

Wirework

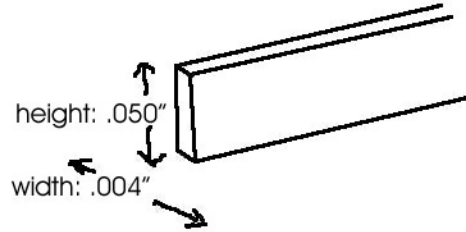
Cloisonné refers to an enamel which uses a wire(s) to separate color areas. Wire can be made of several metals: fine silver, copper, or 24k gold, or in some cases 18k green gold. The wires can have several purposes, and different heights and thicknesses can be used.

A cloisonné wire creates a wall, separating color by making a wall in between colors. This creates a sharp edge between the colors. Wires are not required to separate colors, as you can blend colors within wire cells.

Size of Wire

The height of the wire will determine the depth of the enamel. The thickness of the wire will determine how prominent the wire is when viewing the enamel piece. Generally, the thicker the wire (width) the more prominent it will appear in the design and become a more important design element. I use the following size wires:

- .004 by .05 (my normal height, approx 16 gauge)
- .003 by .05
- .005 by .05
- .010 by .05 (for thicker lines)



Intention

You can use the wire in several ways:

1. to separate one color area from another
2. to create a sharp edge where there is a change in depth
3. to create a shape
4. to create a pattern
5. to create a line

Bending Wires

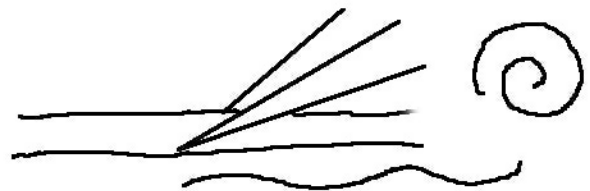
Wire bends easiest when it is annealed. I anneal the cloisonné wire in a kiln on a completely clean (no enamel on it!) firing screen. Coil up some wire, place it in the kiln until the screen begins to glow cherry red, remove and air cool. When it has cooled place it in a container so that you can keep track of what size it is. Use any tool available to bend your wires. I use very sharp tweezers (I prefer hardened steel as they don't give much in the process) pliers, mandrels, drill bits, and my fingers.

Types of Bends

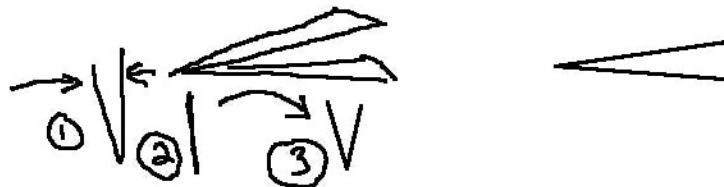
1) The "Twist"; right angle bend creates a sharp bend



2) The "Massage": smooth gradual curve



3) The "Sharp Point": squeeze together with flat nose pliers and then open back up



4) "Mandrel": wrap the wire around something:
mandrels, drill bits, brushes,

Wirework Tips

- *Bend wires directly over a scale drawing
- *Bend in one, comfortable direction
- *Angle tweezers less than 45 degrees
- *Use one pair of tweezers (or a finger) as an anchor, and the other tweezer to create the bend
- *Create a method of placing your wires onto your shape so that they are in the correct place relative to your drawing
- *Bend most important wires first and get them glued into place, even possibly fired before adding other wires
- *When cutting your wires, better a little too long than too short.
- *Keep your wires at a 90 degree angle to the enamel surface; if they lean either correct them when placing them or after gluing or firing into place.
- *When adjusting wirework to the domed surface, hold down two of the higher areas and lift up the lower portion of the wire.
- *Use Blu-stic glue or kyle-fyre glue to hold wires into place. Blue-stic holds faster and longer, and dries very quickly, and can be fired while still wet, but if too much gets onto the enamel surface may discolor the enamel. Kyr-fyre burns away completely clear, but becomes more water-like and tends to pull wires out of place where there is capillary attraction possible. Need heat source to dry thoroughly.
- *Fire Blu-stic until it is light yellow or disappears. Fire Kyr-fyre until flux cracks heal.

Apply & Fire Your Wirework

Bending your wires

You can either bend one wire at a time and glue it in place, or bend many wires and then assemble them together onto your enamel surface. Do whatever makes the most sense for ease and speed. One way may work better than the other. Create your wirework design by creating a line pattern so that each line will be able to stand up on its own after the glue has burned away. That means that each wire must have a curve or bend somewhere. Figure out which wire to start with, bend that, make adjustments considering the dome shape of the enamel surface, and glue it in place with either blue stic or kylrfyre glue. Before fixing the wire in place, decide how to calibrate the position of the wire so that it is in the correct place, at the correct angle, and the right length. Once you get a central wire glued down you can work from that and build the rest of your wirework around it.

Glue down the rest of your wires

Slowly build up your wirework design, making sure that each wire is going in the correct place and position. If the glue is too wet and the wire pieces move when you butt one up to another, let the glue dry before touching one wire to another. You can let the length of the wires extend slightly (around 1 mm) off the edge of the piece. It's better to make it a little too long than too short. When bending and sizing your wires, mark where you want to make a cut with your tweezer, and then clip it a little long so that you are able to make adjustments. If the piece is complicated and you want to get some of the central wires fired in place first, do that and then add more wires after it has cooled.

Firing the wires in place

Remember that the glue is only a holding agent to keep the wires in place until the enamel has melted. When the enamel melts, the wires will stick to the molten enamel and be held in place. More glue (especially blu stic) will only make a mess and possibly contaminate the enamel surface. It will not make your wires hold onto the enamel surface any better once you are firing it. The glue will burn away.

What to look for when firing your wires: The glue will begin to burn away as soon as the piece goes into the kiln. Using blu stic: If there is a lot of glue you might even here a sound as it catches on fire. The glue will turn black, then brown, then yellow, and then be clear. When it reaches the yellow color the enamel is starting to melt, and the wires may or may not be held in place. I sometimes pull the piece out, check for yellow, and touch down some wires with a painting spatula, and then put it back into the kiln until the glue burns away completely. Touch down any more loose wires where there might be gaps carefully. You have around 7 seconds where the enamel is still molten. Do not touch to keep the piece grease free since the next step will be a wet application of enamel.

Finishing Your Enamel Surface

When your enamel reaches the height of the wires and there are no low areas, you are ready to start the finishing process. This consists of two steps: Grinding and Polishing.

Grinding is the process of removing enamel so that the enamel surface is level, there is no enamel over any of the wires, and the surface feels smooth without ridges.

Polishing is the process of finishing the surface of the enamel so that you like the way it looks and feels.

Making Choices: What to use and when?

Here are some questions to consider:

1. What are my Grinding choices available?
2. How careful do I need to be? How much control do I need to have?
3. Are there areas which need more care than others (perhaps the edges)?
4. How coarse should I begin?
5. Is the abrasive I'm using working or should I change to a coarser/finer abrasive?
6. Am I noticing problems in the enamel? When should I address these? How to fix problems?
7. How do I want the finished surface to look? How does it look and feel?
8. What is the best or most efficient way to achieve this?
9. Are there setting issues to consider when making finishing decisions?
10. When do I stop? When is it finished?

Grinding Techniques

You can use any abrasive material which removes enamel. Over the years, popular choices have been alundum/carborundum stones, diamond compounds, and wet/dry silicon carbide sandpaper. I prefer silicon carbide; it is very inexpensive and easily found at hardware stores or at lapidary/jewelry supply store. Whatever your abrasive choice, you need to do it wet!

Some ways to use Silicon Carbide:

1. Use dop wax to attach your enamel to a dop stick (dowel) and rub the enamel onto wet sandpaper sheet.
2. Make a sanding stick by wrapping the sandpaper around a wooden stick and rub the paper against the enamel.
3. Mount silicon carbide paper or discs onto a flexible shaft system (I use a Roloc Sanding System from 3M)
4. Use a lapidary arbor/motor with an expanding drum and silicon carbide belt (I use a Lortone Beaver unit)

Grinding Tips

*Rotate your enamel to follow the dome of your enamel surface.

Have a towel handy to dry your piece often so that you can see the matt areas; these are the areas which you have ground.

*Look at your surface from different angles to see if all the wires are completely exposed. A thin layer of enamel over the wire may cause cracking in the future.

*Rotate your piece so that you don't grind unevenly.

*Use the coarsest paper which still allows you to have control.

*Don't grind mindlessly. Make choices as you grind (how much pressure? What angle? How fast? Should you stop and fill low areas and refile? Are there problems areas which should be dealt with before continuing the grinding process? What areas need extra attention?

Using the JoolTool for Grinding and Polishing

JoolTool for Grinding and Polishing

I've been using this great tool for all my grinding and polishing needs.

The sanding disks have grooves so that when they spin, you can see through them, similar to seeing through the blades of a fan while it turns.

The piece is held to the sanding disc from below, which allows you to see the enamel or metal surface while you are working on it.

Grinding

I begin with what is called a "flexible diamond" disc. I use either a medium or fine grade. The scratches made by the finer grade are more easily removed, and that disk is included in the enameling kit.

Use slight pressure and a gentle rolling motion to prevent cutting too deeply or creating "facets" or planes on your curved surface. Work the surface, dipping the enamel piece into the tray of water occasionally to lubricate it. Continue until all the surface looks matte and all enamel is off of the wirework. Follow each line/wire to make sure the wire looks consistent and has no enamel on it.

Polishing

I use the 3M Diamond micro finishing discs. These go on the Ninja discs and require a cushion between the disc and the sandpaper. This is included in the kit. I begin with the cream colored paper, which is 45 micron. I then use the green paper, and finally the tan one. The cream and tan are in the kit. the green needs to be ordered as an add on. I prefer to use all three as it helps keep the finest paper (tan) from wearing down too quickly. This is then followed up with a polishing compound on a felt wheel.



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THIS IS THE KIT YOU NEED FOR WORKING ON FUSED GLASS, ENAMEL, SOFT STONE LAPIDARY, CLOISSONNÉ, DICHROIC GLASS AND CERAMICS. Use the Diamond abrasives in this kit to take a rough, bumpy surface to a smooth, even finish, then polish in two ways: Felt wheel with compound and/or Cerium Oxide to a mirror-like shine.

Polishing

When all of your enamel surface is level and wires are exposed, it is time to polish the piece. This can be done different ways with different results:

Create a Gloss Finish

Grind surface until all enamel area are matt and all wirework is exposed and free of enamel. Clean enamel surface with a glass brush to remove any residual grit. Fire just until glossy: if fired too long enamel will begin to pull away from the wires and create high and low hilly areas. Sometimes it is necessary to refire prior to other polishing method to seal pits or make the polishing process go quicker.

Create a sanded finish

This is the technique of progressively putting finer and finer scratches on the surface until the tiniest scratches are invisible to the naked eye. Various techniques include:

- * Wet/Dry Sandpaper: Use finer papers (600 to 1000 grit). Make your own sanding stick or dip your enamel and grind it over the paper. Should be done with plenty of water. Move from coarser to finer paper as you see deeper scratches disappear. Final surface should look the same when wet as when dry, with no scratches showing.
- * Flexible Shaft Sanding Pads/Disks: Try a variety of different products on the market. Try diamond pads
- * Lapidary Unit : Use finer and finer sanding belts.
- * Polishing Compounds
- * Cerium Oxide: available in powder, belt, or pad format. Use with water to create a high polish over finely sanded areas
- * Use the correct grit of sandpaper to remove the deeper scratches. It takes much longer to take out a deep scratch with a fine sandpaper.
- * Check for problem areas which you haven't noticed before so that you don't waste a lot of time polishing only to find the problem when you are finished polishing.
- * Use appropriate pressure to remove scratches. Newer sandpapers are coarser than worn ones and require less pressure.
- * a worn 400 grit paper may be similar to a new 600 grit sandpaper.
- * Don't polish mindlessly. Make choices as you polish: How much pressure? What angle to hold the enamel on the paper? How fast should you move the enamel over the surface? What areas need extra attention?
- * Make a decision to stop when you feel you have done enough.
- * Make a decision to stop when you aren't paying enough attention and may ruin the piece.

Preparing a Copper Shape

Step 1: Prepare Copper Shape

1. Cut/shape copper. We are using 24 gauge sheet
2. Anneal and quench. This softens the copper allowing it to be domed easily and helps excess firescale flake off.
3. Using dapping block, give the copper shape a slight dome, similar to a pillow form. use a wooden block, as the metal ones have too deep of a dome. Copper should be soft enough to use your fingers to shape it.
4. Apply (sift or paint) medium layer of your base coat of enamel on to the front. We are using opaque black or white enamel. Fire to glossy on a firing screen. I let the pieces cool for several seconds and then quench them in a pyrex dish of water. This helps the firescale on the back flake off easily and cools, them down quickly. They will crack slightly but the cracks will heal in the next firing.
5. Clean loose firescale from back, check dome and make adjustments if piece has become warped.
6. Turn copper over and sift or paint a medium layer of counter enamel. Place counter enamel side up on a trivet and fire until orange peel. If you overfire at this stage the front side may begin to cling to the side of the trivets, requiring some clean up later..
7. Repeat a second layer of counter enamel, adding twice as much enamel on the second firing. Fire to orange peel. Paint thin layer of scalex onto back if not using a trivet. let dry, and either fire with scalex side down on some firing cloth or proceed to whatever your next step is.

Step 2: Apply Silver Foil.

1. Use Fine Silver Foil. Place a piece between paper if necessary to help cutting process if you are trying to make very detailed cuts and need precision. Then, separate the foil pieces from the paper pieces you've cut.
2. Cut a piece or several pieces to cover surface. Use a mixture of water and glue (klyrfyre) approx 3 parts water to 1 part glue. Proportion is not critical, and glue could be used straight for smaller pieces. The pieces of foil may overlap slightly.
3. Paint glue/water mixture onto the front surface of enamel. Use wet tip of brush to pick up foil pieces and place on enamel surface. Try to remove air bubbles.
4. Let air dry or place on kiln or under a light to dry before firing. The glue must be dry before firing or it will steam.
5. Fire until enamel melts and foil adheres to the enamel. If your next step is to apply enamel which is wet, do not touch with your fingers or the grease from your fingertips will prevent the layer of enamel from flowing effortlessly when you paint it on.

Step 3: Prepare Transparent Enamel Colors

1. Preparation includes removing fine particles (fines) for optimal clarity
2. Use a dry spoon to place a small amount into a cup. pour in a little bit of water. Use your finger tip to press down into the enamel to break up any lumped sections if necessary. Or use a mortar and pestle to break up the enamel.
3. Swirl water enamel mixture for a few seconds, and tilt cup to pour out the cloudy water. The cloudiness is caused by the finer particles floating in the water. Pour the fines (the floating, fine particles) into a container to keep them from going down drain
4. Repeat several times until water stays clear right from the start. The more enamel in cup the longer this will take
5. Make sure you keep track of what color is in what cup! Make a note on a piece of paper or write on cup with a sharpie pen.

Step 4: Paint and Fire a thin layer of flux enamel to the front.

1. Apply and fire a thin layer of either flux or desired transparent onto the front of the piece. Some transparents (usually enamels with gold in them like reds, pinks, and oranges) have a chemical reaction when fired directly on fine silver. If using a color which reacts to silver, fire a layer of flux over the silver before firing the reactive color. Be sure to keep the enamel layer thin and wet enough to moved easily with the side of your brush. (See Preparing Fine Silver Shape).