the mandrel and slant it at the end, as shown in the photo.

   c) Wrap the sandpaper tightly backwards around the mandrel, so that the abrasive side is on the outside.

   d) Secure the sandpaper to the mandrel with tape, covering part of the sandpaper and part of the lower end of the mandrel. When the top layer wears out, cut off a piece of the strip.



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> This way of wrapping the slotted mandrel makes sure that the direction of the wrapping as the same as the direction in which the rotary tool spins. If it were wrapped in the other direction, the sandpaper would come off.

   Now sand the back of your piece, moving back and forth with the mandrel. If the surface area becomes all metallic, it means that the piece sintered just fine. However, if you see spots which do not get metallic, but rather become darker and powdery, it means that the piece has not sintered properly.

   What to do? Just re-fire following the same firing schedule. If some powder came off, add some clay. No need to repeat the first phase.

   The piece is now ready for finishing.

2. **Clean textured areas.** In most cases pieces come out of the kiln covered with a thin dark film. This can be easily removed with radial discs, mounted on a screw mandrel.

Assembling the discs

Unscrew the screw mandrel with a small screw driver (some screw mandrels will screw to the right; some will screw to the left). Mount 2 radial discs, ¾" in diameter, of any grit, on the mandrel with the teeth turning clockwise (as shown in the top disc). Put the screw back on. Mount the screw mandrel on the rotary tool.

This attachment can also be used to wipe off patina and to re-polish tarnished areas of both silver and base metals.

Turn the rotary tool on at minimum speed and buff off the black film.

The attachment on the right is called a course mini-fiber wheel. It is efficient for cleaning large textured areas and for texturing smooth areas.

3. **Sanding smooth (non-textured) areas.**

Sometimes, an area that was smooth and flush before firing comes out of the kiln grainy and bumpy. This is especially the case with mixed metal pieces, where some of the metals shrink more than others.

You will need a drum mandrel and sanding bands. The sanding bands are sold separately and it is best to stock up on 120- and 240-grit bands, since they wear out quickly. When the band is worn out, replace it with a new one.

a) Use a small screwdriver to loosen the screw at the top of the mandrel.

b) Slide the sanding drum onto the mandrel, and tighten the screw.

Sand the surface until it is all flush. If the surface is very bumpy, start with a 120-grit drum; if it is slightly bumpy, start with 240 grit.

Move on to 220-grit sandpaper on the slotted mandrel, with which you tested sintering earlier. Sand the surface by slowly going back and forth, without removing the mandrel from the surface. Apply some pressure during this process; the pressure is more important than quick movements.

The photo on the left shows the process of sanding the non-textured surface of a back of a piece. Customers have a habit of flipping a piece over when you show it to them, so it's best to make sure that the back is just as well finished just as the front.

When using the portable rotary tool, lean the back of your hands on the work surface and move your wrist back and forth; otherwise you'll get tired quickly. The pressure should be coming from your shoulder.

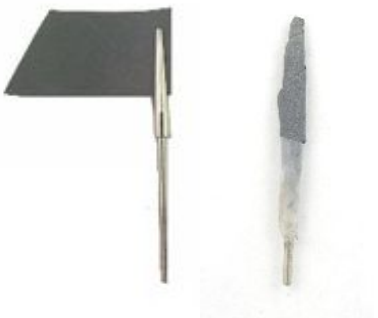
Keep changing directions. Each time you change direction you will still see the scratches of the sandpaper underneath going in the other direction. Keep changing directions until you see the lines going in only one direction. When the sandpaper wears out, tear off a piece of it and you'll have a fresh one underneath.

When the sandpaper wears out and the mandrel shows through, it's time to wrap the mandrel with a new strip of sandpaper, or the mandrel will scratch the silver and you will have to start sanding all over again.

Sand the sides of the piece as well. Feel with your fingers for sharp corners and edges, and round them off using a round motion. Keep sanding until all you can see on the surface is the scratches caused by the sandpaper.

Repeat the sanding with 400-grit sandpaper. This step is less time consuming as it's only meant to refine the scratches left by the 220-grit sandpaper. It also makes the surface look shiny.

Tapered-head Mandrel



This mandrel is used for hard-to-reach spots and small areas, such as the space between the bail and the back of a pendant.

For this mandrel cut the sandpaper strip shorter, no longer than 1½", and a little bit wider than the length of the slot.

4. **Matte finish**

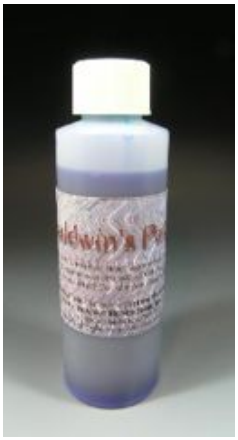
Mount an extra-fine mini-fiber wheel (red color) on the rotary tool. Use light touches and daubs to wipe off the marks left by the sandpapers. If you press hard, the surface will look brushed. This kind of finish is also called satin finish or white finish.

As a result of sanding and matting mixed metal pieces, the contrast between the metals will almost disappear. The contrast is easily recovered by using Baldwin's Patina.

a) Wet a cotton or sponge swab with a drop of the patina. Rub the surface of the circle. Keep rubbing until the full pattern reappears.

b) Wash the pendant well with warm water to stop the patina from reacting (or else your piece may turn green).

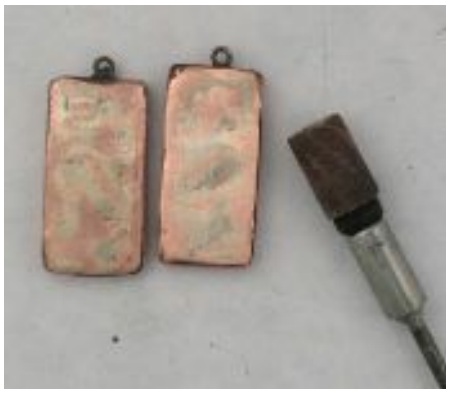
Baldwin's Patina darkens steel and copper, but not silver or any type of bronze (regular, XT, White or Brilliant.)



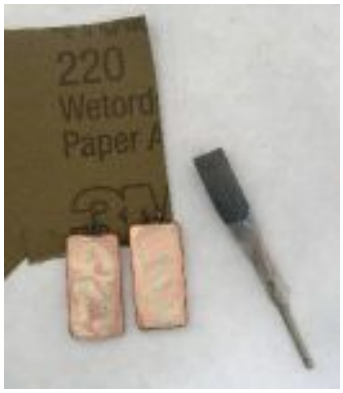
The patina tends to give the surface a shiny look, so there is no need to polish the piece afterward. The patina is the last step on mixed metal pieces. It also provide a sealing film that will keep this look for a long time.

For more on using Baldwin's Patina, see my video clip on YouTube: go to youtube.com/artinsilver and click on the video entitled "Baldwin's Patina on Metal Clay."

To summarize the process, here is a photo demonstration of finishing the under-fired earrings shown on the bottom of page 2. These earrings were made from copper and White Bronze.



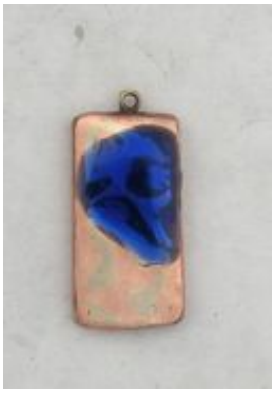
Sanding with a drum mandrel



Sanding with 220-grit sandpaper mounted on a straight head slotted mandrel

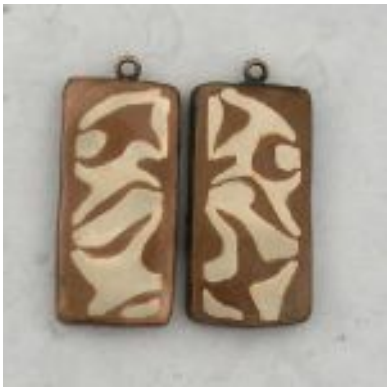
Sanding with 400-grit sandpaper mounted on a straight head slotted mandrel

Buffing with an extra-fine mini-fiber wheel



Applying Baldwin's Patina

When the patina stays on the surface and does get immediately into the piece, as shown in the photo on the left, it means that you have done a good sanding job.



Finished

5. **Polishing**

Textured Surface

Tumbling is the easiest way of polishing textured areas. However, it is only the last step of the finishing process. If you tumble a piece straight from the kiln, it may look shiny but not finished.

Tumbling is **not** recommended for 1) smooth areas where mirror finish is desired, since it may leave marks and dents on the surface; 2) mixed metal pieces, since the tumbling will take off the contrast between the metals; 3) pieces with multiple textures, since it will cause them to look all alike.

If you wish to polish only selected areas, use the polishing wheels.

Silicone Polishing Wheel

Unscrew the screw mandrel, mount the wheel, and screw it back on.

Mount the wheel on the rotary tool, and press it hard onto the piece, spot by spot, until the surface becomes all shiny. You may have to go on to a higher speed. The piece will heat up, so use finger protectors or hold it with a piece of cloth.

The silicone polisher on the right has a shape called knife-edge and is designed to polish hard-to-reach areas.

The silicone wheel is designed only for textured surfaces. If you try to use it to polish a non-textured surface, it will leave unwanted marks.

Mirror Finish

To polish a non-textured surface to a mirror finish, a lot of sanding is required prior to polishing. Go through all grits: 220, 400, 600, up to 1500. The finer the grit, the shinier the piece will be. The polishing itself is done with red rouge, which tends to highlight imperfections. Sometimes a surface looks smooth, but after it is polished with rouge it looks scratched again. This is not caused by the rouge, but rather revealed by it.
If this happens, sand more with fine grit sandpapers.

Mirror shine can be achieved using a stick, felt, or a fabric buff.

Rouge Stick

Glue a strip of scrap leather on a stick. Rub the leather stick hard against a chunk of red rouge, then rub it hard over the textured surface.

Fabric Wheel and Felt Buffs

Mount the wheel on the rotary tool. As it spins, press it against the rouge to coat it, then press hard on the surface to be polished. Be sure to use goggles and a mask, since particles of fabric and rouge will fly all over. If scratches show, go back to sanding.

Set your rotary tool in a vise and turn it on. Rather than pressing the wheel on the piece, press the piece with both hands against the wheel. It's easier and more efficient (the closest you can get to a polishing machine.)

Wash off residues of rouge with an old toothbrush and soap, under warm running water. To avoid water marks and finger stains, dry the piece in a pile of sawdust. Alternatively, you can use a tissue.

Mirror finish on Brilliant Bronze