GBW Standards of Excellence, 2019

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Metalworking for Book Workers

This presentation is intended to demystify metalworking for the book worker. The focus will be on fundamental techniques rather than on making specific projects. Finishing tools, book clasps and furniture have been primarily made from non-ferrous metals so these familiar objects are a useful entry point to this subject.

This will not be a historical overview, however we will take inspiration from the basic characteristics of certain common styles for the purpose of identifying necessary techniques. For finishing tools we will consider a more modern design style, albeit one with a basis in Aldine tools of the past. In other words: simple, closed shapes rather than delicately engraved designs.

I was attracted to this subject because of a fascination with these objects. Why make things like this? Creative control and immediacy; a fascination with the way design is influenced by the limitations of tools, materials, and even skills; and, finally, a need to feed a tool acquisition addiction. Along the way I discovered some interesting pedagogical connections that have inspired me to incorporate this subject into my bookbinding teaching and to give this presentation.

Tool and Supply Resources

Riogrande.com
Mcmaster.com
Contenti.com
Onlinemetals.com

Safety

Wear safety glasses at all times (no, your regular glasses don't count). No loose clothing and tie hair back when using flex shafts and belt grinders. Ventilation is important when working with torch, pickle, patina, etc. Fire safety is critical when working with torches, of course. Nitrile gloves for patina operation. Check SDS on all products and materials to determine safe handling and disposal.

Metals

Medieval clasps were primarily made of copper alloys. Historically there were a wide variety of these alloys but today we tend to break these down into two main types—Brass (copper with zinc) and Bronze (copper with tin). There are a number of additional metals (such as lead, nickel, aluminum, etc.) also included in these alloys. Varied proportions and tertiary metals provide different colors as well as working properties.

There are a few basic reasons for selecting particular alloys. Brass is easier to shape than bronze. Bronze is safer and easier to cast than brass. Some alloys are more or less hazardous when handling in general. Therefore I prefer to purchase known alloys for safety and predictable results.

Older finishing tools tend to be bronze and modern tools are generally made of brass. The methods of making the tools influence this greatly. Many older tools are made with cast blanks while modern tools are machined.

Jeweler's Brass (aka NuGold and Merlin's gold) can be purchased in 6 x 12 dead soft sheets from Rio Grande. 14-26 ga. 20 gauge is an easy thickness to work with for most clasps. 24 gauge might be better for dapped shapes as the thinner metal will be more easily shaped. Rio also sells this in wire form—14 and 16 ga. are nice for pins in catch plates and 16 or 18 ga. can be used to make custom rivets.

Escutcheon Pins (decorative finishing nails) should be solid brass if you want to convert them to rivets or pins. Check with a magnet to be sure they are solid brass and not plated. McMaster-Carr is a good source with many sizes.

Brass 360 (aka ultra-machinable) for basic tool blanks. I use a lot of .25" extruded square bar and .25 x 3" bar to cut larger tool shapes and for "carving" clasps that are thicker forms rather than the styles made from sheet metal. These sizes and many more are available inexpensively from onlinemetals.com.

Though we will touch only a little on casting it should be noted that the **"ancient bronze casting grain"** from Rio is a good value and far safer than casting with brass or some other bronze alloys.

Measuring and Layout tools

Gauge Plates (sheet and wire gauge, drill & tap gauge)
Micrometer
Calipers
Ruler
Dividers
Scribe
Center punch

Cutting tools
Jeweler's saw frame and blades
Snips and Nibblers
Wire cutters (regular and flush cutting)
End nippers

Fabrication tools
Small ball peen hammer, Cross peen forging hammer, Planishing hammer
Rawhide and brass mallets
Bending jigs (make them)
Dapping tools
Pliers (parallel jaw ring pliers, flat sheet metal bending pliers)
Flex shaft or Dremel tool
Burrs and a drill index
Belt grinder
Wet/dry sandpaper (220, 400, 600)
Delft clay for simple casting

Bench Accessories
Bench Pin and other work holders
Anvil or Bench Block
Vise (with jaw protectors of leather or copper)
Magnification (optivisor)
File card
Burr-life or similar lubrication
Mini drill press
Torch (several options will be described)
Annealing pan
Pickle pot (crock pot)

Files

A variety of decent files are critical for making tools, clasps and other metalwork. This list includes a few favorites and the most commonly useful. **Full size files** for jewelers are anything 4-8 inches in length (not including the tang). They should be secured in handles for safety and comfort. **Needle files** are smaller and often have a knurled 'handle' area. They don't require an added handle though I sometimes use a plastic screw-on handle when using them for long periods. **Riffler files** and silversmith's rifflers have double-ended, curved profiles used for getting down into tight areas.

For removing material from larger surface areas and rough shaping use a 6-8 inch **mill file** or similar. However, I mainly use jeweler's files that follow the Swiss Cut system. Basically cut 0 is 'coarse,' cut 2 is medium and cut 4 is fine. Contenti sells Grobet files listed below for a reasonable price. Don't forget handles for full-size files!

6-8" Hand File, cut 00
6" Barrette File, cut 0 and 2
6" Half Round File, cut 0 and 2
5.5" Needle file set, cut 2 and 4 (the Tell sets are *OK* and economical)
6.25" Barrette needle files, cut 0 and 2
6.25" Crossing needle files, cut 0 and 2
6.25" Round needle files, cut 0 and 2

Chainsaw files are also extremely useful and inexpensive (mcmaster.com). Get all of the sizes!

Brief Bibliography

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