

Cabrillo Community College Makerspace Safety Handbook and Operating Procedures

2018-2019

The Makerspace at Cabrillo College supports students, faculty & staff in the exploration and investigation of material research including wood, metals, liquids, plastics, and concrete among other common materials. The Makerspace will become an integral role in student work and faculty research, supporting experimentation with materials and fabrication. The school is equipped with updated and well maintained Laser cutters, Vinyl cutters, computer controlled (CNC) machines, 3D scanners, several FDM plastic 3D printer The lab is overseen by Payson McNett, and is staffed by Mary Govaars the Program Coordinator, and Dave Castro Lab Tech/helpdesk, Mentors, and student volunteers who instruct and guide users in the use of the equipment.

GENERAL INFORMATION

Cabrillo Community College
6500 Soquel Drive Aptos, CA 95003

Makerspace

Rooms 1301, 1302

Intended for supporting cross disciplinary projects campus wide student and faculty research and exploration.

Extended hours for Students & Non-credit student/general public access through Cabrillo Extensions
Makerspace Membership

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MAKERSPACE MISSION

The Makerspace assists students and faculty and staff in the exploration and investigation of material research including wood, metals, liquids, plastics and other common materials. The Makerspace will become an integral role in student work and faculty research, supporting experimentation with materials and fabrication. The school is equipped with updated and well maintained computer controlled (CNC) machines, including laser cutters, desktop CNC router, 3D scanner, FDM plastic 3D printers, SLA 3D printers, Arduino soldering stations, Digital Embroidery. The lab was created and is overseen by Payson McNett, and is staffed by Program Coordinator Mary Govaars and Helpdesk/Lab Tech Dave Castro, and Student Assistants/Mentors, who instruct and guide users in the use of the equipment.

POLICIES AND PROCEDURES

The Makerspace is located in the 1300 building. The safety of students, faculty, staff, and guests is a prime consideration in every activity. The goal of the Cabrillo College Makerspace Safety Plan is to develop practical approaches regarding safety among all members. It will be necessary for the dean(s), directors, department heads, faculty and staff supervisors take an active role in initiating preventive measures to control the perils associated with activities under their direction. The success of this plan depends upon the cooperation and support of all entities. The rules and guidelines in this document apply to the entire makerspace areas including the sidewalk and any other lab related work environment including impromptu installation work locations. All tools must remain in the Makerspace at all times and may NOT be checked out. At no point will tools will be allowed outside of the lab and its adjacent supporting areas.

SPECIAL ATTENTION AND/OR PERSONAL NEEDS

The Makerspace requires any student with a medical condition to consult with their personal physician prior to using the Makerspace, Cabrillo College does not assume responsibility for any harm that might occur to anyone as a result of a prior medical condition. Should such a medical condition be present, a doctor's approval in writing must be provided to the lab. Once read, please sign your initials next to each condition that may apply to you. Please inform the Makerspace supervisor immediately if you are sensitive to the following or have issues with any of the following. It will be your responsibility to inform the Makerspace supervisor on duty each time you enter the lab.

Dust allergies.

Latex allergies

Any other allergies that may be present.

Physical contact with your Makerspace supervisor. (If a supervisor notices you working improperly they may physically move you for guidance or safety purposes.)

Loud background noises and/or commotion caused by machines.

Any other need that may require special attention.

OVERVIEW

An important part of your experience in making will be learning to follow practices and procedures that will prevent injuries to YOURSELF and OTHERS. Develop a positive attitude toward safety. This means that you have a strong desire toward safety and are willing to give time and attention to learning the safest way to perform your work. It means that you will be certain to work carefully and follow the rules – even when no one is directly watching you. Carefully study the safety rules which follow. The Lab supervisor may also recommend some additional rules. If you follow the rules and directions carefully, many of them will soon become safety habits that you will perform automatically. Please note that experience in a Lab does not equal good safety awareness. Many accidents occur not to beginners but from experienced workers that feel more comfortable in the Lab and therefore become more casual in their approach to safety guidelines.

NEVER be afraid to ask a supervisor for help.

NEVER use a new machine without first asking for assistance from a supervisor

MAKERSPACE ACCESS

Makerspace is open to any currently enrolled students taking a minimum of 3 units of classes in any department or area on campus. It is also available to student clubs, and trained Faculty & staff upon request. In addition the general public or non-credit seeking students may gain access to the Makerspace through Cabrillo Extension workshops and Makerspace memberships.

SAFETY

Safety in the Makerspace is the highest priority. Accidents may result in serious bodily harm or death. Following proper safety procedures and conforming to the policies as outlined in this handbook will greatly reduce any chance of injury. Do not experiment with the tool

Or try to figure out how to use a machine on your own. If you do not use a tool or machine exactly how you have been shown or neglect to follow all safety rules, severe injury could result and your privileges to utilize the lab may be revoked.

MAKERSPACE GUESTS AND VISITORS

Any individual who has completed the requirements for access may accompany Lab guests and visitors. He or she is responsible for that guest. Guests and visitors are not permitted to use any machines or tools and are not allowed in the machine use areas. Visits must be scheduled and approved by the Program Coordinator in advance. Visits should be as brief as possible.

SAFETY TEST REQUIREMENTS

All users must attend a **MANDATORY** Safety Training session lecture, pass the safety exam and perform and pass skills tests on selected tools to become certified. All users will gain access to the makerspace upon completion of mandatory trainings and exams. Access will remain valid for a term of one year from date of signed Safety Agreement form. Under no circumstances will anyone be allowed to have extended usage outside of standard operating hours.

All users of the lab or space must complete the Use and Safety Training primer to gain access to the Lab and become certified. Lab certification consists of: attending the Use and safety session/primer, complete the required video trainings, reading and completing the safety policy, successfully completing the written test and demonstrating safe practices during the skills tests on selected pieces of equipment. Test scores must be 90% or greater to gain access. Users can take the test a maximum of two times before they have to retake training.

The Safety Training schedule will be made available to you by the program coordinator. Individuals must receive additional training for machines not included in the standard orientation. Certification is good for one year from date of signed Safety Agreement Form. All requirements must be completed within the same semester.

Makerspace OCCUPANCY LIMIT

In order to maintain a safe work environment, strict user limits will be enforced. Faculty need to be aware of this limit when planning Lab use and should utilize a laconic rotation or other strategy to avoid exceeding the occupancy limit. The maximum number of individuals allowed to work in the Makerspace at any given time is 15 students per employee.

RESERVING THE MAKERSPACE FOR CLASS USE

At least two weeks' notice must be given to reserve the makerspace for class use and should include a brief description of what the lab will be utilized for. This includes demonstrations and student use. In order to ensure that there are sufficient open Lab hours for all users, only one class per day may reserve the Makerspace. A trained monitor must be present at all times while students are working in the space. When the space is reserved for a class, it is closed to other students. The Lab can be reserved Wednesday, Thursday and Friday between 1:00 pm and 4:00pm.

OPEN LAB HOURS

Hours are posted on the window on a semester basis. Makerspace hours may vary, depending on the activities taking place in and around the space. If the space is reserved for a class, there are no open hours during that time. At the discretion of the Lab supervisor, the Lab may be closed. If the school is closed, so is the makerspace. Staff absence may cause closure of the Lab or space.

The Fall 2018 hours for s/faculty/

GENERAL LAB SAFETY RULES

The hazards associated with fabrication work require special safety considerations. Whether you work in a metal lab, wood lab, or any other lab, the potential hazards for injury can be numerous. In an emergency call 9-911 from a school phone, or 911 from a cell phone. All students entering the makerspace must acquire the appropriate safety gear prior to operating any machine or tool. All students must clean up after themselves; students who do not clean up after themselves will lose all lab privileges for a minimum of 1 week. Lab privileges will not be reinstated until the offending student returns to clean the entire lab.

PERSONAL PROTECTION

1. Put on your safety glasses/goggles as soon as you enter the dirty Makerspace.
2. Do not wear loose fitting clothing, especially pants, they may get caught in a machine, long sleeve shirts/sweatshirts.
3. Remove all accessories such as headphones, earbuds, scarves, neckties, etc. The general rule you should be noticing is that nothing should be dangling off your body that could get caught in a machine.
4. Tie up long hair so it is as close to your head as possible. This means more than just putting a hair tie on your hair. Tie it up or put it in a hat so that your hair is not dangling off your head. Free hair ties are available.
5. Tie up long beards
6. No jewelry should be worn in the fabrication lab or makerspace. (Including earrings, watches and excessive rings)
7. Snug fitting clothing is essential to your safety.
8. Wear closed toe shoes, no sandals. You need your feet protected against cuts should somebody drop a tool or a workpiece. Also, no heels, as they are a trip hazard in a machine shop.
9. Optionally wear an apron to keep your clothes clean, and ear protection for your comfort.
10. Remove gloves, they are easily caught in machinery. There are a few rare cases where work gloves are encouraged, such as when folding bandsaw blades, handling sheet metal, using an angle grinder (not a bench grinder!), or welding. Only use work gloves when instructed to do so. The exception to this is very thin latex or nitrile gloves, which may be worn to keep the skin free of oil, solvents, or paints. They must be thin enough that should they be caught in the machine, the glove will simply tear and not drag your hand into the machine.
11. Additional protection using goggles or face shields may be necessary for work such as grinding, chiseling or chipping. Notify your supervisor/professor if you notice any unsafe work conditions. Inform other employees if you see an unsafe work practice; however, be careful not to distract a person who is working with power tools.

***** If you neglect to follow all safety rules and practices, severe injury could result and your privileges to utilize the lab may be revoked. *****

GENERAL SAFETY GUIDELINES

Follow these guidelines for general work safety:

- Never work alone. There must always be at least two adults present in the fabrication lab.
- Always wear appropriate safety gear and protective clothing, including closed toed shoes.
- Eye protection is required while operating any machine.
- Know where the fire extinguishers are located and how to use them.
- Never work impaired. This also does not simply mean impaired from drugs or alcohol, but also from sleep deprivation.
- Know the hazards associated with your work. Be sure you are fully educated on the proper use and operation of any tool before beginning a job. If you cannot do a job safely, don't do it. Think through the entire job before starting.
- If you are unsure about how to safely execute the operation of a tool, ask for help. Have the fabrication lab supervisors assist, demonstrate, and observe to help you become familiar and comfortable.
- If you have not worked with a specific material before, consult the fabrication lab supervisor for precautions, methods and instruction prior to beginning work.
- Do not work in the lab if you are in a hurry, this almost always ruins the work and often results in injury.
- Leave tool and equipment guards in place. This is especially true with the table saw. The guard with the anti-kickback device should always be on the saw unless the operation is not possible with it in place.
- Before starting any machine be sure to check that it is set up correctly and fully operational.
- Check power cords and plugs on portable tools before using them.
- Use a brush, or special tool for the removal of chips, shavings and debris. Do not use your hands to clean shavings or cuttings – they can be sharp!
- When doing heavy sanding face masks or respirators should always be worn.
- Keep your fingers clear from the point of operation of machines by using special tools and devices such as push sticks and paddles. Never use a rag near moving machinery.
- Keep the work area free from debris, clean spills immediately and remove all sawdust and wood chips. Do not bring food or drink in to the fabrication lab or Dirty makerspace. All food and drink should be confined to the lounge area of the clean makerspace or outside.
- Clean up after yourself. Before you leave be sure all tools are returned to their appropriate position and all the machines are clean and the floor is swept. Allow a minimum of 20 minutes for your cleanup procedure.
- Earphones, cell phone use and texting are not allowed in the Lab or space. We need to be able to get your attention and you need to hear what's going on around you. Cell phone use and texting are distractions. Simply go elsewhere to use your phone

EYE PROTECTION

Eye protection must be worn at all times while working in the dirty makerspace - Safety glasses are provided. Consistent failure to wear eye protection will result in loss of access.

NON-INJURY CAUSING ACCIDENTS

In the event of accidents resulting in machine damage, material "kick- back" or other unsafe events, the following procedure must be followed: If gross negligence is determined to be involved in the course of a non- injury accident a meeting is required between the user(s) and the Lab supervisor before Lab or space access may resume. If an individual is consistently working in an unsafe manner, privileges will be revoked.

INJURY-CAUSING ACCIDENTS

In the event of an injury-causing accident, the following procedures must be followed: Notify the Lab supervisor or monitor on duty immediately. Lab personnel will follow established first-aid procedures. All injury-causing accidents requiring outside medical attention requires a meeting with the Lab supervisor to determine the cause of the accident and as a preventive measure against similar accidents in the future before Lab access may resume.

STORAGE OF MATERIALS AND PROJECTS

Storage of materials in the Lab is prohibited. The lab is not responsible for any projects left unattended. Any project left overnight should have all necessary contact information. Projects left overnight must be retrieved by 12 pm the following day. Projects left for one week will be disposed of.

CLEANING OF MAKERSPACE

Each user is responsible for clean-up and tool return. Each machine and work area should be cleaned immediately after use. Machines should be blown off using the air hose and the floor area around it should be swept clean. The last person to use a machine is responsible for cleaning the machine and surrounding work area, users who consistently fail in their clean-up responsibilities will be denied Makerspace access.

MATERIALS

Tools and Machinery in the Lab each have an intended use to specific materials. Please see the Lab supervisor if you wish to work with unique materials in the Lab. Used wood and wood based materials may be processed in the Lab as long as the material is clean, free of dirt, grit, grime, metal, paint, varnishes, enamel, moisture or abrasive materials. Material that is excessively contaminated with any of the above will not be permitted. Lab users using used materials may be found liable for damage to the tools and equipment caused by those materials,

No pressure treated/chemically treated wood allowed in the Lab. No green wood - tree limbs, etc. unless they are completely dry. Consult with before attempting to cut unstable materials (limbs, etc.) as they pose potential dangers when processing. Plaster objects may not be worked on any of the equipment or machines in the Lab. These rules are meant to insure a safe and orderly work environment; please respect them.

- **Quantity limitations**

10 hours a month guaranteed for 3D printing, 4 hours a month guaranteed for laser. Additional opportunities available for all digital fab equipment on a first come first serve basis. 1 yard of Calendar vinyl, CNC will cut, wood products, most plastics, circuit boards. No material is provided for laser or CNC. All other materials such as glue, tape, staples are supplied until monthly materials budget is depleted.

- **Scheduling of equipment use**

All members having completed a digital fabrication training will be granted scheduling opportunities for the equipment they are trained on. Weekly sign-ups will happen the Sunday evening before the week starts. Members wishing to utilize more than their weekly allowance will be able to utilize the equipment during unscheduled time slots. Any time slots not claimed by the morning of will be considered unscheduled and available for first come first serve status.

SAFETY DATA SHEETS (SDS)

Makerspace Safety Data Sheets (SDS) are located in the clean Makerspace Room 1302 in a yellow binder with red lettering SDS. Inside are all of the SDS sheets on all of the equipment and materials that we have in the Makerspace.

HAND TOOL SAFETY

These tools, while they do not involve the same dangers as power machinery, should be used cautiously. Often, the type of injury sustained while misusing these tools are small cuts and lacerations - sometimes requiring stitches. Please observe the following guidelines while using hand tools. Hand tools are non-powered tools. They include wrenches, hammers, chisels, screw drivers, and other hand-operated mechanisms. Even though hand tool injuries tend to be less severe than power tool injuries, hand tool injuries are more common. Because people take everyday hand tools for granted, simple precautions for safety are easily forgotten. Hand tools must remain in the Makerspace at all times and may NOT be checked out. At no point will tools will be allowed outside of the lab and its adjacent support areas.

The most common hand tool accidents are caused by the following:

- Failure to use the right tool
- Failure to use a tool correctly
- Failure to keep edged tools sharp
- Failure to replace or repair a defective tool
- Failure to safely store tools
- IMPORTANT: Use the right tool for the job to complete a job safely, quickly, and efficiently.
- Follow these guidelines for general hand tool safety:
 - Wear safety glasses whenever you hammer or cut, especially when working with surfaces that chip or splinter.
 - Do not use a screwdriver as a chisel. The tool can slip and cause a deep puncture wound.
 - Do not use a chisel as a screwdriver. The tip of the chisel may break and cause an injury.
 - Do not use a knife as a screwdriver. The blade can snap and cause an injury.
 - Never carry a screwdriver or chisel in your pocket. If you fall, the tool could cause a serious injury. Instead, use a tool belt.
 - Use the proper wrench to tighten or loosen nuts. Pliers can chew the corners off a nut and the pliers can become damaged.

When using a chisel, always chip or cut away from yourself.

- Do not use a wrench if the jaws are sprung.
- Direct saw blades, knives, and other tools away from aisle areas, students and employees.
- Keep knives and scissors sharp. Dull tools are more dangerous than sharp tools. Improper tool storage is responsible for many makerspace accidents. Return each tool to its marked location for proper tool storage. Never use a dull tool-it is actually much more dangerous than a sharp one. Think about the direction your energy is going while performing an operation. If you are holding material in your hands, be sure the action is going away from your body. Better yet, clamp the material in a vise or to the surface of a workbench. Like power tools, think through a procedure before you attempt it. Many times, we become complacent or are rushing through a job - that is when accidents are most likely to occur.

HAND-HELD POWER TOOLS

Only change blades, bits, etc., when the tool is off and unplugged. It is very easy to accidentally turn the tool on. Know what direction it moves and be prepared to compensate for the torque of the motor. Wear eye protection at all times - some tools such as the lathe may also require the use of a face shield. Always keep your hands a safe distance from cutters and blades. Make sure all guards and safety devices are in place. Do not use a machine without the proper guards. Keep the machine clean. Know the physics of the machine and where the cutting force wants to throw the material. Make sure to turn all power tools off before unplugging, and always check that it is turned off before plugging in. All hand held power tools must remain in the lab and may NOT be checked out. At no point will tools be allowed outside of the lab and its adjacent support areas.

UNDERSTANDING POWER TOOLS

The most dangerous parts of power tools are the moving parts. All of the machinery in this Lab is powered by electric motors, and the radial forces produced by spinning shafts, pulleys, blades and belts can be particularly dangerous. This danger arises from two effects of spinning parts: (1) outward forces—wood and debris can become violent projectiles when thrown by spinning blades, and (2) inward forces—loose clothing, jewelry, hair, and fingers can be grabbed, wound up, and pulled in and mangled by any spinning machinery. Always be aware of the danger of these radial forces. Always wear eye protection, never stand in line with circular blades, and always maintain a safe distance from spinning parts when the tool is operating. Power tools can be extremely dangerous if they are used improperly. Common accidents associated with power tools include abrasions, cuts, lacerations, amputations, burns, electrocution, and broken bones. These accidents are often caused by the following:

- Touching the cutting, drilling, or grinding components
- Getting caught in moving parts
- Suffering electrical shock due to improper grounding, equipment defects, or operator misuse
- Being struck by particles that normally eject during operation
- Touching hot tools or work-pieces
- Falling in the work area
- Being struck by falling tools when working around power tools, you must wear personal protective equipment and avoid wearing loose clothing or jewelry that could catch in moving machinery.
- In addition to general lab guidelines, follow these guidelines for working with power tools
- **Cabrillo employees or students shall not turn on, use, repair, or operate any machine, tool, equipment unless authorized by a Makerspace supervisor.**
- Use the correct tool for the job. Do not use a tool or an attachment for something it was not designed to do.
- Select the correct bit, blade, cutter, or grinder wheel for the material at hand. This precaution will reduce the chance for an accident and improve the quality of your work.
- Keep all guards in place. Cover exposed belts, pulleys, gears, and shafts that could cause injury.
- Always operate tools at the correct speed for the job at hand. Working too slowly can cause an accident just as easily as working too fast.
- Watch your work when operating power tools. Stop working if something distracts you.
- Do not rely on strength to perform an operation. The correct tool, blade, and method should not require excessive force. If undue force is necessary, you may be using the

wrong tool or have a dull blade.

- Before clearing jams or blockages on power tools, disconnect from power source. Do not use your hand to clear jams or blockages, use an appropriate tool.
- Never reach over equipment while it is running.
- Never disable or tamper with safety releases or other automatic switches.
- When the chance for operator injury is great, use a push stick to move material through a machine.
- Disconnect power tools before performing maintenance or changing components.
- Keep a firm grip on portable power tools. These tools tend to "get away" from operators and can be difficult to control.
- Never leave chuck key in chuck.
- Keep bystanders away from moving machinery
- Do not operate power tools when you are sick, fatigued, or taking strong medication.
- When possible, secure work pieces with a clamp or vise to free the hands and minimize the chance of injury. Use a jig for pieces that are unstable or do not lie flat.
- Always work in a clean environment. An unkempt workplace can result in injury, especially when sawdust accumulates on concrete floors. You must always be responsible for cleaning up after yourself.

MACHINE SAFETY

To operate a machine safely, you must know more than just how to turn it on and off. You must know how to perform the basic operations and how to make simple adjustments. Always maintain a healthy respect for the tool's capabilities and limits. Never use a machine for a job it was not designed for and never experiment – if you are unsure about how to perform a certain operation, ask for help. The more you know about a machine, the safer you will be. Don't become over confident - that leads to carelessness, which causes accidents. The following are general guidelines for stationary machines. Wear eye protection at all times - some tools may also require the use of a face shield.

Always keep your hands a safe distance from cutters and blades. Make sure all guards and safety devices are in place and in perfect operating order. Do not use a machine without the proper guards. Know the physics of the machine and where the cutting force wants to throw the material. When feeding material through a machine with the hands, be aware of the direction you are pushing (away from blade or cutter). Never operate a power tool when alone in the Lab.

Defects in material can be dangerous. Check the stock carefully for knots, splits, and other defects. Keep the machine clean. Remove all tools, lumber, and unnecessary materials. Objects left on the machine can vibrate into revolving cutters. They can then be thrown from the machine with great force. Never clean a machine while it is running. Always work with a plan of procedure. Consider and think through each step ahead of time. Never make an adjustment unless the power is off.

The tool must come to a complete stop. Your stance is also important - stand in a comfortable, balanced (defensive) position when working with power tools. Both feet should be firmly on the floor. If something doesn't sound right, or feel right - turn off the machine and inform the supervisor or monitor. Above all, think before you perform any task. Know the tool's capabilities and the work it is intended for. If you feel unsure, STOP and ask for assistance.

BAND SAW-RYOBI 9 INCH

Free hand tool designed for cutting circles and curves. Can also be used to rip and crosscut relatively small pieces of wood.

Safety–Eye protection is required by law. Do not be distracted by or talk to others when operating machinery.

1. Always keep hands and fingers 3" away from the cutting edge. Use a push stick if you cannot find a way to hold the piece without putting your hands at risk. Alternatively, use the miter gauge or fence to help hold your workpiece.
2. Before cutting, adjust the blade guard to be less than 1" above the top of the workpiece. In addition to protecting you from the blade, it will improve the quality of the cut.
3. Before making a cut, think about the direction in which you are pushing. If this direction would cause any part of your body to come in contact with the blade, stop and adjust.
4. Only use wood that has flat surfaces.
5. Hold wood firmly feeding it into blade at a moderate speed.
6. Check band for good tension, if the blade breaks. Shut off the machine and step back. When the machine has stopped, notify and staff/mentor worker immediately.
7. Only Staff/Mentors and approved users may change the blade.
8. Avoid backing wood out of an incomplete cut.
9. Blade inhibits tight turns that could twist and break band.
10. Never clear chips or scraps from the blade or working area while the machine is running. Wait until the machine has come to a complete stop.



SANDER

Free hand tool for sanding small pieces of wood. **SAFETY–Eye protection is required by law. Do not be distracted by or talk to others when operating machinery.**

- A. Sand only in the direction of the wood grain on the downward stroke of the machine.
- B. Do not apply excessive force
- C. Check sanding surfaces for tears and holes. Worn surfaces should be replaced
- D. Check belt traction while running



SPINDLE SANDER

Used for sanding curved surfaces. **Safety–Eye protection is required by law. Do not be distracted by or talk to others when operating machinery.**

- A. Sanding spindle should be appropriate size for the radius of the curve you need to sand.
- B. Keep wood flat on table while sanding
- C. Do not apply excessive force
- D. Check sanding surfaces for tears or holes. Worn surfaces should be replaced.
- E. Only staff/mentors or approved users may change the spindle.



COMPOUND MITER SAW

13" Compound Slide Miter Saw – Used for cross cuts, miter and compound miter jointing. **Safety–Eye protection is required by law. Do not be distracted by or talk to others when operating machinery.**

- A. Blade should be sharp, run freely, and be free of vibration.
- B. Let blade come to full speed before beginning to cut.
- C. Hold material with hand away from blade and keep your fingers and thumb together.
- D. Do not cross your arms while using saw.
- E. Start the saw, pull out, push down, and push back.
- F. Allow blade to stop completely before lifting up.
- G. Do not attempt to cut small pieces
- H. Do not handle blade guard. It is designed to self-tract.



DRILL PRESS

10" Variable Speed – Designed to make vertical holes or create mortises. **Safety-Eye protection is required by law. Do not be distracted by or talk to others when operating machinery.**

- A. Before drilling, look up the correct drilling speed for your tool and material. Set the speed before drilling by ensuring that the machine is the correct gear. Have a staff member help you with this, do not do this yourself.
- B. Always clamp your work before drilling, never ever hold a workpiece with your hands while drilling.
- C. Place scrap stock underneath material to be cut in order to protect base.
- D. If the drill jams in the material or causes material to become loose from the fixture, turn off spindle immediately. Get a staff/mentor to help you. Do not resume drilling without first removing the tool from the material.



SCROLL SAW

Free hand tool for cutting fine detail designs. **Safety-Eye protection is required by law. Do not be distracted by or talk to others when operating machinery.**

- A. Be sure adjustment keys and wrenches have been removed
- B. Rotate motor once by hand before use
- C. Lower hold down clamp against wood to secure it
- D. Only use 1/2" stock wood or smaller that has flat only surfaces
- E. Hold wood firmly feeding it into blade at a moderate speed
- F. Blades should be changed by staff/mentor but always check band for good tension
- G. Stop blade before backing wood out of an incomplete cut
- H. Make release cuts before making long curves



BELT SANDER

This tool is designed to smooth larger items like rough boards, old finishes, and sometimes metal and plastic. **Safety–Eye protection is required by law. Do not be distracted by or talk to others when operating tools.**

- A. Hold with both hands. This tool is easy to lose control of
- B. Belt must be tracked properly before use
- C. The weight of the sander is sufficient. Leaning on the tool is bad for the motor and is less effective.



CIRCULAR SAW

Hand ripping and crosscutting stock. **Safety–Eye protection is required by law. Do not be distracted by or talk to others when operating tools.**

- A. Hold with both hands. This tool is easy to lose control of
- B. Blade guard is designed to self-retract.



DETAIL SANDER

This tool provides the ability to sand in corners and in other detailed spaces. **Safety–Eye protection is required by law. Do not be distracted by or talk to others when operating tools.**

- A. A moderate grip on the sander insufficient. Excessive forces are bad for the motor and is less efficient.



FINISHING SANDER

Half and quarter sheet sanders for finishing flat surfaces. **Safety–Eye protection is required by law. Do not be distracted by or talk to others when operating tools.**

- A. The weight of the sander is sufficient. Excess pressure on the tool is bad for the motor and is less effective.
- B. Abrasive paper should be secure before use.



ANGLE GRINDER

This is a metal, stone, plastic and wood working tool for grinding, and smoothing rough edges. **Safety–Eye protection is required by law. Do not be distracted by or talk to others when operating tools.**

- A. Hold with both hands. This tool is easy to lose control of.
- B. Lay tool trigger and grinder side up
- C. Always position wheel guard between you and your work.



RECIPROCATING SAW

Safety–Eye protection is required by law. Do not be distracted by or talk to others when operating tools.

- A. Hold with both hands. This tool is easy to lose control of.
- B. Can cut wood and metal
- C. Make sure your material is clamped to a stable surface before cutting.



CORDLESS DRILL

This tool is designed to drill various sized straight holes into wood or metal. **Safety–Eye protection is required by law. Do not be distracted by or talk to others when operating tools.**

- A. Before drilling, clamp the material being drilled to a solid surface
- B. Drill straight in and pull straight out. Twisting or wobbling bit in a hole will damage the bit and cause bodily harm
- C. Bits can be extremely hot after use
- D. Be sure to drill with motor in forward direction. Reverse direction will burn or can ignite wood
- E. Pull bit out of deep holes to remove debris. Excess chips can cause overheating.



JIG SAW

Safety–Eye protection is required by law. Do not be distracted by or talk to others when operating tools.

- A. Put material on a stable surface when cutting

SOLDERING IRON

- B. Always use the silicone pad to change the tip, even if you think the iron is cold.
- C. Don't touch the tip of the iron.
- D. Wash your hands after you are done soldering, or wear gloves during soldering.



ROLAND GX/GS 24 VINYL CUTTER

- A. Avoid reaching into the working area of the machine while it is running. The cutting head moves quickly and somewhat unpredictable.
- B. If you are cutting a large piece, make sure to unroll the vinyl and let hang down to prevent the vinyl cutter from pulling the vinyl roll off the rollers in the back.



ULTIMAKER 3D PRINTERS (UM 2+, 3, 3 extended and the go)

- A. Never eject the SD card while the printer is running.
- B. Never reach into the printing area while you are printing.
- C. If you see a problem, ask one of the lab assistants to help you.
- D. Let the print bed cool before removing the part from the bed.
- E. If you must use the scraper, use tool with the red handle that is approved to use with the printers. Always push away from yourself. Never put any part of your hand or body in the potential path of a sharp object.



UPRINT 3D ABS PRINTER

- A. Only staff and mentors may operate the Uprint.



SUPPORT CLEANING APPARATUS (SCA) FOR UPRINT

- A. Only staff and mentors may operate, add parts or remove parts from the SCA.
- B. Wear goggles and shoulder length gloves when retrieving parts from the SCA.
- C. Wear rubber apron.
- D. If you spill any of the SCA liquid on yourself:
- E. Remove any affected clothing and flush the affected skin with water for 15 minutes.
- F. If necessary, use the emergency eyewash/shower station next to the sink in the dirty space.
- G. Notify a staff member or mentor as soon as possible.
- H. If a large spill occurs:
- I. Clean yourself up first
- J. Notify a staff/mentor
- K. Have the rest of the people in the dirty space evacuate
- L. Call Safety for cleanup

BROTHER PR670E DIGITAL EMBROIDERY MACHINE

- A. Only staff may operate and do maintenance on the machine.



LASER CUTTER USE AND SAFETY

- A. First turn laser exhaust system on..
- B. Make sure the air assist is on.
- C. Turn on the laser and make sure to properly focus the laser.
- D. Only cut and engrave materials on the approved materials list. Certain materials such as PVC and Fiberglass emit toxic gases and must NOT be cut or etched under any circumstances.
- E. If you would like to use a material
- F. **NEVER** leave your job unattended, if you do need to step away you can press pause



ACCEPTABLE MATERIALS:

- Chipboard up to 4-Ply
- Museum board up to 1/8" thick
- Basswood and Hobby Plywood up to 1/8" thick
- Limited Acrylics up to 1/4" thick (Absolutely no PVC material, such as Lexan, or other Polycarbonates)
- Styrene up to 1/4" thick

Important:

If cutting acrylic, the material must have some type of label stating that it is in fact acrylic. If the material does not have this, it will not be cut or engraved. When cutting acrylic please bring tape to cover the gaps in the laser door. Other materials are prohibited from the laser unless prior consent from a Makerspace supervisor is given.

SHOPBOT DESKTOP

Safety–Eye protection is required by law. Do not be distracted by or talk to others when operating tools.



- A. **Shopbot is to be run by Staff/Approved Operators only!**
- B. Material must be properly secured (plastic brad nails). Or with the Alpha Shopbot, the vacuum system must be turned on.
This also applies to parts as they become separated from the base material. In this case, screws or tabs must be used to prevent parts from becoming free, as they can be flung by the spinning cutter.
- C. Learn and understand safe use of the machine. Do not allow untrained individuals to operate the machine without supervision. Be aware of the location of the Emergency Stop switches at all times.
- D. **Eye and ear protection MUST** be worn by the machine operator as well as any bystanders or observers. Flying sawdust, material chips, and other debris can cause serious eye injury.
- E. Wear closed-toe shoes at all times.
- F. **DO NOT** place hands on the rails of the ShopBot. Be aware that the machine may move unexpectedly in any direction, which can cause serious injury if hands are in the path of movement.
- G. Never wear gloves while operating the machine. As with any power tool, a glove can get caught in moving or spinning parts and pulled into the machinery.
- H. **Never leave a machine running and unattended.** A spinning tool generates friction and heat, creating a risk of fire. This risk is minimized by using correct chip load, using sharp bits, and by always double-checking files before cutting. Be prepared to pause or stop the cut if something seems incorrect or unsafe.
- I. **Keep a working fire extinguisher within reach of the machine.**

CONCLUSION

While this handbook does cover numerous safety issues, it is not a replacement for time spent practicing safe work habits in the Lab. Ultimately, it is the responsibility of the Lab user to follow all safety procedures as outlined. Failure to do so could result in serious injury. Completing the process to become Lab Certified in no way makes the user an expert. Becoming accomplished at fabrication with many materials and the equipment used to shape them takes time, patience and hard work. One should plan ahead and ask for assistance. The Lab staff is available to help and offer advice. Finally, the user needs to understand the limits of the equipment, the materials, their own technical ability and the size and scope of the project when considering work in the Lab.

SAFETY AGREEMENT FORM

Cabrillo Makerspace

Failure to follow these guidelines, procedures and the instructions of the makerspace supervisors will result in the loss of privileges of the entire fabrication facility indefinitely.

I have read and understand the general guidelines for the operation of the Cabrillo College Makerspace and agree to comply with them. I agree to attend the introductory safety orientation and to operate all Cabrillo College owned equipment in compliance with the applicable safety policies posted in the lab and at each machine. I also agree to individual instruction and orientation in order to gain certification to use a piece of equipment on my own. I agree to abide by all of the applicable safety requirements for the use of the lab, including the wearing of protective safety gear. I agree never to operate any machine without eye protection. I understand that I may not bring in my own personal tools to work on a project. I agree not to operate any machine on my own without certification. I am solely responsible for understanding and abiding by the proper operation of the makerspace and that I do so at my own risk. I understand working in a fabrication environment involves an element of risk, which I accept. I also acknowledge that orientation and certification is required for my use of the lab. I understand that the Makerspace supervisors are present to help ensure my safety. In order to help me use the tools provided, I understand that they may need to oversee my use and possibly correct me if a tool is being used incorrectly. This oversight may include a small amount of physical contact with a Makerspace supervisor and I fully understand that this is strictly for my safety and the safety of others. I understand that users of the Makerspace should not operate power tools or equipment if they are taking any medication that impairs their mental faculties or physical ability to operate tools or equipment. I also understand that the Makerspace should not be used by persons who are tired or in a hurry. By signing this form, I confirm that I will not enter the fabrication lab or Makerspace and operate tools or equipment under any impaired state (mental, physical, or any other, including sleep deprivation).

I HAVE READ AND UNDERSTAND THE TERMS AND CONDITIONS OF THIS POLICY. I UNDERSTAND THE USE OF THE MAKERSPACE IS NOT A RIGHT, BUT A PRIVILEGE AND ANY UNSAFE ACTION ON MY PART MAY RESULT IN THE REVOCATION OF MY PRIVILEGES INDEFINITELY, AT THE DISCRETION OF THE MAKERSPACE DIRECTOR/PROGRAM COORDINATOR. I HAVE BEEN TRAINED AND INSTRUCTED ON THE PROPER AND SAFE USE OF THE MAKERSPACE EQUIPMENT. I UNDERSTAND THAT FAILURE TO FOLLOW THE INSTRUCTIONS OUTLINED IN TRAINING AND IN THIS DOCUMENT WILL RESULT IN LOSS OF PRIVILEGES AND ACCESS. IF GROSS NEGLIGENCE IS DETERMINED TO BE INVOLVED IN THE COURSE OF A NON-INJURY ACCIDENT A MEETING IS REQUIRED BETWEEN THE USER(S) AND THE LAB SUPERVISOR BEFORE LAB ACCESS MAY RESUME. IF AN INDIVIDUAL IS CONSISTENTLY WORKING IN AN UNSAFE MANNER, LAB PRIVILEGES WILL BE REVOKED.

Student (Legibly Printed) Name

Date:

Student Signature:

Date:

STUDIO SECTION:

GRADUATION DATE:

Test Score: Pass

Fail

No. of Attempts:

Shop Supervisor

Date

