Metals 101 Certification Class
Part 1 Project Introduction

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Your instructor:_____ on _____, 20___

Welcome!!

We will continue to the practical portion of our certification class. Reading this online does not constitute certification. You will need to complete sampler project with an instructor in order to achieve certification. (Special circumstances may apply, and decided at instructor discretion)

Prerequisite: Metals 100
This portion is a prerequisite for 102 and 103.

Goals:

- Identify basic hand tools for the 101 certifications
- Demo of tool use
- Practice using tools on practice material
- Overview of the project, get materials
- Complete the certification sampler project and checklist.

Identify Tools: There are tools that perform different jobs, the following 5 categories cover most uses of basic hand (bench) tools. The following tools can be used on unheated (un-annealed) metal sheet, wire, and tubing using traditional skills.

- **Gripping/Securing:** bench pin, vise, pin vise, pliers, clamps, adhesive, 3rd hand
- **Cutting/Removing material:** Jeweler's saw, hole punches, shears, snips, disc cutter, files, sand paper
- **Shaping and Forming:** Hammers, pliers, mandrels, jump-ring maker, stakes, anvils, bench blocks, dapping punches/blocks, stamps
- **Measuring, Marking and aligning:** center punch/scribe, jeweler's rule, dividers, templates, tri-square, gauge wheel, ruler, triangle, compass
- **Finishing:** sanding sticks/paper, polishing cloths, preservative wax or spray, steel wool, brass brush, chamois

There are many other processes that share tools with the categories listed above, such as surface treatment, fabrication, and wire wrapping. Surface treatment falls more into the finishing category but can be approached at most any time in the process of making depending on the desired effect.

List of tools you should consider using in fabricating your project. **The highlighted tools are expected at this stage and their proper use will be demonstrated by your instructor.**

- Jeweler's saw
- Hole punch
- File
- Sanding media—what grit do I use first?
- Hammers- ***There are different types of hammers***…
- Ring Mandrel
- Bench Block
- Anvil
- Dapping Punch/Block
- Pliers—which pliers do I use for what purpose? Wait, there are different kinds??
- Aviation shears
- Calipers, Jewelers rule, gauge wheel
- Bench pin
- Stamps and punches
- Jump ring maker
- Trinity

Important to Remember!!

- Annealing is a heat process to soften metal that has become hardened through fabrication processing, to make it pliable and prevent it from getting too brittle
- Annealing your materials may be required depending upon the process you choose to complete your project.
    - Rule of thumb for shear and rolling mill: metal over 20 gauge will need to be annealed before using these tools.
    - Texture hammers and stamps all metal must be dead soft or annealed.

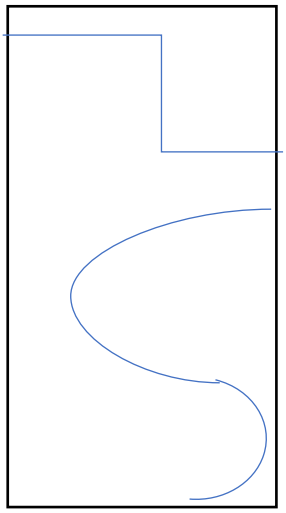
- Do NOT use STEEL for your work material. Doing so will mar the tools and transfer those marks to future materials.
- Avoid exposing tools to moisture: dry tools thoroughly if wet, dry pieces (work material) thoroughly before using tools. Any moisture on the tools will rust them immediately.

Practice time!

Use the scrap pieces and follow the instructions below.

Instructions:
Jeweler's saw practice:

1. Either free hand or using the ruler draw an angled line with several angles. Either free hand or with the circle template draw a curved line.
2. Select a blade from the holder, load your frame and cut the lines that you drew. Think about an order of operations and how you are going to hold the material. Only the staircase and the curvy line need to be cut for this exercise. Use your material wisely, as the scrap may be used in your project.



Project instructions:

Materials:
1 2"x6" 22 gauge Copper
1 2"x 4" 22 gauge Copper
1 pc of 14-gauge wire at 6"
1pc of 18-guage wire at 6"
Any materials from the Scrap bin
Additional non-scrap supplies must be purchased

Sampler Requirements:

- **You must use the check listed tools in your processes**
- **You will follow the basic instructions to fabricate one of the "boxes"**
- **You must use the tools properly and safely.**
- **You must complete the sampler project to achieve certification. *(all three classes)***
  - **Box requirements:**
  - **it must have either a hinged or pressure fit lid**
  - **it must have some surface texture. either compressed or raised**
  - **it must have some embellishments constructed by you.**

Sampler Instructions:

You will need to decide which box you are making. You will either follow the square or cylinder instructions. Whichever design you decide to do you should consider the end result and do a quick sketch of your idea before beginning. This is a good guide to follow.

Square:

1. Measure your 2"x 6" piece of copper at half on the 2" width. Use Trinity to cut this piece in half. You should have two 1" by 6" pieces when this step is complete.
2. What surface texture will you have? This is the point that any surface texture will need to be considered and carried out. Before texturing, you will need to sand the entirety *(both sides)* from 100 grit to at least 400 grit. All surfaces should have visible sanding marks going in the same direction on each plane. This should be done for all four pieces of metal and your wire.
3. If you are considering adding wire or other attached surface embellishments *(such as decorative hinge plates or handle skirts)*, construct these first and set them aside.
4. You will then measure and mark 4" on both of the 6" lengths. Be sure the line is absolutely straight. Scribe well. *(for better clarity you may go over your line with a sharpie)*
5. Use a triangle file to incise a groove on one side of the sheet along the scribed line. You will need to reach a depth of 2/3 of the thickness of the metal. Be patient this may take a while.
6. On each end of the sheets you can file them completely flat. The instructor will show you how to set up these pieces when it is time to solder.
7. You can then bend the metal to close the gap in the groove. This should create a 90-degree bend. Do this with both pieces. If you filed correctly you should have a crisp straight crease/fold where you filed.
8. You can now consider the top of your box. What does it look like? Does it have a handle? How will you construct this handle? Make any modifications to the top and bottom pieces of your box at this point. *(2" x 4" pieces)*
9. Will you be making a hinged box or a pressure fit box? If you are making a hinged box you will need to do the practice hinge before moving forward. If you are making the pressure fit box this is also something you should practice on a smaller scale.
10. Will you need a handle for your lid? Now is the time to consider the construction of this piece. How will you attach it to the top of the box?
11. Does your box have feet? What other embellishments are you considering? Will anything be cold-connected with rivets?
12. Construct, sand and file completely all embellishments. Store these in a baggie until the next class.
13. Complete the questions at the end of this handout, clean up your space, contain your project in the provided bags, and check in with the instructor. When complete, you have finished today's class.

Cylinder:

1. Have you done a quick sketch of your idea? Do that first.
2. What surface texture will you have? Will it be compressed or raised? If it is compressed do this first. If it is raised you can construct these embellishments later in the process.
3. Sand all of your metal to 400 beginning at 100. File the short edges of your 2" x 4" piece of copper, be sure that they are absolutely flat. *(You can use a jeweler's square to check your edges.)*
4. Use the roller portion of Trinity to begin the curve of your cylinder. This will need to be altered, but will give you a good start on the form.
5. Once you have fit the cylinder to match edges you can then determine the size of the top and bottom of your "box". Be sure to trace these sizes onto the 2" by 4" piece of copper. *(Consider whether or not you would like your lid formed in anyway, or if it should have a lip. Should your lid and bottom be fit inside or outside of your cylinder?)* Cut out with jeweler's saw. File the edges to a vertical flat, no curves or bevels.
6. Will your box be a hinged box or a pressure fit box? If making a hinged box you will need to practice making a hinge before moving forward. If you are making a pressure fit top you will need to practice this technique before doing it on your piece.
7. What about your lid? Will it have decoration or a handle on top? Now is time to make those items, or at least get them cut out and sanded. Construct all embellishments at this time, sand and file to "fit", and contain them in a baggie.
8. Complete the questions at the end of this handout, clean up your space, contain your project in the provided bags, and check in with the instructor. When complete, you have finished today's class.

Recap and Review:

Answer the following questions:

1. Name three ways to ensure your safety when using hand tools:
   - **i.** _____
   - **ii.** _____
   - **iii.** _____
   - b. How do we ensure safety of others while in the shop?
     - **i.** _____
2. Name three ways to avoid unnecessary damage to tools?
   - **i.** _____
   - **ii.** _____
   - **iii.** _____
   - b. What do you do if a tool is damaged?

i. _____

3. Which hammers can you use for striking steel tools?
   i. _____
   ii. _____
   iii. _____
   b. What happens if you use a different hammer?
   i. _____
4. Tell me about your project. Did you choose a round or square box?
   i. _____
   b. What challenges/successes did you face with your project today?
   i. _____
   _____
   _____
   c. Where did you leave off with your project? (How far did you get with it today?)
   i. _____
   _____
   _____
   d. What do you think are your first steps for next session?
   i. _____

Day 1 Check list:

The tools listed below can be used in your current project and many future projects. Which of these did you safely and properly use today? Please check or circle those that you used:

Measuring/Marking	Cutting	Surface Finishing	Forming	Gripping
Gauge Wheel	Jeweler's saw	Files	Dapping block	Bench pin
Scribe	Trinity	Stamps	Anvil	vise
Ruler	Hole Punch	Sanding sticks/paper	Bench block	clamps
	Disc Cutter	Hammer texture	Jump ring maker	ring clamp
			Hammer use	

Shop clean up:

You are responsible for the area you worked in, the tools you used and the area around your work area. Do not leave a mess, if you do not remember where it goes ask. Always put the tools back where they belong. You should keep these handouts for your future reference, specifically, at least until the end of the certification course. Be sure that you have signed up for the remaining two classes as you are not certified until you complete all

three. In addition, should you consider teaching any classes in the MJ&L shop you will need to have completed the whole certification series as well as work in the shop on a somewhat regular basis. When you are finished, collect your things and you are free to go.

Student:_____on this _____of _____, 20__ has completed this portion of the certification series. They have shown safe working habits, proper use of the tools and worked diligently on their sample project.

Check by Instructor:_____

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