METALS 102 - Basic Fabrication: Powered Tools Certification Class

Prerequisites: METALS 100 and METALS 101 Certification

Welcome
Attendance / Intros

GOALS:

1. **Identify the power tools for Metals - 102 certification**
2. **General safety issues**
3. **Learn how to use the tools**
4. **Practice using tools and materials -**
   and Complete the Certification sampler or project

METALS: 102 - Basic Fabrication using Power Tools Certification

The warnings, precautions, and instructions discussed in this handout 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 cannot be built into this product, but must be supplied by the operator.

1. Identify the power tools in this certification

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

- **Dremel drill press:** Variable speed lightweight rotary utility tool.
- **Flex-shaft:** A motor driving a rotary hand piece through a flexible cable.
- **Buffer:** 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
- **Bench-mounted belt/disc sander:** A motorized relatively wide belt impregnated with sanding material used to quickly remove material from a surface.

2. General safety issues with power tools

- Generally, risks are higher with powered tools, bad things can happen very fast
- Placement and height, securely mounted, report damage or poor functionality, dust off motor
- Be aware of potential limitations (yours and the tool's) - when in doubt, check the specs which are kept in the shop binder, or ask.
- Read the General Tool and Safety Warning included in this handout which applies to all Metals 102 tools.
- Take precautions:
  - Always wear safety glasses to prevent eye injury caused by flying debris or injury from a piece that is thrown back by the wheel.
  - Tie back long hair and do not wear loose clothing or jewelry which might get caught in the equipment.

- Wear a dust mask and work in a well-ventilated area to avoid inhaling dust into your lungs.
- Always hold your work firmly. Small pieces should be held with a hand vise or wedge (ring) clamp.
- Keep bits and work piece cool; lube reduces friction and heat and extends bit life.

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3. Learn how to use the tools

- **Dremel & drill press**
  - Features and parts:
    - Variable speed switch
    - Jacobs chuck
    - The press
  - Limitations: High speed, low power (torque). Precision somewhat limited. Ok for thinner sheet (21gauge (.035”) or thinner). 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
    - speed settings, use slowest speed, cool your bits - use lube and a down and up motion
    - 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

- **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
- Bidirectional motor suspended above the bench
- Foot operated rheostat speed control
- Higher torque at lower speeds than Dremel

- Capabilities:
  - Bits available for drilling, grinding/carving, sanding, polishing metal, stone, and wax
  - Reaches small areas and offers fine control
  - Bi-directional rotation for left-handers and 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, Wire Wheel

- 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.

• Bench 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

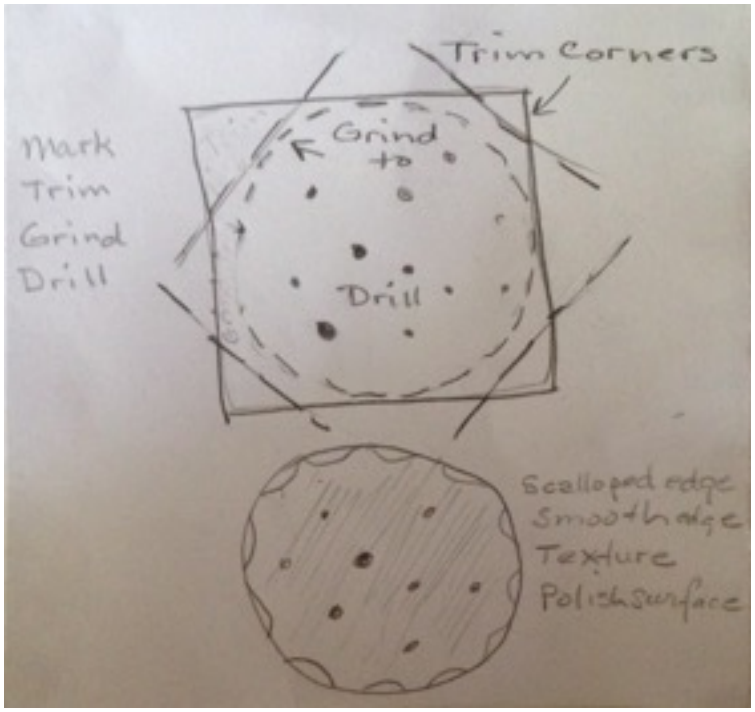
4. Practice using tools and materials - Complete the sample

(not judging quality, just knowledge of best practice and evidence of the safe attempt)

Steps:

Use the copper sheet in your materials packet.

1. Mark as big a circle on it as you can. Trim excess off using the shear.
2. Use the disc sander to grind away the corners to your mark and form a smooth circle.
3. Make a few center punch marks in the disc and use the Dremel/ drill press to drill at least two different size holes.
4. With the Flex-shaft, use a diamond bit to make a scalloped edge and then change to a sanding drum to sand the edge smooth.
5. Use the wire wheel on the buffer to add texture.
6. Use the buffer wheel and polishing compound to finish the sampler.



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.)

	Dremel and press		*Flex-shaft*		*Bench Sander*		*Bench Buffer*
	Adjust height		**Change bits**		**Use disc to round a square sheet into a circle**		**Set up**
	Drill two different size holes in copper or brass		**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**
	Other?						

5. Sign the certification log

References and Resources

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**