Metals 102 Power Tools Certification

Prerequisites Metals 100 and 101 Certification

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Welcome!

The agenda for the class is as follows:

Intros: make sure you know your classmates! Makes class time more fun.

*Identify the tools we will cover this evening
*General Safety issues
*Learn how to use the tools
* Practice (by completing the sampler)
*Quiz
*Closing

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Metals 102: Basic Fabrication using Power Tools

**The warnings, precautions and instructions discussed in this handout and class cannot cover all possible conditions and situations that may occur. It must be understood by the operator that common sense and caution are factors which must be supplied by the operator.

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Identify Tools associated with this Certification:

The following tools extend the capabilities of the shop's hand tools:

1. Drill Press: two presses in the shop. Larger variable speed medium duty press (Mitch), and a small duty drill press (Suzi)

2. Bench mounted Belt/Disc Sander: AKA (Sandy) A motorized relatively wide belt and a 6" disc, both parts are covered with a paper impregnated with sanding medium. Currently the grit for the belt and sander are 80g.

3. Flex Shaft Rotary tool: (AKA Hewy, Dewy, Lewy and Peaches) This tool has a motor that propels a rotary hand piece through a flexible shaft. As you have guessed there are four of these types of tools in the shop.

4. Buffing Machine: Also known as a Buffer (or Buff) A powered cloth wheel (buff) used to extend the work of hand tools such as polishing cloths and small Flex-shaft buffing wheels used to finish a piece, giving it a final shine using abrasives and/or polish. This machine can be fitted with wire wheels for texturing and removing material.

General Safety issues with power tools:

*Risk of injury is higher with power tools, anything that can go bad will happen very fast.

* Check the placement and height of the tools when you are using them, always report poor functionality, accidents or broken tools.

* Be aware of limitations, both yours and the tools. When in doubt ask, look it up or check the spec binder under the bench.

* Take precautions. Safety equipment is required at all times when using power tools in this shop.

*Saftey glasses
* mask/respirator (N95)
* hearing protection
* Always tie back long hair and do not wear loose or dangling objects or clothing
* Hold work firmly while using equipment.
* Keep work piece and tool bits cool by using the following lubricating products:
Beeswax---3in1 oil----Burr Life

This reduces heat caused by friction and can extend the life of the tool or bit.

Learn how to use the tools: DEMO TIME!

Drill Press:

- Features and parts:
    - Light and operation buttons
    - Jacobs chuck
    - The press

Limitations:

- Height restrictions, no gate.
- Consider bringing your own drill bits.

Safe practice:

- Take the general safety precautions previously mentioned to protect yourself from injury
- on-off switch and end of use shut down
- changing bits
- adjusting the height
- securing your piece
- center punch and pilot holes guide the bit and keep it from wandering over surface
- replace dull bits, take your time, lift bit away from heavier pieces periodically to cool
- drill bits can jam at exit points forcing an unsecured piece to spin or fly off, increasing chance of injury.
- Use a sacrifice wood block

Belt/Disc Sander:

- Features and parts:
    - 4” wide belt; 6” diameter disc
    - Table can be oriented horizontally and vertically
    - Belts and discs, available in various grits, are changeable, but it is not especially convenient to do so. *Advise shop captain if this is required.*
    - Quickly removes metal from surfaces, corners, edges for rough shaping, finishing

Limitations:

- Difficult to hold onto small, flat pieces; consider use of Flex shaft instead

Safe practice:

- Follow the general safety precautions previously mentioned to protect yourself from injury
- Keep fingers free and away from moving belt/disc; don’t entwine fingers in piece
- Sanding Disc: Brace work piece on the table surface and position it such that only the downward turning quadrant of the disc is used.
- Move work piece evenly across the sanding surface to allow for consistent wear and extend life of belt/disc

- Don’t use for sanding flat surfaces on pieces that cannot be securely held
- Keep piece cool. Heat builds up quickly and can burn your hands

Flex-Shaft:

- Features and parts:
  - Changeable hand pieces for holding wide range of cutters, grinders and burrs in a chuck
  - Rotating cable in flexible housing allows for comfortable use and easy reach
  - motor suspended above the bench
  - Foot operated rheostat speed control
  - Higher torque at lower speeds
  - Bits available for drilling, grinding/carving, sanding, polishing metal, stone, and wax
  - Reaches small areas and offers fine control
  - (Peaches only) Bi-directional rotation for reversing out of a piece. Rotate in the direction to maximize the effectiveness of bit/burr

A bit about bits, burrs and mandrels:

- Wheels, brushes, buffs, grinders and abrasives
- Polishing compounds

Limitations:

- Small work area

Safe practice

- Take the general safety precautions previously mentioned to protect from yourself from injury
- Slack shaft - gentle arc
- Motor housing may twist when motor turns on - ok if minimal
- Don’t change motor direction while motor is running

Buffer:

- Features and parts:
  - Powerful motor, dual arbor, 6” wheels
  - Large work surface on wheels compared to Flex-shaft and Dremel
  - Allows both hands to grip work piece
  - Different wheels can be purchased for various finishing purposes; texturing, cleaning, buffing, polishing and for preventing contamination between polishing compounds. Refer to polishing compound charts in the shop binder.
  - Arbor uses a special nut to hold wheels. Keep track of it when changing wheels

Limitations:

- Changing wheels on this arbor is tedious enough to discourage proper safeguards against cross-contamination. Suggest purchasing your own buffing/polishing wheels.

Safe practice:

- Take the general safety precautions previously mentioned to protect from yourself from injury. Wire wheels are especially and deceivingly dangerous and can result in serious injury and disfigurement.
- Be sure to secure the unit to the bench top with clamps or bolts
- ALWAYS use ONLY the lower quadrant of wheel which spins downward and away from you
- Hold piece firmly - use wedge clamp for small items - especially with wire wheel
- Never use this tool for chain or pieces with loose parts
- Polishing compounds can contain silicates. Use dust mask or respirator. Refer to polishing compound charts in the shop binder.

Practice using tools and materials: HANDS ON!

+This is not to judge the quality of your work, it is for you to obtain safe practice and familiarize yourself with the tools. +

STEPS:

1. Mark and shear your metal to the appropriate size: one 3”x3” square.
2. Using either a divider and ruler or a template create a circle within the square.
3. Using the shear you will trim to the edge of the circle as close as you can.
4. Using the disc sander you will true your circle up, then remove the burr on the back of the circle with the belt.
5. After marking your potential holes and center punching them you will use the drill press to make six holes.

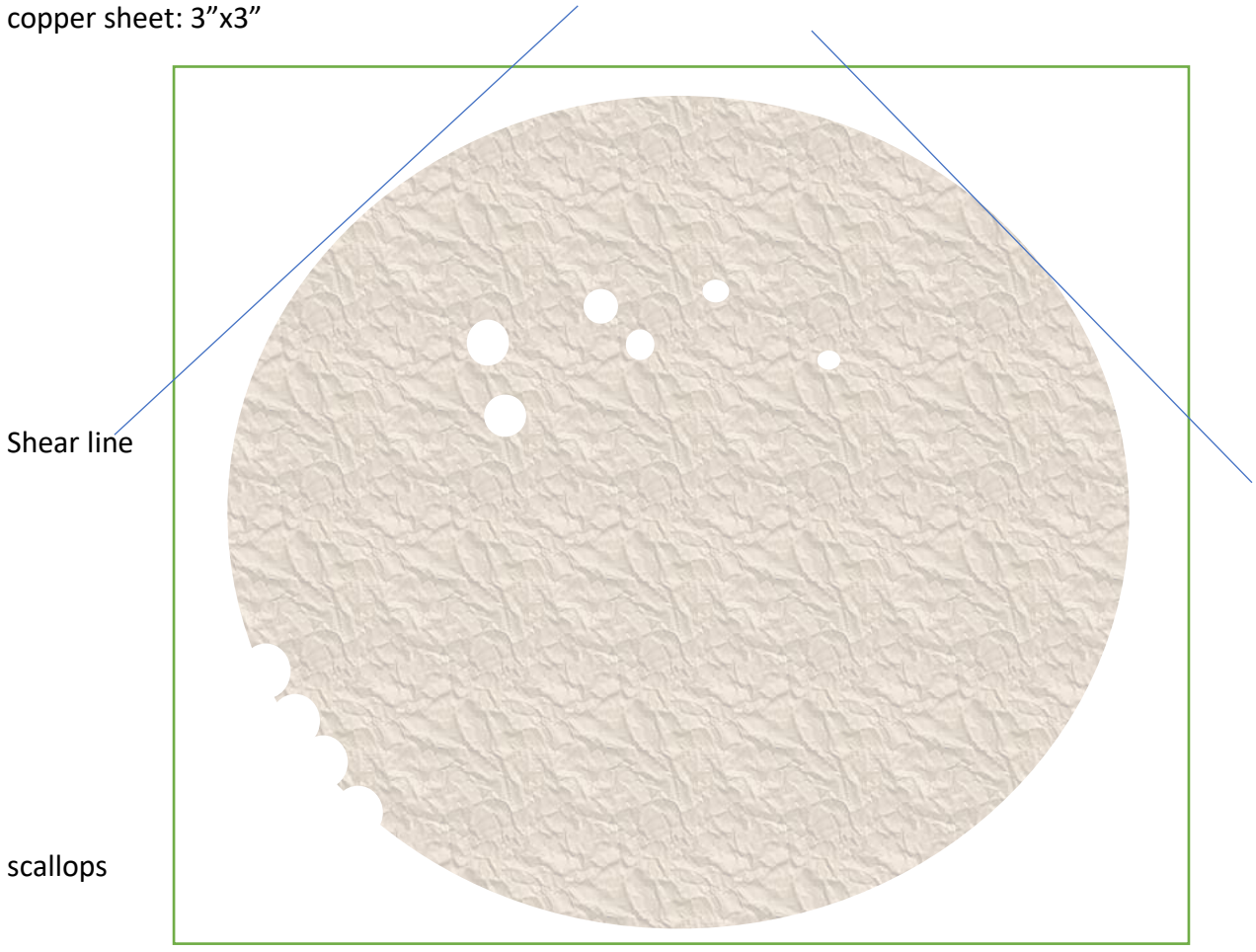
Drill six all the same size 20 g, then drill through 4 of the same holes with a 16g drill bit then drill through 2 of the same holes with a 16^{th} bit. I will have these out for you to use.

EXTRA CREDIT: Counter sink at least one of your holes.

6. Experiment with the flex shaft bits. You will want to create a texture on the surface, as well as remove material from the edge of your circle. The simplest way is to create scallops. You will use each of the five bits types that I set out for you.
7. Using the buffing wheels, choose a side to shine up. Remember to clean your piece between the Tripoli wheel and the muslin wheel.

**Check in with me once you have completed your project. I have a few questions for you to answer.

Example of what your piece should look like:



Certification checklist:

Answer the following (may be done orally):	
	Name three ways to ensure your safety when using power tools.
	Name three ways to avoid unnecessary damage to power tools.
	What part of the bench buffer/wire wheel is to be used? Why?

Demonstrate the use of the tools that are **bolded** below (required).

Check off any other tools you used for your certification project/sampler.
(You don't have to use them all, but you should know where to find them.)

	Drill press		*Flex-shaft*		*Bench Sander*		*Bench Buffer*
	Adjust height		**Change bits**		**Use disc to round a square sheet into a circle**		**Use proper safety equipment**
	Drill six different size holes in copper		**Identify two types of burrs or bits and what they are used for**		**Use belt to smooth an edge**		**Use wire wheel to add texture**
			In which direction should the motor be used? Why?				**Use buffer to shine a ring**

5. Be sure to log in and out of the shop each time you are here.

References

General Tool and Safety Warnings:

1. **KEEP GUARDS IN PLACE and in working order.**
2. **REMOVE ADJUSTING KEYS AND WRENCHES. Form habit of checking to see that keys and adjusting wrenches are removed from tool before turning it on.**
3. **KEEP WORK AREA CLEAN. Cluttered areas and benches invite accidents.**
4. **DON'T USE IN DANGEROUS ENVIRONMENT. Don't use power tools in damp or wet locations, or expose them to rain. Keep work area well lighted.**
5. **KEEP CHILDREN AWAY. All visitors should be kept safe distance from work area.**
6. **DON'T FORCE TOOL. It will do the job better and safer at the rate for which it was designed.**
7. **USE RIGHT TOOL. Don't force tool or attachment to do a job for which it was not designed.**
8. **WEAR PROPER APPAREL. Do not wear loose clothing, gloves, neckties, rings, bracelets, or other jewelry which may get caught in moving parts. Nonslip footwear is recommended. Wear protective hair covering to contain long hair.**
9. **ALWAYS USE SAFETY GLASSES. Also use face or dust mask if cutting operation is dusty. Everyday eyeglasses only have impact resistant lenses, they are NOT safety glasses.**
10. **SECURE WORK. Use clamps or a vise to hold work when practical. It's safer than using your hand and it frees both hands to operate tool.**
11. **DON'T OVERREACH. Keep proper footing and balance at all times.**
12. **MAINTAIN TOOLS WITH CARE. Keep tools sharp and clean for best and safest performance. Follow instructions for lubricating and changing accessories.**
13. **DISCONNECT TOOLS before servicing; when changing accessories, such as blades, bits, cutters, and the like.**
14. **REDUCE THE RISK OF UNINTENTIONAL STARTING. Make sure switch is in off position before plugging in.**
15. **USE RECOMMENDED ACCESSORIES. Consult the owner's manual for recommended accessories. The use of improper accessories may cause risk of injury to persons.**
16. **CHECK DAMAGED PARTS. Before further use of the tool, a guard or other part that is damaged should be carefully checked to determine that it will operate properly and perform its intended function – check for alignment of moving parts, binding of moving parts, breakage of parts, mounting, and any other conditions that may affect its operation. A guard or other part that is damaged should be properly repaired or replaced.**
17. **DIRECTION OF FEED. Feed work into a blade or cutter against the direction of rotation of the blade or cutter only.**
18. **NEVER LEAVE TOOL RUNNING UNATTENDED. TURN POWER OFF. Don't leave tool until it comes to a complete stop.**

Congratulations!

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on having successfully completed the requirements for

Jewelry and Metal Craft Shop - Metals 102:

BASIC FABRICATION USING POWERED TOOLS

Enjoy! Be safe!

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Date **Instructor**

This is your certificate of completion, you may now use any of the power tools in the shop independently! Yay!!