

RIVETING HANDOUT

Standard, raised, tube, pivot,
and managing multiples

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This document is a helpful guide for riveting sheet metal designs. It is intended for riveting primarily flat, stacked layers of metal. If your design includes any non-flat sheet, check with your instructor for strategy and tips.

Angela Dalio
Hand Brooch
Copper sheet, Brass rivets
3" x 2" x 1/4"
Course: Intro Jewelry and Metals, Montgomery College

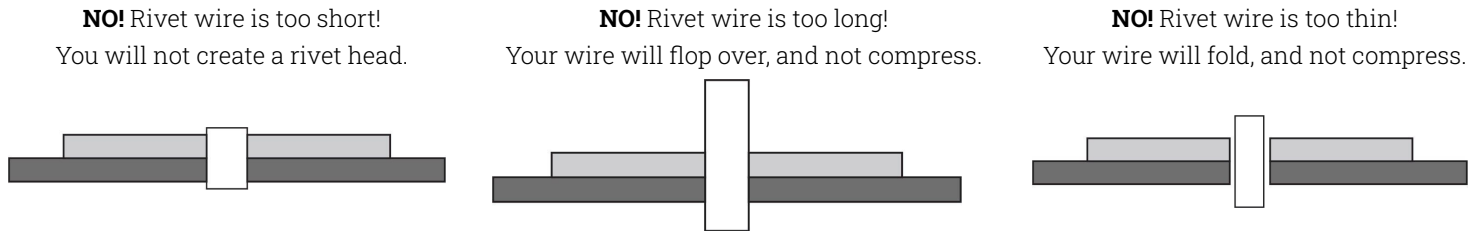
ORDER OF OPERATIONS: Quick Reference

1. Create: Saw/texture layers of sheet metal.
2. Drill rivet holes
**For small pieces, drill a hole first, then cut it out.*
3. Clean up: File, sand all edges and surfaces
4. Finishing: Patina or polish
5. Set Rivets

**Some exceptions to this order for Flush Rivets*

Rivet Basics

The fit and height of the rivet wire in relation to the drilled hole, and gauge of sheet is very important. It must be just right so that the rivet wire will compress, rather than crumple or fold when hammered. The rivet wire must be long enough for a rivet head to form when hammered, securing the sheets together.

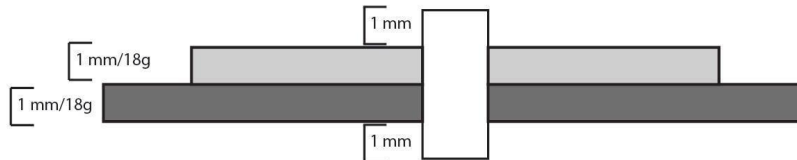


NO! Rivet wire is too short!
You will not create a rivet head.

NO! Rivet wire is too long!
Your wire will flop over, and not compress.

NO! Rivet wire is too thin!
Your wire will fold, and not compress.

YES! Rivet wire is the correct length and thickness!
It fits snug in the drill hole and will not fold over when hammered, creating a nice rivet head.



**This diagram shows rivet wire PRIOR to hammering.*

MORE Tips:

Keep holes accurate! Once your holes are drilled, the metal cannot be textured, bent, or formed in any way. This will stretch or alter your rivet holes.

Prep your rivet wire. Anneal your rivet material so it will compress when hammered. File the ends of your rivet wire flat so that it will compress evenly. (Note: when using wire cutters, the end of your wire will be pinched, not flat. File it).

Support your rivet wire. The rivet cannot go through an empty space. This will always cause the rivet wire to bend, rather than compress. Make certain your layers are flush against each other, or add a support material such as a tight fitting heavy wall tubing.

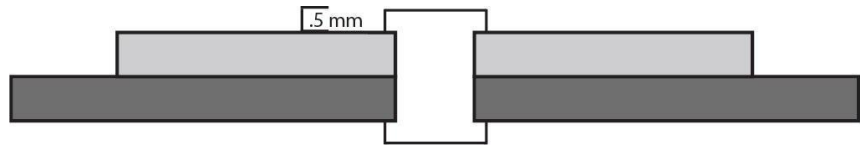
Setting your rivets: Work slowly and gently. Hammer lightly and with good control. Only let your rivet hammer contact the rivet wire (not your beautiful sheet!). Don't heat work once rivets are set, this will anneal the rivet wire, and make them fragile.

Alternative Materials: Riveting is great for connecting alternative materials together. BUT, you will usually need to sandwich that material between two pieces of metal.

Multiple rivets: Special care is needed to ensure holes line up. ***See steps on the last page.***

Step by Step Instructions

Standard Wire Rivet:

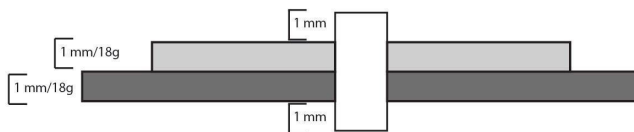


Prepare your sheet metal for riveting

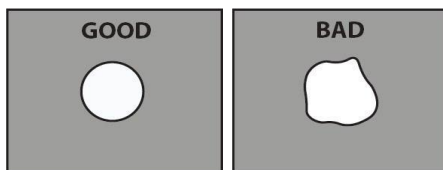
1. **Center punch** the top layers where you intend to drill.
*When layers are very small, drill before you saw
2. **Secure layers** together using masking tape. Use a drilling clamp when appropriate, especially for drilling larger holes for tube rivets.
3. **Drill** the appropriate holes through both layers of metal
4. **Clean up:** Once all the holes are drilled, take the tape off and sand the surfaces as desired (usually to 600grit)
5. **Patina:** Add patinas where desired.
6. Now that your holes are drilled and your surfaces are beautiful, you are ready to CAREFULLY set your rivets.

Set your rivets

1. **Use annealed wire.** You can anneal before or after you cut. Small pieces are easily lost, but soft wire is more bendable. Keep your wire straight!
2. **Measure and cut your rivet wire.**
Your wire should be about **2mm + the thickness** of your stacked metal.
If you are using two layers of 20g or 18g metal your wire will be about 4mm.



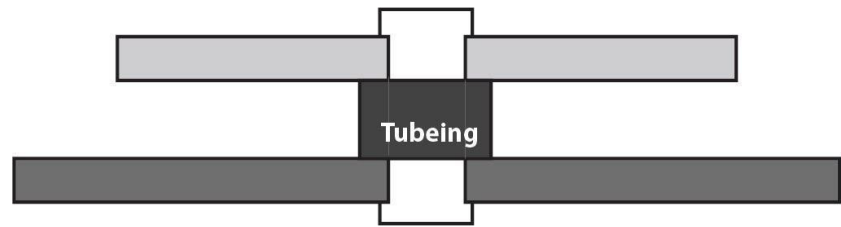
3. Place your rivet wire into your drilled layers. Split the amount of rivet wire so there is **1mm on the top** and **1mm on the bottom**.
4. Using a **rivet hammer** and a **steel plate**, gently tap the rivet wire to set your rivet. Alternate between the top and bottom to make sure that your wire is evenly displaced. Your rivet wire should only be in contact with the steel block and the hammer head. **Your sheet metal will be hovering above the plate, not touching it.**
5. The rivet head will look round, and slightly raised above the surface on each side.



DO NOT HAMMER SO HARD THAT YOUR RIVET LOOKS LIKE A PANCAKE.

This is a delicate controlled process!

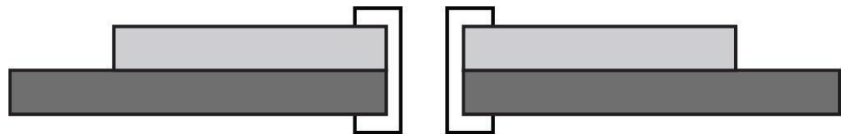
Raised Rivet:



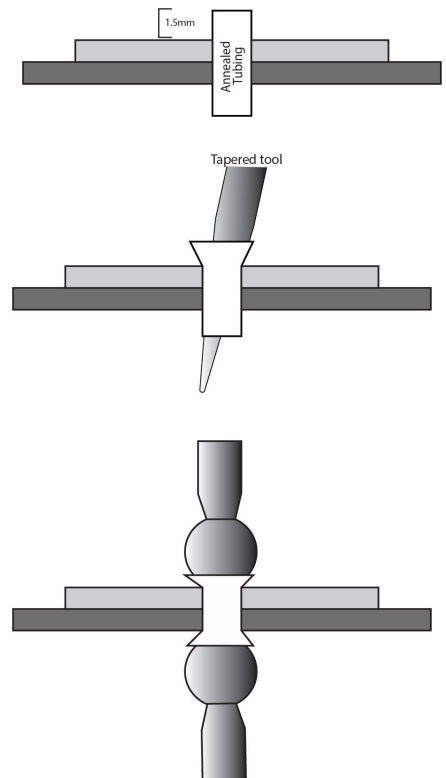
1. You will need a piece of **heavy wall tubing** that fits your rivet wire perfectly!
Do not anneal this tubing. Use a tube cutter, and cut it to whatever length you want.
2. File tubing is totally flat. It cannot have any angle whatsoever, or your top plate will follow that angle. (Trick: Use a flex shaft, but don't squish it!)
3. Set your rivet the **same as a Standard Rivet**.

*Note: A raised rivet can also be used with a variety of different rivet heads. Mix and match as you wish!

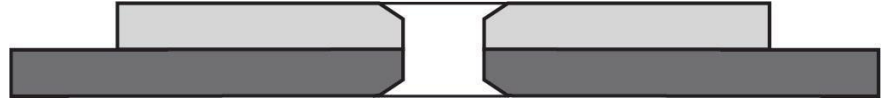
Tube Rivet:



1. You will need **thin wall tubing** that fits snugly into your drilled hole.
2. Measure and cut tubing about **3mm + the thickness** of your stacked metal. ****This might vary based on the size of the hole/tube. Experiment a little!***
3. **File and sand the tubing totally flat and smooth.**
(Trick: Use a flex shaft, but don't squish it!)
4. **Anneal the tube!**
5. Place the tube through your rivet hole. Divide the excess between each side. (approx. 1.5mm)
6. **Start to flare** both sides of your tubing using a tapered steel tool (center punch or scribe works well).
7. Continue to encourage the tubing to flare with some **dapping punches**. Place one punch in a vice, and hold the other above, and strike with a hammer. Gradually use larger dapping punches, don't flare it too quickly or the tube will fold.
8. **Finally register your tube rivet totally flat** against your sheet using a rawhide or plastic mallet and your steel block (See top diagram for end result).
Be gentle. Protect your sheet metal.

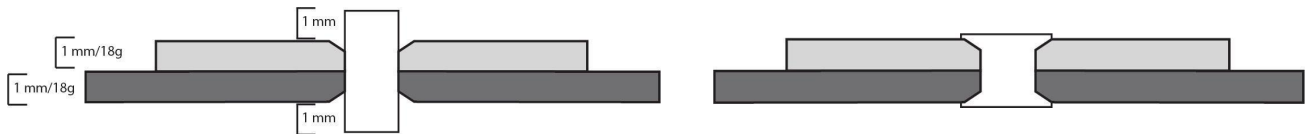


Flush Rivet:

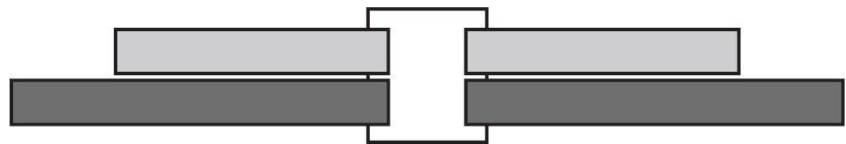


NOTE: The order of operations will be different with a flush rivet. The flush rivet needs to be sanded to 600, **after it has been set**, so that it will blend in with the metal around it. This means any patina would be sanded away as well. Plan accordingly.

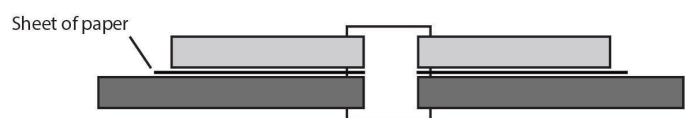
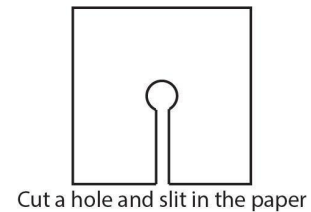
1. Prepare rivet wire exactly the same as a standard rivet. ***Mind the note above.***
2. Countersink your drill hole by using a slightly larger drill bit. While rotating, kiss the top of the previously drilled hole. This will leave you with more of a **funnel**, not a straight drill hole. ***A bur can also be used to do this.***
***The countersink cannot be more than ½ way through the thickness of the metal sheet.** If you go too far, you just made a new hole.
3. **Continue with standard rivet procedure.**
4. Hammer rivet head so that it expands and fills the countersunk space.
5. Once set and stable, **sand the surface totally flat**, and the rivet will be completely flush with the surface of the metal (see top diagram for end result). If using the same metal for wire and sheet, it should be practically invisible.



Pivot Rivet:



1. To allow for movement in a riveted piece, a piece of index card may be placed between the materials to be riveted prior to setting the rivet.
2. Punch a hole and cut a slit in the paper.
3. Place the paper between the sheet metal. Make sure the hole is where the rivet is going through.
4. Set the rivet using your preferred rivet style.
5. Then remove the paper. Your top sheet should swivel.

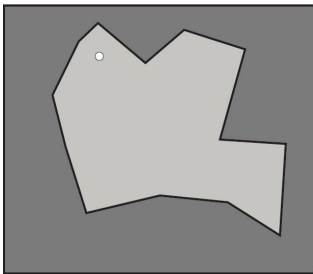


Strategy for Multiple Rivets in one piece!

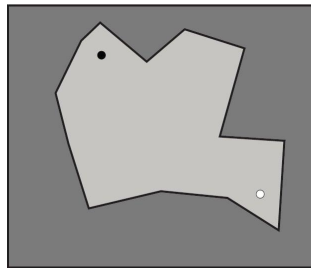
When placing more than one rivet in a single sheet of material, it is crucial that all the holes line up! This means it is ESSENTIAL that the sheet metal does not shift as you move through drilling the holes. A slight shift means nothing will line up later. If this happens, you may have to re-drill everything a little bigger, and use a larger rivet wire. This can be quite stressful when you thought you were on your very last step, and now are back at the beginning again! So take extra, EXTRA, care to do this correctly.

1. You can use any style of rivet mentioned above.
2. **Center punch** the **top layer of metal all the places** you want your rivets to be.
3. Tape pieces together securely. Make sure you can still see the center punch marks.
TIP: Some **vices** might be enough to hold the work throughout drilling. Pieces could also be **super glued** together. A little heat will release them later, but you must have good ventilation for this, and don't fully anneal the pieces! It's best they stay work hardened.

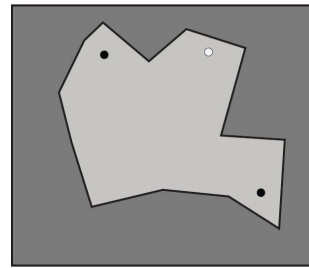
Regardless, try the following steps to keep the layers from shifting while drilling.



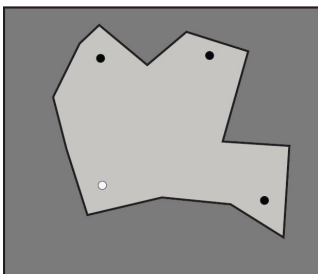
Drill first hole



Plug first hole, drill second

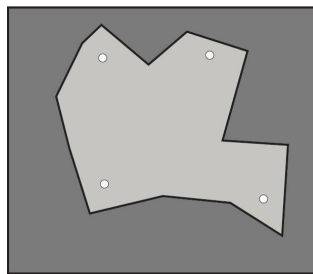


Plug second hole, drill third

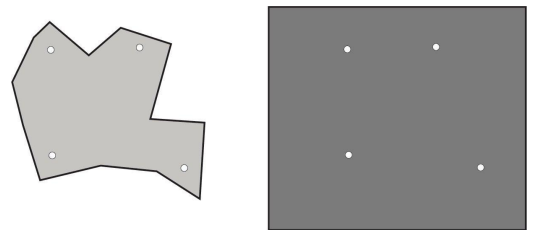


Plug third hole, drill fourth.
At this point, the two layers should not be able to shift.

Drill all remaining holes



Remove all plugs



Separate sheets

Sand to 600, patina or polish as desired.
DO NOT hammer or bend. Your hole will shift!

When ready, set rivets in the preferred style.

ANOTHER WAY! You have the option to drill and set rivets all at once. For example, drill hole one, set rivet one, drill hole two, set rivet two, drill hole three, etc.

The drawback to this method is that you will not be able to sand your sheet metal surface easily with little rivet heads everywhere. Additionally, this will make it difficult to keep a nice patinated surface, because the drilling process can be damaging (tape, oil, fingers etc). You can try and see.

You can patina your metal AFTER rivets are set, but it might create some limitations in your design. For example, you won't be able to use liver sulfur on only ONE layer now that they are joined.

Whatever your intentions, plan accordingly. EXPERIMENT to learn your preferences!