METAL 2: SHEET METAL WORKING
This guide briefly highlights equipment and protocol covered in Metal 2 and Metal Foundations.
Before working, make sure you know what kind of metal you are using. Painted, rusty, and zinc plated metals are prohibited.

KNOW WHAT GAUGE YOU’RE WORKING WITH
The thickness of sheet metal is measured in “gauge.” The higher the gauge, the thinner the metal. Make sure you are cutting material within each machine’s capability. For most of the equipment, the maximum is 16 gauge for mild steel, 1/8” (12 ga.) for aluminum and brass, and 20 ga for stainless. Hardened steel should not be cut or bent with our machines.
A “Gauge gauge,” is located on the welding cart in the Metal Shop at Open Works. It’s a small piece of metal with notches indicating the thickness of each notch, in both gauge and imperial decimal.

OPERATING THE SHEAR
A pneumatic (compressed air) powered machine that is used for straight- cutting a variety of sheet goods including mild steel, aluminum, brass, acrylic. It can cut up to 16 ga. mild sheet steel, up to 50” wide. The shear consists of a table, an extension for longer pieces, a bevel gauge for cutting angles, a work-holding device (the fingers), upper and lower blades, a rear depth stop with a microadjuster, and a foot pedal to engage the shear. It is a simple machine but has the potential to be very dangerous. Wear eye and ear protection.
1. Make sure the hose of the shear is connected to the drop down air line using the quick connect coupling. Do not adjust the air pressure regulator. Do not disconnect after finishing your cuts.
2. The On/Off switch is on a tall post and connects to the pedal, to the right of the shear.
3. Hold your material up against the ruler on the right side of the machine. Keep your fingers clear of the fingers of the shear, which hold the work down as it cuts.
4. Press down on the pedal and release once the material is cut.

OPERATING THE SLIP ROLLER
The Slip Roller is used for making curves, hoops, coils and cones with sheet metal and round bar. There are three different rollers that act together to feed and form the metal. It can accomodate mild steel up to 16 ga., aluminum up to 1/8”, and stainless up to 20 ga, as well as up to 3/8” round bar. The Slip Roller at Open Works is electric and powered by a foot pedal, and can be set to roll forward or in reverse.
• The front lower roller is the Pinch Roller and is connected to the motor, feeding the material forward and back.
• The Pinch Roller Adjustment Knobs are located in front of the machine, on either side of pinch roller. The knobs change the distance between the pinch and gripping roller to allow different gauge metals through. While adjusting the knobs, watch the gap between rollers and test with your workpiece till it catches and easily feeds the material through.
• The Gripping Roller is on top. It has a sleeve which pulls out of the groove of the body of the slip roller, and allows the user to swing the arm of the roller out to release formed hoops and tubes. Caution! It is very heavy!
• The Radius Roller is in the back. Incrementally adjust its height to set the radius of the desired curve. It too rotates and pushes the material up over the gripping roller.
• The Radius Adjustment Knobs are located on the back of the machine, on either end of the radius roller. To make a perfect cylinder, both knobs must be adjusted equal amounts, incrementally until you achieve your radius. How many times you’ll need to adjust will depend on the thickness of metal and the radius. To make a spiral or a cone, the radius roller will have to be at an angle, the knobs will be adjusted at different points.
To use:
1. Release both Emergency Stops, on the main panel (shown) and the pedal post. Press “On.” The “Power” indicator should light green.
2. Use the “Forward” pedal to engage the rollers. Feed metal between pinch and gripping rollers.
3. The material will exit the rollers between the gripping and radius rollers. Use the reverse pedal to back out material for localized curves or for easing material into a radius.
OPERATING THE BRAKE
The brake is used to make bends in sheet metal. It is 48” wide and can bend up to 16ga. mild steel, 20ga. stainless, and 1/8” aluminum.
- The brake has a set of fingers, which clamp down your workpiece. They are removed or rearranged for specific bending operations, and set in the upper portion of the machine. The fingers are removed with an hex key and remounted so the finger clamps are parallel to the rail.
- Clamping handles on either side of the brake lift the upper portion in order to set your work under the fingers. To lock, lift the handles till they fully lock and point to the rear of the brake. It’s necessary to fully lift both levers to adjust the fingers. Don’t force the clamps to lock down your metal.
- The bending leaf is the hinging table that the workpiece rests on. Once the fingers are clamped down on the piece, lift the bending leaf handle upwards, slowly. The bending leaf will push your material up towards the fingers.
- When the piece can’t be bent anymore, you have probably hit the angle adjustment stop. This is a collar on a rod that connects to the bending leaf and can be adjusted at different points along the rod to control the degrees of the bend.
Tip: Short workpieces should be bent in the center of the brake. This equalizes strain on the machine. Never force the clamps down.

OPERATING THE HANDHELD PLASMA CUTTER
This machine combines compressed air and and electricity to generate plasma for freehand cutting of sheet and plate mild steel. It can cut up to 3/8” mild steel, at a max. output of roughly 25 Amps. It requires a specific set of consumables, available in the red cabinet in the metal shop. Wear flame resistant clothing such as a welding jacket, welding mask, and gloves during use.
1. Plug it in near an air drop down as you will need to connect to the air quick connection coupling. The air inlet and power switch are on the back of machine.
2. The receptacles for this machine’s plug are wired 120 v, 20 Amps. Set the dial in the range of the blue bar.
3. Stabilize your piece to direct sparks to the floor. Position yourself so that the offcut doesn’t fall on your feet.
If working on the floor, do not cut metal directly on the concrete.
4. Clamp the work lead to your piece or a metal object that is touching your workpiece.
5. Use the Amp Settings Guide at the Metal Shop computer station to determine what amperage you will need to use to cut your material.
6. Place the drag shield on the edge of the base metal, or hold about 1/8” above. Direct the arc straight down. Dragging the tip will reduce tip life.
7. Raise the trigger lock, press the trigger and the pilot arc starts immediately. When the arc starts, begin to slowly move the torch across the metal. Travel speed contributes to the capability and quality of the cut.
8. At the end of a cut, angle the torch slightly towards the final edge or pause briefly before releasing trigger to completely sever the metal.

OPERATING THE VERTICAL BAND SAW
The band saw is for free hand cutting of curves, angles, and straight cuts in metals like aluminum, brass, copper, and mild sheet steel. Wear safety glasses at a minimum. The saw can cut thin sheet mild steel, 24 to 14 ga., and non-ferrous metals such as aluminum and brass up to 1/4” thick. Wear eye protection at minimum and clean up after use. Vacuum above and below the table and the surrounding floor.
- Loosen the blade guard adjustment knob on the back of the machine to adjust the guard height. Guard should be about 1/4” above your workpiece. Tighten the knob to lock the guard position.
- When cutting curves, use the “relief cut” technique, and make shallow, straight cuts bit by bit. Take your time to smoothly and continuously feed the metal forward, with the blade.
- Only cut material with a fully flat face against the table. Do not cut round, unstable objects.
- The metal will get hot as you cut, so wear gloves and be prepared to stop working periodically.