Bench Trick Principles

What is a bench trick? A shortcut? A faster way of doing something? A better method? A tool used for one purpose converted to another? A tool or technique that saves time, effort, thinking and work? Bench tricks are keys to understanding Process, signifiers that someone has understood the process occurring and they are therefore useful to understanding the nature of metal and metalworking. Think process and look for patterns around you when working to invent new ones yourself. These are some guiding principles for coming up with new tricks, new ways of doing things.

1. Use contrast and comparison to understand a system faster and deeper.
2. See the patterns, if something looks like something else there is probably a relationship. (A burr is a file wrapped around a ball etc). Shift mental categories, categorize objects you look at in new ways.

1. Describe the problem as clearly as you can, ie good ventilation='move air fast'. Then you can look for solutions that fit the problem. Describe the Process occurring. What is happening?
2. When you have an accident, see if it is a solution for something else, for instance getting copper plating on a piece in the pickle with iron tweezers-you can use this to plate the recesses in a gold ring and then use liver of sulfur to darken it.
3. Look for someone who uses so much of something they do not value it for the best deals. (Bic® lighter wheel, vibratory tumbler in gun shop, Sodium Bisulfate (Sparex® used as swimming pool acid, the Scotch brite centers of floor polishers etc.).
4. What is the action going on? Is there a smarter way of using this? (chuck key in handle, self-mounting flex shaft tools, thumb on cogs to close flex shaft chuck).
5. Combinations. Can you combine elements of a job into one tool? (chuck key in handle with screwdriver shaped end, needle file with end shaped as a graver for scoring)
6. Look for industrial examples of what you are after, if you keep seeing the same solutions there is a reason for it (efficient air movement for a given motor size=squirrel cage blower like on a hair dryer and as small tube, like on a vacuum.
7. When building things use relative fitting, where each part is built relative to what you have constructed so far
8. Look at other industries and fields for how they solve problems you deal with.
9. Can you organize the space and workplace better to speed the work?
10. If you are constructing something and you want parts to be related, make them from the same unit (that you then cut apart).
11. Simplify the procedure. Boil it down, distill it, reduce the steps, combine things. (like using ZAM or Fabulustre instead of two polishing steps like tripoli and rouge)

Channel setting - Set 'Em Straight

Over the past decade, channel setting has grown in popularity. Setting small diamonds, rubies, sapphires, and even emeralds into channels has become commonplace in most shops. Hardly a week goes by without some form of repair being preformed on a channel set piece. The following tips will hopefully make this work a little easier.

When channel setting it is of utmost importance to cut a precise seat. If the stone fits loosely in the seat it will be difficult to tighten and problems will develop during the setting process.

When channel setting it is best to intentionally cut the seat too small. Then, gradually enlarge the seat to fit the stone. This will help keep you from over cutting too large a seat.

A closed back channel is most secure. If an open back channel is used, make certain there are support bars between the channel walls or support circles under the stones. Without these the walls of an open backed channel can spread apart over time causing the stones to come loose or fall out.

Before setting, color the inside of the channel with a felt tip marker. With the dark color as a background it will be easier to see the diamonds and to keep their spacing even. When finished setting dip in alcohol to remove the ink.

When channel setting file the tops of the channel wall at a 30-degree angle. Then, hammer the channel wall at this angle and the metal will form down and out over the stones.

When channel setting always undercut the same side of the channel on each stone. Alternating the undercut side may cause the stones to set unevenly when finished. Before cutting the seats mark one of the walls of the channel with a felt tip maker. Then you will be certain to always undercut the same side of the channel. This is particularly important if you are interrupted while cutting the seats.

When setting a straight row channel set band, place the ring on a ring mandrel and tap the sidewall over the stones with a hammer handpiece on your flex-shaft. Rest the mandrel on your bench pin and slowly rotate it while hammering the channel edge down. This will help keep the channel wall even and smooth. Placing cellophane tape over the stones will hold them in place while hammering.

When channel setting square stones, a tapered square hole must be cut to accommodate the pavilion of the stone. This can be accomplished by first using a heart bur held perpendicular to the mounting to cut the four-corners. Then, use a small wheel bur to remove the metal between the corner cuts.

When setting stones into a curved channel undercut the wall on the outside of the curve. Then, secure the stones by hammering or bending the inside channel wall over the stones. Although some mounting designs will not allow you to set in this manner it is more efficient than trying to secure the stones with the metal from the outside wall. Remember, it is always easier to stretch metal than compress it. By hammering the inside curve you are stretching then metal outward over the stones rather than trying to compress the outside curve inward to secure the stones. In addition, pressing in on the stones to tighten them may force the stones together causing them to chip.

When channel setting stones in a channel that is next to, or circles a center crown you have no option but to under cut the channel on the center crown side. Then, carefully hammer the outside wall down to secure the stones.

If a channel is too wide for the stones you are setting tap down on the top of the channel wall without the stones in place. This will spread the metal closing the channel. Then, anneal the mounting to soften the channel wall before setting the stones.

To channel set stones in a solid plate first lay out the stones on the plate. Then cut a seat slightly smaller than the stones into the plate. Next, remove the metal from between the stones with a wheel bur forming the channel in the plate. Polish the inside of the channel and set the stones using normal channel setting procedures.

To tighten stones in a channel set band, use a pair of pliers with one 1/2 round jaw and one flat jaw. Place the 1/2 round jaw on the inside of the ring and squeeze down on the top of the channel with the flat jaw. Using the ? round jaw on the inside will prevent nicking and marring the inside of the ring.

To smooth the channel walls on small channel set stones a roller can be made from an old milligram wheel. Carefully grind away the metal ridges that form the beads, leaving a smooth channel around the outside of the wheel. Then polish to a high shine. Place this modified wheel in its handle and roll it over the top of the channel wall in the same manner you would use to milligram an edge. The result is a smooth edge of metal burnished tight against the stones.

You can use a ring roller designed to enlarge rings to tighten stones in a channel set wedding band. Select a half-round die larger than the width of the band; making certain the die will contact the tops of the channel without hitting the stones. Apply gentle pressure and roll across the entire channel, compressing the metal down tight onto the stones. Then, remove the ring and check the stones. Repeat as necessary. DO NOT Over Tighten The Die Against The Ring. This process will leave the channel smooth and even.

To re-build the top of a worn channel, solder a thin strip of gold matching the color and karat of the jewelry to the top of the channel. Then, file to shape. An easy method to make the small strip for re-building a channel is to roll a piece of round wire through a rolling mill once or twice.

Before re-building a worn channel top, examine the mounting carefully. Often the sides of the channel are just as worn as the top. To only re-build the top will result in an unsatisfactory repair. Rather than soldering a strip to the top, you may need to solder an "L" shaped piece of gold to the channel. Sometimes the only remedy is to replace the channel section or the entire mounting.

Curve Ahead - Using Coils To Bend Tubing

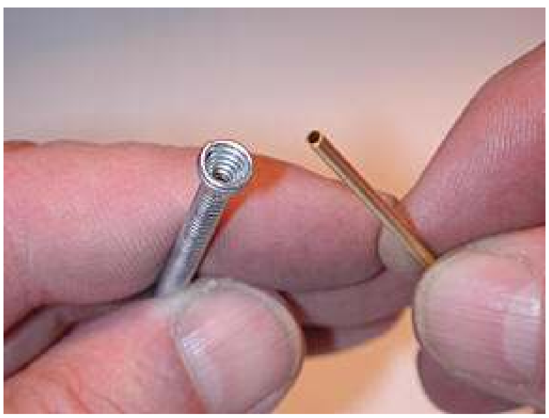
By Jurgen J. Maerz, August 2006

Many tools sold in model/hobby stores can be used for jewelry making. During a recent visit to a hobby shop,

I found these tube bending coils, which model makers use to build models that require bent tubing.

Jewelry makers will find these coils handy when bending tubing for projects.

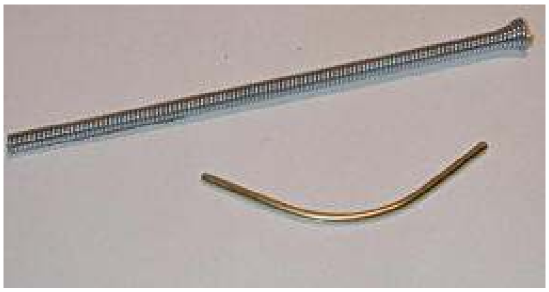
Bending coils are available in different sizes, making it possible to bend tubing without any major distortions.



When selecting a coil, pick one that fits the tube snugly.

Insert the tube into the coil and leave a small amount of the tube sticking out. This will allow you to grab the tube to remove it from the coil after bending.

Gently bend the coil to the desired curve.
As the coil is bent, the tube inside will bend as well.
If the tube fits snugly inside the coil, it will not deform during bending.



Use a pair of pliers to remove the tube from the coil.
It may be necessary to lightly sand the surface of the tube to remove any marks left behind from the bending process.

Tubes can be bent in different directions using these coils.

From the setting bench of "Gemz Diamond Setting" author "Gerry, the Cyber-Setter!"

These are not for the novice!

1. What is one of the causes of a "rippling or jagged" effect around an inside cutting edge in a Gypsy or Flush setting? How can this be avoided? When an edge of a cutting tool (of any shape) glances over or hits a facet it will ride above that face. In turn, it will transfer the difference in angles to the tool and then to the gold. So how can the setter avoid these undesirable results? To keep cutting back is not the answer! What I do in these circumstances is to hold my graver securely and maintain an 1) outward and 2) forward cutting motions. This can be achieved by also putting your finger right near the cutting edge and with this will have a clean result. Do not let any part of the tool touch the facets while cutting the bezel inner frame of the diamond. If you do, you are back to "square one". Try and avoid changing the holding pattern of your hand, let your ring clamp do the turning, keep your cutting hand rigid and don't change your cutting angles. If you are using a Flat #39 or

#40graver, reshape the absolute cutting edge to be thin as possible nearest the diamond. This also will avoid the unnecessary touching of the facets as you are cutting along. Don't lean too far back on the inside cutting angle.

2. What is the correct filing angle to finish off a large claw? If you are using a Triangular file of either #2 or a #4 cut 20 cm in length you will notice that either side has a 45 degree angle built in. Simple? But why at this angle? The effect is that during polishing, the cloth wheel will actually brighten the sides of that claw. If the sides are vertical, no way can this effect be achieved. If you are using a "Pillar" file, you might not be filing at this angle continually. The hand does and can get tired for a few seconds so why not let the filing tool do the work for you? To achieve this filing stance, is to rest your 'finger pad' on the top-flat part of the Triangular file, this will automatically give the angle you so desire. Simple?

3. When drilling holes with a twist drill, I generally use only three sizes #.9mm, 1.0mm, or maybe a 1.1mm, no more and no less! No matter the size of diamond, don't use a 0.8 > mm or less. When you are drilling through the metal, heat builds up rather fast and over-heating takes place. Always use an oil-based lubricant. What causes the breakage? The hot twist drill binds and stops, but the motor still wants to turn. I then decide to activate the motor at a rather slower speed than a setting speed.

4. Do you use a ring clamp when hammering a ring with a bezel If you do, you will most definitely notice that the ring clamp is absorbing much of hitting action. You should, from my experience, attempt to use a ring mandrel. As you are hitting on a solid metal substance, for each direct hit will be non-absorbed and little of the hitting energy will be lost. Try it ..you'll like it!

5. Do you use a saw blade when setting a major sized stone? Don't laugh with this suggestion, I use it all the time. When you are finished make a bearing cut and attempting for push over the large thick claws. You will find only a part of the actual claw making the contact. You shouldn't process in pressing over the claws any more than you have to. You just allow much too much stress in griping the crown facets, hence squeezing or worse breakage! What do you do now? If at all possible bring back that claw just a tad to give more room to start the initial saw blade cut.

Lay your #4/0 saw blade on the "Bezel or Star Facet" and with care draw the cutting blade in between the diamond and the gold and then proceed with this cutting action till the #4/0 blade comes to a stop right at the girdle. This 'stopping' will be at farthest point or at the juncture of the metal where it meets the girdle. When you are using the saw blade try and extend the cut to just beyond the girdles' position. If the stone has a thin girdle I would hate to see the gold squeeze that diamond. Once this line has been drawn, you may apply even pressure with your serrated, non-slipping steel pusher and make most of the gold meet the facets. Now you can proceed with the normal trimming or filing to suit your needs.

6. How do YOU pick up diamonds? When I was learning setting over 40 years ago, my teacher taught me a few methods, one of which I will explain here. Grind up some charcoal from your bench-soldering block or burned wood and mix this composition with Bees Wax. This Bees Wax may be bought at any jewellery tool supplier. Charcoal is used as a substance that prevents sticking the diamonds to the wax, almost as a 'quick release' mechanism. I have four little 'daubs' of this stuff at easy arms reach, if I loose one there is another. For easy holding, I roll this wax on to a used large head bur, so the wax won't slip off while in use.

7. What if the girdle is very thick, so now what? Many times I have seen diamonds with very thick girdles. So thick that there is a space between the bearing- cut and the stone in question. This is not acceptable in any circumstance. Supposing you "the setters" try another method of preparing the 'seats'. I found a method of alleviating this problem, try and use a "bud" bur right at the > groove. Start the grinding and press this slow rotating bur into the gold so the bearing matches the thickness of the stones' girdle. This pre-selection of bud is very important. If the bud bur is too large, again you'll have another "larger and wider" space to contend with. I suggest hand picking each bur that will match the size of the girdle. As each bud bur has a little point, I call this the "leading edge" or "guiding tool". I will then very carefully place the "guide" inside the bearing cut and slowly allow the bud bur to make a wider horizontal cut of that claw. Got it? But how far 'in' would you go? You are only making the bearing cut WIDER, NOT DEEPER. Now that the groove has met your needs, you can actually push the side of the claw right up to the stone and have no space at all. I use this method regularly

8. Checking for security for loose diamonds..! I read in one major monthly jewellery trade magazine that is correct to use a pair of metal tweezers and grip the girdle and rotate the stone duh? How about breaking off the girdle of that stone? I have just one word for you DON'T. My friend who used to be a diamond setter was setting over 1,000 stones one week and delivered his work. The uninitiated "quality control inspector" had no idea about breakage on thinner girdles on "VS-G" diamonds. That person used tweezers on every diamond, and complained that each one was chipped in two places. It was then that 1,000 diamonds were replaced at the companies' expense! If you have to use tweezers, please use the plastic version.

9. How can you break out CZ's from "set in wax" casting? I won't go into how they break, they just do! That is not my topic to discuss at this present time but they do! The question is how to get them out. From many years of experience in this style of unsetting, you must use extra eye care. When you are tackling this stone while still in the confines of the gold, they have a great tendency of exploding. What .exploding? You bet they do, but if you don't wear safety glasses you will be wearing the stones on your cheeks and in your eyes. I will use a ring mandrel to hold the ring. The reason being is that the wooden ring clamp absorbs much of the 'impact of hitting' from the hand held hammer. Not to mention that it frees up one of your hands. Place the ring securely on your mandrel and seek out a broken bur that still has a sharp point. With this end of the bur hold the point just 2 millimeters ABOVE the ring. Now start hitting the stone with your small hammer. After each and subsequent downward hit, great amount of energy is given to that stone. The action is now like a "mini-pile driver"! The resulting impact causes the stone to explode and the need of "picking and groping" for unseen pieces of CZ's in the gold is greatly diminished. For any further removal, I would use a graver and not use a bur, as the bur will be worn down from the CZ of 8.5 Hardness

Fit to be Sized

Before sizing any ring, examine it carefully and compare it to the information on the job envelope. If you see any damage or potential problems that are not marked clearly on the envelope, inform the store manager or sales clerk who took in the job so that they can notify the customer. It is extremely important that you inform them now, before any work is performed, rather than wait until later to inform them.

Measure the thickness and width of the ring shank and record these measurements on the job envelope. Having these measurements may save you from doing a half-shank later if the customer complains that you thinned the shank too much during sizing.

While examining the ring, measure the ring's current size and determine if you need to size it up or down. Divide your sizing jobs into four groups: rings to be sized down, rings to hammer up (1/2 size or less), rings to size up, and wedding bands to stretch. By organizing your ring sizings in this manner and working on all the rings in each group together will increase your productivity.

To begin, anneal all the wedding bands needing stretching or compressing. Die struck seamless bands are work hardened during the manufacturing process. This hardened gold is difficult to stretch or compress. Annealing the band before you begin will reduce the amount of physical force that you will need to apply to accomplish the task. A ring stretcher is not designed to double as a nautilus machine. In addition, if the metal is not annealed the stretching or compressing process may cause the metal to crack.

While the wedding bands are in the pickle, take all the rings to be sized down together. Then one at a time mark the back of the shank for the amount of gold to be removed from each shank. The difference in one size is 1/10 of an inch or 2.54 millimeters. For simplicity 2.5 millimeters is used in actual practice. If a ring is to be sized up or down one size 2.5 mm is either added or removed from the shank.

The curvature of rings creates problems when down sizing a substantial amount. Your measurement on a flat ruler cannot be accurately transferred to the curved surface of the ring shank. As the distance increases the inaccuracy multiplies. To compensate, when sizing down 3 or more sizes cut the back of the shank at one side of center. Then straighten the back of the shank. Mark the amount to remove on this straightened portion. Cut off the excess amount with your saw and re-shape the ring closing the gap.

When sizing purposely make the ring 1/8 size too small. You can later hammer across the solder joint until the ring reaches the correct size. This will help you to be more accurate in your sizing (if you are a little too large you will need to resize). In addition, this will work-harden the sizing area making a stronger joint, and finishing and polishing will be easier.

When all the rings are marked, then pick up your saw. Saw through all the rings without putting down the saw.

When finished sawing, pick up your ring bending pliers and bend all the shanks closed. Make sure there is no visible gap; hold the ring up to a light to see that there is a precise fit. If there is a gap, true the seam with an equaling needle file. Grind a knife-edge on the end of the file. Then it will be easier to insert it into the seam. Another method to true a seam before soldering is to saw through the seam with a saw blade, trimming a little metal from each side of the seam.

Next, group the rings on your bench as to metal content and color, 14k yellow together, 14k white together, 18k yellow, etc. Then place enough solder on your soldering pad to solder all of the rings closed. Make a small pile of solder for each metal type.

Then begin the soldering process. Hold the torch in one hand and with the other hand pick up a ring with locking tweezers, and dip the ring in boric acid and alcohol. Set the ring down on your soldering pad and light it with your torch. Arrange several rings across your soldering pad in this manner. Then, with the solder pick in your free hand, pick up the solder and solder the ring shanks closed.

Place the rings aside on your soldering pad to cool, and pick up another group of rings as before. As the alcohol is burning off, pick up the solder with a pick, and solder the shanks of this group. Lay them aside to cool, and move on to the next group.

With this process, you can solder all the rings closed without ever placing the torch down. You light the torch once and do not have to re-light it for each separate job. When you are finished soldering all the rings, turn your torch off.

While the down sizings are cooling, remove the wedding bands from the pickle, and rinse and dry them off. Place down sizings in the pickle and begin stretching the wedding bands.

To stretch a wedding band that is larger than your ring stretcher mandrel, slip a copper sleeve over the mandrel and place the ring over the sleeve. The mandrel will press out on the copper sleeve, which in turn will press out on the wedding band stretching it to a larger size. To make the sleeve purchase a 3/4 inch copper pipe coupling from a plumbing supply store. Then, using a hacksaw cut slits down the length of the coupling. Make four or six cuts to line up with the slits on the mandrel on your stretcher. Make all the cuts from the same end and cut 3/4 of the length of the coupling. This will allow it to expand easier and will make it easier to remove the ring when finished.

Next begin work on the up sizings. Cut each shank through with the saw. Then open the shanks, either with pliers or by sliding it down on the ring mandrel. Then cut pieces to add to the shanks from your gold stock and lay on your bench next to each ring. Lay out across your bench each ring with the corresponding piece to add to the shank.

If you do not have the correct size of metal stock available for up sizing, reduce the size of stock with a rolling mill before marking the amount needed. This will eliminate waste and will save time over filing away the excess. Ideally the stock should be 1 tenth of a millimeter and no more than 2 tenths wider and thicker than the shank.

With two pairs of locking tweezers, hold the ring in one pair of tweezers, the piece to be added in the other. Solder the piece you are adding to one side of the ring and lay it aside to cool. When each ring is soldered on one side turn your torch off. Using your pliers, close the gap on each ring making sure you have a tight fit. Then solder the rings closed using the same manner that you used sizing rings down.

When they are all soldered, place them in the pickle and take out the rings you sized down. Rinse and dry them off and begin to file with your half-round ring file. File each ring on the inside so that it is smooth. File off excess solder only on the inside of the rings at this time.

Then lay the file down and pick up the ring mandrel and mallet. Taking one ring at a time, slide it onto the ring mandrel and straighten it out; check to make certain you have reached the right size.

When rounding out the rings from sizing use a double face mallet - brass on one side and nylon on the other. Use the nylon side to straighten out the ring shank. Like a rawhide mallet, it will bend the shank but not stretch it. Then if the ring is a little too small turn the hammer around in your hand and tap up with the brass side. This saves time from putting down the rawhide mallet and picking up a steel hammer then going back to the rawhide mallet.

After you have straightened each ring, pick up your file again. File the sides and back of the shank, removing the excess solder and hammer marks on the outside of all the rings.

You should always take great care when filing that you do not remove too much metal. It is impossible to replace the metal removed. When filing to remove excess solder, often the mistake is made of filing too much resulting in thinning the metal. Stop filing when the outline of the solder is just barely visible. Sanding to prepare the metal for polishing will remove the remaining solder. If you continue to file until all evidence of the solder is removed the sanded metal will be thinned more than necessary.

When you have finished filing each ring, take the rings that you sized up out of the pickle rinse and dry them off. Add any rings that are to be sized up 1/2 size or less. They can be hammered up along with straightening the rest of the up sizings.

Repeat the filing / straightening process. File the inside of the rings first, then straighten each ring and then file the outsides of the rings. When all ringsneeding to be sized are filed, sand all of the shanks, polish, and place them in the cleaner.

If you only have a few rings to size, you can size the down sizings and up sizings together. Solder the piece on one side of the up sizings. While they cool, solder the down sizings. Then bend and solder the second side of the up sizes.

Sizing heavy gent's rings creates additional problems because of the metal thickness in the shank. Straightening the ring on a ring mandrel can be particularly challenging. Using a Lead-filled weighted rawhide mallet or a dead-blow mallet will provide the extra force needed to make this job easier. In addition, one of these mallets can be used to force the ring down on a ring mandrel when opening a shank up after sawing through the shank.

Heavy duty "Bow Pliers" available from most jewelry tool suppliers are indispensable in closing the gap in down sizing. Be certain to cover the jaws with leather or copper to avoid marring the outside of the ring. Sometimes it is necessary to use a rawhide mallet to hammer the shank into position. A bench mounted ring shank bender is a welcome asset in shaping pieces for up sizing and half-shanks.

When soldering heavy gents rings avoid the temptation to use a pick to smear the solder around the joint. This will result in a weak solder joint, known as a cold solder joint, as the solder flowed only at the surface and not through the seam. Make certain you have a tight fitting seam and apply solder to only one side of the joint. Then, with the heat of your torch pull the solder through the seam to the other side.

By following these procedures your shop will become more productive, and you will be Fit To Be Sized.

Get a Grip - Tips for using tweezers at the bench

Tweezers are a constant in a jeweler's life, particularly in these safety conscious times. Tweezer use can help reduce your contact with nasty dermatitis causing chemicals. For example, when used for handling objects in solutions such as pickle, soap, and cleansers, tweezers limit potential damage to your skin.

Tweezers are also one of the more easily adaptable tools at the bench. For example, they can be altered to hold together stone setting components, or heads and rings, while soldering. Here are a few of my favorite tweezers and modifications:

Normal hand-held tweezers for soldering are most useful if they consist of 8 inches of good, solid metal. My favorite pair are stainless steel bench tweezers from Germany. It might be noted that the Indian style soldering tweezeris excellent; it has a heavy, thick end to grip during use so your fingers don't get hot.

One of my favorite tweezer tricks is done using a wide-jawed self-locking tweezer-the type that is normally chrome plated. You can alter this tool to pick up earring posts from a flat surface at a 90o angle. There is no skill required to snap the posts into place in the tweezer jaws, making production soldering of earrings much faster and more efficient.

To create this tool, open the ends of the tweezers and file a groove into each side of the jaw with a triangular needle file. Start close to the end of the tweezer. The grooves must be in the same location on both sides so they line up with each other. Also, the grooves should not be too deep-no more than 0.5 mm, and even that is probably a bit too deep.

Once the grooves are made, file the outside of the jaws. Form a beveled front end that slopes down toward the very top edge of the grooves. With the ends filed at such an angle, they can smoothly grasp an earring post lying on a flat surface and guide it into the groove in the tweezer ends. You can then use the post to pick up a solder chip, melt the solder onto the post, and solder it to the earring back.

Numerous grooves, slots, and holes can be made in tweezers to hold various assemblies together while soldering. If the tweezers are made of titanium, or if titanium ends are attached to self-locking tweezers, they cannot be soldered onto the piece you are working on, and thus make a superb soldering jig. (Note: If you are working with platinum, use tungsten welding rods to make tweezer ends, as other metals can contaminate platinum at high temperatures.)

To use these types of tweezers as soldering jigs, position them on a large, strong magnet on your soldering bench: Just clamp the backs of the tweezers to the magnet at a useful angle.

I found the perfect magnet for this purpose inside an old stereo speaker unit. Just drill out the mounting spots attaching the magnet to the frame (while wearing safety equipment), and you have a great platform for your tweezers.

Hints on making tubing

Not all sizes and wall thicknesses of tube come seamless from a factory or refiner. Especially when working in gold it is not cost effective or timely to order in a specific tube size, material, or wall thickness. There are many times when you need a piece of tubing, you don't have it, and you can't wait a day or so to order it in or run across town and buy it. In general, it is possible to make the length of tubing you require for an object in about fifteen minutes. When compared with the time required to go across town to buy the tube, or order it in, as well as paying more than the cost of the material for the privilege of buying ready-made tubing, it is clear that making your own is a cost-effective, rapid way of obtaining it. When you need very thick walls it is particularly important to be able to make your own tubing.

To make tubing you have to define your needs: what wall thickness what outside diameter what inside diameter what material type you need. Did you plan for the material and structural requirements when in use in your hinge?

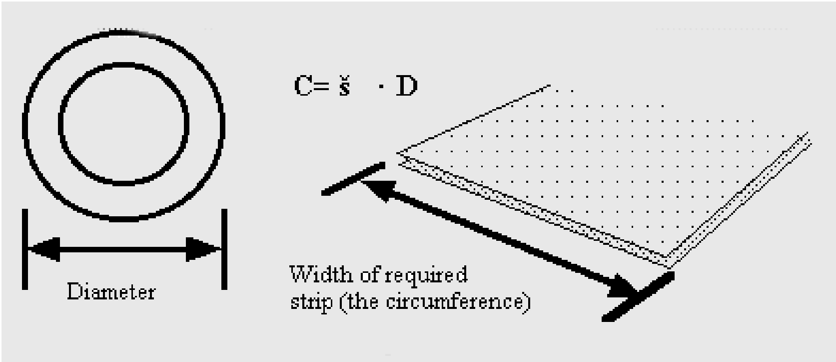
Some goldsmiths keep a few sizes (generally larger ones) of gold tube in the shop and then rapidly draw it down to the sizes they need when a job comes up. This saves having to buy a large selection of sizes to have on hand.

You will also need some tools for drawing. Drawplates in larger sizes are essential. They should be steel and are rather expensive. For very occasional use a wooden draw plate, or brass, delrin or nylon may be used. Best is a proper steel one. While one can draw tubing by hand, in the larger sizes and thicker walls it is really pleasant to have a draw bench.

Because, for all intents and purposes, the wall thickness of a tube does not change during drawing, unless you're down in the very small sizes, you start out with the wall thickness on you want to end up with. Only when a tube has been drawn very small (for example, with an inside diameter of less than 0.5 mm) does the wall thickness appear to change and begin to thicken while drawing the tube.

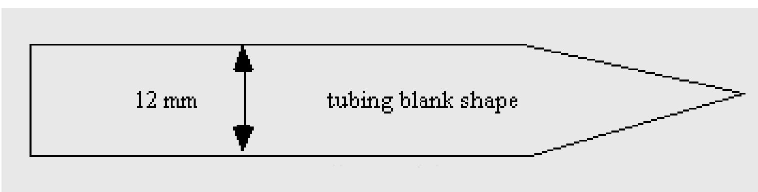
Let us assume then that I wanted a wall thickness of one millimeter on a tube with an outside diameter of 3 mm. I would first determine the circumference of a 3 mm diameter tube. C (circumference) =P x D (diameter) so we would multiply 3.14 times 3 to obtain 9.42 mm (P=pi=3.14 more or less). This represents the minimum width of the blank required to make the tube. The sheet used would be 1 mm thick.

C = P x D
C = 3.14 x 3
C = 9.42 mm width of blank.



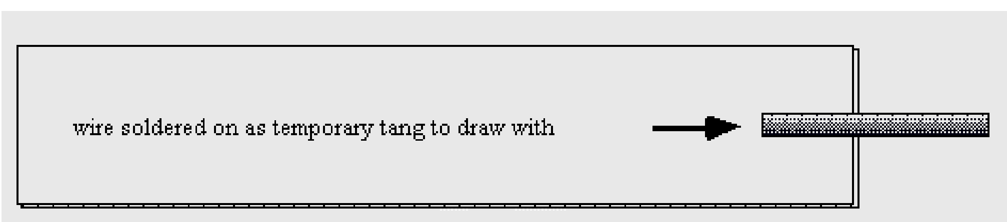
In order to have a nice round tube and get a reasonable length with a tightly drawn seam we start bigger than this so I might choose a blank width of 12 mm or more. We have to plan for some material for a tang to draw the tube with and so we will make the length of our blank at least as long as the final desired length of the tube, plus the tang length (if not longer). The end of the tube to be drawn is cut at a broad taper, and the sides of the strip that we are going to be using to make the tube are parallel.

It is pretty much the same amount of work to draw a short tube as a long tube so you might as well make it quite a bit longer than you need, so that when you draw the tube, you get more than you need, and so develop a stockpile of tubing in various sizes and wall thickness in the process of doing the work you were doing anyway. Often with tube making it is worthwhile making a much longer tube than you need, and cutting off 2 inches. (5 cm) from the back every few holes as you draw it down. In this way you end up with a great selection of tubing in graduated sizes. This is particularly worthwhile with thick-walled tubing. An important principle: always make more than you need-it is the same amount of work and you will need some more tubing at a later date.



actual tube width we will start with

Sometimes, particularly with precious metals such as gold, one doesn't feel like utilizing material for the tang, which will just end up as scrap, so one can take a small piece of brass or even silver wire, and solder it onto the end of the rectangular blank from which one makes the tube. This will serve as a tang to draw with. For gold and similar costly materials it can be a good idea to avoid some wastage by soldering on a wire of a less expensive material instead of making a taper to draw the tube with.

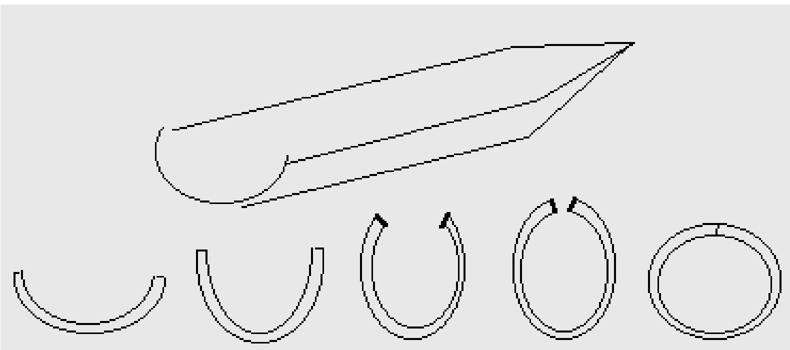


When all is said and done, and the tube is finished, you unsolder that small wire tang, and this way you didn't have to use up some of your gold in a tang for drawing. If I do this I will taper roll the wire and tube beginning to blend them into each other. Roll the end in slightly, back it out and put it in again at 90o to the first direction, then go to the next smallest hole and do the same thing only not as far in on the wire. Continue in this way until you have a smooth tapered point.

Tubing, too, can be step rolled to get a taper on the end for drawing it. You make the tube without any taper to the blank. Then you taper the end with the wire rolling mill as described above. This gives you a solid tang to draw with but the tang material becomes scrap at the end of drawing. One can solder the tapered end for more strength while drawing.

I like to shape my tubing blanks into wood-that is, that I will take a stump and I will use a forging peen, or the peen of my bench hammer, and make a groove or dent into the endgrain of the wood, then shape the tube into that to obtain a half round cross-section. I don't like to use commercial tube-shaping swage blocks, which are steel blocks with half round grooves in them, because I find that they tend to damage the sheet metal of the tube quite a bit during the making. So, again, for me, it's a wooden shape of some type that I form into. The blank is tapped into the groove using the hammer, and rolled sideways while tapping onto it, back and forth, so that the sides of the groove form the metal around the hammer at the same time as the hammer is pushing the tubing blank into the groove. First of all, we shape it into a "U"-shaped cross-section. It is at this point that we can "true up" the two sides of the blank they are now in the same plane and so we can file down the length of the blank, evening up both of them simultaneously.

When you hammer and shape, don't make small dents or nicks you want the shaping to be as smooth and un-bumpy as possible. After you have reached the "U"-shaped position, you then begin hammering at about forty-five degrees to the edge of the trough. You hammer gently while rolling the blank back and forth until the cross-section of the tube becomes somewhat pear-shaped, perhaps even a little bit teardrop-shaped. At this point, we can tap it so that it is more or less round, and we can begin drawing it through the drawplate.

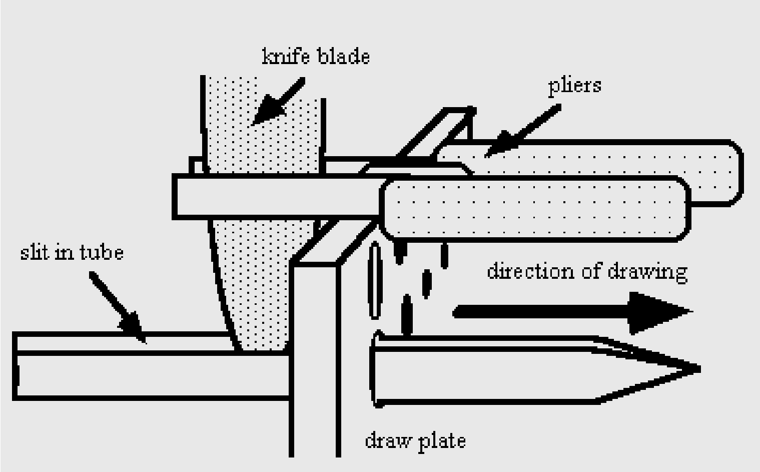


tubing cross sections as it is being prepared for the draw plate

It's perfectly possible to draw tubes under about five or six millimeters in diameter by hand, but for over this size, or for tubes with a very heavy wall thickness, such as a two millimeter wall (which is something that one does sometimes) it is preferable to use a draw bench of some type. We draw the tube through the drawplate until it is smooth and round. At this point, I stop, and I will inject a watery flux solution inside the tube until I see flux run out the bottom of the tube to make sure that the interior seam is protected, then I flux the outside of the tube, and anneal the entire thing. This releases any stresses built into it from making it, and the gap, the seam, will open slightly. Rinse it off with hot water to dissolve and remove flux residues-do not pickle it (we don't want a pickled finish inside our seam because solder does not like to flow onto pickled surfaces)-and then draw it through the last hole that it went through in the drawplate, just to tighten it up. At this point, the seam is tight-as tight as it's going to get-and you have just removed all stresses by doing the annealing procedure. Then re-flux the interior of the tube with a syringe as before, flux the outside as well and solder it, if it's going to be a soldered tube. When drawing it down further, to find the correct hole to draw it through next, take the back of the tube and try and push it into the hole you think is right. When the tube will not go in then the correct hole to use is the next one down, the next smallest hole.

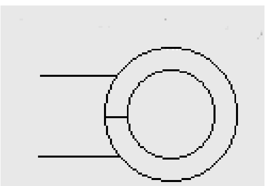
After soldering, any spilled solder is cleaned up, the tubing is pickled, and then it is drawn further until you have reached the outside diameter that you require. One of the things you have to watch out for in making your own tubing is having overlaps of the seam, so when you're closing it up with the hammer, before you even begin to draw, make sure that everything is nice, clean, that the seam consists of even butt joints, and that you have no overlaps occurring.

Another thing that can sometimes occur, is that during drawing the tubing twists, so that your seam is not a straight line down the length of the tube, but in fact twists or spirals around the tube, which is not a happy situation. The way that you fix this is, while you are drawing it, you place a jackknife, held carefully, clamped securely with pliers, in front of the drawplate, and insert the jackknife into the seam of the tube at the same time as the tube is drawn. This will automatically straighten up the seam into a single, even, parallel line.



Straightening a seam on a tube while drawing it.

A warning: if you press down too far with the jackknife, you'll end up with two half-tubes-I've been there, done that. For much hinge-making, we don't, in fact, use soldered tubes, because, if you do, then when you install the tube into your hinge, you don't know where the seam is, and usually it's in a nice, open, wrong position, and the solder flows out of it during the solder job, and then you're left with a visible gap or a seam. So, if we're going to be using tubing for hinges, often we do not solder the seam until we're actually installing the hinge knuckle in place, and during that installation, the seam is then soldered closed at the same time as the tube knuckle is soldered down, combining both steps and ensuring that the tube seam faces inwards and so is hidden on the finished piece.

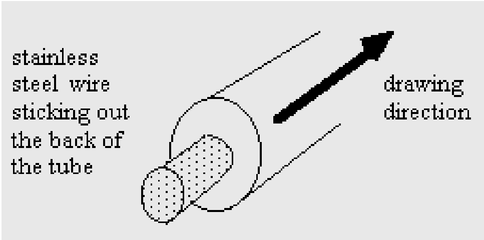

Tube seam faces in

Drawing thick walled tubing

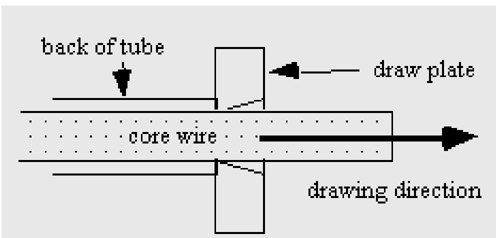
Thick-walled tubing has special applications for hinge-making, and there are some silversmiths' hinges that only work if they're constructed with very thick-walled tubing. Certain bracelet hinges, too, require that the walls be quite thick and strong in order to have the bracelet function, or the catch function, as will be seen in the discussion of hinge-based catches. There are some hints for drawing thick-walled tubing. When drawing thick-walled tubing, it helps to have a draw bench for the extra force that's required, and the sheet metal thickness that you start out with is, more or less, the wall thickness of the tube that you end up with. Definitely start with a fairly large diameter tube it is much easier to make the tube that way and you end up with a lot more tubing. Again, for the larger sizes, wood, Delrin and homemade steel (even unhardened) drawplates will work. All you need are tapered holes in the plate. As always make sure there are no overlaps at the seam.

Drawing wire inside

Sometimes a solid core is used to obtain a fixed size of hole in a drawn tube. When the inside diameter needs to be a very exact size, goldsmiths will draw a wire inside the tube at the same time as they're drawing the tubing down. Usually you draw a tube with a core in it only a little bit (through just a few holes) unless the core wire is much harder than the tube material, as softer cores can bind really effectively into a tube when drawn together. If you use a core, make sure that a good portion of it projects out the end of the tube being drawn so as to allow you to grip it and draw the core wire out again when done. A steel core wire is best as core wires of softer materials may bind and snap off when you are trying to withdraw them at the end. I like stainless steel the best for this.



It can also help to lubricate the core wire with oil or graphite (a pencil lead) prior to drawing to ease its eventual removal. A polished wire core helps as well. The way that it would be removed at the end, is by placing the back end of the tube against the drawplate with the wire that's inside fitting through a hole in the drawplate, and then drawing against the drawplate to withdraw the wire from the tube. A very good selection of hard-drawn, high-polished, stainless steel wire in a number of sizes is available from Small Parts Ltd. (see sources).



Removing the wire core from the tube.

With a gold tube it is also possible to use a core wire of copper or aluminum which is then etched out at the end of the drawing procedure. This procedure is, however, time-consuming and involves dangerous acids or caustic chemicals. Nitric acid, ferric chloride or even hydrochloric acid are used for a copper core-depending upon which acid will not affect the material of the tube that you drew around it: hydrochloric acid or sodium hydroxide (lye) for an aluminum core wire. I have heard that people who have done this got so impatient with the speed of the core removal that they drilled a number of holes into the tube at different places to allow the acid access and then had to plug the holes afterwards. So in general, I don't recommend attempting to remove a wire from inside the tube with acid. I think that if you have to resort to this approach, there is probably something wrong in your design process and you should be able to avoid this situation by more careful planning. Any acid use would require proper safety equipment and chemical handling experience.

If you do use a steel wire-not stainless, but ordinary steel wire-as a core, for drawing inside, and if it by chance breaks off-and yes, I've seen this happen-then we can remove the steel from inside by simmering the tube, if it is a silver or gold tube, in a very concentrated solution of alum and water. You purchase the alum at the supermarket-it's in the pickling section-you make this concentrated solution, you simmer it, and the iron will be eaten out. This method is also used for removing drill bits when they break off inside a piece of jewelry.

How to step-roll wire

1. One requires a taper on the end of the wire to grip it with when placed through a drawplate for drawing. One may obtain this taper in several ways.
2. If a notch is filed into the flat slanting slope of your bench pin then the wire and the end to be pointed may be held hard in the notch. The lower end of the notch should be as deep as the thickness of the wire. Then with a 15-20 cm long flat file one files across the surface of the wood and rotates the wire at the same time as filing. Do not lift the file from the wood on either stroke direction. The wood steadies the file as the wire end is turned under it. The groove automatically makes a taper on the end of the wire. Other options include using a belt sander, a sanding disc and so on.
3. The end of the wire can be tapered and pointed by step drawing it. One uses the hand wire rolling mill for this. Set the wire mill rolls tightly together, but not so tight that turning them with the handle is affected.
    - Take the end of the wire that needs pointing and place it into a wire mill hole that is barely too small for it. Roll the wire about 2cm into the mill.
    - Reverse the direction of cranking and roll the wire back out.

- Turn the wire 90o, insert it into the same hole it was just rolled

  in and roll it in and out again the same distance. By doing this one flattens any flange or burr that might form from the wire mill. Any time one uses the wire mill the wire must go through every hole twice at 90o for the same reason.

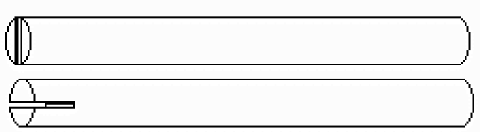
- Place the wire end into the next smallest hole and crank it in, but only about 1.5 cm this time. The same procedure of reversing the rolling direction to back it out, turning it 90o, back in and then out is repeated with this hole, but always to 1.5cm.
- This is then repeated in ever smaller holes and in each hole the wire is inserted less far thus creating a series of 'steps' on the wire. The overall effect is to produce a tapered, work hardened wire point. The work hardness helps prevent the tapered point from breaking off while drawing it.

4. This method of rapidly tapering rods is used to good effect as a production method of forging metal into tapers. For example one can step roll and taper a thick rod at each end to use it for a bracelet. One then uses a planishing hammer to smooth the surface and sands it before polishing it. The product is identical to one made by hammering the metal out into a taper by hand.

Jump Ring Notes

Jump rings may be made most easily by using a small hand drill with various sizes of mandrel.

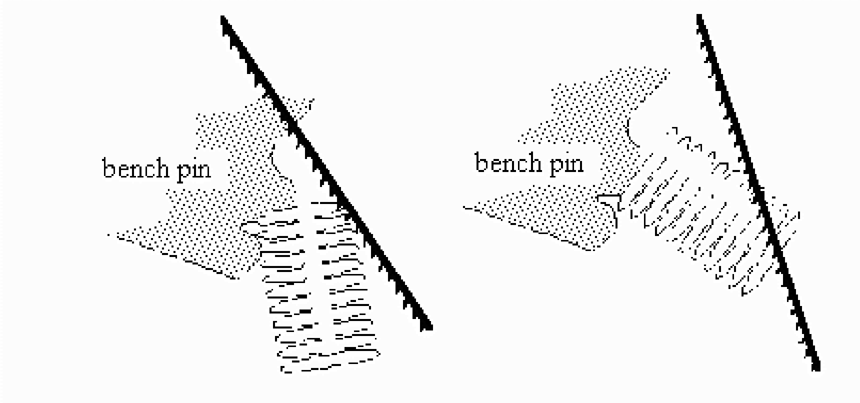
Take a broken burr, old needle file handles or a piece of drill rod and make a slit near the end. (I would use a separating disc to do this). Or one may drill a hole through the rod. Then it may be set into a hand drill or a flex shaft handpiece. By inserting a wire in the hole or slit and feeding the wire onto the rod as the flex shaft is slowly operated one can mass-produce jump rings. The same tool used with a hand drill is safer and requires less skill.



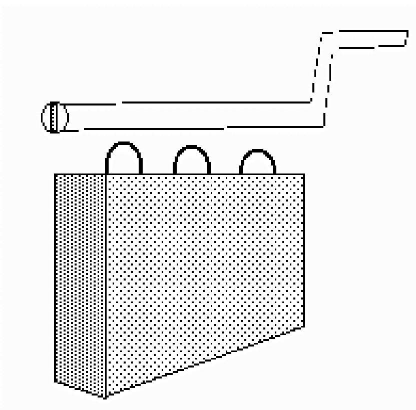
jump ring winding mandrel

If feeding wire onto a mandrel using a flex shaft handpiece be aware that with most standard ones it is difficult to get the feeding speed slow enough to be useful. One needs annealed wire and also needs to have tension on the wire being fed. Do not feed the wire on by hand as it is dangerous. Instead feed the wire through the jaws of a pair of round nose pliers or other tension creating device.
It is important to use a metal mandrel such as steel to wind jump rings on. Winding onto wooden rods for instance leads to loose, sloppy jump rings while on a metal mandrel they wind tight and do not release or spring back when the tension of winding is removed. This is one reason I like to use the smooth part of drill bits to wind jump rings with. One winds short sections, perhaps a centimeter or so long so as to be able to hold them easily while cutting them.

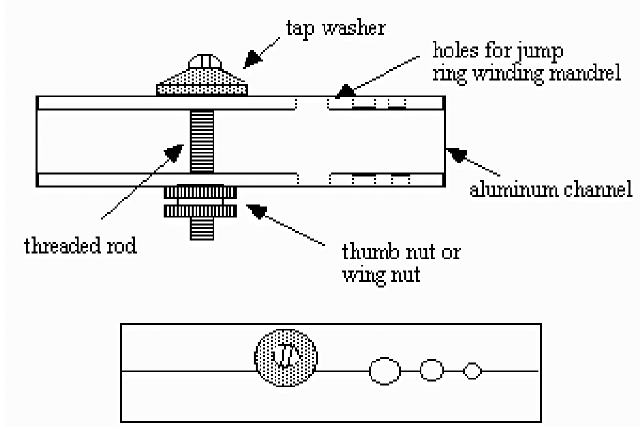
When I make jump rings I wind only a short section and saw them by hand. If the section is long and a little wiggly I will hold them as on the left of the diagram, if short and stiff enough as on the right (fingers not shown). In both cases they catch onto a little wooden nub I quickly cut into the bench pin. I also have a pair of locking, grooved pliers to grip them with while cutting.



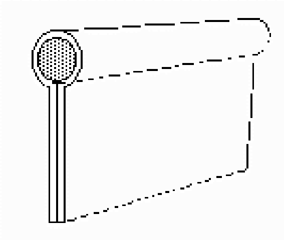
One may take a board and hammer in staples or crossed nails on the top edge. The board is now clamped in a vise. A long piece of drill rod is clamped in the hand drill. A hole or slot has been made through the end of the rod to insert the wire in. The drill rod is now inserted into two or more staples on the board and the drill handle turned to make the jump rings. With this arrangement one can also make different sized drill rod mandrels and bend one end to make a crank to turn. It is important to provide tension onto the wire being wound whether by pulling against it while winding or by running the wire through a leather or rubber clamp of some kind as it is wound on.

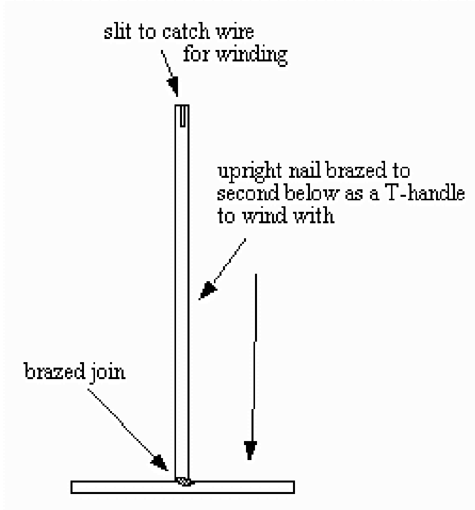


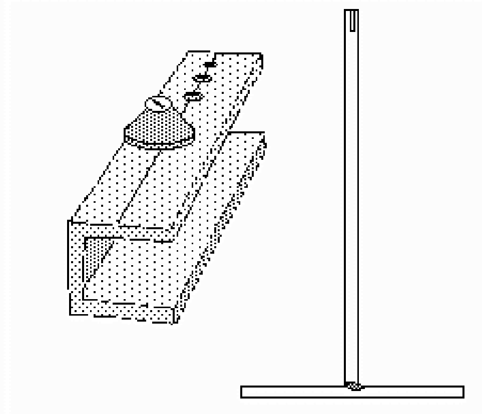
Here is a jump ring winding tool I came up with. It uses extruded aluminum window channel. The slit in the end of the rod catches the wire and allows it to be wound. The wire is fed under the washer which is clamped tight. This keeps tension on the wire and makes for good jump rings. When one is ready to remove them one turns the mandrel the other direction which disengages it and allow the mandrel to be withdrawn allowing the jump rings to easily slide off it as it is pulled out. The mandrel itself is made from common nails which gives one the opportunity to make different sizes.



top view of jump ring winder







jump ring winder

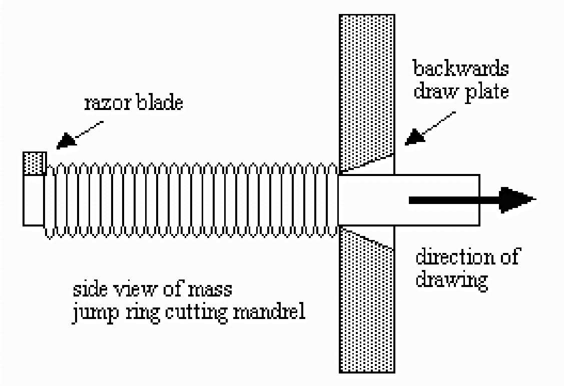
In another approach, one makes a little brass "hinge section", which is clamped in the vise, the drill rod inserted and turned. This is simpler to store than the board and staples version and does not require as long a piece of drill rod. In all cases if one can feed wire up under a faucet washer clamp the winding proceeds much better with the wire under tension.

Sometimes the drill rod will be sawn up through the middle for some distance in the manner of the emery mandrel to allow the jump rings to be easily cut off. The rod should be well hardened and tempered for this approach.

Some people wrap paper around the drill rod prior to winding jump rings, anneal the whole thing after winding and remove the rings. I find it more useful to keep the rings work hardened for easier cutting, but there might be a time to use it. Carol Campbell in Calgary wraps tape around her wound jump rings to keep them together while cutting them.

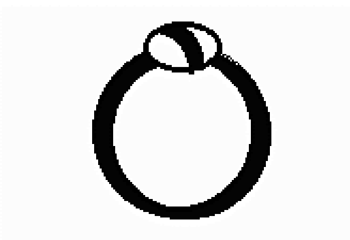
When I worked in a factory in Pforzheim we would use a specialized jump ring winding tool which was essentially a kind of fancy hand drill with gearing and a Jacobs chuck. We used copper and brass mandrels in the cross section of the required jump ring, ovals, rounds and so on. To cut them we used a kind of miniature table saw, the same design as for wood working but with metal cutting blades and very small. The circular saw was about 2-3 cm across and could be adjusted so that it projected above the table only the height of the jump rings being cut, perhaps a millimeter or so. An adjustable metal fence provided a straight edge against which one pushed the wound mandrel over the saw. You had to do it right the first time because otherwise the jump rings got really chewed up. It worked very well though it was a little scary and there is some potential for building a home made version with a "captive" mounted flexible shaft handpiece and a similar table and saw. I'd suggest two fences, one on each side of the wound mandrel so you could not cut yourself.

A less expensive method of mass-production cutting of jump rings is as follows: one can cut them all at once by taking the drill rod, sawing into the end a bit, soldering in a razor blade or matt knife blade so that it protrudes on one side only (it protrudes only a millimeter or so) and then putting the drill rod through a draw-plate hole of corresponding size, backwards, and drawing it. The drawplate presses the wound rings onto the blade which cuts them. A bottle may be placed around the drill rod to catch them. I learned this one from Christian Gaudernak from Norway.

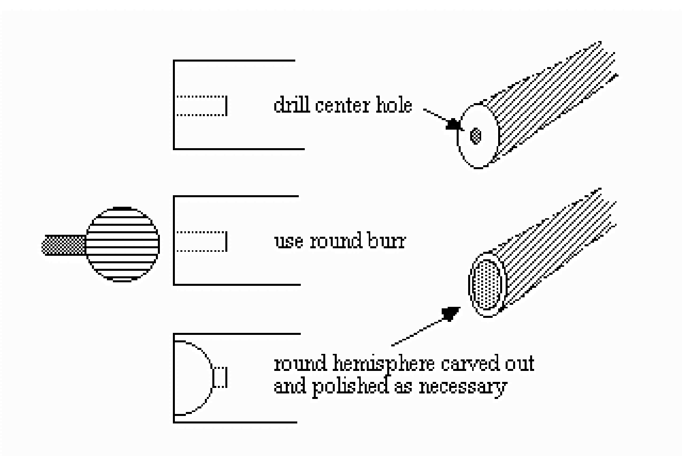


mass jump ring cutting

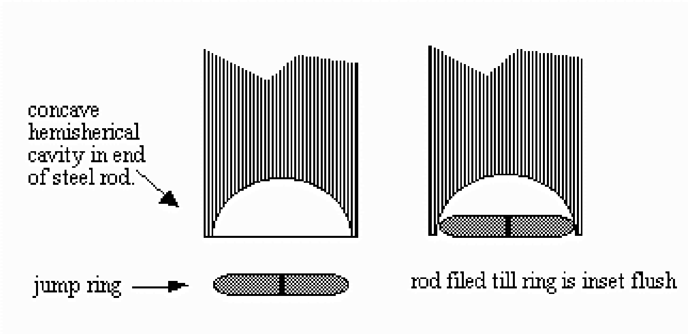
For production closing of jump rings one makes a band for the index finger of the left hand (for right handers) and solders a screw head on it. The other hand holds a pair of pliers which hold the ring in place while it is closed. Some factories use plated steel rings and magnetized pliers to speed the work up. The slot head takes the place of one of the pairs of pliers normally used to open and close jump rings.


production jump ring closing ring

Another factory method of closing lots of jump rings quickly is to use a special punch which is made to fit a specific size of jump ring. One can create a concave domed hole in the end of a piece of steel rod which then just fits over a closed jump ring of the desired size on a surface plate. Just as when making a bezel rocker the end of a round rod is drilled into with a smallish drill bit. When the subsequent concavity is made with the round burr the burr stays centered in the previously drilled hole and the concavity is afterwards polished with a piece of wood and steel polishing compound using the flex shaft. The wood takes the shape of the hemispherical depression while polishing it.

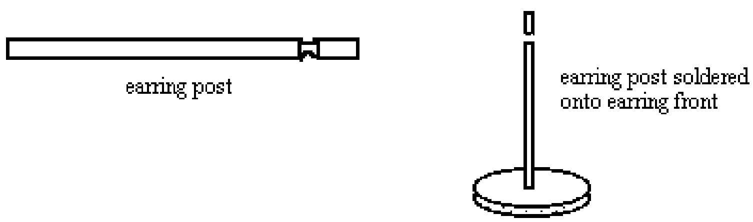


The jump ring size to be closed is chosen and one makes a jump ring. It is set into the concavity and the metal of the rod is filed back until the jump ring lies flush with the end surface of the rod. To close rings in quantity one throws them onto the surface plate or anvil and taps them closed with the punch. Because the punch was made relative to the size of the ring when flush with its end surface it closes them neatly, quickly and securely. The same basic tool form is also used as a setting tool for tube settings and if the edges are sharpened it becomes a "dinking tool" which is used like a punch to cut discs out of sheet metal. In this latter form one tilts it at an angle while hammering it.



Making Earring posts by hand

Yes you can make your own earring posts. It is generally more cost effective to buy them, but making them is not a problem and there are times that it is useful to know how.

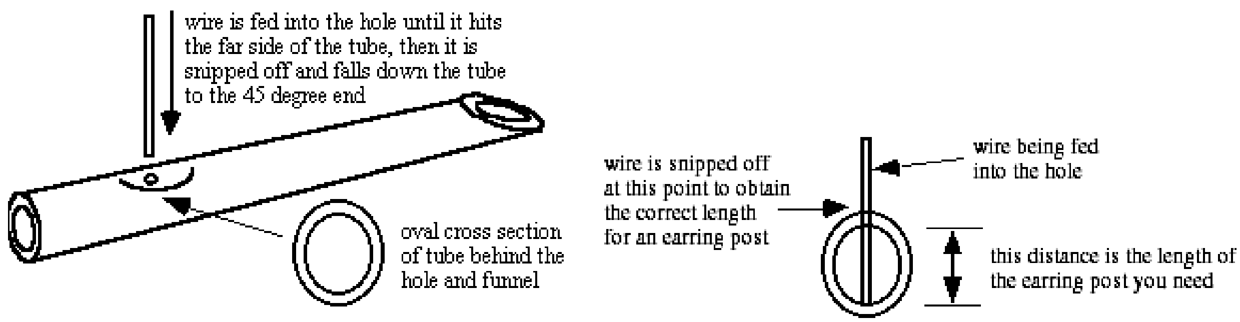


1) draw your wire down to the size you want. Maybe .9 mm.

2) Anneal the wire carefully (avoid hot spots-local overheating). Robert Kaylor anneals wire coiled up in a tin can, playing the flame on from the outside to avoid localized overheating.

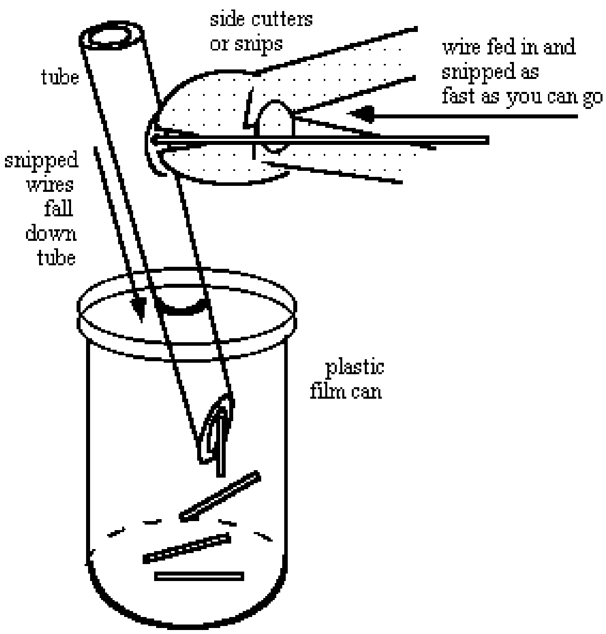
3) Clamp one end of the wire carefully into a vise, grip the other end with draw tongs or vise grips or toothed pliers and pull gently and hard, stretching the wire-you will see it visibly stretch. This will straighten the wire instantly.

4) Get a piece of brass hobby tubing about 3" (7cm) long, cut one end to a 45 degree angle or so, anneal it, about one inch (2.5) cm below the flat end of the tube make an indentation with a center punch and then drill a one mm hole at the bottom of the dent. This will serve as a funnel to feed the wire into the hole (and the tube). Then gently squash the tube near the dent and hole at 90 degrees thus making the tube into an oval at that point. The dent with the hole in it is a one of the ends of the oval, on the short curve of the oval. You adjust the squish on the tube until when the wire is fed in and then snipped off flush with the tube the piece that is cut off is the correct length for your earring posts.



5) Then stick the angled end of the tube into a hole you make in the top of a film can. Now when you feed wire into the hole in the dent it slides in until it hits the far side of the tube, is snipped off flush with the outer side of the tube at the dent. It then falls naturally down the tube into the film can.

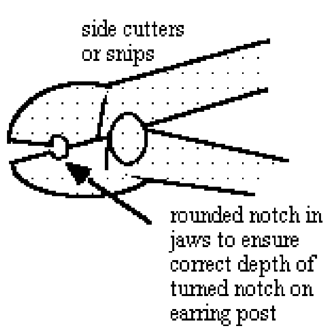
You can then clamp the film can in place gently in a vise and cut the right lengths of earring posts as fast as you can feed the wire into the hole and snip. You will find that because we made a funneling dent leading to the hole into the tube that when you snip it the wire you are feeding in will automatically slide into the tube and stop again ready to be snipped. The wires gather in the film can. The procedure is very fast and smooth.



6) Now flatten the both ends of the wires (give them a right angled flush end). Use a Zipee? belt sander (my favorite) or a sanding or separating disc on your flex shaft which you push the wires onto (hint-use a tool to hold them-they can get really hot) or as I might do sand them flat on the cardboard disc sander described at the Tips from the jewelers bench section at *Ganoksin.com*. This is a quick job to do the whole pile or earring posts you have made.

7) You will need a #30 flex shaft handpiece or an equivalent Jacobs Chuck type handpiece for the next step. The wire is chucked into the flex shaft with about 4mm or a quarter inch showing. (see the 'Small tools' article in the tips section for how to make a chuck key for prouction use of the #30 type handpiece)

8) Press the foot pedal and rotate the wire in the handpiece at medium speed. You then make the indentation for the ear nut on the wire by pressing onto the wire gently with a side cutter (go gently-you can easily cut off the wire instead of making a groove), or round nosed pliers pressed in to the turning wire, or a triangular needle file held onto the spinning wire or my favorite solution: a pair of side cutters one has altered the jaws on with a separating disc or a diamond burr, so that there is a small hole in the cutters. This last is fast and sure and does not require much skill or thinking, always a useful attribute in a production situation.



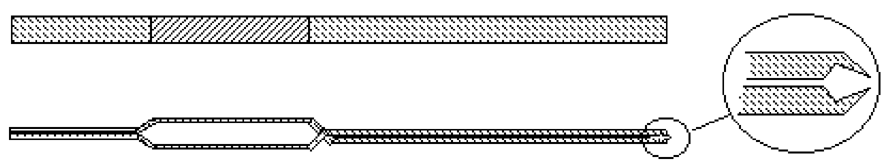
This hole lets you clamp the cutters onto the ear wire, make the correct depth groove quickly and without skill requirements and be sure of not cutting off the end of the wire instead of grooving it.

Although I prefer to put the groove in before soldering the ear post on some people solder the ear wires onto the piece and then put the groove in by hand with side cutters, clamping gently and swinging them around the post back and forth to make the groove at the end. Of make the groove too deep into the wire and so weaken it and cause it to break-you should aim for a pretty shallow groove.

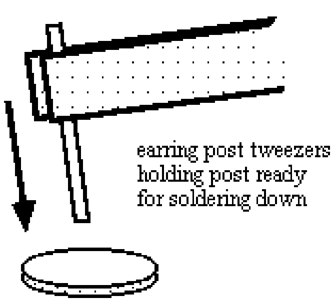
9) Once the groove is made in the correct place on the ear wire in the flex shaft then hold a 220 grit (medium) emery stick against the end of the wire as it spins, moving it constantly so as to quickly round off the end of the wire. A cup burr held onto the rotating wire end will also round it off. You may then hold a piece of leather or felt with polishing compound against the wire end to give it a hint of polish as a finishing touch.

Some people will use a triangular file to make the groove instead of snips, try which works best for you.

10) When you are going to solder the earring post on use the earring post tweezers to rapidly clamp the earring post. A pair of the cheaper, chrome plated steel self-locking tweezers with a triangular notch filed in place at each of the ends automatically grips and snaps earring posts to a right angle for quick earring post soldering. To use them one simply throws the earring posts onto the table and they are easily and quickly held at 90o no matter what angle they are gripped from. Note that the ends have been filed so that when using them they smoothly grasp and guide the earring post into its groove.

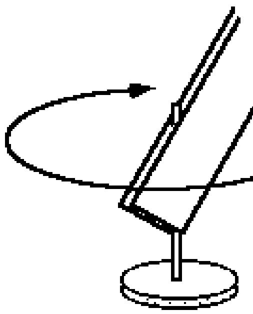


Clamp the earring post near the notched end. While clamped in the tweezers rub the far flat end on an emery stick to clean it for soldering (good solder joins require recently bared metal), then dip the bared end into flux. Have your solder chips lightly pre-flused on the brick. Gently heat the fluxed post end until the flux on it goes glassy, then touch it to a pre-fluxed chip. The solder chip will stick to the hot wire end. (Do not point the flame at the other solder chips-we need them pre-fluxed but unheated in order to most easily stick them onto the wire end in the way just described). Lift the wire away from the soldering surface and gently heat the end until the solder melts onto it. Then heat the fluxed object itself. I usually take a small round burr and just touch the back of the earring where I want the post both to bare the metal for a better join and to increase slightly the contact surfaces of the join to improve strength.



As the earring gets hotter watch the flame where it leaves the metal If it turns orange as it leaves the metal you are around 800-900 degrees F and can bring the earring post into the flame area. If your metal is glowwing red you missed the orange flame and it is defintiely time to bring your earring wire into the heat. Do not point the flame at the earring post at all (you might melt it) but keep it on the earring. When you think the earring is hot enough place the earring post (bracing the heel of your hand nearby so as to steady it while it solders in place). Let the heat from the earring itself rise up and draw the premelted solder on the post down thus joining it to the earring.

Make sure it is vertical. Remove the heat. Quench the earring in water. Immediately test the join with a pair of pliers. Now is the time to find out you if should do the join again, not later. To test it take your flat nosed pliers, grip the top (notched) third of the earring with the pliers on at a 45 degree angle (this gives a good broad area of grip on it so you don't dent or scar the wire post). Twist the post 360 degrees around (yes thats right) and back again the same amount.



If the post didn't fall off the join was good. If it did fall off now is the time to solder it again. This also hardens the post in its bottom two thirds (because the post was annealed during soldering it is dead soft-therefore it doesn't matter how hard or soft your wire post was before you soldered it on).

There, you are done. If you are moving quickly and you have everything set up to go you can make good earring posts very rapidly and perhaps even competetively with some commercially produced sources. I mostly do this for gold posts now if I need some and I don't have commercial ones around. There was I time when I did it for silver posts too, not really economical but it worked.

Methods of Closing Jump Rings

By Charles Lewton-Brain, 2004

- When attaching a jump ring to a chain, hold the chain about 3/4 of an inch from its end and dangle it from your fingers. You can snag it onto the jump ring easier this way than by grasping the last link and trying to hook it onto the jump ring.

- To close jump rings, hold chain-nose pliers in your dominant hand and hold flat-nose pliers in your other hand. Use the flat-nose pliers to steady one side of the jump ring and tighten the loose end closed with the chain-nose pliers. This process shouldn't dent or damage the jump ring wire.

- In high volume production operations, many jump rings need to be closed one after another. For such fast paced operations, pliers simply won't do. Factory workers need efficient tools for closing jump rings. One such tool consists of a ring that has a slot head on it for gripping and steadying a jump ring (see photo). To make it, you will need a brass or silver ring that fits on the index finger or thumb of your non-dominant hand. You also need a rounded, slot head screw. Make sure the gap in the screw head is the same diameter as the jump ring wire you intend to close. If necessary, enlarge the gap by carving it wider with a separating disc, or make it smaller by soldering a thin shim into the slit. Cut the head off the screw with a jeweler's saw and solder it onto the ring.

The slot head now takes the place of one pair of pliers normally used to open and close a jump ring. Place the jump ring into the slot head and use the pliers to manipulate and close the ring.

- Another version of this jump ring closing tool is a ring with a slit in it. You can keep multiple rings with various size slits to fit different jump ring diameters.

- Another tool for closing multiple jump rings quickly is a special punch made to fit a specific size jump ring. The punch is made from a round steel rod and it has a concave domed hole in one end, similar to a tube setting bezel rocker. The jump ring of the desired size fits exactly into the dome. When the punch is struck over a jump ring, it automatically closes the jump ring tightly.

To make the punch, anneal a round rod and drill up into the center of it (about 3 to 5 mm) with a small drill bit. Use a large round bur to carve out a concave domed hole in the end of the rod. (The drill hole keeps the bur centered as you carve out the shape.) You can polish the rounded hole with a piece of soft wood; a disposable chop stick works well. Set the wood into a flex-shaft handpiece and press it into the end of the punch. Using a polishing compound together with the wood makes the concave end mirror bright and smooth, preventing damage to the jump rings.

Choose the jump ring size that you plan to close with the punch. Close this jump ring using pliers and set it into the concave end of the rod. File back any metal that protrudes past the ring; the jump ring should be flush with the end surface of the rod.

To close rings in quantity, throw them onto a surface plate, anvil, or pad and tap them closed with the punch. Because they fit flush into the end of the punch, the jump rings are closed neatly, quickly, and securely. I sometimes use a hard rubber pad, such as a urethane pad used for hydraulic die forming. The pad wells up into the end of the punch, forcing the jump ring closed.

MINI DIAMOND SETTING HINTS

1. When setting a series of diamonds in a row, I use a 156C and just touch the inside wall of the hole. This way each and every diamond will sit at the same level and be correctly placed.

2. When bright-cutting the inside bezel for a 'gypsy' set stone, apply downward finger pressure to the #39 Flat graver. This will give you a consistent applied control to the cutting tool and not have a jagged edge when cutting.

3. When starting to drill for a diamond or any small stone, open up the base of the hole with a smaller round bur. Why? The diamond will be sitting only at the upper thickness of the gold and not have to sit at the whole gold depth. Some diamonds have a deeper pavilion, these the pavilions will cause trouble for you while adjusting for the correct depth. A wider opening will also allow the polishing compounds to exit more easily while in the ultra-sonic cleaner.

4. Try and use a smaller round bur at the underside of the "pre-set" holes. When the polishing wheel is cleaning the backside of the gold it will also give a brighter finish to the counter-sunk holes at the same time.

5. Don't limit yourself to one bead-raising tool, I use about 4-5 at my setting bench. Some beads need just a heavier pushing action while others just need a little piece of metal to hold the stone. I prefer a simple Onglette #2 and reshape it to my specifications. Thin, thicker blade or even with a larger face.

6. I use pumice wheels of #180 grit on all of my setting items. Its not because of being rough on my work. It's because it's a mark of a "careful, high quality setter".

7. I remove all of plier marks, graver slipping and just the general rough edges left by the 'casting house'. I don't want my polishing sub-contractor, to grind away more than he has to in finishing my setting work. I use a flat-edge and as well as the tapered-edge. I usually buy a gross of each style at each purchase period.

8. Always clean your gold shavings with a nylon brush after drilling. The reason being is that when the shavings are left inside the hole and the diamond is placed in the hole with these shavings and beads are raised and secured, you might think that the diamond is secured. When the gold item is placed in the sonic-cleaner, the shavings are released and let go..The diamond is now loose!

9. For final claw-filing, I always use a smooth #4 cut Triangular file. The #2 cut does leave minute file marks that are very difficult to remove after setting and prior to polishing. Then, I use my pumice wheel over any filing I've done.

10. When attempting to raise beads, visualize a square or "picture

frame" around each diamond. At these juncture points is exactly just where the bead should be placed. At the outside of the work area, all of the beads should follow a line so the pre-cutting graver (of your choice) can be drawn and no damage to those beads.

As you remove a diamond or any other precious gemstone, observe any inclusions or defects in that stone. Always keep your 10X 'Triplet Loupe' at you constant side, lest your client will charge you for any misadventure that might be caused by removing that stone. Take note and record or even have the client view it themselves. I speak this from experience. If you are in doubt of setting a stone don't do it. Being an over cautious setter is far rewarding than paying for its replacement. If you notice a telltale aberration in the claws covering the stone, do not let any jewellery or setting tool "touch the mounting". You might be again being charged in its subsequent "breakage". Many setters are asked to hide defects under the claws, be aware of this, when removing customer's stones! If you see some claws that are out of alignment, maybe it was that the claw was gently moved to cover an inclusion. Why is this done? To protect the "weakness" of that area of the diamond, as this is quite a common practice. It is not to hide from the appraiser, but to help secure, as well as refrain from further damage.

When you are using the burs constantly, always apply an oil based lubricant, regular machine oil. But please refrain from using "Oil of Wintergreen", it is a very strong substance and will with no doubt burn the tender parts of your face. Face, as in getting the oil on your fingers and then in error, touching parts of your eyes or lips. The subsequent result is a sensation that will almost require a full face washing and time-off from your setting. It doesn't tingle, but the feeling is of intense burning and using words of profanity.

The many things that any setter does prior to setting a large diamond is. Is the head of the ring large or small enough to take this particular diamond? Is the head well soldered unto the mounting and done securely? Are there any telltale pin holes in the gold anywhere around the ring in question? Will the claws upon completion be attractive and pleasing to the wearer's eye? Do I have the right selection of burs to complete this project? Is the jewellery item properly polished? Which ring clamp will I use? Now for the diamonds are there any visible inclusions where the claws are to addressed?

How is the shape of the stone in relationship to the head? For a Princess stone, how is the girdle of the diamond ="thin or thick"

Mining industry for jewelers tools

I've been doing a lot of electroforming in the last year, and my naturally skinflint ways came to the fore as I looked for the power supply. The approach works like this: first of all describe the problem: in this case, I needed a regulated rectifier (a direct current source). Then: What fits the bill? I set aside the kid's model racing car and train transformer I used to use for plating ($5.00 at a flea market) in favor of something a little more heavy duty - a battery charger ($10.00 at a flea market). After eight months I've upgraded to a really good plater: a used high tech regulated power supply from ebay ($65.00). This is normally used for electronics applications. In the same way a superb high quality rectifier for anodizing titanium (new it is $250.00+) can be had used from ham radio buffs for as cheaply as $15.00.

Saving some dollars on equipment can be really helpful to a shop's bottom line. Often tools and equipment from other industries prove useful, and are sometimes cheaper than regular tool suppliers. I think this behavior used to be called 'scrounging'.

When looking outside the jewelry world for tools and equipment there are a number of basic principles to use. Describe the problem you want to solve and then look for industries that have the same problem. Use contrast and comparison to understand a system faster and deeper. Look for the patterns, if something looks like something else there is probably a relationship. An example is Aquaplast, a wonderful plastic material that turns into soft putty in hot water and hardens stiffly at room temperature - just like pitch. It replaces pitch and shellac in stone setting, can be used to make handles, soft jaws for pliers and so on. Do you remember 'Friendly Plastic'? It is the same material, and works the same way. And so does the sheet material used to make lightweight casts for broken limbs. This means you can obtain aquaplast cheaply as scrap Friendly plastic (and your aunt thought that those balled up reject jewelry pieces were wasted), and if you are willing to leave a used and cut off plastic cast on an anthill for cleaning (ooh that skin gunge) then you may be able to get some from a hospital worker friend....

It is important to 'shift categories', that is to look at how you (and other people) class things in your mind and see if you can break out of that 'putting things into mental boxes' behavior. An example is chasing tools which sell as high as $40.00 for 5 on Ebay while wooden boxes of 80-100 watchmakers staking tools (the same hardened and tempered steel, same thing as chasing tools, and easily altered to suit ones purpose) sell for $20.00. Watchmakers tools are classed as 'obsolete' and 'only for fixing watches' but shift mental categories and that box is worth a pile.

A vital principle is looking for someone (or some industry) who uses so much of something they do not value it. There are numerous examples of this.

- The flint wheel from an older style disposable lighter is a great carbide steel burr that jewelers can otherwise pay several dollars for. It is made of in such quantities that they can be produced incredibly cheaply. When the lighter is empty the top can be knocked and pried apart and the flint wheel placed on a standard screw mandrel for the flexible shaft to obtain a carbide burr. It works like a rotary file for filing edges and coarse metal removal.

- Dry pickling acid (you know the ubiquitous brand I mean). is almost the same as sodium bisulfate which is commonly sold as 'swimming pool acid' and is used to change the pH of swimming pools and hot tubs. It is far less expensive there than at the jewelry suppliers ($1.50 for the same amount you would normally pay $6.00 for). It is also the main ingredient in most toilet bowl cleaners (this may say something about disposal) and can be bought very cheaply in drums as an industrial toilet bowl cleaner

- If you know someone who works in an institution (jail, school, factory, etc) they have large floor polishing machines with giant scotch brite pads on the bottom. When they think the pads are worn out they are still good for our use, but even better are the round discs they punch out and throw away from the middles of the pad when they are mounted on the machine. Stiffen up the center with a little epoxy and they are essentially the same scotch brite discs for the polishing machine that jewelers pay up to eight dollars each for.

- We can find vibratory tumblers cheaper at gun shops than jewelry suppliers (there are lots more gunners than jewelers). Generally about 30% cheaper.

- Another auto example is waxes and transparent paints to protect metal surfaces, designed for expansion and contraction, extremes of temperature, acidic rain, ultraviolet light, in short an ideal long lasting finish for certain metal objects. In the same way, Nicholas Lacquer, beloved by people who use patinas and metal coloring, is found most easily in music stores as it is used universally on high school marching band instruments as the longest lasting finish - a brutal testing ground for a product. Must be good.

- Garden potassium sulfur solutions (sometimes called 'lime sulfur spray') can be used to oxidize silver surfaces much like liver of sulfur does, as can photographers selenium print toner solution (contains selenic acid-basically the same as most gun-bluing and 'brass black' type solutions).

- A source for titanium wire for making great soldering picks with is your local high tech bike shop-they use titanium spokes and usually have bent ones for free.

- One can buy round leather dog chews in different diameters at the pet store, cut them in half, drill through them and mount an appropriate sized hammer handle in them to make very inexpensive good quality leather mallets, particularly in the small sizes. Look for a chew that is solid all the way through as some will have cavities in them. $2.00 gets you three small mallets.

- Use a 50 mm camera lens as a giant high quality loupe for working with. You can pick one up for free or cheaply from a camera shop if the iris diaphragm inside is broken. The optics are great on such a lens, and the field of view is large.

So, providing you take care not to endanger yourself by substituting one thing for another, scrounging can be really helpful in dropping that overhead over the long haul.

Notes on Soft Hammers

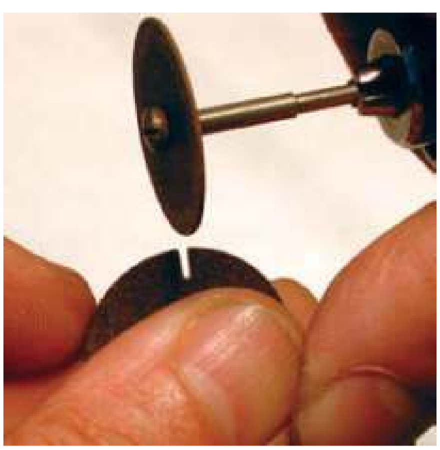
If you don't want a mark in the metal don't put it there?. This simple saying would save jewelers lots of time if they were able to apply them. Jewelers spend hours fixing damage that they themselves did to the metal. Soft hammers and shaping tools limit the injuries to the metal being worked, with the best quality of all (the least damage to metal while still shaping it) being paper mallets. Leather however remains tried and true as material for making mallets from. Some can be found at your local Pet Supply Store.

Photos: Charles Lewton-Brain

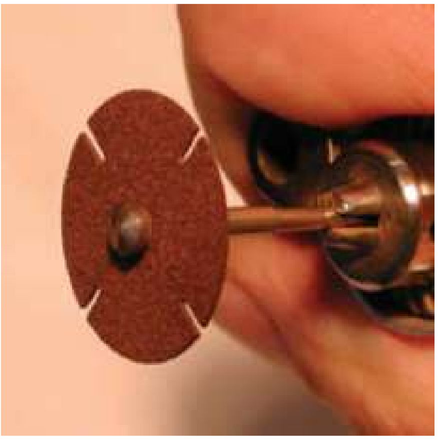
You can buy round leather dog chews in different diameters at the pet store, cut them in half, drill through them and mount an appropriate sized hammer handle in them to make very inexpensive good quality leather mallets, particularly in the small sizes. Look for one that is solid all the way through as some will have cavities in them. One chew makes about three hammers.

Bench Tricks

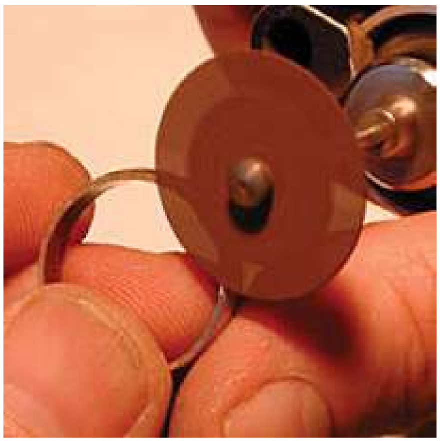
By Jurgen J. Maerz



1a. Take a separating disc that is in a mandrel and insert it into a flex-shaft. Using a fairly high speed, score a second separating disc in four places.



1b. Mount the modified disk on a mandrel and use it as you would use a lapping wheel.



1c. The advantage of this modification is that you can see right through the rotating disc, which makes it much easier to work.

2. Don't discard your broken twist drills; it's quite simple to re-sharpen them. Just place a separating disc at the proper angle to grind a new tip. Take care not to overheat the tip of the drill.

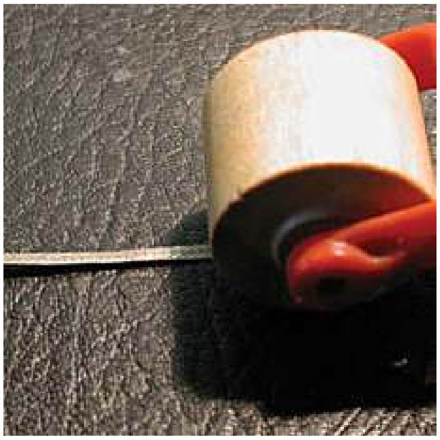
3. Installing a simple wood screw on the side of your bench will make it possible to open and close jump rings with ease.

4. It is difficult to explain surface textures to a customer who is not familiar with the terminology of the trade. By preparing a texture strip like this one, you'll be able to show the surfaces to clients, preventing misunderstandings.

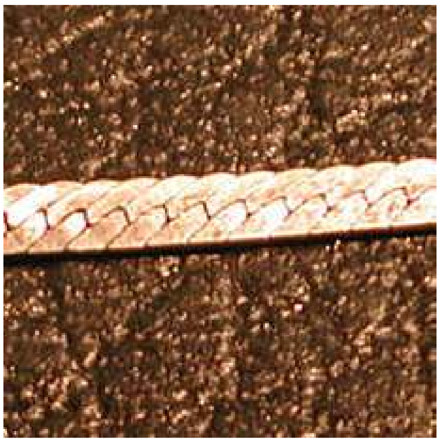
5a. When remounting diamonds from an old ring, it is usually somewhat difficult to clean them. For a quick and easy solution, place a small amount of table salt into your hand and add the diamonds.

5b. Rub the salt and diamonds together. The abrasiveness of the salt will clean the stones without scratching them. Once they are clean, just rinse the salt away using warm water.

6a. To repair a kinked herringbone chain, start by using pliers to gently push the bent links down.



6b. Use a regular wallpaper roller to flatten the links. Be sure to roll on a sturdy surface.



6c. Once the chain is flat again, polish it at the bench with a small, rotating brush. Do not use a large polishing machine, as chains can get caught in the buffs.

7. This small, handy gauge makes it easy to know how much metal needs to be removed to size down a ring one, two, or three sizes. To make the gauge, cut a piece of platinum sheet into three tiers, one for each size.

8. By wrapping a copper or brass wire around the end of tweezers, you can use them as locking tweezers. Just slide the copper or brass wrap forward to close them.

9. When polishing a ring with diamonds, it can be difficult to remove the rouge after polishing. Try dipping the ring in water and then in baking soda before you polish. The rouge dust will stick to the baking soda rather than the metal. Since baking soda is water soluble, the rouge will wash away easily when the ring is rinsed.

Keeping a Connection:

Preventing Soldered Seams from Flowing
By Alan Revere , 2004
Illustration by Sean Kane.

Soldering is a delicate and sometimes difficult process-especially when you need to solder very close to a previous solder seam. Without extra care, you can easily melt that prior seam and dislodge the parts.

One solution is to drop down a temperature level for the second seam, but that will limit further soldering to even lower temperatures. Another reason for staying with higher-temperature solders is that the color of lower-melting-point solder usually does not match the metal as well. Fortunately, there are other ways to deal with multiple solderings in close quarters, which enable you to work at the same solder level.

Remember that solder flows only on clean surfaces; it doesn't work well on dirty or oxidized areas, nor on surfaces that don't have flux (a cleaning compound). So you can discourage seams from flowing by intentionally making them dirty. A good way to do that is with an anti-flux, such as yellow ochre, rouge, grease, or even melted rubber; all of these compounds inhibit solder flow.

However, one tangible technological benefit for bench jewelers is correction fluid, the kind used in offices all over the world. Coming with its own applicator in a jeweler's size bottle, this solution significantly decreases solder flow. (Note: Water-based correction fluids are less toxic than those that are solvent based. In any event, after applying the liquid, let it air dry in a well ventilated area, and *do not inhale the fumes* .) By applying correction fluid to previously soldered joints, you can solder additional seams nearby and still maintain the integrity of the piece.

Slicing Wax Slabs

By Kate Wolf, September 2005

Don't you wish you could just karate chop your way through all those thick wax slabs until you had the perfect size piece for a project? Well, there may be a way that's even better -- and easier on your hands.

A drill press (either a full size, miniature, or Foredom) with an end mill or cylinder bur can thin down wax slabs quickly and accurately. Position the bottom of the cylinder bur or end mill slightly higher than the desired thickness of the finished wax. Slide the wax onto the press bed and feed it under the spinning bur. Make sure the directional pull of the bur is such that you are pushing the wax away from yourself while you are cutting; pulling the wax toward yourself when cutting is a safety hazard. Just to be on the safe side, mill a piece of scrap wax to see if the bur is set to the correct height.

Warning: When milling, tie back long hair and wear safety glasses and a dust mask. Pay attention to what you are doing: Keep your fingers away from the spinning bur or end mill. If the wax piece is pulled away from you while milling, let it go to keep your fingers from being pulled under the spinning tool.

Reconditioning Beading Tools & Dot Punches

Beading tools and dot punches lose their form and become dull as you use them. You can recondition a tool at least ten or twelve times, or you may need a special size, or perfect polish for a particular job.

They can be reconditioned fairly easily. The best tool that I have found to do this is the 40 hole "beading block" available from metalsmithing suppliers and jewelry tool suppliers. Made in Switzerland, it has four rows of ten beads, set down into cone shaped depressions in a steel block, about 1" x 2 1/4". Each row is identical, in case you should damage one of them.

First ANNEAL the tip of your damaged tool, whether it is a "dot" background punch or a jewelers beading tool. I usually run the tip of the tool and part of the shank across a bar of Ivory soap beforehand to keep the firescale down. You can slow down the cooling, and sometimes get a softer tool, by burying it in a can of dry sand while it is cooling. Either way -- air cooling or in sand the tool will darken.

Chuck it up in a #30 flexshaft handpiece and true up the cutting edges of the cup against a sharpening stone while spinning the tool. Do this slowly and carefully -- check to see how much you've taken off every few seconds. You may have to take a bit off the shank side wall angle, as well as the actual lip of the tool.

Remove the tool from your handpiece. Place the tool into the right sized depression in your beading block and strike it gently with a brass or copper hammer. Check the result for depth and center. Repeat as necessary until you get the "cup" depression to look as much like the original tool as possible. You may need to chuck it up and spin it against the stone to get a bit of bevel on the outside edge. Reheat the tip to red and harden, using water or oil to quench, depending on the type of steel the tool is made of. If you aren't sure, experiment with the water first. The tools are not expensive, so if you wind up ruining a couple 'till you get it right=A6 Oh well=A6

When the tool is hardened, wrap a bit of 400 wet or dry sandpaper around the bottom third and clean off the firescale -- again by chucking it in the handpiece and spinning it slowly until you achieve a bright finish on the bottom half of the tool -- especially the taper that ends in the working cup. Take it out of the handpiece. Now you'll be able to see the color change as you reheat it very gently with a bushy flame. Start this from about the middle of the shank, watching the colors creep toward the tip.

Quench immediately when the tip reaches light straw. Finish by polishing the cup - putting it back into the handpiece, spinning and pressing it into a bit of diamond paste on a piece of hardwood or hard leather.

Sitting on a Nest:

Ensuring a Piece Heats Evenly
By Alan Revere , 2004
Illustration by Sean Kane.

One of the most difficult aspects of soldering is to heat the piece properly so that the solder will flow. For jobs involving small items, such as soldering the seam on a jump ring, this entails concentrated heating in a localized area, Most times, though, you must heat the entire piece of metal, especially when working on silver. The same is true when annealing: The entire piece has to be heated to restore the metal's workability.

The best way to heat the entire piece evenly is from below (it is more difficult to do so from above). But this may not always be possible-for instance, if the piece has a large flat base that rests on the soldering block.

To solve this, you can elevate the work a few millimeters above a soldering surface by taking some binding wire and making a loose nest. Flatten the nest to offer a large, stable surface on which to rest the work. (If the piece will not rest on a flat surface, you can easily shape the nest to fit.) Place the nest and the work on a refractory (heat-resistant) soldering pad, which is preferable to charcoal for this process. You can now aim the flame so that it bounces off the heat-reflective surface upward through the nest, toward the underside of the piece. This method of indirectly heating from below, combined with intermittent direct heating from above, works well to warm a piece of metal evenly at the bench.

A Crowning Achievement

Often jewelers are called upon to hand fabricate a crown to fit a stone. This is necessary when either the stone is a non-standard shape, or the crown needs to fit a particular design. Although one will seldom hand fabricate a simple round basket crown, constructing one gives the jeweler the basic knowledge and understanding of crown construction needed when creating a more advanced crown.

To make a round wire basket crown, you will first need to determine the size wire you will use. The size used can be determined by the size of the stone and the finished look that you want. A thicker wire will form a sturdier mounting although it may look heavy and clumsy. A thinner wire will look more delicate, however it may not hold the stone securely.

Measure the diameter of the stone. This measurement needs to be to the tenth of a millimeter. Then subtract the diameter of the wire from the diameter of the stone. Multiply this number times 3.14 and round to the nearest tenth of a millimeter. This will give you the length of wire needed to form the under-bezel. For example: for a stone 8mm in diameter using 0.8mm wire, subtracting 0.8 from 8 gives you 7.2mm. Multiplying this times 3.14 gives you 22.608. Round this down to 22.6mm for the length of the wire for the under-bezel.

Cut a piece of wire to this length, and also cut a second piece of wire 10% shorter. This second wire is for the bottom bezel. In the example above for an 8 mm stone, the second wire would be cut to 20.3mm. Make certain the ends of the wires are flat. Then bend them in a circle and make certain the ends meet tightly together. If needed hold the ring in a pair of flat nose pliers, and saw through the joint to trim a little off each side of the seam to create a tight fitting seam. Dip in boric acid and alcohol and solder the ends together, using hard solder of the appropriate karat and color. Flux the joint well and use a minimum amount of solder. Using a solder pick will aid you in placing the solder.

Do not pickle the rings at this time. Gold is porous and will adsorb the pickling acid, which may impede solder flow on subsequent steps. If the rings are tarnished from soldering and pickling is necessary, clean the rings in the ultra-sonic cleaner after pickling. Generally soaking the rings in warm soapy water is all that is necessary to remove the flux and boric acid.

Next clean any excess solder from these seams with a fine needle file and straighten the rings on a round bezel mandrel. Check the size of the under-bezel by laying the stone on top of it. Looking straight down on the stone you should not be able see the under-bezel. The bottom bezel should be slightly (10%) smaller in diameter than the under-bezel.

Next prepare both bezels for the prongs. Mark with a scribe or fine tipped marker where the prongs will be placed, making certain they are evenly spaced. To help in laying out the prongs, lay a template for drawing round stones over the bezels. Then using the centerlines on the template for a guide, mark the bezels where the prongs will be placed. Another method is to lay the rings on graph paper and use the lines to lay out the prong placement.

Then from the outside of the bezel saw 1/3 to 1/2 of the way through the bezel on each of the marks. Next, use a cylinder bur the same size as the prong wire to cut the shape of the prong into the bezel. The sawed line will help hold the bur in the correct place on the bezels and your work will be more accurate. Hold the bur at a 75 degree angle when cutting. This will allow for the proper angle of the prongs.

Next we need to make the prongs. You need to use your own judgment to determine the height of the prongs. The minimum height of the prong is the distance from the culet of the stone to the table of the stone, if you make your prongs any shorter than that distance the culet of the stone will protrude from the bottom of the crown, which is unacceptable. How much taller the prongs are is dependant on personal preference and the over all look and feel of the design of the finished piece of jewelry the crown is being made for.

Once you have determined the length of the prong cut two pieces of wire three times the length of the prong. For example if you want your prong to be 6 mm tall you need to cut two pieces at least 18 mm long. Next take those two pieces of wire and bend them into a U-shape with the sides of the U approximately at a 75 degree angle. The U needs to fit across the under-bezel and into the notches for prongs opposite each other, not the ones next to each other. The U-shaped wire prong should fit into the notches of the under-bezel matching the angle of the cuts that you made.

Take one of the U-shaped prongs and slide the under bezel into it to prepare for soldering. The U-shape prong should be snug enough to hold the under-bezel in place without any additional support. The under bezel should rest at approximately 60 percent of the prong height below the top of the prong. Once you have made the crown you want 60 percent of the prong height above the under-bezel. Position the under-bezel in place on the U-shaped prong and dip boric acid and alcohol and add a little flux to the two joints between the under-bezel and prongs. Solder the prong to the under bezel using medium flow solder that matches the karat and color of the crown you are making. The best way to solder the prong is to place a small piece of solder against one side of the prong where it contacts the under-bezel and heat until the solder starts to melt. Then move the torch to the other side of the prong and flow the solder through the joint between the prong and under-bezel. This way you will be sure you have a good strong joint.

Once you have soldered both prongs, dip in water to cool if it is yellow gold or if it's white gold allow it to air cool before quenching. Then saw through the bottom of the U and spread it apart a little bit so that you can insert the other U-shaped piece into the under-bezel. The two U-shapes should cross each other in the back. Once you have positioned the second U-shaped prong solder it in place as you did the first prong.

Once all four prongs are soldered into place, soak in soapy water to remove the boric acid and flux. Then cut the bottom of the U-shaped pieces off the prongs and trim them to the proper length. Remember 60 percent of the prong height should be above the under-bezel and 40 percent of the prongs below the under bezel. Once the prongs are trimmed to length, insert the bottom-bezel into the bottom of the prongs. The bottom-bezel should be held in place by the prongs and all four prongs need to be in tight contact with it. Check to make sure everything is in alignment, and make any adjustments needed. Coat with boric acid and alcohol, and solder the base of the prongs to the bottom bezel using medium flow solder of the correct karat and color.

Once all the prongs are soldered to the bottom bezel soak the setting in soapy water to remove the boric acid and flux. Check in all directions to make certain all the prongs are at the same angle and that the bottom-bezel and under-bezel all are perfectly parallel in every direction.

Next, file off the bottom of the prongs to clean up the bottom of the crown and if necessary use a fine No. 6 cut needle file to remove any excess solder. It is very difficult to file the solder joints and keep them looking nice and clean and sharp so it is best to use a minimum amount of solder so that you do not have to do any cleanup at this stage.

Polish the crown using a bristle brush in your flex-shaft, and you will be ready to use the crown, adding it to your piece of jewelry. Because we used hard and medium flow solder you can easily attached it to the jewelry using easy flow solder. When the stone is set in this crown the distance between the bottom-bezel and the under-bezel should be the same distance as between the under-bezel and the girdle the stone. For proper proportions the under-bezel should be exactly in the center between the girdle of the stone and the bottom-bezel. That's why we left 60 percent of the prong height above the under-bezel as this gives you 20 percent of the prong height to use in setting the stone. If this is too much you can always trim the prongs while setting, however, if the under-bezel is too high and the prongs are too short you will have difficulty securing the stone in the prongs.

Although this seems like a very simple and easy project to complete, it is quite an accomplishment to make this crown. To keep all four prongs properly spaced and at the same angle, the bottom and under bezels all perfectly parallel, and to set the stone so that all proportions are correct, takes a skillful goldsmith. If you can accomplish all of this in creating this crown you truly have attained A Crowning Achievement.

The Final Cut - Cutting jump rings after winding

By Charles Lewton-Brain , 2004

Once you've wound jump rings around a mandrel, what's the best way to cut them apart? Some craftspeople use hand-held side cutters, but there is one problem with this method - it cuts only one side of the wire flush. Therefore, you have to cut the ring twice, which results in a small amount of waste and slightly varying ring diameters.

Photo by Charles Lewton-Brain

As an alternative, working goldsmiths tend to use other cutting tools. Some use separating discs, but these cut ragged edges and tend to create a lot of heat. A superfine separating disc works better, but it is hard to have complete control over the procedure. As a result, most goldsmiths use jewelers' saws, which are slower and more controllable.

In addition to a jeweler's saw, there are a number of tools and methods you can use to cut jump rings, including the following.

- When I make jump rings, I wind a short section at a time and saw off the rings by hand, using the bench pin for support. If the section is long and a little wobbly, I hold it as shown on the left of figure 1; if it's short and stiff enough, I hold it as shown on the right. In both cases, the coiled rings catch onto the little wooden nub that I shaped into the bench pin.

- In addition to holding the coil in your hand, you can use a pair of self-locking pliers. I filed a rounded groove into each side of the jaws. The jump ring coil fits in the grooves, allowing you to hold it securely while cutting.

- Carol Campbell of Kingston , Jamaica , wraps tape around the outside of wound jump rings to keep them together during cutting. (I like them to fall out of the way as I cut them loose.)

- Tammy Powley offers a tip on cutting jump rings in her online newsletter, Jewelry Making : "After coiling wire around a mandrel, thread your saw blade through the coil to cut the jump rings apart, and saw from the inside out. This makes sawing the coil easier, as your blade tends to slip when starting to cut from the outside of the coil." (She uses a Jiffy Jump Ring Tool to hold the jump ring coil steady while cutting it from the inside.)

There are several tools designed for cutting piles of jump rings. The Jump Ringer and the Koil Cutter by Dave Arens of Tucson are systems designed for the mass production of jump rings. Both use a flex-shaft attachment to create a contained circular saw blade. Clamped jump rings on mandrels are fed onto the tools for cutting.

I learned an old-fashioned method of cutting jump rings en masse from Christian Gaudernak of Søn , Norway . Take a round steel rod and saw a thin slit into the end (figure 2). Solder a razor blade or matte knife blade so it protrudes 1 to 2 mm from the surface of the rod. Grind off any excess material from the blade. Position a draw plate so it is backwards to how you would normally use it. Pull the rod with the wound jump ring coil on it through a draw plate hole of corresponding size. The draw plate presses the wound rings onto the blade, which cuts them.

The Hole Story - Drilling Tips and Techniques

By Charles Lewton-Brain, August 2006

We all drill, all the time. We take drills and what they do for granted, but reviewing the obvious doesn't hurt -- and there may be a nugget of new information that is brought to light.

Drilling is done for decorative purposes, to install components, to allow a saw blade or bur to be accurately inserted through sheet metal, and to situate stone settings. Most metalsmiths drill with a flex-shaft, using standard twist bits. We often use very tiny bits, which can break easily, and the process usually results in flying debris. Eye protection is required at all times when drilling.

The following are some tips for drilling accurately:

Using drilling boards. It's a good idea to use a mobile piece of wooden board to drill on so that you don't end up with a moonscape bench pin. Such a drilling board can be thinly coated with sealing wax or dopping wax for holding multiple small parts while drilling. Simply warm the metal part with a torch and drop it onto the wax; it melts a spot for itself that then hardens, trapping it in place for drilling. Use a lubricant and avoid heating the part during drilling to keep it locked in position. When you are ready to remove the piece, just pop it out of the hardened wax with a graver or knife blade. Dozens of small parts can be rapidly scattered on a surface like this for production drilling. Remember, though, that it's usually best to drill and work on a component when it is still attached to a larger piece or "handle."

Making a dent. To ensure that the drill bit does not skip and scar the metal, it is best to have a small sharply defined indentation where you want to drill. You can make the dent with a center punch. An automatic center punch can be useful for locating an exact spot for the dent.

A prick punch, which has a long, needlelike taper, works well for denting a precise spot. Lay out the plan on the metal with a sharp scribe and indicate where the dent should be. Then lay the punch down almost flat on the metal with its point exactly on the spot for the dent. Carefully raise it up and tap it with a hammer. By having it flat and raising it up, you achieve very exact placement. It's also faster than trying to hold a punch vertically and placing it perfectly onto a given spot.

A large darning needle works well as a prick punch. I usually snap off the eye of the needle and briefly anneal the very back end of the punch to soften it. This prevents it from shattering accidentally when hit with a hammer, and it keeps it softer than the hammer face to prevent marring.

You can also use an awl or point burnisher in a graver handle, as well as a beveled or onglette graver, to create a suitable dent in metal. When using any of these tools, be sure to start the drill slowly to avoid slipping, as the dent is not as smooth as those made with the previously mentioned tools.

Moving a hole's position for accuracy. When drilling into a dent, always make a pilot hole using a much smaller drill bit than the hole you want to drill. The moment the drill begins to cut at the surface, hold it steady and watch, pressing it down only far enough that the cut becomes a full shiny circle, so you can see how accurately the dent was positioned. Don't drill into the metal, just mark it. Now, you can see if you need to move the dent in one direction or another.

To move a dent, use a beveled or onglette graver. Decide which direction from the hole the dent should move. Point the graver at the hole from that direction. (See diagram above.) Position the tip of the graver 0.5 mm to 1 mm away from the hole, depending on how far you want to move the dent. Drive it in at about 50 degrees, and then lever it up and out. This moves the hole, and the dent, in that direction.

Lastly, take the small pilot drill and begin drilling again in the new position. A hole can be moved as far as a few millimeters, which is usually enough.

Pilot drilling. Pilot drilling is vital for getting an accurate hole. I will often begin a hole with a 0.6 mm or 1 mm drill bit, regardless of what size the finished hole will be. Once, when I was laying out a series of graduated circular holes in a girder shape, I used 19 drill bits for the central, largest hole to ensure accuracy and proper spacing between the holes.

So here's a good habit to get into when drilling: After making each hole, take a larger drill bit or a ball bur and, by hand, turn it once in the hole. This deburrs it and leaves a tiny but perceptible shiny bevel on the top edge of the hole. This "finish as you go" behavior really cuts down on the total time spent working on a piece, and it keeps construction clean and tidy.

Tool Tricks - tips and methods for creating jump rings

By Charles Lewton-Brain

Jewelers use jump rings extensively as chain components, connectors, and linking devices for multiple construction problems. Here are a few tips and methods for creating jump rings:

› Most jump rings are round, but other shapes can be made-it just depends on the cross section of the mandrel rod they are wound around. Whatever shape mandrel you use, I recommend using steel because the wire stays put after being wound. (I also like to use drill bits as mandrels.)

Broken burs, old needle file handles, and round metal rods make great mandrels. When making your own mandrels, cut a slit into the end of the rod to permit the wire end to catch when you're winding it. You can also drill a hole through the rod for the wire end.

› When winding jump rings, don't make the coiled sections longer than 2 cm. It's difficult to hold long sections while cutting the jump rings apart.

› It's a good idea to anneal the wire before you begin. Robert Kaylor of Boise , Idaho , coils the wire into a tin can while annealing to avoid accidentally overheating one section of wire. The metal can creates a "muffle," which provides a more even heat for the wire.

› You should straighten the wire before winding it onto the mandrel. My favorite method of straightening wire is to stretch it. Place one end in a fixed vice, grab the other end in a stout pair of pliers, and stretch it the same way you'd pull a wire when drawing.

› You can straighten (and even draw) wire very effectively by using leverage. Clamp one end of the wire in a vice and make a small loop at the other end. Place the loop on the rod and lever against a wooden block attached to the bench top.

› After straightening, wind the wire into a coil on the mandrel. You can make a jump ring coil by using an old-fashioned hand drill to hold the mandrel. Clamp the drill handle into a vice and chuck the mandrel into its jaws. Carefully feed the wire onto the mandrel while slowly and steadily cranking the drill. Kink the end of the wire to a right angle and slip it into the jaws of the chuck. Feed the wire through tightly gripped fingers, keeping tension on it as you wind. This will keep the jump rings taut.

› It's easy to make your own basic jump ring winding tools. The simplest tool uses a little brass hinge section. Clamp it into a vice, insert the winding mandrel, place the wire into the slot or hole at the end of the mandrel, and turn. It helps if you bend the end of the mandrel into the shape of a hand crank.

› Another wire winding tool is a rechargeable battery-powered screwdriver, which has low speed and high torque.

› Here is a jump ring winding tool that I created from an extruded aluminum window channel (see photo). The slit in the end of the T-bar winding mandrel catches the wire. The wire is then fed under the washer, which is clamped tight. This keeps tension on the wire while it is being wound onto the mandrel.

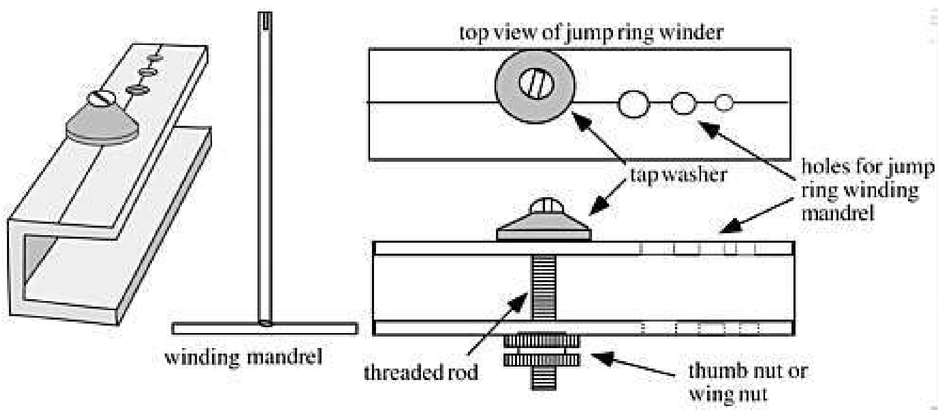


Photo: Charles Lewton-Brain

When you are ready to remove the jump rings, disengage the mandrel by turning it in the opposite direction. As you pull out the mandrel, the jump rings slide off easily.

Tooling a Round

Tips for removing, holding, and drilling pearls
By Charles Lewton-Brain, 2004

When taking in a piece of pearl jewelry for repair, it may be necessary to remove the pearl to avoid damaging it. Since most pearls are held in place with glue, you can remove them by gently warming the jewelry piece. You want the part near the pearl to get warm and soften the glue. Most glues will soften with heat, allowing you to pull the pearl off the peg easily.

If epoxy was used to attach the pearl, a soak in the appropriate solvent, such as acetone, may permit pearl removal, but it's a good idea to try the gentle heating method first.

When repairing pearl jewelry, you may need to replace a pearl. Finding a perfect match for the piece may require half-drilling an undrilled pearl. The following tricks can make holding a pearl in place and drilling it a lot easier.

Holding a hard, slippery pearl still while successfully drilling it can be tricky. It's dangerous to hold the sphere in your fingers, so other methods are necessary. Give the following holding tools a try:

- A three-jawed chuck (see photo), such as that on a hand drill, a flex-shaft handpiece, or a three-jawed miniature lathe, can be used to hold a pearl in place securely. You can remove the flex-shaft handle when using it as a clamp.
- A commercial tube-cutting jig can be used to clamp a pearl. Originally designed to hold a round rod, these jigs also work with spheres. Graver-sharpening jigs can also be used.
- A simple tool for holding pearls is a piece of metal with holes in it. Bend the metal over the pearl so two holes surround it on either side. You can hold the metal piece in a pair of pliers or a hand clamp while you drill the pearl.
- Sections of piano hinges or similar small hinges are great for this purpose, as they already have holes drilled in them that line up perfectly when the hinges are closed around a pearl.
- self-locking tweezers with ring-shaped ends can be used to clamp a pearl for drilling.
- This circular version is a relative of a standard commercial pearl drilling jig. The commercial jigs clamp even better than this design and cost under $10. They are available from most jewelry suppliers.

When drilling a pearl, the drill bit tends to skid off the surface, endangering you and the pearl. To prevent skidding, make a small indentation in the pearl prior to drilling. Start by clamping the pearl securely into one of the holding devices listed previously. Take a sharp pointy steel tool, such as a soldering pick, heat the point to glowing orange-red, and press it onto the pearl. Move your hand in a circling motion while pressing down. This will make a small indentation that your drill bit can grab onto, preventing skidding.

When you start drilling, you should drill in a little and then back out the bit repeatedly. The hollow grooves in the bit carry chips away from the drilling surface, but they tend to become packed with pearl dust during drilling. This can jam the bit in the hole and cause it to snap off?not a pleasant problem.

To avoid this situation, back the drill bit out every 1 mm as you advance it into the pearl. This pulls out the packed dust and releases it. Be sure to drill carefully and avoid using too much pressure, which can cause the pearl to split.

To gauge drilling depth, wrap a piece of tape around the drill bit to indicate the stopping point. Some jewelers make a small tape ?propeller,? which serves a dual purpose: it gauges drill depth and also blows away any dust that accumulates as you drill. (This trick is great for wax work and wood work, as well.)

V Prong Setting - To V or Not To V

To V or not to V? That is the question. Whether 'tis nobler in the minds of thou customers to place upon their marquise a prong in the shape of a V, or dost thou leavest it exposed to the concerns of the world.

Ok, William Shakespeare I'm not. However, for the bench jeweler, the question remains. What do you do with this prong in the shape of a V?

Several shapes of stones have pointed ends, including marquise, pear, heart, and princess. Because these points are often thin and fragile, it is important to protect them with a prong. This is particularly important on rings where the stone may be subject to more abuse than in pendants, earrings, or brooches. Although a standard prong will usually suffice, a V shaped prong is preferable. A V-prong provides additional protection and will more securely hold the point of the stone.

Special care is necessary when setting these stones to keep from chipping or breaking the point. Extensive preparation is necessary and work must be executed with precision to properly set them. Nothing short of true craftsmanship can be exercised while attempting to set a stone with pointed ends.

The seat in the V-prong may be cut with a variety of burs, gravers, drill bits, or files. There is no one best method. The method used will depend on the situation and one's own preference of tools. The following is the basic procedure I most often follow.

Using a small hart bur cut a line on the inside of the prong at the height you want the girdle of the stone. Check and double-check that this line is at the proper height and is straight and level. In addition to beginning to form the seat, this line will serve as a guide to base all future cutting on. If this line is off it will be near impossible to set the stone straight. This line does not have to be very deep at this point (it can be cut deeper later); however, do not cut into the prong more than 1/3 the thickness of the prong.

Next turn the bur 90 and cut a line down the center of the prong. This cut, along with the first cut, will form a cross-shaped pattern in the prong. This second cut will allow clearance for the pavilion of the stone. It is particularly important on the heavier cast V-prongs.

Using a bud bur cut a hole in the center of the cross. Cut no further than ? the way into the prong. This hole creates the void surrounding the tip of the stone. Make certain there is a cavity below AND above the tip of the stone. Putting pressure on the tip of the stone from above with no support underneath will cause the point to break off.

Finally trim away any excess metal and smooth the seat using a polished flat graver.

How you cut the seat is not nearly as important as what you accomplish. The seat you cut in a V-prong must accomplish three items:

1. A smooth even seat which will support the sides of the point on the stone.

2. A void to surround the very tip of the stone.

3. Enough metal must be removed to safely push the top of the prong over the stone, while leaving enough metal to securely hold and protect the stone.

Once the seat is cut completely, examine it for these items with a loupe or microscope. First examine the seat, then lay the stone in the setting and re-examine it. One small bur of metal or ripple in the seat is all it takes to break the point off a stone.

ALWAYS check the stone with a loupe or microscope before you begin to push the prongs over the stone. Then check AGAIN once the prongs are part way down and the stone no longer rocks. The small amount of extra time taken to check the seats can save a lot of heartbreak (or point break) later.

With pear or heart shaped stones, bend the V-prong over the stone first. Then push the remaining prongs over the stone tightening it in the setting. Setting the stone in this manner allows the stone to move slightly as you bend the V-prong, limiting the amount of pressure applied to the fragile tip of the stone.

On marquise shaped stones, bend the side prongs over the stone first, securing it into the setting. Then the V-prongs are adjusted down over the points. The V-prong is seen as protection to the fragile points rather than as something to hold the stone. Setting the stone in this manner limits the amount of pressure applied to the fragile tips of the stone.

You can use several methods to push the prong down onto the stone. You can use a prong pusher to gently roll the metal over the stone in the same manner you would push a bezel down. First, push on one side of the V, then the other. Alternate sides until the prong is tight against the crown of the stone.

Chain nose pliers with polished jaws can also be used. Place one jaw at the top of one side of the V, and the other jaw at the base of the opposite side of the prong. Gently squeeze one side down a little, then reverse the position of the pliers and move the opposite side. Work back and forth until the prong is down on the crown of the stone.

Another method using chain nose pliers is to place both jaws at the top of the outside edges of the V. Make certain the jaws are at the top of the prong well above the girdle of the stone. Angle the pliers to match the angle of the crown facets. Then gently squeeze the pliers together. As the pliers come together at the point of the V, the jaws will burnish the metal down onto the stone. Keep repeating the procedure until the metal is tight against the stone. As you work, excess metal will form between the pliers' jaws, making a line at the point of the V. You should remove this excess metal with a file. This method works better on the thinner die struck V-prongs.

Some jewelers cut a V in the top of the prong leaving two tabs to push over the stone. Then once the tabs are down the seam is soldered closed. This method works fine on diamonds, but cannot be used on most color stones. There is one danger in using this method on diamonds. If excess solder is used it can flow into the void providing clearance at the tip of the point. As the solder solidifies it contracts. This can cause the point to chip or break off.

Once the stone is set, trim and shape the outside of the prongs using a #6 needle file. Be certain the file has a polished safety edge to avoid the possibility of chipping or abrading the stone. Trim and clean up the inside edge of the V with a polished flat graver. Remove the file marks with an abrasive rubber wheel and polish.

Remember: Caution Is The Better Part Of Valor. If you feel uncertain while setting, STOP, take a deep breath, check all your steps, examine the setting with your loupe, then proceed. If you still feel uneasy, take a break, get a drink of water, relax a bit. Then re-examine the setting and proceed to finish the setting.

Working with Pearls

By Arthur Anton Skuratowicz and Julie Nash, 2004

Both natural and cultured pearls are formed when an irritant lodges in a mollusk. The mollusk then deposits layers of nacre, covering the irritant and producing a pearl. In a natural pearl, the irritant may be organic or inorganic matter. In cultured pearls, the irritant is a mother of pearl bead or a piece of tissue placed in the mollusk by a technician. The mollusk covers the nucleus with alternating layers of conchiolin (a protein-like substance similar to human nails) and nacre. The latter consists of very fine crystals of calcium and aragonite, which are very soft minerals. It is delicate and can be scratched or chipped easily.

Among cultured and natural pearls, there are freshwater and saltwater varieties. These names simply mean that the pearl formed either in a freshwater or saltwater mollusk. The information outlined in this article pertains to working with all pearls.

Overaggressive drilling has damaged the nacre on this pearl.
photo courtesy of Anton Nash.

Rock Solid Facts
Mohs Hardness: 2.5 to 4

Treatments
Many pearls of light body color have been bleached to im-prove color matching. Bright pinks, purples, greens, yellows, and blues have been dyed. Irradiation can also be used to achieve exotic colors, such as bronze or black.

Dyes tend to be concentrated around drill holes or blemishes. Irradiation often turns the conchiolin layer of cultured pearls dark. To help identify these treatments, look down drill holes under magnification.

In the case of very high end pearls, coatings have been an issue. These are difficult to detect. The use of a qualified laboratory is recommended if there is any suspicion about coatings.

Clean It
Cleaning pearls in an ultrasonic cleaner is not recommended. The vibrations of the machine can be harmful to nacre, and the chemicals used can attack the conchiolin layer, which can cause cracking over time. Steam cleaning is likewise not recommended. The temperature is damaging to the organic proteins in the pearls.

The best way to clean pearls is with a soft brush, such as one used for powder or blush, and a mild detergent, followed by a thorough rinse in clear water. If the pearls are strung at the time of cleaning, lay them flat to dry. This will prevent stretching the cord.

At the Bench
Pearls cannot tolerate heat or chemicals. In any repair situation requiring heat, it is best to remove the pearl. If the pearl cannot be removed for repair, use a heat-shielding product or immerse the pearl in water while doing torch work. Do not immerse the pearl in pickle solution, as it will etch the surface of the pearl.

Most pearls are drilled and glued onto a post with epoxy to set them in jewelry. Soaking the piece in methylene chloride solvent will usually allow the pearl to be removed. If methylene chloride solvent does not work, acetone can be used as a last resort. However, acetone may dull the surface of the pearl slightly, especially if the pearl is left in it for several hours.

An alternate method for removing a pearl is to heat the piece in water. To do this, heat a small pan of water with the piece in it. When the water is warm, try to pull the pearl from the post. Repeat this every minute until the water is too hot to touch. If epoxy was used to secure the pearl, this method of removal usually works. If super glue was used (which can stain the conchiolin layer and cause noticeable damage to the pearl), acetone often is required for removal. This is a very nasty situation in the case of an expensive pearl. The possible risks of acetone removal should be discussed with the customer prior to any repair that requires it.

Communicate with the Customer
Customers need to know that pearls are somewhat delicate. There are risks in the repair of any type of pearl jewelry, especially when removal of the pearl is difficult or not feasible. Customers need to be made fully aware of the risk to their pearl and any liability that you are willing or not willing to take.

When restringing pearls, count the pearls in the customer's presence and inform her that the pearl strand will be slightly shorter after restringing. (This is often due to the fact that the silk was stretched out from wear.) A professional restringing also includes washing the pearls. Once cleaned, filthy pearls look quite different.

Working with Topaz
By Arthur Anton Skuratowicz and Julie Nash , 2004

Topaz is commonly yellow, orange, or brown in color. Pink topaz is a lesser-known color. ?Imperial? topaz is a pink-orange color that is reminiscent of zinfandel wine. Colorless topaz is an historic diamond imitation. Topaz is found in many areas around the world, with South America and Sri Lanka leading production.

Rock Solid Facts
Mohs Hardness: 8
Cleavage/Fracture: one direction of perfect cleavage

Enhancements
The most common treatment is the irradiation of colorless or very light yellow topaz to cause blue color. Treatment of topaz with thin film coatings results in any color. Blues, yellows, browns, reds, greens, and iridescent examples of coated stones are available.

This topaz was damaged when moderate pressure was applied to a small cleavage.
photo courtesy of Anton Nash.

Clean It
Topaz has one direction of perfect cleavage that makes it prone to breakage (especially if fractures are present). Topaz often has liquid inclusions. Cleaning in a steamer or ultrasonic can cause damage in stones with fractures or liquid inclusions.

If dealing with a hard to replace pink "Imperial" topaz, a customer's stone, or a custom cut stone, the safest course of action is to clean the jewelry with a soft brush and warm soapy water. If the stone is a stock size and color that is easily replaceable, you may feel confident enough to steam and ultrasonic clean. Just be sure that you are very comfortable with the possibility of having to replace the stone.

At the Bench
The primary issue with topaz that must be remembered at the bench is its one perfect cleavage direction. Hammering or putting pressure on a topaz runs the risk of cleaving the stone into pieces. Routine stone tightening on a prong set topaz can result in cleaving the stone. Setting a topaz in prongs presents a greater risk than tightening. To minimize the risk, avoid alloys that are very hard, as well as overly thick prongs. Cut stone seats with care and smooth away any burrs left by tools.

The design of a piece of topaz jewelry should take into account the stone's tendency to cleave. Use slightly thinner stone settings or more malleable alloys. Channel settings are difficult, as pushing the girdle edge of the stone into the channel is a perfect opportunity to cleave the stone. Designs should also be engineered in a way that protects the topaz from any sharp blows during normal wear.

Files and burs can cause scratches on the stone. The most common tool damage on a topaz takes the form of small chips along facet junctions, again due to the cleavage. This type of damage is obvious and should be avoided by using files with safety edges and doing as much sanding and filing as possible prior to stone setting.

Topaz cannot tolerate heat from a jeweler's torch. Retipping with the stone in place is not possible unless using a laser welder. Sizings and other repairs can be done with the stone protected in a water bath or heat-shielding product. It is safest to remove the stone if possible.

Coated topaz must be handled with the utmost care, as the coating can be worn off or otherwise affected by buffing compounds.

Tools That Rule

- Laser welders allow topaz to be left in place during repairs. However, make sure a skilled operator uses the machine, as hitting the stone with the beam will likely result in damage.
- Heat shields or water baths are necessary in situations where topaz cannot be removed from the setting during repair.
- A safety edge file prevents chips and abrasions when finishing prongs.

Communicate with the Customer
Customers need to know that blue topaz is irradiated and heat-treated to its current color. They can be assured that the stones are not radioactive. In the case of a coated topaz, the customer absolutely has to understand that the color is not natural and may not be permanent if worn roughly.

Sharp blows, especially to rings and bracelets, often result in a broken topaz. Make sure the client understands that topaz is not an appropriate stone for the gym or the garden.

In repair take-in situations, make sure the customer understands that topaz can cleave in the process of repair. Before you accept the job, fully inform the customer about what you will and will not be responsible for if the stone is damaged.