METAL 1: CUTTING AND SHAPING

This guide briefly highlights equipment and protocol covered in Metal 1 and Metal Foundations. For a more thorough review of each machine, refer to the Metal Safety Manual located at the shop entrance.

Before working, make sure you know what kind of metal you are using. Untreated steel, iron, manganese, aluminum, copper, brass are permitted in the metal shop. Painted, rusty, and zinc plated metals are prohibited.

While working in this shop, keep the following in mind:
1. Assume everything is hot and sharp!
2. Be mindful when generating sparks—direct away from delicate machines (metal lathe, computer, other members ;)

OPERATING THE HORIZONTAL BAND SAW

A coolant fed saw used to break down and process metal in the shop. It has multiple adjustments that must work together to operate successfully. It can be used to cut tube, pipe, and solid stock but should not be used for sheet metal. Use a chip brush, and in case of spills, a rag, to clean up work area when finished.

1. Firmly lock workpiece in the vice before cutting. The vice must be adjusted to fit different sized materials, or to make angled cuts. Vise jaws are adjusted by loosening the knobs (B, C, and D). Never attempt to “freehand” cuts.
2. After powering on, open the coolant valve just enough to let coolant flow along the blade.
3. A dial on the hydraulic feed mechanism controls the speed at which the blade is lowered into the material. The lever, (A) opens the valve, while the knob, (B) adjusts the speed.
4. The cutting action must be monitored. Support the head of the saw as it passes through the workpiece. It will automatically switch off the machine after the cut.

OPERATING THE COLD SAW

This coolant fed saw produces a cleaner, quieter cut and extends the life of the blade. The cold saw is used to cut mild steel and non ferrous rod, tube and bar. We recommend cutting material that is under 1" thick. Use a chip brush to clean up work area when finished.

• Your workpiece must be securely locked in the vice before cutting.
• Turn on the power supply to the machine. A second switch on the handle engages the blade and coolant pump.
• Wait for a steady flow of coolant to flow from behind the blade guard, back into the pan.
• Allow the machine to do the cutting. Do not force the blade through your material.

OPERATING THE MULTI-CUTTER SAW

This saw functions similarly to the cold saw, but leaves a rougher cut and does not use coolant. It can cut ferrous and non-ferrous metals.

Sweep up the surrounding surfaces-tables and floor when finished.
• Unlock the blade by pulling out the silver pin on towards of the back left side of the machine
• Your workpiece must be securely locked in the vice before cutting.
• Wear hearing and eye protection at minimum, and a face shield and long sleeves if possible. Go slow and do not force the saw through a cut.

OPERATING THE VERTICAL BAND SAW

A dry saw that can be used to cut free hand and guided cuts in sheet metal. Typically the thickest sheet metal that can be cut is 14 ga for mild steel, 18 ga for stainless, and 1/8” for aluminum. Dust off the machine and sweep floor when finished.
• Never pull out of a cut. Use relief cuts with cutting curves.
• Always cut flat material; the cutting of tube, pipe, rod, and bolts is prohibited.
OPERATING THE DISC SANDER:
Used for light duty sanding operations, such as beveling edges of metal to prepare for welding, sanding burrs, and smoothing contours. **Clean up by thoroughly sweeping the table, floor and all surrounding surfaces, and vacuuming the machine.**
- To sand bevels to prepare joints for welding and when working with small/flat, while still keeping your work piece FLAT on the table, direct the edge you want to bevel at a slight angle the disk.
- The table angle can be changed to safely bevel material. Ask a tech to make this adjustment for you.
- NEVER attempt to lift your work piece at an angle in order to bevel an edge, especially small, irregular items.

OPERATING THE ANGLE GRINDER
A versatile hand-held power tool. It functions as a grinder, sander, wire brush, polisher or cut-off tool by accepting a variety of attachments. Each operation requires a different configuration for assembly, and sometimes a different key depending on the lock nut or flange being used. **Orange rolling curtains are in the shop and should be used as a barrier to contain debris when removing high volumes of material. Clean up by thoroughly sweeping and vacuuming the floor, table, and all affected surfaces.**
- Before each use inspect the tool and abrasive wheels for chips or cracks, backing pad for cracks, tears in the power cord and proper assembly.
- Always use a guard and face shield when operating the angle grinder.
- Position the cord clear of the spinning accessory.
- Use clamps or a vise to secure and support the workpiece to a stable platform (ideally, a table top).

OPERATING THE DRILL PRESS
A heavy machine for drilling holes and countersinking into wood, metal and plastic. It can be used for any type of metal as long as the proper drill bit and speed are used. **Clean oil and debris from the machine with a chip brush and sweep up with a bench brush.**
1. Before drilling, use a punch to make a small indentation the center of the hole. This will help keep your bit from wandering and dulling, and will ensure accuracy.
2. When drilling through sheet metal and plate, clamp workpiece onto a piece of wood to prevent drilling into the worktable. A drill vise is can be used to stabilize the workpiece.
3. Using the oil can, add a heavy drop of oil to the area you’re about to drill out. With thick stock, sometimes it is necessary to add oil throughout the process.
4. Do not force a bit to drill. Look for curls of metal. If the drill bit is producing small chips or even dust, this is a sign of a dull bit.
5. Feed bit into the material with only enough force to allow the bit to work. Feeding too quickly may cause the motor to slow and/or the bit to break or dull.