



Objective: Students will learn to safely use tools including hammers, stamps, files, jewelry saws and the rolling mill to create texture and patterns on copper. They will learn to drill holes, use files, and how to add color to the pieces with various methods of patination. Students will design and create a layered pendant or pendants. They will make decisions about design, appropriate tool usage and color based upon information received in this worksop. Students will leave the studio with at least two completed textured and patinaed copper pendants.



Note: the web is the source for images. Images appear for educational purposes only.

Supplies - listed per student unless noted

- 2-3, 3-inch 18 gauge copper circles
- 1, 4-inch x 4-inch sheet of 18 gauge copper
- 2, 18-inch "leather" cord necklaces with clasp
- 3-8, 1/4-inch copper jump rings
- 1 pair each - chain nose, round nose and flat nose pliers
- 1 set of needle files
- 1 jewelry saw frame
- 2-8, 2/0 jewelry saw blades
- 1 ball-pein hammer
- 1 set of alphabet, number, geometric, abstract and organic metal stamps per 8 students
- 1 4-inch x 6-inch metal anvil
- 1 drill press per 4 students
- 1 6" rolling mill per 8 students
- 1 soldering/annealing bench with 3 torches per 8 students
- 3, 3-foot x 8-foot wood benches with chairs per 8 students
- 3 enameling kilns per 8 students, 1 fork per kiln
- 1 80-mesh medium sized sifter
- 3 firing forks per 8 students
- 4 metal screens/stands per 8 students
- 3 tripods per 8 students
- 15 assorted colors of 8 ounce, 80-mesh enamels
- 1 paper plate per container of enamel
- 4 alundum stones per 8 students
- 1 dust mask
- 1 paper plate to create stencils
- 1 pair scissors
- 4, 8 ounce bottles Klyr Fire per 64 students
- 1, 8 ounce bottle liver of sulfur per 64 students
- 1 delrin hammer
- 4 dapping blocks with complete sets punches 4.5 mm - 40 mm
- 2 sheets 18 gauge brass per 8 students

Patina

Red Patina - Use the large torch (Big Bertha) to heat the copper until it is RED hot. Use tongs to drop the bracelet into a pot of boiling water/borax until it bubbles. Use tongs to place bracelet in clear water. Remove and dry.

Black Patina - clean the copper with soap and hot water. Use tongs to place the bracelet in the water/liver of sulfur mixture. Leave until desired color is achieved. Remove from the liver of sulfur, rinse and dry. Use a

History of Metalsmithing

Jewelry has been worn by people since ancient times. The earliest people wore necklaces made of bones and animal teeth. The Egyptians started using gold and silver for jewelry around 2,000 B.C.

- The Egyptians were among the first to incorporate precious stones and enameling in their jewelry.
- During the Medieval period, styles and morals combined to discourage the wearing of most types of jewelry except for brooches which were used to hold up tunics and cloaks. Rings were also important at this time - think signet rings (used to seal documents).
- In the late Medieval/Early Renaissance period more jewelry started appearing including necklaces as collars. The collars became more elaborate as time progressed and rings and brooches were still worn.
- During the Renaissance/Elizabethan period many types of jewelry were worn. Pearls were the common "gem" and earrings appeared in the 16th century.
- The art of jewelry-making was refined during the Georgian and Victorian periods in Europe. Artists started making cameos and lockets.
- In the 1920's Art Deco pieces became popular, featuring abstract geometric forms and shapes.
- The Retro Modern style, with flamboyant curves and bows in large pieces of jewelry was introduced in the 1940s. Yellow, pink and green gold and unusual colored gemstones were also used in this jewelry.
- World War II created a shortage of platinum, so most jewelry was made of gold and silver, but platinum made a huge comeback in the early 1990s. Pieces like the tennis bracelet and diamond solitaire pendant made its debut during the latter part of the 20th Century and designer jewelry gained popularity, too.

Vocabulary

Annealing - heat and allow the metal to cool slowly in order to remove internal stresses and toughen it.

Ferrous - metal that contains iron (like steel)

Non-ferrous - metals that do not contain iron (like copper, brass, bronze, silver, aluminum)

Fabrication - term used by metalsmiths to indicate work made by hand

Work hardened - metal that has become tough due to work processes such as hammering or roller printing

Bench block - a heavy piece of iron or steel with a smooth top on which metal is shaped

Filing - using an abrasive to smooth rough edges of metal; proper filing is completed by pushing in one direction

Patina - method of coloring metal caused by chemical reaction

Resources

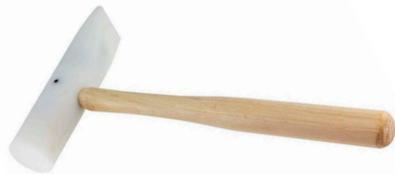
- **Metalliferous** - www.metalliferous.com - metal and tools for jewelry and small sculpture
- **Rio grande** - www.riogrande.com - jewelry findings, metal, gems, tools and equipment

Creating a Textured Copper Pendant Steps:

1. Use a piece of scrap metal to test out ideas for textures or stamped patterns.
2. Start with a clean piece of annealed copper.
3. Begin with textures created by rolling the copper through the rolling mill with various materials. Use 2 pieces of brass on either side to make a "sandwich" to protect the rollers. The brass can be used twice before it needs to be annealed.
4. Place your "sandwich" in between the rollers, and tighten the handle. Take note of the number that the dial is on. Open the rollers just enough to remove your material. Tighten the rollers 2-3 numbers past where you stopped before. The rollers should be tight when your material passes through, but not overly difficult to move through the mill.
5. Add stamping or hammer texture to create depth and intricacy to your design.
6. Consider both the front and the back of the pendant.
7. Once you are satisfied with your design, center punch and drill a hole for the jump ring.
8. Move to the forming station to use a dapping block to create volume for one of your pendants. We will use a wooden block and a Delrin hammer in order to avoid damaging your pattern. Metal tools will deform your textures.
9. Go to the enameling station to add powdered glass to one of your pendants if desired.
10. Patina your domed pendant with liver of sulfur if desired.
11. Add the cord.



Roller mill - used to flatten and thin metal or to add texture to metal by rolling metal and fabric, leaves or other thin objects through the steel rollers



Delrin hammer - hammer made from a non-marring, but strong polymer



Stamps - used to add marks to metal



Dapping block - used to create a depression in flat metal. The block can be wood or metal and has concave depressions in it. A hammer or a die are used to force the metal down into the depression.



Samples of a variety of patinas for copper:

Liver of sulfur - causes the copper to blacken; depth of color depends upon amount of liver of sulfur used and number of times dipped or coated
Borax - creates a "reddish" hue
Vinegar with salt - can create pitting or tarnishing effects
Flame or torch - creates a "rainbow" effect.

Copper Fabrication Safety

- Wear safety goggles throughout this activity to protect your eyes from potential metal fragments and chemical spills or splashes.
- Be aware that the metal can have sharp edges. Use caution and file sharp edges smooth..
- Always use the tongs to handle the copper after it is heated and while putting the copper into and taking it out of any type of chemical bath/solution or hot/boiling water.
- Keep your hands away from the path of the hammer and be aware of the location of your classmates when you are hammering.
- Keep all dangling jewelry or loose clothes out of the rolling mill. Make sure that long hair is tied back. Never put any wet organic material through the mill, and make sure to protect the rollers with a brass "sandwich."



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