This document provides a step by step walkthrough for using the power tools located in the inworks prototyping lab. By following this walkthrough, you will become comfortable with the safety requirements, proper use, and locations of these basic tools. You will be required to demonstrate proficient use of these tools in order to receive the credentials necessary to use them.

Tool Function and Location

Our hand tools are located in or on the blue toolbox. Inside the toolbox, you can find:
- Wrenches, ratchets, sockets and extensions
- Measuring tools (calipers, measuring tape)
- Screwdrivers, punches, pliers, metal snips
- Power tools (circular saw, sawzall, drill)

Workshop Content

Power Tool Safety Requirements
Coordless Drill Operation
Circular Saw Operation
Power Tool Safety Requirements

For this power tool workshop, you will need safety glasses, hair tied back (if long), close toed shoes, and you must not be wearing loose clothing. Ear plugs are available if you are using loud equipment. If you are creating a lot of sawdust, wear a dust mask.

If you will be using the circular saw, you will need to set up sawhorses and a work station outside. You will notice a sign that says “TAKE ME OUTSIDE” located on all equipment that creates excessive dust or noise.

If you are drilling material, make sure to use clamps or a vice to prevent the material from rotating. Use a scrap piece of wood as a base to prevent drilling into any tables.

In the blue toolbox and pegboard, you’ll find measuring tape, digital calipers, levels, carpenter’s squares and speed squares. Use these tools to accurately cut, form or drill your material in order to ensure the best outcome.

Use appropriate materials for the tool you are using. If you are unsure if a material is safe, ask a lab monitor. There are different bits and blades for different materials.

Consult the drill press speed chart (posted on the blue toolbox) if you are unsure how to properly use a specific type of drill bit. Each type of drill bit serves its own purpose, so you will need to know which bit will be most effective for each drilling operation, in order to operate the drill safely.
Cordless Drill Operation

Make sure the drill is charged. If the battery is low, swap it out with a charged one located on top of the blue toolbox.

Select the proper bit for the job. There are separate bits for drilling wood and metal. If you are drilling a hole larger than 1/4”, you’ll want to drill a pilot hole first with an 1/8” drill bit. This will make your drilling operation easier on the drill and yourself.

If you are using a fastening bit, make sure it is the appropriate size bit for your fastener. Inspect the bit before chucking it into the drill. If the bit is chewed up, throw it away and use a new bit.

Never force the drill into your material, as it will damage the equipment and can cause injury. If your are drilling into metal, use a lubricant such as cutting oil or WD-40 to reduce the friction generated by the rotation of the drill bit. If you are drilling metal that is thicker than the diameter of your drill bit, use the pecking method to clear excessive metal out of the drill hole and observe chip size of the evacuated metal.

Stop all drilling operations if smoke occurs. If you are drilling into metal, the presence of smoke indicates too much applied force, not enough lubrication, a dead drill bit, or some combination of the three. The presence of smoke while drilling wood is an indication of a dead drill bit.
Make sure that the material you’re working with is secured with clamps or a vice, so that it does not move when being drilled. If you are drilling on one of our work tables, place a piece of scrap material underneath the piece you’re working with, to avoid drilling into the table. It is good practice to make sure your drill is perpendicular to the material you’re working with, to ensure that your drill hole is not crooked. You can use a speed square to check your drill angle, or have a partner verify that the drill is perpendicular.

Our cordless drills use a universal chuck to loosen and tighten drill bits. To remove a bit, grab the upper chuck and twist counter clockwise. Keep turning the chuck until the jaws open wide enough to receive the drill bit. Insert the smooth end of the drill bit and then tighten the chuck by twisting the upper chuck clockwise.

Make sure the drill bit stays centered in the chuck while it is being tightened.

To operate the drill, pull the trigger. To specify forward or reverse drill operation, directional finger switches located on either side of the trigger. Releasing the trigger will stop drill function.

Make sure your head of your fastener is flush with the top surface of your material. When you are done using the drill, place it back on top of the blue toolbox and put the drill’s battery on a charging station. Remember to clean up after yourself if you made a mess. There are table brooms and dust pans located in the heavy fabrication area.
Circular Saw Operation

Before using the circular saw, you will want to setup sawhorses and a work station outside. Sawhorses are located in the heavy fabrication area. Use a piece of scrap plywood as a work surface. Make sure your work station is stable enough to support your work piece while cutting.

Use a carpenter’s square to mark a cut line on your material. Our circular saw is set up to cut wood only. If you need to cut plastic or metal, use the metal bandsaw or bring in your own material specific blade.

Grab the circular saw from the top of the blue tool box. You’ll also want to grab a fresh battery from the charging dock. There is an adjustment knob on the rear side of the circular saw that will determine your cutting depth. Make sure the cutting depth is adjusted for the thickness of your material, then tighten the knob to secure the cutting guard in place.

There is an additional adjustment knob on the front side of the circular saw that will determine the cutting angle. Make sure the cutting angle is adjusted to your needs, then tighten the knob to secure the cutting guard in place.
Circular Saw Operation

Make sure the blade guard of the saw is riding flush with the top surface of your material, and there are no obstructions in your cutting path before starting the saw.

Use both hands to hold the saw as pictured above, then use your thumb to depress the lockout button. You’ll notice a red laser guide appear, which will help you make a straight cut.

To start the saw, pull the trigger with your index finger while the lockout button is depressed. Make sure the saw blade is rotating freely and not in contact with your material before you start cutting. Push the saw gently through your material with both hands, and keep the red laser guide aligned with the cutline that you marked previously.

Make sure you move the saw all the way through your material before releasing the trigger, which will stop the saw. Once the saw blade stops spinning, you can set the saw down and set up your next cut. When you are finished using the circular saw, place it back on top of the blue toolbox and return the saw horses back to the heavy fabrication area.