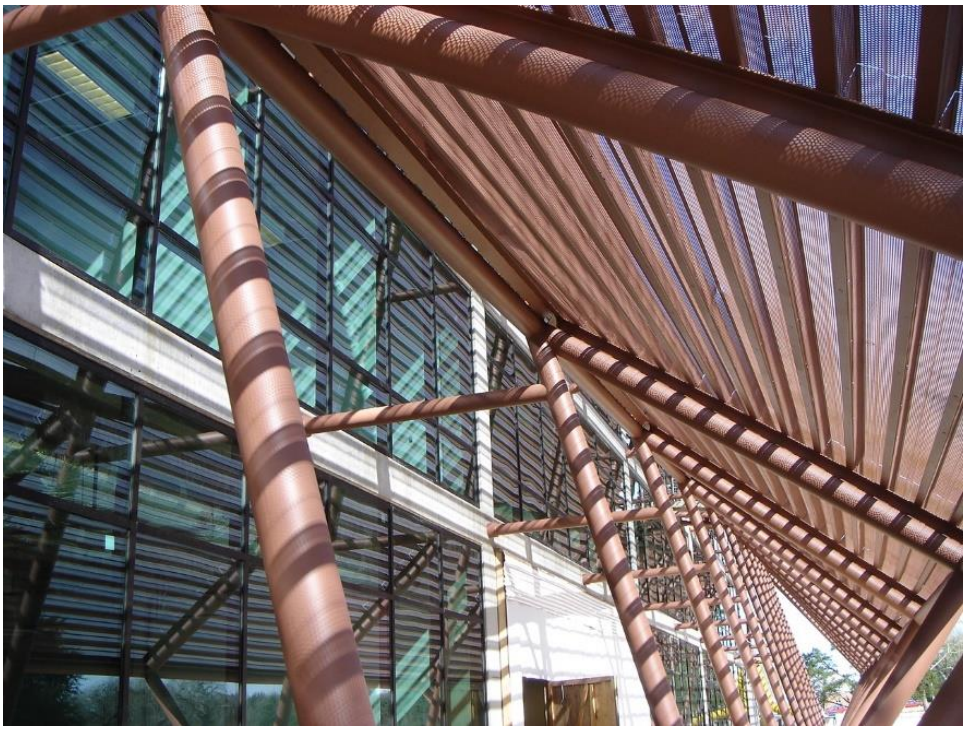
PVAMU SOA FAB-LAB SAFETY HANDBOOK

2016-2017



The digital fabrication laboratory at Prairie View A & M University (PVAMU) supports university students and faculty in the exploration and investigation of material research including wood, metals, liquids, plastics, and concrete. The fabrication laboratory 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 two laser cutters, a 3-axis CNC router, 3-D scanner, three ABS plastic 3D printer and a CNC Plasma Cutter. The lab is overseen by the Director, and is staffed by the lab specialist, a Lab Tech and Student Assistants, who instruct and guide users in the use of the equipment.

REVISED 02.22.16

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GENERAL INFORMATION

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FAB LAB MISSION

The digital fabrication laboratory at Prairie View A & M University (PVAMU) supports university students and faculty in the exploration and investigation of material research including wood, metals, liquids, plastics, and concrete. The fabrication laboratory 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 two laser cutters, a 3-axis CNC router, 3-D scanner, three ABS plastic 3D printer and a CNC Plasma Cutter. The lab is overseen by the Director, and is staffed by the lab specialist, a Lab Tech and Student Assistants, who instruct and guide users in the use of the equipment.

POLICIES AND PROCEDURES

The Fabrication Lab is located on the first floor of Nathelyne A. Kennedy building and is a support and research facility for the students, faculty, and staff of the SOA. The safety of students, faculty, staff, and guests is a prime consideration in every activity. The goal of the PVAMU School of Architecture 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 fab lab area including the sidewalk accessed by the garage door and any other lab related work environment including impromptu installation work locations. All tools must remain in the Fabrication Lab 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 fab lab requires any student with a medical condition to consult with their personal physician prior to using the fab lab, PVAMU 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 Fab-Lab 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 Fab-Lab supervisor on duty each time you enter the lab.

1. Dust allergies.
2. Latex allergies
3. Any other allergies that may be present.
4. Physical contact with your Fab-Lab supervisor. (If a supervisor notices you working improperly they may physically move you for guidance or safety purposes.)
5. Loud background noises and/or commotion caused by machines.
6. Any other need that may require special attention.

OVERVIEW

An important part of your experience in woodworking 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.

FAB LAB ACCESS

Currently enrolled SOA students, full-time faculty and staff may access the Lab during open Lab hours or by appointment to work on research related projects (see section on personal projects). Adjunct faculty may use the lab upon written request and written approval of the Fabrications Lab Specialist. Adjunct faculty use is limited to research and development of course related material only. All users must attend a 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 Fabrication Lab upon completion of mandatory trainings and exams. Access will remain valid for a term of one year from date of signed Safety Agreement form. Any Faculty member that does not access the lab for a period of one year must re-take the Use and Safety training. Under no circumstances will anyone be allowed to have extended usage outside of standard operating hours. Faculty/Staff who are interested in using the Laser Cutter must sign up in advance of using the laser. Lab access may be limited during peak times. Any faculty or staff who use the Fab Lab must fill out a record of use form at time of use. The Record of Use form is available by request only.

SAFETY

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

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.

LAB 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 Fab Lab Director or Manager. Visits should be as brief as possible.

TEST REQUIREMENTS

All users of the lab must complete the Use and Safety Training module to gain access to the Lab and become certified. Lab certification consists of: attending the Use and safety session, 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 re-take training. The Safety Training schedule will be made available to you by the Director of the Fab Lab. 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.

FAB LAB 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 Lab at any given time is 5 students per employee.

RESERVING THE LAB FOR CLASS USE

At least one weeks' notice must be given to reserve the Lab 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 Lab. **A trained monitor must be present at all times while students are working in the Lab.** When the Lab is reserved for a class, it is closed to other students. The Lab can be reserved Monday, Wednesday and Friday between 1:00pm and 5:00pm.

OPEN LAB HOURS

Hours are posted on the Lab window on a semester basis. Lab hours may vary, depending on the activities taking place in Pearl Hall. If the Lab 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 university is closed, so is the Lab. Staff absence may cause closure of the Lab.

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 the fab lab office phone, or 911 from a cell phone. The fabrication lab is located in Nathelyne A. Kennedy Building room 128. All students entering the fab lab 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 re-instated until the offending student returns to clean the entire lab.

PERSONAL PROTECTION

There are several measures you must take to protect yourself from work hazards.

1. Put on your safety glasses/goggles as soon as you enter the lab.
2. Do **not** wear loose fitting clothing.
3. Do **not** wear loose fitting long sleeve shirts/sweatshirts.
4. Do **not** wear neckties.
5. No jewelry should be worn in the fabrication lab. (Including earrings, watches and excessive rings)
6. Snug fitting clothing is essential to your safety.
7. **Make certain that long hair is not loose, but is pulled back away from equipment.**
8. **Always wear safety glasses** when working with any lab equipment. 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. *********

SAFETY GUIDELINES

Follow these guidelines for general work safety:

1. Never work alone. There must always be at least two adults present in the fabrication lab.
2. Always wear appropriate safety gear and protective clothing, including closed toed shoes.
3. Eye protection is **required** while operating **any** machine.
4. Know where the fire extinguishers are located and how to use them.
5. Never work impaired. This also does not simply mean impaired from drugs or alcohol, but also from sleep deprivation.
6. 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 in the fabrication lab, **don't** do it. Think through the entire job before starting.
7. 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.
8. If you have not worked with a specific material before, consult the fabrication lab supervisor for precautions, methods and instruction prior to beginning work.
9. Do not work in the lab if you are in a hurry, this almost always ruins the work and often results in injury.
10. 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.
11. Before starting any machine be sure to check that it is set up correctly and fully operational.
12. Check power cords and plugs on portable tools before using them.
13. 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!
14. When doing heavy sanding face masks or respirators should always be worn.
15. 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.
16. 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.

17. Clean up after yourself. Before you leave the lab 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.

18. Earphones, cell phone use and texting are not allowed in the Lab. 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 Lab - 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 access may resume. If an individual is consistently working in an unsafe manner, Lab 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 9:00 am the following morning. Projects left for one week will be disposed of.

CLEANING OF FABRICATION LAB FACILITY

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 Lab 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 Brandon Gassaway 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.

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 Fabrication Lab 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:
1. Failure to use the right tool
2. Failure to use a tool correctly
3. Failure to keep edged tools sharp
4. Failure to replace or repair a defective tool
5. 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:

1. Wear safety glasses whenever you hammer or cut, especially when working with surfaces that chip or splinter.
2. Do not use a screwdriver as a chisel. The tool can slip and cause a deep puncture wound.
3. Do not use a chisel as a screwdriver. The tip of the chisel may break and cause an injury.
4. Do not use a knife as a screwdriver. The blade can snap and cause an injury.
5. Never carry a screwdriver or chisel in your pocket. If you fall, the tool could cause a serious injury. Instead, use a tool belt.
6. Use the proper wrench to tighten or loosen nuts. Pliers can chew the corners off a nut and the pliers can become damaged.

7. When using a chisel, always chip or cut away from yourself.
8. Do not use a wrench if the jaws are sprung.
9. Direct saw blades, knives, and other tools away from aisle areas, students and employees.
10. Keep knives and scissors sharp. Dull tools are more dangerous than sharp tools. Improper tool storage is responsible for many fab lab 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 if 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 will 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:

1. Touching the cutting, drilling, or grinding components
2. Getting caught in moving parts
3. Suffering electrical shock due to improper grounding, equipment defects, or operator misuse
4. Being struck by particles that normally eject during operation

5. Touching hot tools or work-pieces
6. Falling in the work area
7. 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:

1. University employees or students shall not turn on, use, repair, or operate any machine, tool, equipment unless authorized by a fabrication lab supervisor.
2. Use the correct tool for the job. Do not use a tool or an attachment for something it was not designed to do.
3. 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.
4. Keep all guards in place. Cover exposed belts, pulleys, gears, and shafts that could cause injury.
5. 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.
6. Watch your work when operating power tools. Stop working if something distracts you.
7. 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.
8. 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.
9. Never reach over equipment while it is running.
10. Never disable or tamper with safety releases or other automatic switches.
11. When the chance for operator injury is great, use a push stick to move material through a machine.
12. Disconnect power tools before performing maintenance or changing components.
13. Keep a firm grip on portable power tools. These tools tend to "get away" from operators and can be difficult to control.
14. Never leave chuck key in chuck.
15. Keep bystanders away from moving machinery.

16. Do not operate power tools when you are sick, fatigued, or taking strong medication.

17. 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.

18. Always work in a clean environment. An unkempt work place 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.

LASER CUTTER USE AND SAFETY

There are 3 procedures that must be done prior to laser cutting.

1. Make sure the laser exhaust system is properly turned on.
2. Make sure the air-valve is connected to the lasers.
3. Properly "Z" the laser.

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. The appropriate acrylic material is stocked in the Fab Lab. **When cutting acrylic please bring tape to cover the gaps in the laser door.** Cardboard is prohibited from the laser unless prior consent from a Fab Lab supervisor is given.

ILLUSTRATOR BASIC VECTOR CUTTING/SCORING

Open the Illustrator template the template is sized to the bed of the laser cutter (32" x 18")

Go to FILE > PLACE your work into the template.

Make sure all lines are inside bounding box and are as close as possible to maximize the material.

Ungroup everything go to OBJECT > UNGROUP and repeat at least 3 times.

Release any clipping masks go to OBJECT > CLIPPING MASK > RELEASE CLIPPING MASK repeat a few times

Select and place all cut lines in the cutting layer and assign them a "MAGENTA CUT" style from the graphic styles menu. There is also a CYAN Perimeter cut as well. This is for cuts that make up a perimeter around other cuts or scores, and is meant to be the last cut performed.

ILLUSTRATOR RASTER FILLS/ENGRAVING

Follow the same instructions as above. When setting graphic styles, black will be the deepest, 50% gray will be half and white would be no engraving you can use the preset raster fills, or just a grayscale. Your file may be rejected if there is too much raster fills to be engraved for this is a very time intensive way to score with the Laser Cutter.

AUTOCAD CUTTING/SCORING:

INITIAL SETUP

Open the laser template. The year (2000, 2004, and 2007) should correspond to whichever version of AutoCAD you are using.

The template is sized to the bed of the laser cutter (32" x 18") Copy and paste your work into the template in model space.

In PAPER SPACE, zoom extents to view your work.

Using the VIEWPORTS toolbar, scale your work so that it fits inside the bounding box.

Arrange the pieces to be cut so that you use the least amount of material.

DRAWING PREP

Set all the line weights to 0.00 mm or make sure they are all by layer and set to the layers provided.

Make sure to have your lines on their proper cutting layer before entering the lab to save time.

Erase all overlapping lines with the overkill command. Overlapping lines can cause your file to be cut incorrectly.

Procedure: type EXPLODE > select all > type OVERKILL (make sure the "ignore" options are unchecked) > select all any text in the file needing cut should be one of the following fonts: ISCOP, ISOCT, MONOTXT, PROXY, SIMPLEX, TXT.

LAYERS

The template already has the necessary layers and corresponding line styles set up but you must assign your work (lines circles, etc.) to the appropriate layer.

A. **Band Saw** – Free hand told 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.
2. Upper guide should be only 1\8" above material height.
3. Only use wood that has flat surfaces.
4. Hold wood firmly feeding it into blade at a moderate speed.
5. Check band for good tension
6. Avoid backing wood out of an incomplete cut.
7. Lade inhibits tight turns that could twist and break band.
8. Clicking while blade is in motion indicates a hazard. Inform trained personnel.

B. **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.**

1. Sand only in the direction of the wood grain on the downward stroke of the machine.
2. Do not apply excessive force
3. Check sanding surfaces fir tears and holes. Worn surfaces should be replaced
4. Check belt traction while running
5. Gloves should not be worn; neither should you hold object with rag.

C. **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.**

1. Sanding spindle should be appropriate size for the radius of the curve you need to sand.
2. Keep wood flat on table while sanding
3. Do not apply excessive force
4. Check sanding surfaces for tears or holes. Worn surfaces should be replaced.

D. **Compound Miter Saw** – 10" 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.**

1. Blade should be sharp, run freely, and be free of vibration.
2. Let blade come to full speed before beginning to cut.
3. Hold material with hand away from blade and keep your fingers and thumb together.
4. Do not cross your arms while using saw.
5. Start the saw, pull out, push down, and push back.
6. Allow blade to stop completely before lifting up.
7. Do not attempt to cut small pieces
8. Do not handle blade guard. It is designed to self-tract.

E. **Drill Press** – 15" 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.**

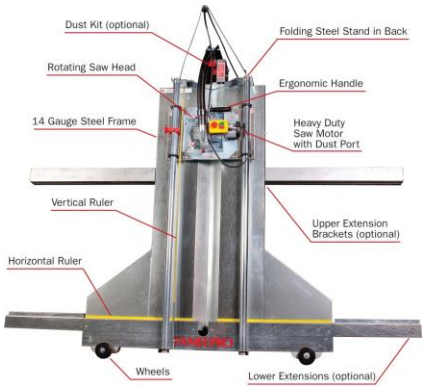
1. Larger bits should be used at slower speeds.
2. Adjust speed with motor running
3. Place scrap stock underneath material to be cut in order to protect base.
4. Clamp plastic and metal to base.

F. **Jointer** – 8" Long Bed for squaring and shaving along the edge grain. **Safety – Eye protection is required by law. Do not be distracted by or talk to others when operating machinery.**

1. Use a push block whenever project goes over the cutting surface keeping fingers 4" from the cutting knives.
2. Wood should be more than 6" long
3. Never adjust outgoing table.

4. Feed against blade rotation. Reverse direction can cause serious injury.

G. Panel Saw Ripping and crosscutting large sheets. **Safety – Eye protection is required by law. Do not be distracted by or talk to others when operating machinery.**



1. Lade should be at full speed before beginning cut
2. Slowly return saw motor to the top and tighten it down. Never let go until it is secure.
3. Be aware of the power cord that it does not fall into path of the blade critical when returning blade to top.

H. Planer – Designed to plane stock to any thickness smoothly. This machine cannot straighten bows or warps. **Safety – Eye protection is required by law. Do not be distracted by or talk to others when operating machinery.**

1. Use only with personnel assistance
2. Plane off only 1/16" each pass
3. Keep others out of line of input and output of table
4. Plane only clean clear wood. Any imperfections in the would should be checked first.
5. Only one piece of wood at a time. Do not start a second until first is clear and do not stack.
6. If board stops moving, turn off power immediately, lower deck, and get trained personnel
7. Clear dust and woodchips with brush not hand
8. Feed against blade rotation. Reverse direction can cause serious injury.

I. **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.**

1. Be sure adjustment keys and wrenches have been removed
2. Rotate motor once by hand before use
3. Lower hold down clamp against wood to secure it
4. Only use ½" stock wood or smaller that has flat only surfaces
5. Hold wood firmly feeding it into blade at a moderate speed
6. Blades should be changed by personnel but always check band for good tension
7. Stop blade before backing wood out of an incomplete cut
8. Make release cuts before making long curves

J. **Table Saw** – Ripping and Crosscutting stock. **Safety – Eye protection is required by law. Do not be distracted by or talk to others when operating machinery.**

1. Use a push block whenever project goes over the cutting surfaces. Keep hands at least 4" from blade
2. Stand to side of wood being ripped
3. Stay within reach of power switch
4. Only use one fence or miter gauge
5. Be sure adjustment wrenches or any other objects have been removed from table before use
6. Hold wood firmly feeding it into blade at a moderate speed. Push wood with a push stick until it clears cutting blade.
7. This is not a free-hand machine. Always use a fence miter gauge
8. Feed against rotation. Wrong way will accelerate wood and cause damage

9. No dead end cuts. Continue ripping all the way through your board without stopping.
10. Only use wood that has flat surfaces
11. Only one piece of wood at a time. Do not start a second until first is clear.

K. **Wood Lathe** – Milling original, symmetrical wood profiles. **Safety – Eye protection is required by law. Do not be distracted by or talk to others when operating machinery.**

1. Tool rest should be at proper height ad as close to work as possible
2. Vary speed with motor running
3. Only certain types of wood can be milled. Check wood with trained personnel is unsure
4. Check for clearance and balance before beginning
5. Tailstock should be tight
6. Turning tool should not interfere with work
7. Do not jam tool into work, especially during rough turning
8. Disengage index pin before beginning
9. Refer to chart to determine speed.

L. **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.**

1. Hold with both hands. This tool is easy to lose control of
2. Belt must be tracked properly before use
3. The weight of the sander is sufficient. Leaning on the tool is bad for the motor and is less effective.
4.

M. **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.**

1. Hold with both hands. This tool is easy to lose control of

2. Blade guard is designed to self-retract.

N. 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.**

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

O. 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.**

1. Drill straight in and pull straight out. Twisting or wobbling bit in a hole will damage the bit and cause bodily harm
2. Bits can be extremely hot after use
3. Be sure to drill with motor in forward direction. Reverse direction will burn or can ignite wood
4. Pull bit out of deep holes to remove debris. Excess chips can cause overheating.

P. 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.**

1. The weight of the sander is sufficient. Excess pressure on the tool is bad for the motor and is less effective.4abrasive paper should be secure before use
2. Abrasive paper should be secure before use.

Q. Grinder – this is a metal 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.**

1. Hold with both hands. This tool is easy to lose control of.
2. Lay tool trigger and grinder side up
3. Always position wheel guard between you and your work.

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

PVAMU SOA Fabrication Lab

Failure to follow these guidelines, procedures and the instructions of the fabrication 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 PVAMU SOA Fabrication Laboratory and agree to comply with them. I agree to attend the introductory safety orientation and to operate all PVAMU SOA 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 fabrication lab 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 Fab-Lab 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 Fab-Lab supervisor and I fully understand that this is strictly for my safety and the safety of others. I understand that users of the fabrication lab 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 fabrication lab 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 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 FABRICATION LAB IS NOT A RIGHT, BUT A PRIVELEGE AND ANY UNSAFE ACTION ON MY PART MAY RESULT IN THE REVOCATION OF MY PRIVELEGES INDEFINATELY, AT THE DISCRETION OF THE FAB LAB DIRECTOR/ MANAGER. I HAVE BEEN TRAINED AND INSTRUCTED ON THE PROPER AND SAFE USE OF THE FAB LAB EQUIPMENT. I UNDERSTAND THAT FAILURE TO FOLLOW THE INSTRUCTIONS OUTLINED IN TRAINING AND IN THIS DOCUMENT WILL RESULT IN LOSS OF LAB PRIVELEGES AND ACCESS. IF GROSS NEGLIGENCE IS DETERMINED TO BE INVOLVED IN THE COURSE OF A NON-INJURY ACCIDENT AMEETING 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_____

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