Soldering Tools

Tank torch tips can be changed to fit the job at hand.

The micro butane torch (front), the large-flame butane torch, and a fuel canister.

My tank holder can be wheeled around or fixed in place.

Torching

You have to have a torch to solder, but it doesn’t have to be a big tank torch. It’s easy to solder with friendly butane cooking torches, or to set up a small-torch system that runs on small tanks—even disposable ones!

Butane torches Butane torches come in a few sizes: pencil, micro butane, and large flame or jumbo. The pencil size has a tiny flame, so I don’t recommend it. Micro butane torches are comfortable to hold and can handle soldering jobs up to small bezel settings. For bigger jobs, use a large-flame butane torch. Read and follow the instructions that come with your torch to safely light and refuel your torch.

Tank torches A tank torch runs on a single fuel, like propane or acetylene, or a mix of two gases, like oxygen and propane or oxygen and acetylene. Their flames are generally hotter than butane for faster and more efficient soldering. I prefer the versatility of small torches that run on clean oxy/propane. Their tips can be interchanged for tiny, pencil-point flames up to a melting tip for the largest flame. See Setting Up a Studio: Setting up a small torch system, p. 17, for examples of different systems as well as advice on how to set them up.

How to refuel your butane torch

Butane is available in canisters at hardware stores, smoke shops, or convenience stores. Match the nozzle on the canister to the fuel port on the bottom of the torch. Wear safety glasses and refuel your torch away from open flames.

Make sure your torch is off and the flame is out. Find the gas control and turn it off (or all the way toward the minus sign).

Hold the torch upside-down. Remove the stand. Shake the gas canister a few times to warm the fuel up. Hold it away from your face, with the nozzle away from your skin. Hold the butane canister upside down, aligned with the fuel port.

Press down hard with the canister to make a tight seal and to start fueling. If you don’t press hard enough, or the nozzle is misaligned, or the torch is full, the butane will spray back right away. Normally, if the torch is partially empty, the butane will hiss into the torch quietly with a slight haze in the air. This can take 5–20 seconds. As soon as the torch is full, wet butane will spray into the air. Stop fueling. Don’t overfill your torch! If you do, butane will spit out of the bottom or top and you can’t use your torch until this stops.

Turn your torch upright and wait 5–10 minutes after fueling before you use it. This will help to settle any air bubbles in the butane.

Press down hard to make a tight seal for refueling.

Disposable fuel and oxygen tanks are available at hardware stores.

Big propane, acetylene, and oxygen tanks can be refilled at welding suppliers.
Charcoal, honeycomb, and firebrick
Materials like compressed charcoal, honeycomb, and firebrick amplify the heat from your torch and speed up melting and soldering. Charcoal makes a reducing atmosphere when heated, which fights oxides like firescale. Soft charcoal is good for pressing in props or pieces to hold them during soldering. It can smolder if you don’t quench it. Hard charcoal will hold heat, doesn’t burn away, and lasts longer than soft charcoal. Honeycomb has a clean ceramic surface and is easier to clean. Soft firebrick, available from ceramics suppliers, is very reflective of heat, and can be cut into smaller pieces with a wood saw.

Solder boards
Solder boards are made to take the heat of soldering and come in different materials and brands, like ceramic, Solderite, Transite, and Silquar. The difference between them is preference and how cold the board is to work on. Cold boards like ceramic or Silquar take more heat and can slow soldering down, which can be a good thing when you’re working on small jump rings or wire that could be easy to melt. Solderite reflects more heat and can amplify your torch, but pits can be melted into the surface.

Flux
Flux keeps metal clean and helps solder to flow. There are many different types of flux, but they can be grouped into a couple of categories: flux, fire coats, and combinations of both (see All About Flux, p. 22).

Soldering picks and tweezers
Soldering picks and tweezers are used to move solder and hot metal. Solder won’t melt onto tungsten and titanium picks. Tweezers come in two general groups: locking and non-locking. Non-locking tweezers are easier to use for picking up small things, like jump rings. Cross-locking tweezers are great for holding metals during soldering. Upgrade to tweezers with fiberboard handles that protect your fingers from the heat.

Cleaning your soldering tools
Clean your solder board with a damp towel after it’s cooled. Don’t use any chemical cleaners. Honeycomb, steel mesh, and solder boards can be cleaned in a utility sink or bucket by pouring boiling hot water over them to dissolve any baked-on flux. Charcoal and firebrick can be sanded with 60-grit sandpaper. Rinse unheated flux from your tools with water. Remove solder from your pick and tweezers with an inexpensive file. Remove hardened flux by filing or pickling the tips of your pick or tweezers in citric pickle for 20 seconds. Rinse and wipe with a towel.
Setting Up a Studio

Working at home
My students ask me all the time about setting up a studio. Most of us learn jewelry in a classroom, where the metalsmithing department is full of benches, tools, and polishing and casting equipment. Translating that big space into your own studio is overwhelming, but the truth is that a jewelry studio can be as small as one table or a bench.

Now, the words “home” and “studio” may not seem like a reasonable combination, especially when considering using jewelry tools, torches, flex shafts, and such. The topic brings up common questions, like: Is it safe? Where should I put my studio? Can I solder at home? The answers are yes, almost anywhere, and absolutely. I’ve worked in goldsmith shops and lots of studios. They were parts of retail shops, home studios, or office spaces. Floors ranged from wood to carpeting—not your first choices in fire safety. Bench tops were made of wood; walls were normal drywall. And yet, we never had a fire. Why? Because we practiced commonsense safety rules.

Later, when I became an independent jeweler, I took what I learned about workplace safety to my home, where my studios were spare bedrooms, half of a room, a shed in the yard, and even a tiny space outside of my bathroom! That space contained my bench, a casting machine, polishing motor, kiln, and everything else I used to solder, fabricate, and cast jewelry. With a bit of organization, your studio can start with just a bench or sturdy table. And once it’s set up, you can make jewelry anytime you want—as long as you don’t wake up the neighbors!

Set up for safety
When soldering, your number-one concern is safety. Sawing, filing, and even polishing with the clean bits I recommend are benign operations when compared to flames and red-hot metal. With a few simple precautions, you can solder safely at home. For more tips, read Safety first, p. 19.

Protect your table
Heat will eventually pass through a solder board and burn an unprotected table. Work on a flameproof table or protect the table you have with something fireproof. Not everyone has a steel table. Most benches and tables are made of wood. Put something under your board, like a 12” (30.5cm) square ceramic floor tile. Keep the solder area clear of anything flammable, such as paper or plastic.

The next level of protection is to cover the tabletop with concrete tile backer board, available at hardware stores. Score it with a utility knife and then snap it to size. Want more protection? Set up a torch station with some landscaping bricks. This is a good choice for tank torches, especially if they have large tips with big, hot flames. A station like this can handle soldering, annealing, or even casting ingots. Put a sheet of steel down as a base to catch small parts. The brick wall around the sides helps keep the flame inside the work area.

Keep the flame where it belongs
The first safety rule to learn is to keep the flame where it belongs: in the soldering area. This includes igniting the torch, which some beginners think should take place while pointing the torch in the air, at the table, or onto the bench. Not so. The only surfaces that can safely take the intense heat of any torch are soldering surfaces: solder board, charcoal, and firebricks. Everything else burns: you, your table, drapes, and the carpet.
Here are examples of efficient setups: a bench (above) and a workspace (below right).

Protect your room
Let's face it: Gravity works even in the studio, so eventually something hot will fall on the floor. If you care about your floor, protect it with a remnant carpet or mat. Just confirm that anything hot that falls on your safety mat is quenched and doesn’t smolder. If you set up to solder less than 3 ft. (91.4 cm) from a wall, protect it with a sheet of concrete tile backer board.

Where to set up your studio
The best place to set up your studio is in an open space that has some natural ventilation, like near a window. Don’t set up in a confined space, like a walk-in closet. Although this book emphasizes safer tools and chemicals, some fumes can affect your health if you solder full time for years. Solders contain zinc, and when they flow, a little is released as gas. Some flux contains fluorides, which also create fumes. Non-fluoride fluxes are a healthier alternative. Keep your face back from the solder area; hovering over the board is a one-way ticket up your nose for heat and fumes.

A simple way to increase ventilation is to work near a fan. The fan should blow air away from your solder area. Small bench-top fans with filters for fumes are also available. You can make a low-budget ventilation system with ducting from the hardware store and a window fan, or install a kitchen exhaust hood. The ducting sends any fumes out the window. Lightweight respirators and dust masks rated for minor fumes from soldering are available from jewelry suppliers.

Set up your studio near a water faucet to make it easy to clean and refill quench bowls and pickle pots. The best choice is a utility sink that is not shared with food or dishes. When my studio was in a small outbuilding in our yard, I improvised a sink from a drink cooler with a spout, and used a big bowl alongside it. Put the pickle pot near your sink or on the bench with a tray to catch spills.

Good lighting can make a big difference in your studio. Natural light is best, but it’s easy to add a good lamp to your work area. Daylight matching bulbs are good for reading detail and color. One drawback to too much light is that it’s difficult to see the first stages of heat on metal, as it glows a light pink, especially on silver. Dim the light or use a shade. A soldering station with bricks can have another steel sheet across the top for a hood, providing shadow while you solder or anneal.

Jewelry bench vs. a kitchen table
Wherever you work, it should help you make jewelry, not make it harder. One or two sturdy tables can make a perfectly usable work area, or you can buy a jewelry bench. Whatever you choose, it should be adaptable to the tools used for jewelry, ergonomic, and easy to organize. See my sample layout below for one arrangement idea.

It’s fairly easy to improvise a bench. One of my benches was made with a tabletop set on two drawer units. I recommend solid-wood tops to withstand hammering. Your bench should be heavy or braced against a wall to keep it from walking away when you push against it, such as when you load a saw frame.

Your work area will have to adapt to making jewelry, but the needs are simple: a pin for filing and sawing, a hanger for your flex shaft, a place to solder, and a way to catch precious metal filings. Bench pins can be clamped to the table or screwed in place, usually in the center of the bench for easy access. Hang a flex shaft from a hanger above your dominant hand. Tuck the foot pedal under the table, within easy reach.

Sample Layout

- Sink
- Pickle
- Lower level for hammering
- Bench
- Bench apron for organizing tools
ALL ABOUT FLUX

Flux and solder go together like ham and eggs. You can’t solder without flux. Flux keeps metal clean and helps solder flow. It forms a glaze that protects metal from firescale, which can stop solder from flowing. Metals that contain copper, including copper, brass, nickel, sterling silver, and some alloys of gold, especially need protection with flux. Metals that resist scale, like fine silver and Argentium, require only a minimum of flux at the join. Flux can be grouped into three categories: flux, fire coats, and combinations of both.

Jewelry fluxes are rated for hard soldering or brazing, and they are not the same fluxes used with low-temp solders. That means that they turn clear at 1100°F (593°C) and remain effective up to 1600–1700°F (871–927°C). As flux absorbs firescale, it tends to change color, from clear to green to blue. Blue means that the flux has absorbed a lot of copper scale and it’s starting to break down, a sign of overheating.

Flux
In its most basic form, flux minimizes scale and helps solder flow. Fluxes in this category include paste and self-pickling.

Paste fluxes are mixed with water to a creamy consistency and are easy to apply with a brush. Common paste flux brands include Handy, Otto, and Grifflux. Paste flux is water and borax, and can include other chemicals, such as fluorides. Fluorides can be inhaled during soldering and are harmful over long-term exposure (fluoride-free fluxes are available). Paste flux won’t stop firescale, but it will minimize it if you coat the entire piece.

Self-pickling flux is liquid and can be applied with a brush or from a squeezable bottle with a needle spout. Self-pickling flux is applied with heat. After dripping it on, heat with the torch to dry it. Repeat until it has an even coat of flux. You have to be quick with the flame to catch the liquid flux before it just flows away! Self-pickling flux works best on just the join.

Fire coat
A fire coat is a firescale retardant. It acts as a strong barrier to stop scale, but it doesn’t have the qualities of a flux that would be used on the join for the soldering itself. Fire coats are applied first, and then flux is applied to the join. An easy fire coat is made of a 50/50 mix of boric acid and denatured alcohol. Store the solution in a small glass jar with a tight lid to prevent evaporation. Dip the clean metal and stir it around for an even coat. Place it on the solder surface and ignite it with the torch. It will burn with a green flame and leave a flat coat of borax. If the jar catches on fire, put the lid on to snuff out the flame. Store it at a safe distance away from the torch.

Other fire coats include Stop-Ox and Prips flux, both of which are sprayed onto warm metal (see Using spray flux, right). Available in a ready-to-use mix, these two formulas tend to be more effective than boric acid and alcohol at stopping firescale and are nonflammable.

Flux and fire coat
What could be better than something that both stops firescale and works as a flux? Well, not much when it comes to soldering! Some of my favorite flux hybrids include Cupronil, Firescoff, and Magic Boric Soldering Dip. Cupronil and Firescoff are spray-on fluxes. Both are great at stopping firescale, but Firescoff costs about four times as much as your average flux. It does a good job of stopping scale, and can be removed with just warm water after soldering, but spraying uses a lot of flux, and at that price it’s a bit hard to swallow. Cupronil is almost as effective and costs a lot less. Magic Boric Soldering Dip is a nonalcohol-based flux that doesn’t have to be ignited or sprayed. Just dip and solder.

Using spray flux
Spray flux has to be applied with the torch. The heat evaporates the water at 212°F (100°C), so it takes only a little heat to do it. Spray it on and heat the metal until it has a dry, flat, white coat of flux. The flux doesn’t need to be as thick or lumpy as paste flux. Spritz any missing areas and dry with the torch. When one side is complete, use tweezers to turn it and coat the rest. If you see the flux turn clear, or if colors like yellow, red, cobalt, or black appear on the metal, it’s too hot and you haven’t used enough flux.

Spraying flux wets the solder board and surrounding area, and they may get sticky; excess flux can pool on solder boards and charcoal, making it hard to get the flux to dry on the metal. It’s best to use spray flux over porous blocks, like honeycomb or firebrick. A couple of firebricks, propped up around the solder board, make good shields to contain overspray. Dry any extra flux with a towel immediately after soldering and cooling.

Spray bottles clog easily, usually during application, so clean them before the flux dries in the nozzle. Here’s an excellent trick for a clog-free sprayer: turn the bottle upside down so that the tube is above the liquid. Spray repeatedly into a lined trash can until the nozzle is empty. Clean the nozzle and store it upside down.
A little bit of solder can flow a long way. I’ve seen 1mm chips flow up to 1/2 (12mm) along a seam when the join is good enough. Even that size can leave extra solder to clean up. It’s hard to cut a chip any smaller, but chips can be split with a pick while they’re molten: Cut and flux a 1mm chip of medium solder on the solder board [A]. Balance the tip of your pick on top, with just a little pressure. Heat it up, and when it becomes molten, press the pick down, separating it into two pieces [B]. Remove the heat and hold the pick in place so the halves don’t slip back together.

Balancing heat to draw solder
When solder fails to flow into the join, two common reasons are that it wasn’t touching the join or the heat was unbalanced. If the solder is away from the join, it will flow onto the metal where it’s touching. If the heat is uneven, it will flow toward the side that reaches solder temperature first. As you learn how to aim the flame, practice adjusting its direction to draw the solder in the direction you want it to flow.

Jewelry metals such as silver, gold, and copper are very good at conducting heat. Heating just the join usually fails because the rest of the metal is drawing the heat away. Instead, heat the entire piece evenly, looking for signs of heat, like the condition of the flux and any visible glow in the metal. Flux turns clear at 1100°F (593°C), just a few hundred degrees below the temperature at which solder flows. Look for the flux to clear on the entire piece before heating the join. Solder will flow between light red and bright red heat (see Solder comparison chart, p. 21). Look for even color on both sides of the join.

Sometimes the join is between different size parts, like soldering a small jump ring to the back of a bigger charm. Heating directly on the join will bring the ring up to temperature first, and the solder will flow onto it, but not into the join. The ring will fall off in the water or pickle. The temperature has to be balanced between the two by mostly heating the larger charm and staying away from the small ring until the very end, when the solder is about to flow.

Inspect your joins with a loupe
How do you know if the solder worked? Well, if the join doesn’t open or the pieces don’t fall apart, then that’s a good sign. But is the join complete, or is it just tacked together? A weak join can open later. Use a 10x magnification jewelers loupe to inspect it. Hold the loupe against your eye or glasses. Bring the join up close, about an inch away from the lens, until it comes into focus [A]. This microscopic view will reveal any pits, gaps or a beautiful join in a way that is almost impossible to see with the naked eye alone [inset].
FREEFORM PRONGS

Create settings for metal stampings, beads, unusual stones, and river rocks with a simple framework of wire prongs. The basic concept is to create a simple frame or base that fits within the outline of your piece to set. Solder on wire prongs to later bend over the edges, capturing it against the base.

LEVEL
Beginner

TECHNIQUES
Soldering wire
Designing a custom prong setting
Setting prongs

MATERIALS
- 4mm ID 18-gauge sterling silver, copper, or brass jump ring
- 12” (30.5cm) 18- or 16-gauge sterling silver, copper, or brass round wire, dead soft
- Easy, medium, or hard silver solder wire
- Something to set

TORCH
Micro butane torch, maximum flame, or small torch with #5 tip, medium flame

FLUX
Paste flux
Sketch the setting
Draw an outline around your piece to set (in my case, it was a metal stamping). Be sure to outline any openings too. Sketch ideas for the frame and prongs. In this example, the frame extends to create four prongs [A]. Look for good spots to place the prongs, like in the notches on the edge of this stamping. To match my stamping, I made the frame and prongs out of copper (the patina I added later hid the prongs well). Using a contrasting metal, like sterling silver, is another option that would have accented my setting. The ends of the prongs can be varied: flattened headpins, forged wedges, or straight wire [B].

How long should the prongs be?
The prongs need to be able to bend over the edges of your piece, with enough wire left over to hold your piece securely against the base. Too long, and they can obscure the beauty of what you’re setting. To measure for the prongs, use something flexible and cheap, like leftover twist-ties from bread packaging or strips of paper. Bend the scrap around the edge of the piece like a prong, mark where it would meet the frame underneath, and then measure that against the ruler. In this example, the prongs extend 5mm past the point where they stretch away from the outline of the frame. Except for flattened headpin-style prongs, prongs can be trimmed to size during setting, so make them a little longer than needed.

Make the frame and prongs
I cut the long wires from 18-gauge copper wire, 2mm shorter than the drawing. Use your fingers or flat/half-round forming pliers to form the wires to match your sketch [C]. I forged the ends into wedges with the polished flat face of a goldsmith’s hammer. As they were forged, I compared them with the drawing until they matched [D]. Don’t thin the ends too much; they need to be thick enough to make strong prongs. I flush-cut the rest of the parts, including the arch and the straight pieces, from the same copper wire and filed the ends with a flat needle file to create tight-fitting joins and positioned the jump ring at the top [E].

Solder the parts together
It’s easiest to solder one piece at a time. Mark with permanent marker where you want to attach the first piece to the long prongs. Follow the six simple steps to soldering: Flux the pieces completely and arrange them on a honeycomb board for a flat, clean surface. Cut and flux several 1mm chips of silver solder (easy, medium, or hard). Make sure the join is flush. Heat the entire piece until the flux turns clear. Simmer the heat as you place a ball of solder on the join. Continue heating to solder it together. Repeat for the other end [F].

Allow the piece to air cool to avoid cracking off any flux in the water, then mark it again for the next part. Add a light coat of flux on the pieces
DOUBLE-SIDED BEZEL

Not every stone has a flat back like a cabochon. I bet you have many interesting objects you want to bezel-set—things like river rocks, beach glass, and tumbled pottery. This variation on a traditional setting has a bezel that wraps just around the edge of the stone, showing off both sides of the piece. The setting has to fit snugly around the stone, and you must have enough bezel to push down around both sides for a secure fit.

LEVEL
Beginner

TECHNIQUES
Making a backless bezel setting around just the edge of the stone
Soldering on a bail after setting the stone

MATERIALS
- 12" (30.5cm) 28-gauge fine-silver plain bezel strip, ¼–⅛" (3–6mm) (varies with size of item to set)
- 4mm ID 18-gauge sterling jump ring
- 6x25mm (¼ x1") 22-gauge sterling silver sheet
- Easy and hard silver solder
- Two-part clear epoxy
- Beach glass, river rock, or similar item to set

TORCH
Micro-butane torch, maximum flame, or small torch with #5 tip, medium flame

FLUX
Paste flux
Form and solder the bezel
For this project, I’m setting a 2” (51mm) long oval bead that is rounded on both sides. The bezel wire to be wide enough to leave enough bezel to burnish on both sides [A]. Be sure the bezel will cover the thickest edges of the stone with room for crimping. Wrap the bezel wire around the stone and scribe a line where the ends overlap. After soldering, the bezel should fit snugly around the stone without falling off. My trick is to trim the bezel up to 1mm short on purpose [B]. After soldering you can stretch the bezel by passing the stone through it repeatedly until it’s the perfect fit.

Close the join with a 1mm flat chip of hard solder (see Looking Sharp Bezel project, p. 51). Pickle for 5 minutes.

Check the fit
This is a good time to move the join to where you want it to be hidden by the jump ring and bail. Just reposition the join and use your fingers to match the general shape. Placing the stone inside will reshape it again. Ideally, with a few passes of the stone through the bezel, it should stretch to fit tight. If the bezel is too loose, cut it open at the join and repeat the first step to adjust the fit. If it’s too tight, stretch it on a ring mandrel. For large stones like this one, you may need a large-size ring mandrel (sizes 16–24) or similar to fit the bezel.

Solder on a jump ring
Center the bezel along the girdle of the stone and mark where to solder the jump ring with a permanent marker [C]. Soldering the ring on the bezel join will help to disguise the line. The ring has to be horizontal, in the same plane as the bezel. If the ring is soldered on too close to the edge of the bezel, or vertical across the bezel, the solder will harden it, and then it can’t be set.

Close the jump ring with a 1mm chip of hard solder. File a flat spot at the join. Flux the join on the bezel and use a third hand to hold the ring in place. Elevating the bezel on a charcoal block will make it easier to line it up. Warm the flux between the ring and bezel first until it clears. Remove the flame, and while you scoop up the solder, the flux will harden, holding the two parts together. Using a minimum of heat, place the 1mm ball of easy solder on the join [D]. Heating directly on the join can cause the solder to flow first to the jump ring. Pickle for 5 minutes.

Set the bezel
Setting the bezel on both sides of a stone can be slippery business, since there is no base to support the stone. I recommend gluing it around the stone first to tack it in place and keep it steady during setting. The bezel will still be

What can you set in a double-sided bezel?
This technique is made for setting pieces that are rounded on both sides, which will give you that all-important taper to set the bezel against. I don’t recommend using this method to set normal cabochons, because the flat side requires pushing the bezel over 90 degrees. Sharp angles can leave hard wrinkles that can’t be set. Instead, set them with a traditional bezel, but make an open back by piercing out the inside or adding a soldered ledge.

For a snug-fitting double bezel, trim the bezel wire 1mm short and later pass the stone through repeatedly until the bezel is the perfect fit.

has to be horizontal, in the same plane as the bezel. If the ring is soldered on too close to the edge of the bezel, or vertical across the bezel, the solder will harden it, and then it can’t be set.

Close the jump ring with a 1mm chip of hard solder. File a flat spot at the join. Flux the join on the bezel and use a third hand to hold the ring in place. Elevating the bezel on a charcoal block will make it easier to line it up. Warm the flux between the ring and bezel first until it clears. Remove the flame, and while you scoop up the solder, the flux will harden, holding the two parts together. Using a minimum of heat, place the 1mm ball of easy solder on the join. Pickle for 5 minutes.

Set the bezel
Setting the bezel on both sides of a stone can be slippery business, since there is no base to support the stone. I recommend gluing it around the stone first to tack it in place and keep it steady during setting. The bezel will still be

For a snug-fitting double bezel, trim the bezel wire 1mm short and later pass the stone through repeatedly until the bezel is the perfect fit.

has to be horizontal, in the same plane as the bezel. If the ring is soldered on too close to the edge of the bezel, or vertical across the bezel, the solder will harden it, and then it can’t be set.
prong with a rawhide mallet and steel block. Mark the locations for the prongs with a permanent marker [G]. The prongs should be in opposing pairs as much as possible.

Place the unfluxed pedestal on flat, soft charcoal and press several prongs in place with pliers, embedding them almost halfway into the charcoal [H]. The prongs should be flush against the pedestal, holding it in place, and be straight and perpendicular. Since the marker will fade during soldering, scribe clear lines in the charcoal for the locations of the remaining prongs for later.

Leave the parts in place and apply Cupronil. The base and embedded wires will be kept clean by the charcoal because they can’t move during soldering. Solder each prong in place with one or two 1mm balls of hard silver solder, placed either on the top or lower corners [I]. Inspect the joins to make sure they’re complete on both sides.

Let the piece air cool and then embed the remaining prongs. Apply more Cupronil, and solder the prongs. While the piece is still warm, insert your tweezers and pick under the pedestal to gently pry it up a little at a time. Try not to warp the soft metal. Pickle for 10 minutes.

Trim the prongs flush with the bottom of the pedestal with flush cutters. Mark each prong at 3mm (1/8") above the top edge of the stone. Trim with flush cutters [J]. It’s better to make the prongs slightly longer, because they can be trimmed during setting. But if they’re too stubby, they’re much harder to push down. For this setting, I used a file to bevel the tip of each prong at 45 degrees.

Make the bail

The tubing is bent with nylon jaw bracelet-forming pliers [K]. Measure 1” (25.5mm) across the curve and saw it to size with a #2 blade. Hold the tubing with a ring clamp, and support it on the bench pin to keep it from collapsing during sawing. Saw across the tube, like a hacksaw. If the blade gets stuck, use more wax and cut on the smooth forward stroke until it saws easily again [L]. File and sand the ends with sticks through 600-grit.

For a little added detail, I added a coil of jump rings to the bail. Coil some 18-gauge round sterling silver wire around the same diameter tubing, making about six rings. Clamp the tube against the bench pin and hold the coil with your fingers or a smaller clamp. Slide it to the end of the tube and saw at a 45-degree angle with a 2/0 blade [M]. As you saw through the rings, they will drop into your sweeps drawer with parallel cut joins.

Close the rings with hard solder. Cutting the join makes them a little bit too small, but they can be stretched. Even slender bezel mandrels are usually too big to fit inside these rings, but the jaws of roundnose pliers are like tiny mandrels. Tap the ring down one of the jaws, stretching it with a nylon or rawhide mallet. It only takes a little stretching, so check the fit often until the ring fits tight. Slide all the rings to the center and align all the joins on the side that will be soldered to the setting. If the rings are too loose, they can move out of center and are difficult to resolder.

Apply Cupronil and solder between each ring with 1mm balls of hard solder [N]. Pickle for 10 minutes. Make sure the solder flowed through to the copper and that none of the rings still move. Hold the bail with a ring clamp and make a flat spot along the rings with #2 flat file [O]. Flux all sides of the bail and setting with Cupronil. The bail is thick, so to center the flat spot against the pedestal, press it down into the soft charcoal. If it’s hard to press, dig a little bit of the charcoal out and try again. Reapply Cupronil to cover any bare areas. Place a 2mm
Make this ring from scraps of sterling silver sheet. I’m demonstrating two styles of fusing in this project: textured and nontextured. The easiest way to fuse is to allow the metals to go a little beyond fusion, melting them together and creating reticulated textures. Once you’ve observed the color and gloss of the surface as it fuses, it’s easier to recognize the first stages and pull away, preserving the original texture of the metal.

Use this technique to recycle scrap into big, textured sheets. With a melting tip on a small torch, you can make bracelet-size blanks!
The blank for this ring can be made from scraps or strips of sheet of the same gauge. Since the ring gets harder to form after fusing, it’s better to use thin gauges, like 22 or 24.

**Fuse a textured blank**

For a textured ring, cut some scrap 24-gauge sterling sheet into similar size pieces. They don’t have to be square, but the closer they are in width, the easier it will be to lay them out like a ring blank for fusing. If you’re starting with a bigger piece of sheet, set a pair of dividers to 5–8mm and scribe a parallel guide line [A]. Since the pieces are going to be overlapped for fusing, the thickness of the metal for the Ring Blank Size by Metal Gauge chart (p. 109) will be twice the gauge of the sheet.

For example, this ring uses 24-gauge sterling sheet, which is .5mm thick. Two layers would be 1mm thick, so I used the 18-gauge column on the chart for my size. Since the blank will be made from lots of little pieces, draw a line as long as the ring blank size with a permanent marker on the cold honeycomb block, adding about 5mm to allow for shrinkage during fusing. Flux each piece on all sides before fusing [B]. Use paste flux; the wet flux will help hold the pieces together during layout. Line them up along the guideline, overlapping like a line of cards. If they overlap in the same way, by at least 1mm, it’s easier to make into a ring later. Butt joins or uneven connections are harder to fuse and break easily.

Fusion happens near the melting point of the metal. The metal will glow a bright red or light orange and the surface will look glossy and wet. Start by heating the entire blank, letting the flux settle and liquify into a clear glaze. Use the pick to realign any parts that moved. Focus the flame near one end of the blank, where the first pieces overlap. When the join is glossy on both sides at the same time, the metal has fused [C]. Move down the line, fusing each piece to the next. If the metal is overheated, it can shrink and melt. But a little extra heat can create more texture. After fusing the pieces together, heat them again, letting the surface texture before pulling the heat quickly away. Quench and check the joins. Pickle for 20 minutes, since the piece will be heavily scaled from the high temperature.

**Fuse a nontextured blank**

For a nontextured ring blank, use shears to cut two to four 3mm wide strips of 24-gauge sterling silver sheet, referencing the chart on p. 109. The strips will be overlapped to make the width of the band. Use the column for twice the thickness of 24-gauge, which is 18-gauge, to find the ring blank size, and add 5mm to allow for shrinkage on the ends. Texture the strips with

---

**Can you really fuse sterling?**

Yes! Many metals can be fused. Fine silver, which contains no copper, and Argentium sterling are predisposed to fuse easily. Other metals, like sterling, copper, and brass, need to be protected with flux during fusion, or firescale can prevent the metal from bonding. Since they are a little harder to fuse, there is more chance that the metal will begin to melt and reticulate into bonus textures.