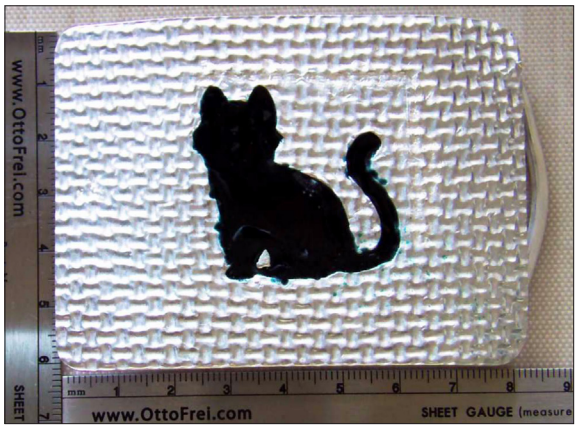
# Tech Time with Tom




## Sterling Belt Buckles

By: Thomas J. Tessier

**Materials:**

- 100 grams of Sterling Silver metal clay
- Fine Silver Paste Type or Sterling Silver Paste made from lump clay
- Fine Silver Syringe Type with medium tip
- 2” 1.7 mm sterling silver wire (14 gauge)
- 3” 2.6 mm sterling silver wire (12 gauge)
- Wooden Popsicle stick
- CA glue (super-glue)
- Release agent

**Tools**

- #2 flat artist brush
- Non-stick work surfaces
- Large roller frames, plastic slats, or playing cards
- Clay roller
- Clay pick
- Craft knife
- ¼” round clay punch
- Low relief texture plate
- Bold design stamp
- Large cylindrical surface to form a curve
- 600 & 1200 grit wet/dry sandpaper
- Assorted grit sanding sticks or files
- Preferred clay drying tool
- Kiln to fire the clay
- Crucible with vermiculite OR firing blanket pieces
- Tumbler or other burnishing method
- Flat Nose Pliers
- Fine tip tweezers
- Hand drill or drill press
- Drill bits
- Small anvil and hammers (riveting and ball peen)
- Metal metric ruler
- Fine point marker or pencil
- Jeweler’s saw & blades or flush cutters for 12 gauge wire

**Optional Tools & Materials:**

To draw your own wire:

- Empty 3ml syringe
- Clay extruder
- Draw plate & draw tongs
- Vise
- Opaque enamel and related tools and supplies
- Foredom with hammer handpiece
- Pickle pot & pickle, neutralizer, and water

The purpose of this article is to present step-by-step instructions on how to make a sterling silver cowboy/cowgirl belt buckle from scratch using only metal clay. You should have experience using the tools listed above and be comfortable with some basic fabrication techniques.

**Reverse engineering**

To make a belt buckle the right size, you need to start where you want to end. What size does the belt buckle need to be for a given belt size?

Most western belts are 1.5 inches wide, but they also come in 1 inch wide. We are going to make one that will accommodate a 1.5-inch belt, but if you follow the logic you can easily make one for a 1-inch belt.

In your mind's eye what does the finished buckle look like? Draw a few sketches and see what appeals to you. Look on the internet to help you get ideas. For simplicity in this project, I'm going to texture the surface and stamp an image into it. You may simply want to texture the surface. You can make your buckle as ornate or plain as you want.

Some options are: Add a twisted or braided trim around the perimeter of the buckle. Apply a 3-dimensional piece to the surface, like a molded steer or horse. Stamp small designs into it while the clay is still wet. Engrave designs into the surface of the piece in the leather-hard greenware state. This project really does have limitless options and what you do will depend upon the skill sets you bring to the project.

What dimensions should the rolled clay be cut to end up with a buckle the size you want? The actual shrinkage depends upon the thickness of the clay, the length, and the width. For the sample belt buckle, the clay I used will shrink about 18% on length and 20% on the width, given a1.5 mm (6 cards) thickness. I'm going to make a belt buckle that I want to be approximately 85mm in length and 60mm in width after firing. Therefore, the starting length in clay needs to be 104mm and the width needs to be 75mm.

Note: This buckle turned out to be 83mm x 62mm after firing. A little off, but very acceptable.

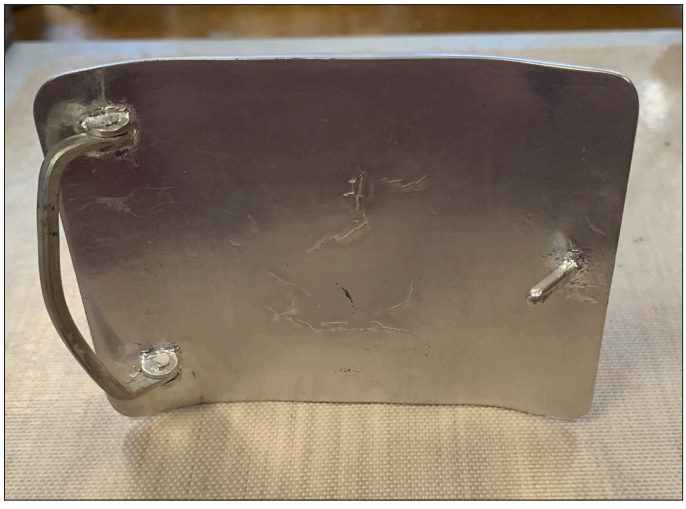
**Terminology**

There are names given to the various parts of a buckle.

The main piece, in our case the 85mm x 60mm part, is called the 'frame'. It's the part that holds all the other parts together. On the frame we will have two hinges that the 'movable bar' will pivot from.

The movable bar is where one end of the belt will be attached. On the other end of the frame will be a 'prong', also known as a 'pin'.

The prong is what sticks through the belt to stop it from moving. In the image below, the prong on the right side of the buckle (frame) and the hinges and movable bar are on the left side. Each of these hinges is made up of three 'knuckles'. A knuckle is where a hinge pin fits through. Hinges typically have an odd number of knuckles. Each of the two hinges on our buckle has three knuckles- two on the frame and one on the movable bar.



**Making the Frame**

Once we calculate the size of the frame, we're ready to start the fabrication process.

We calculated the frame needs to be 104mm x 75mm and 1.5mm thick in clay. Select a low relief texture, apply release agent, and roll the clay 1.5mm thick (Image 1).

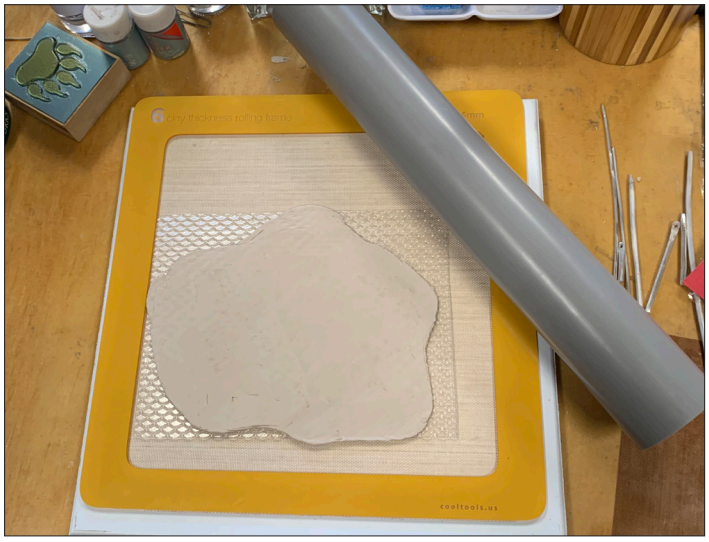
Remove the clay from the texture and place on top of a flexible work surface. Cut the frame to the calculated size using your clay pick or craft knife (Image 2).

*Note: I made a template from a red file folder exactly the size of the frame. If you plan on making more than one of these, the template will be very handy.*

Remove the excess clay and put it into your clay keeper to use later. For the example, I stamped a cat into the center of the frame (Image 3).

Bolder stamped designs translate better. Any stamping should be added to the piece before you set it up to dry. Small embellishments, edge embellishments, and molded pieces can be added later. Engraving will be done once the clay is dry.

Once you decorate your frame, lay it across a curved surface to dry. Since belt buckles are not flat - they have a slight curve for comfort- I laid mine across a 5-gallon propane tank. You can use any curved surface that's available. Depending on your environment, the piece may require up to 24 hours to dry. (Image 4).



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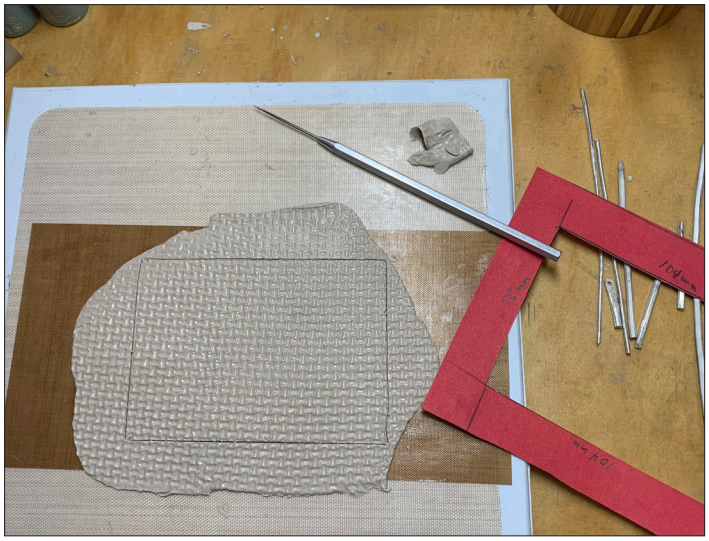

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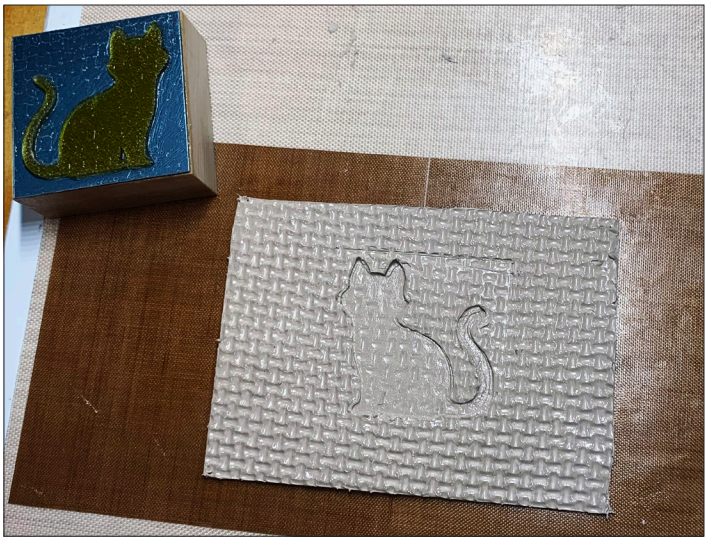

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**Making the other parts of the buckle**

While the frame is drying, use the time to make the other parts of the buckle. Roll some of the clay out to 1mm thick (4 cards), Use the ¼ inch brass punch to cut 6-8 discs. (Image 5). Cut off one edge to allow a straight edge to butt up against the frame. Use your needle tool and poke a divot into each knuckle. This will be used to guide the drill when drilling the pin holes later (Image 6)


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**Design layout for the parts**

Check your frame to see if it is dry. If it is not completely dry, but it can hold its shape (slight curve), you can use your preferred drying method to complete the process.

Before you add the functional pieces, finish prepping the frame. Use sanding files or sticks to sand the edge of the frame square and flat. Use the files to round the corners of the frame. Use a piece of 600 grit wet/dry sandpaper to sand the back of the frame smooth.

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Once the back is smooth, switch to 1200 grit and repeat the procedure. Sand different directions (e.g. lengthwise, crosswise, & 45° angles) until you have a smooth surface.

This is the best time to sand the surface, because once the other parts of the buckle are added it will be much more difficult to sand.

The next step is to determine where the parts go on the back of the frame. Use a fine point Sharpie or pencil and small metric rule to measure and mark.


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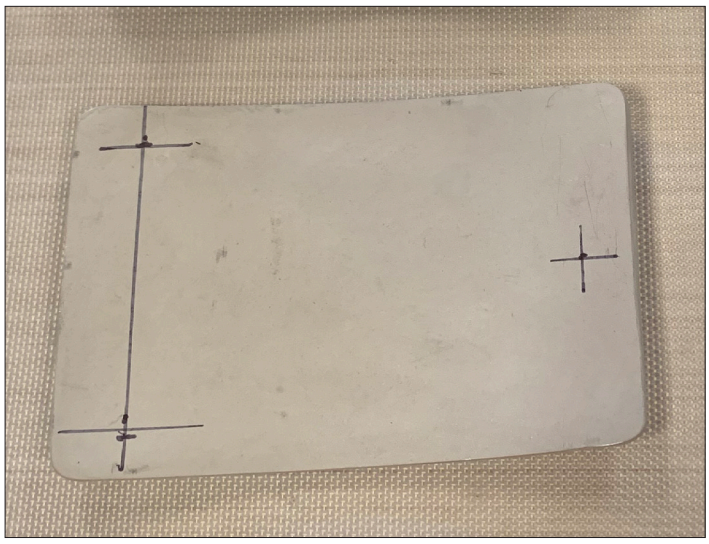
Since this buckle fits a 1-1/2 belt, the length of the movable bar (and distance between the hinges needs to be at least 1.5 inches. A little more is fine, but less and the belt won't fit. 1-1/2 inches = 38.1mm (1.5 X 25.4). This is the fired measurement after the clay sinters and shrinks. Based on the shrinkage rate of the clay I used, the distance needs to be 47.6mm. I rounded up to 50mm to be on the safe side.

Draw a line with your Sharpie or pencil 10mm in from the left side of the buckle as viewed from the rear (Image 7). Measure the length of the line (the width of the frame) and subtract 50mm from it. Divide that number by 2. This is how far the center of the hinges should be from the edges of the buckle. Draw a line perpendicular to your long line at those points.

On the right side of the frame, draw a line 10mm in from the right side and another perpendicular at the midpoint of the width of the frame. That is where the prong (pin) will go (Image 7).



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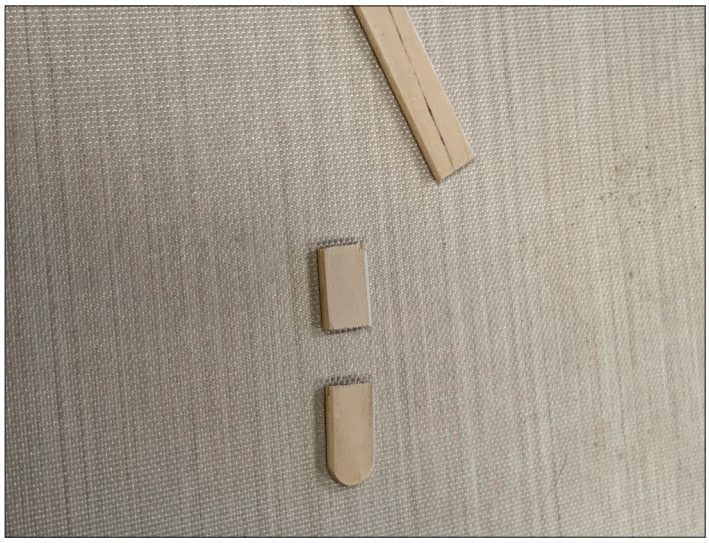

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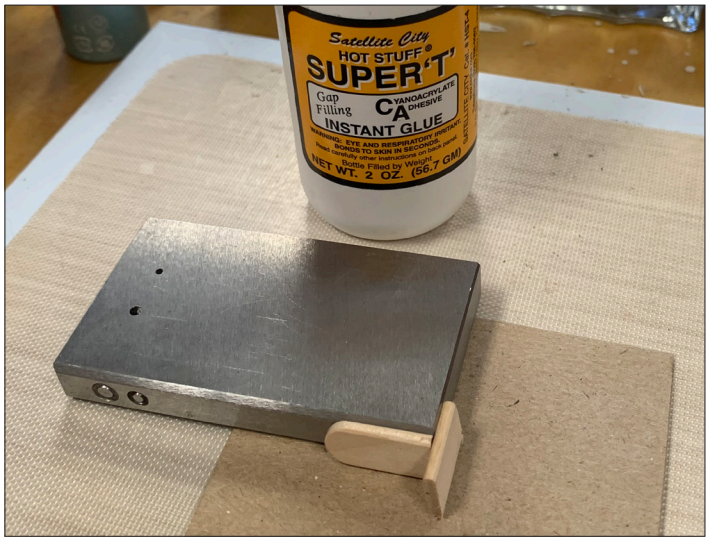
**Assembling the hinges and prong**

The next step will be to set up the knuckles. Take the greenware disks and separate out 4 that are almost identical. Clean them up with your sanding sticks. They are going to be positioned on the frame where we marked previously. In order to secure them in the correct position, you will need to make a jig to hold them vertical while they dry.

To make your jigs, cut the Popsicle stick into four ¾ inch long pieces (Image 8). Fasten them together with a drop of CA glue. Hold them in position for drying with a small steel block. (Image 9) Rub a little release on the

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steel block where the pieces will come in contact, just to make sure you don't glue the wood to the block. Once the glue has dried, apply a little release to the jigs before use.

Attach the knuckles one at a time. Start by adding a little water with a small brush to where you are going to attach the knuckles. Place the jig so the T lines up with the + you drew (Image 10). Moisten the straight edge of the knuckle with water using a small brush. You may find it helpful to hold the knuckle with a pair of tweezers.

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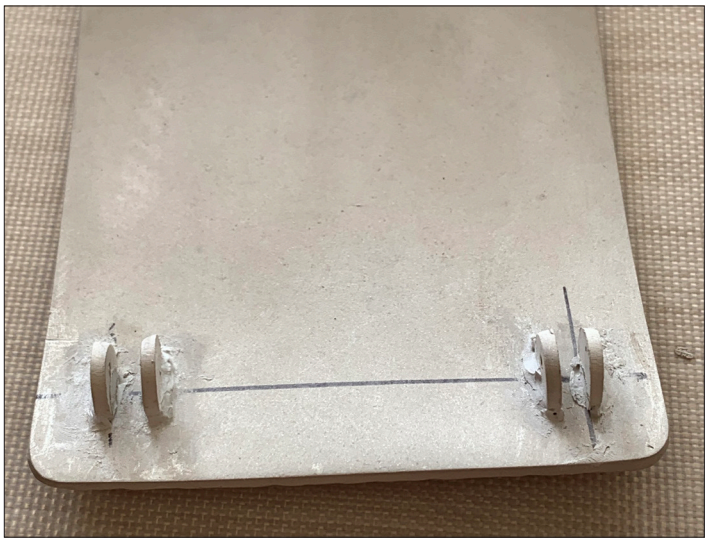
Apply syringe type using a medium tip along the knuckle's straight side. Carefully place the piece in position next to one side of the jig that you have in place. Be sure the divot for drilling faces out. Look straight down on the placement of the knuckles and reposition as necessary. Make sure the entire knuckle is positioned between your two reference lines. Repeat the procedure for the other knuckle. Carefully lift the frame and place it in the dehydrator and let the syringe type dry. In 5-10 minutes, remove it from the dehydrator.



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Carefully remove the jig. If the pieces are straight up and evenly spaced, add a line of syringe along the outsides of the knuckles to help reinforce their attachment point. Use a small, damp brush to help smooth the syringe clay. Dry completely. (Image 11) Repeat these steps for the other hinge.

Once all your knuckles are dry, the next step is to set the prong. Cut an 11mm piece of the larger wire with a jeweler's saw or strong flush cutters. (I used a #3/0 blade in my saw.)

## Hinge making tips:

- Take your time and make sure all the pieces are centered.
- If something moves or is not aligned properly, remove the hinge knuckle(s), scrape the surface with a craft knife or scraper and start over.
- A repair at this point is easy. This is also why you want to make more hinge parts than you intend to use.

The hole doesn't have to be a perfect fit for your wire because we're going to fill it with syringe type. You will want to go slowly and check the depth frequently so you don't drill your hole all the way through the frame. I drilled mine using my drill press as that allowed me to set a stop. I set the stop about half way through the thickness of the frame. Drill a hole in the frame where the prong will go with a drill bit that corresponds closely to the wire diameter.

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Once your hole is made, clean any dust from the hole and place the prong in position to check the fit. If you are going to put a slight bend in the prong, remove it from the hole and add the curve to the wire (Alternately, if you forget, you can add the bend after the piece is fired but before it is tumbled).

Moisten the hole with a little water using a small brush. Fill the hole with syringe type and push the prong down into the hole. Clean up the displaced clay with a small brush and smooth it around the base of the prong (Image 12). Dry the piece completely.

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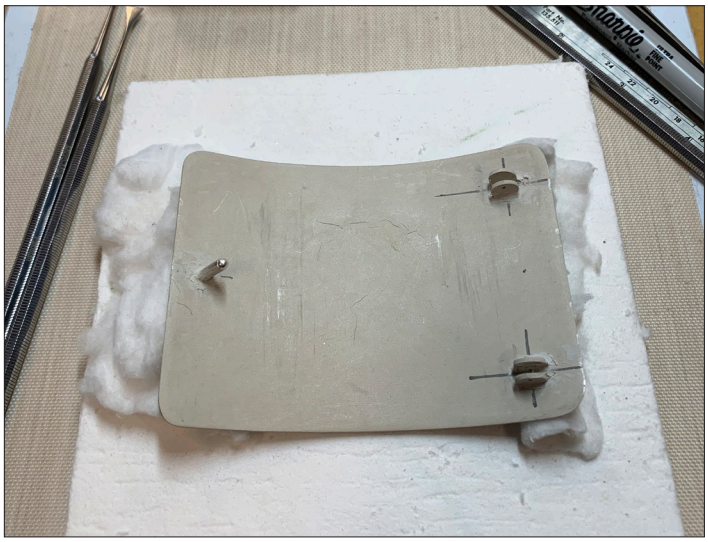
Your almost completed buckle is ready to fire. As you want to keep the curve in your buckle, you have choices here for firing. You can fire it nestled in a crucible filled with vermiculite to support the curve (Image 13).

You can also fire the buckle on a kiln shelf with the two ends supported with pieces of firing blanket (Image 14). Gravity will pull the center down flat against the firing surface. The ends will maintain a small curve. Once you've decided how you're going to



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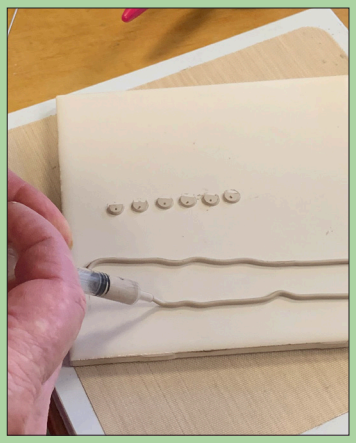
TECH TIME: Making your own Metal Clay Wire



I used a 3 cc syringe to extrude some clay into a couple of strands. I'm going to use these to make some sterling silver 'wire'. From this wire I will make the pins that go into the knuckles to hold the movable bar in place.

To extrude clay from a syringe, suck the syringe full of water and expel it. That will give the inner surface a little lubrication. Remove the plunger. Roll a small amount of clay into a log with your fingers (or use a snake roller). It should be just small enough to fit into the syringe barrel. Replace the plunger and push it down against the clay. Continue to push until the clay starts coming out of the syringe's nozzle. Extrude the clay onto a non-stick work surface, making a straight line. Make a couple of strands around 5 inches long. Using your fingers or snake roller, put a taper on each end of the strands. Using a small syringe will extrude about a 2mm diameter clay strand.

Using a clay extruder for metal clay, extrude a couple of 3mm diameter strands of clay onto a non-stick surface. Lay them as straight as possible and taper the ends of the strands. Place all the strands to dry using your preferred drying method.

Remove the greenware pieces from the dryer. If you forgot to put tapers on the ends of any of the strands, now is your chance to do it the easy way. Use sanding sticks and sand the about ¾" of each end to taper. Put the strands into your kiln and fire according to the manufacturer's instructions.

Once your strands are cooled, you're ready to "pull" some wire. To do this you'll need some draw plates, a vise, and a pair of draw tongs Drawplates come in a variety of shapes, like round, half-round, triangular, square, etc. I used the square holed draw-plate to pull my larger strands and a round holed drawplate for my smaller strands.

The drawplate is clamped into a bench vise. Your strand of wire is fed through the back of the plate. There are holes in the plate that are shaped like funnels. The wide end of the funnels are at the back of the plate. The holes get smaller and smaller as you go across the plate. Start by finding a hole that is just slightly smaller than your wire. Push the tapered end of the wire into the hole on the back of the plate. It should be sticking out the front of the plate at least ½ inch. Grab the wire with your tongs and smoothly pull it through the plate. Repeat the process. Then move on to the next smaller hole and repeat the process. Use a pair of calipers to determine the diameter of the wire. I pulled the small strands of wire down to about 1.7mm in diameter. This will be for the pins in the hinges. The larger strands will be used to make the movable bar and the prong. I pulled the wire down to about 2.6mm (across two parallel faces)

If you have pulled wire before, you'll notice something different right away. When pulling conventional wire, it tends to really stretch in length every time you pull it. The metal clay wire stretches in length a small amount. That's because this wire was sintered. It's less dense than conventional wire (about 20% less). The molecules of silver are spread much further apart. When you pull it, the diameter simply gets compressed, the length hardly changes.


Once you have pulled your wires 3 or so times, you'll need to anneal the wire. After pulling the wire, it becomes work hardened (brittle). If you attempt to bend it or flatten it without annealing, it could break. Every time you manipulate the wire, like bending it, working it on an anvil with a hammer, or pulling it, you need to re-anneal it.

Annealing is the process of heating the wire up with a torch until it turns dull red or or-ange. The piece should be the same color you fire greenware fine silver metal clay with a torch. Once it turns dull red or orange, you can stop heating and let the metal come back to room temperature. If you prefer to quench your piece, wait until it is no longer glowing before dipping it in the water.

support the greenware, go ahead and fire it according the firing schedule for your clay.

**Finishing/Tumbling**

After you've fired your buckle and allowed it to cool, you're ready to finish it. I use a large rotary tumbler for my bracelets and buckles. Use jeweler's shot, enough water to cover the shot and buckle and a squirt of your preferred burnishing liquid. Tumble for at least 1.5 hours. You could also use a hand held burnisher or wire brush, depending on the finish you want.

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**Preparing the Frame to Receive the Movable Bar**

Now that the frame is tumbled, it's time to drill the hinges' pin holes. The easiest way to drill these hinges is to use a drill press. Start by drilling a small hole first (I used a 0.9mm drill). That hole will act as a guide for the larger drill. My smaller wire is 1.7mm in diameter, so I used a 1.75mm drill for my final drill. Drill both hinges.

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Measure the length for the pins by sliding your wire into the hinge and letting it stick out the other side approximately 0.5 mm. Mark the other end 0.5 mm from the hinge with your fine point Sharpie (Image 15). Using your jeweler's saw or flush cutters, cut two pins from your small wire. Set the pins aside. We will mushroom the ends to rivet the pins in place after we've created our movable bar.

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**Making & Installing the Movable Bar & Final Touches**

The large size wire you made the prong with will be the same wire used to make the movable bar. If you have not annealed the wire, anneal it now.

Measure the distance between the centers of your hinges. For a 1.5” belt, that should be around 42mm. The distance between the hinges needs to be at least 1.5 inches for the belt to fit properly. Add 20mm to that number. In this example 42 + 20 = 62mm. This is the length of the large wire that you need to make your movable bar. Cut this length with your jewelers saw or cutters.

Next using a hammer and anvil, flatten out the ends of the wire (Image 16). Turn the piece over several times while hammering to get even flattening. Ideally use a rounded head hammer head to flatten and spread the wire end out. Use a flat head hammer head to remove the unevenness that develops using the rounded head. Test the fit of the flattened ends into your hinges. The fit should be loose. When both ends are flattened to your satisfaction, use a #4 metal file and round the ends of the wire (Image 17).

Next drill the holes. I drilled mine 1.9mm. My wire pins are 1.7mm in diameter, so this gives a little play. Holes that are a little larger than the pins will make it easier to assemble the parts together.

Now that you have hammered the ends on your movable bar and drilled the holes, you need to anneal the wire again. It’s become worked hardened from the hammering and flattening. If you don’t anneal, the wire may crack or snap when you try to bend it. Once annealed and cooled, you are ready to bend the wire to make your movable bar. Place the wire on the frame, alongside of the hinges (Image 18). Center it up and draw marks that line up with the centers of the hinges. Next take a pair of pliers and bend the wire at the marks you just drew.

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You now have a completed movable bar. Test fit the ends into the hinges. If it too wide, then put a slight vee bend in the center of movable bar like in Image 19 and reshape the bar accordingly.

From the annealing process your movable bar may have picked up a little fire scale. If so, place it into your hot pickle pot for 5-15 minutes. Neutralize in a baking soda and water solution & rinse off. If you don't have a soldering setup, you can lightly sand the piece or tumble it.

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The buckle is now ready for final assembly, and you need to immobilize the pins. I used my Foredom Flex Shaft with the "Key Tip Hammer Hand Piece" and mushroomed the ends of the pins using a small anvil. This makes a rivet out of each pin. You can also use the anvil and a small riveting hammer to do the same thing (Image 20 ).

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I stamped the front of frame with a cat stamp. I wet packed the cat impression with black Thompson Opaque 1995 enamel. I dried the enamel completely, then fired it at 1550°F for 2.5 minutes in the kiln. (Image 21) .

Images 22 and 23 show other examples of buckles made using these steps.

Now you have all the steps to make a cowboy/girl buckle. There are many good lessons to be learned when doing this project. Have fun!

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