

CEPT UNIVERSITY WORKSHOP

USER HAND BOOK

Developed by, CEPT Workshops


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CONTENTS

OVERVIEW

The CEPT University workshop is structured as an open environment for material-based learning. Experimentation with materials, prototyping, testing, craft explorations and learning while making is an integral part of the design culture at CEPT University.

The aim of CEPT University Workshop is to enrich the culture of …

'Learning by Making'

The safety of students, faculty, staff and visitors is a principal consideration in every activity.

The CEPT University Workshop provides equipments, facilities, staff and instruction to all students and faculty of CEPT University for the exploration and investigation into material based research.

The CEPT University Workshop main building is located near the Faculty of Design building covering about 7100 sq.ft. The main building houses Wood, Metal, Ceramic, Textiles and the Fab-Lab facilities. The workshop annex. is located near the Faculty of Architecture building covering about 1100 sq.ft. dedicated for model making activities.

The Workshop resources are focused on supporting students to make high quality models, prototypes and innovative products by providing;

Orient

Orientation to safety procedures

Access

Accessibility and technical support

Coach

Coaching to develop skills

Celebrate

Celebrate novel outcomes and

Augment

Augment facilities continually

CEPT University has a multi-disciplinary Workshop facility which encompasses a wide range of equipment and machinery to support design research ranging from craft to mechanical and contemporary digital manufacturing. The CEPT workshop has dedicated facilities for wood, metal, ceramics, textiles, model making and a Fab-Lab (Digital Fabrication lab).

‘Learning by Making’

MAIN EQUIPMENTS OF THE WORKSHOP

- **Wood Workshop**

Table Saw, Planar, Mitre Saw, Band Saw, Jig Saw, Wood Turning Lathe, Sander Machine, Drill Press, Power Drill, Battery Drill, Router, Trimmer, Chain saw

- **Metal Workshop**

Bending Machine, Turret Lathe, Shearing Machine, Sheet Cutter, Grinding Machine, Arc Welding Machine, Drilling Machine, Metal Table

- **Ceramic Workshop**

Electric Kiln, Test Kiln, Electric potter's wheel, Work stations

- **Textile Workshop**

16 lever Wooden Looms, Spinning Wheels

- **CEPT Fab-Lab**

Shopbot CNC Router, Abs Plastic 3D Printer, 3D Scanner, Laser Cutter, Vinyl Cutter, Roland Milling Machine, Solder, Hot Gun

- **Model Making Studio**

Thermocol Cutters, Paper Cutter, Sander and Belt Machine, Drilling Machine, Jig Saw, Power and Hand Tools.

The CEPT Workshop is overseen by the Director and Coordinator and is staffed with a Workshop Executive, Technicians and Student Assistants, who instruct and guide users in the use of the equipment.

WORKSHOP OPENING HOURS

General operating hours

Mon - Fri – 10:00 am – 7:00 pm

(Lunch - 1:30 pm - 2:30 pm - the workshop would remain closed)

Sat – 10:00 am – 2:00 pm

Sunday – Closed

The Annex - Model making workshop is available for 24 hours access to students who have registered for the current semester. A shop technician shall be available during the general operating hours.

If the Annex - Model making workshop is not CLEAN at 8:00 am, it shall remain closed for the following 24 hours.

Workshop Time table

Workshop time table is established each semester for all workshop based courses.
The time table is posted on the workshop noticeboard and updated on the workshop website.

Extension

To avail the workshop facilities on a Saturday or Sunday until 7:00 pm, complete the workshop utilization form and submit it to the Director / Coordinator of CEPT workshop on or before the preceding Friday. This would allow us to organize for a shop technician or a trained student assistant for supervision well in advance.

In case of non- availability of technician or a trained student assistant, the workshop shall remain closed. The cost for the extra hours for the technician/ student assistant shall be borne by the respective faculty or centre which places the request.

As a policy decision **NO EXTENSION SHALL BE GIVEN BEYOND 10 PM** as the users are prone to be tired and drowsy which increases the risk for accidents.

CONTACT INFORMATION

Phone: 079-26302470 (Ext:127)

Email: workshop@cept.ac.in
Web: cept.ac.in/workshop

Address:
CEPT University Workshop
Kasturbhai Lalbhai Campus,
University Road, Navrangpura,
Ahmedabad - 380 009

FIRST AID

First Aid boxes are available at all following locations.

1. **Wood Workshop - near Technician's cabin**

2. **Fab - Lab - near Technician's desk**

3. Model Making Workshop - near the Technician's desk

INJURY CAUSING ACCIDENTS

In the event of an injury-causing accident, the following procedures must be followed:

- Immediately notify the workshop technician or student assistant on duty. Workshop personnel will follow established first-aid procedures.

- All injury-causing accidents requiring outside medical attention requires a meeting with the Workshop Technician to determine the cause of the accident and as a preventive measure against similar accidents in the future before the workshop access may resume.

EMERGENCY CONTACTS

Student Services Office
CEPT University
Kasturbhai Lalbhai Campus,
University Road, Navrangpura,
Ahmedabad- 380 009

Ph: 91- 79 -2630 2452 / 2740 / 2470
Fax: 91-79-2630 2075

In case of any medical emergency please inform Student Service Office.

Dial 108 for ambulance.

General physician is available in the campus for the students during the following schedule for consulting.

Tuesdays :	10:15 am - 1:15 pm
Thursdays :	4:00 pm - 6:00 pm
Fridays :	4:00 pm - 6:00 pm

Remember

To

Be Safe ... !!

NEARBY HOSPITALS

1) SAMVED HOSPITAL

Commerce College Road,
Near Stadium Circle, Navrangpura,
Ahmedabad – 380009

Contact: 079 2640 2064
Distance: 1.7 kms

2) SHREEJI ORTHOPAEDIC AND ENT HOSPITAL

F/5,Veemurti Complex, Opp. Oxford Tower,
Gurukul Road, Memnagar, Ahmedabad - 380052

Contact: 079 27479053
Distance: 2.4 kms

3) JAIN HOSPITAL AND ICU

1st Floor, Oxford Tower, Gurukul Road, Memnagar,
Ahmedabad - 380052

Contact: 079 27478122
Distance: 2.4 kms

4) NIDHI HOSPITAL

Shree Kunj, Near Patil Park, Opposite Vodafone Office,
Stadium Circle, Stadium Circle, Ahmedabad - 380009

Contact: 079 4023 2121
Distance: 2.3 kms

POLICIES AND PROCEDURES

Workshop Access

All workshop users (both the main building and the annex.) should be registered students of CEPT University, who have paid the course fee for the current semester or Faculty or Staff and have legitimate course related work.

It is mandatory for all users of the workshop to complete the workshop orientation program. The workshop orientation program is conducted at the beginning of every semester.

Workshop Access Privileges can be revoked at any time at the discretion of Workshop personnel. Revocation of Shop Access Privileges must be reconciled with the workshop Director.

Please Sign in EVERY time you use the workshop.

NON-ACADEMIC PROJECTS

The University's Campus Office has determined that use of the CEPT University Workshop for non-academic purposes exposes the University to unnecessary risk and does not serve the mission of CEPT University.

All shop use must be directly related to CEPT University's courses. The Research centers of CEPT University and users associated with the Fab-Lab are allowed to use the workshop with prior permission from the Director of CEPT University Workshop.

TOOL CHECK-OUT

- Obtain approval from Shop Technician before removing ANY tool from the shop.
- Obtain special permission for periods longer than 2 hours.
- Tools should be returned to the shop promptly upon completion of use.
- Tools (listed as borrowable) could be checked out overnight by submitting the completed declaration form to the shop Technician.
- You are responsible for any tools you check out. If Workshop equipment is lost, stolen or damaged while checked out to you, you are responsible for replacement.
- Tools checked out overnight should be removed less than 1 hour before closing.
- Tools checked out overnight must be returned within one hour of opening the next day.
- Tool Check-Out privileges can be revoked at any time at the Shop Technician's discretion.

A fine for of Rs.50 per day, per tool late fee may be imposed !


mobile
WORK
SHOP

SAFETY POLICY

The safety of students, faculty, staff and visitors is a principal consideration in every activity.

The goal of the CEPT University Workshop's safety policy is to develop positive attitudes regarding safety among all members.

It is essential that Deans, Directors, Department Heads, faculty and staff supervisors take an active part in initiating preventive measures to control hazards associated with activities under their direction.

The success of this policy depends upon the cooperation and support of everyone.

The rules and guidelines in this document apply to the entire CEPT Workshop area including the annex :

- It is mandatory for a technician or a trained student assistant to be present in workshop during operation.

- Workshop staff provides user assistance, training and supervision while offering users an extensive knowledge of materials, tools, processes and safety.

- It is mandatory for all users of the workshop to complete the workshop orientation program.

- Instructors of courses who would be utilizing the workshop are encouraged to contact Workshop staff to arrange for an introduction to Workshop capabilities and procedures.

- Unsafe use of Workshop facilities or equipment may result in revocation of access to the facility.

PERSONAL PROTECTIVE EQUIPMENT

It is compulsory for all workshop users to wear closed toe shoes.
Sandals are not allowed.

Safety glasses or goggles MUST be worn during the operation of any stationary or portable power equipment (non-tinted, plastic lens prescription glasses are also acceptable).

Ear muffs and ear plugs are available and should be worn during sustained use of noise generating equipment.

Dust masks are available and should be worn when generating significant dust.

WORKSHOP OCCUPANCY POLICY

In order to maintain an acceptable level of user safety, the Workshop has adopted the following occupancy limits. This policy takes into account space, equipment and staff limitations of the Workshop.

Occupancy of workshop may be limited to 20 users per shop technician.

The primary responsibility of Shop Technicians is monitoring the safety of shop users.
The number of users which an individual Shop Technician is able to effectively monitor is affected by many factors.

It shall be each Shop Technician's responsibility to determine how many users they can effectively monitor under any given circumstances.

Generally, each Shop Technician should be able to monitor 20-25 users. This limit may be adjusted upward or downward at the Shop Technician/s discretion dependent upon conditions.

Maximum no. of students allowed in the workshop at any given time would be as follows.

Wood Workshop – 30
Metal Workshop – 15
Ceramic Workshop – 30 (ceramic yard)
15 (ceramic studio)
Textile Workshop – 25
Fab-Lab – 30

The nature of the work conducted in the Workshop requires significant space for each machine and user. Each machine requires a clear space for safe operation. Traffic ways must be kept clear for the safe movement of people and materials.

For typical utilization of shop equipment, the above prescribed occupancy limit have been deemed to be the maximum safe occupancy capacity. This limit may be adjusted upward or downward at the Shop Technician/s discretion dependent upon conditions.

If occupancy limits are exceeded:

- The most recent arrivals will be asked to retire and as users leave or machines become available, shop technicians will admit new users.
- If a safe environment cannot be established through the application of the procedure above, the Workshop may be CLOSED to establish order at the discretion of the Shop Technician/s on duty.
- Application of this policy will be left to the discretion of Shop Technician/s on duty.
- Please consider these occupancy limits when assigning projects and deadlines.
- Notify Workshop Director/Coordinator of expected heavy shop use so that the adequate staff can be scheduled.
- If Workshop occupancy is expected to exceed the prescribed limit as a result of your class, you should make arrangements for additional Shop facilities.
- Technicians to be scheduled at least 1 week prior to the day of expected shop use.

HOUSEKEEPING

- A clean shop is an effective shop. Be considerate of other shop users by keeping your work area neat.

- **ANY materials sitting on the floor at ANY time will be considered trash and treated accordingly.**

- Sweep up any significant dust or refuse as you make it. Throw away scraps into the scrap box kept outside the workshop.

- **Daily clean-up starts ten minutes before closing.**

- **Please help us clean up by stopping work, returning tools and removing/storing your materials at least ten minutes before closing time.**

MATERIALS STORAGE

Store any materials neatly and out of the way of other shop users.

Obtain permission from a Shop Technician before leaving any materials unattended in the shop.

Clearly mark any materials with name, date and contact information. Unidentified materials may be disposed off at the Shop Technician's discretion.

Identified materials may be disposed off if left in the shop for over one week.

AIR QUALITY AND DUST COLLECTION

In order to maintain the air quality in the shop and neighboring areas an extensive dust collection system is provided.

NEVER allow sparks or other incendiary material to enter the dust collection system.

Sawdust is a known carcinogen; collectively the shop staff is in the shop over 120 hrs/wk:
please help to minimize our exposure to this and other toxic substances.

SAFETY RULES AND GUIDELINES

For general work safety
kindly follow the guidelines
on the following page ...

No Headphones

When operating machines, you need to be able to hear what's going on around you. Headphones are prohibited when operating power tools.

Wear Eye Protection

Wear safety glasses, goggles or a face shield when operating any power tools. Be sure you have enough good light to see what you are doing.

Do not bring food or drink in the workshop.

Wear Close toed Shoes

Sandals are not allowed

Never work alone

There must always be at least two adults present in the workshop.

Carrying Tools

Keep sharp-edged and pointed tools turned down.

Don't Hurry !

Do not work in the workshop if you are in a hurry, this almost always ruins the work and often results in injury.

Ask for help

If you are unsure about how to execute the operation of a tool safely, have the workshop technician assist, demonstrate, and observe to help you become familiar and comfortable.

If you have not worked with a specific material before, consult the workshop technician for precautions, methods and instruction prior to beginning work.

Caution other students if they are not following safe operating procedures.

Know where the fire extinguishers are located and how to use them.

Dress Properly for your work

Remove coats, jackets, dupattas, and shawls. Roll up loose sleeves, remove loose jewelry and tie back long hair.

Report any injury, however minor, to a Shop Technician.

NO CELL PHONES

CELL PHONE USE AND TEXTING ARE NOT ALLOWED IN THE WORKSHOP.

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.

Wear Masks,

When doing heavy sanding face masks or respirators should always be worn.

Consult with the Workshop Technician

before performing any procedure you are unfamiliar with. He or she is the one to decide if the work can and should be done, and will be able to suggest the safest, most efficient way to do it.

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 workshop, don't do it. Think through the entire job before starting.

No Drugs and Alcohol,

NEVER use the shop if you are under the influence of spirits or drugs.

Check power cords and plugs on portable tools before using them.

Working Speed: Give yourself enough time to complete your work.

Rushing can lead to accidents and seldom produces quality work. Do not take risks for the sake of speed.

Sleep deprivation impairs judgment:

despite what your instructor might tell you, **your project IS NOT more important than your fingers.**

Know when to call it a night.

Use Power tools only when they are absolutely essential.

Before starting any machine be sure to check that it is set up correctly and fully operational.

Never use a rag near moving machinery

Keep your fingers clear from the point of operation of machines by using special tools and devices such as push sticks and paddles.

Keep the work area free from debris, clean spills immediately and remove all saw dust and wood chips.

Be Thoughtful and helpful towards other shop users.

Be sure the work you are doing doesn't endanger yourself or anybody else.

Select the proper size and type of tool for your work.

Never use a tool unless it is sharp and in good condition. Inform a Shop Technician if tools are damaged, dull or in need of adjustment.

Do not carry sharp tools in the pockets of your clothes.

Do not swing or raise your arms over your head while carrying tools.

Leave tool and equipment guards in place.

This is especially true with the table saw. The guard with the anti-kick back device should always be on the saw unless the operation is not possible with it in place.

Do not use your hands to clean shavings or cuttings – they can be sharp!

Use a brush, or special tool for the removal of chips, shavings and debris

Floor safety

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.

The floor should be clear of scrap blocks and litter. Keep models, prototypes and other equipment and materials out of traffic lanes.

Immediately wipe up any liquids spilled on the floor.

Clamping

Whenever possible, mount the work in a vise, clamp or special holder. This is especially important when using chisels, gouges, portable electric tools, or drill press.


Safetymatters

PORTABLE POWER TOOL SAFETY

Wear appropriate personal protective equipment. (safety glasses, ear plugs, dust masks, etc.)

Never attempt to use a tool that you are unfamiliar with.

Seek the assistance of a Shop Technician if you have any questions about the safe operation of any tool.

Think through an operation before performing it. Know what you are going to do and what the machine will do in response.

Make all the necessary adjustments before turning a tool on.

Never remove or adjust a safety guard on any machine or tool without permission.

You must be wide awake and alert. Never operate a power tool when you are tired.

Allow the tool to reach its full operating speed before feeding it into your stock

Work the tool carefully and only as fast as the material will be cut easily.

Most cutting tools should work without the use of excessive force.

If a tool does not cut cleanly and easily, it is probably dull or damaged. Please bring it to the Shop Technician's attention.

If a tool is not working properly, shut off the power immediately and inform a Shop Technician.

Do not allow your attention to be distracted while using a tool. Do not distract other shop users while they are using power tools.

When you're done using the shop, put away all tools, clean up your workspace and sign out.

STATIONARY POWER TOOL SAFETY

Never operate a machine or power tool without the approval and/or instruction of a Shop Technician.

Tell us what you want to do and we will suggest the safest, most efficient way to get it done.

Use the Workshop as an Applied Physics Lab.
For every action, there is an equal and opposite reaction. Be prepared for all of the possible reactions to your action.

Think through an operation before performing it. Know what you are going to do and what the machine will do in response.

Make all the necessary adjustments before turning on the machine. Adjustments on certain machines will require approval.

Never remove or adjust a safety guard on any machine or tool without permission. Use approved push sticks, feather boards and safety devices.

Some operations require the use of a special jig or fixture.

You must be wide awake and alert. Never operate a machine when you are tired or impaired.

Keep the machine tables and working surfaces clear of tools, stock and project materials. Also keep the floor free of scraps and excessive litter.

Allow the machine to reach its full operating speed before feeding in the work.

Feed the work carefully and only as fast as the machine will easily cut it.

Most cutting tools should work without the use of excessive force.

If a tool does not cut cleanly and easily, it is probably dull or damaged. Please bring it to the Shop Technician's attention.

If a machine is not working properly, shut off the power immediately and inform a Shop Technician.

When you are operating the machine, you are the only one to control it. If someone is helping you, be sure they understand what you are doing and what they will be doing.

Do not allow your attention to be distracted while operating a machine. Do not distract other shop users while they are operating equipment.

When you have completed an operation on a machine, shut off the power. Wait until it stops before leaving the machine or setting up another cut.

When you're done using the shop, put away all tools, clean up your workspace and sign out.

Inform other employees if you see an unsafe work practice; however, be careful not to distract a person who is working with power tools.

MACHINES AT THE WORKSHOP

PILLAR TYPE DRILL PRESS

How to use the machine:

- Use the right bit and drill speed for the job.
- Holes in harder materials and over 1/2 inch should be bored at the lower speeds. Check with the Shop Technician if you're unsure of proper speed.

- UNLOCK table before adjusting height. Mount the bit securely in the drill chuck. Position the table and adjust the feed stroke so there is no possibility of the bit striking the table.

- Use a backing board to protect the table and to drill cleaner holes.

- Use a punch to locate holes in hard materials to prevent drill bit from skating.

- Small or irregularly shaped pieces must be clamped to the table or held firmly by some means.

- Feed the bit smoothly into the work.

- When the hole is deep, withdraw it frequently to clear the shavings and cool the bit.

- Hold stock with vice or other fixture to prevent injury caused by spinning stock.

- Use only an approved bit.

- Bits with feed screws or those that have excessive length generally should not be used in a drill press.

BAND SAW CUTTING MACHINE

How to use the machine:

- Wheel guard doors must be closed and the blade properly adjusted before turning on the machine.
- Adjust the upper guide assembly so it is ¼th inch above the work.
- Check blade guides for proper set-up.
- Allow the saw to reach full speed before feeding the work.
- Use appropriate fence and/or guide.
- **The stock MUST be held flat on the table.**
- Feed you stock only as fast as the teeth will easily remove the wood.
- Whenever possible, plan saw cuts to avoid backing out of curves.
- Make turns carefully and do not cut radii so small that the blade is twisted.
- STOP the machine before backing out of a long curved cut.
- Round stock should be mounted securely in a jig or hand screw.

- **If a blade breaks: step away from the saw, shut off the machine and wait for the machine to come to a complete stop.**
- Have a Shop Technician install a new blade.
- Turn off the machine as soon as you have finished your work.
- Do not leave the machine until it has stopped running.
- Consider the size of your stock / work when picking a machine.
- Use small machines for small cuts and large machines for large cuts.

SANDER MACHINES

How to use the machine:

YOUR STOCK MUST SIT FLAT ON THE TABLE OR BE SECURELY CLAMPED TO SOMETHING SITTING FLAT ON THE TABLE.

- Be certain the belt or disk is correctly mounted.
- The belt must track in the center of the drum-sand platen.
- **Do not operate the disk sander if the abrasive paper is loose.**

- Check the guards and table adjustments to see that they are in the correct position and securely locked in place.
- Whenever possible, use the table, fence and other guides to control the position of the work.
- **Small and irregularly shaped pieces should be held in a hand clamp, special jig, or fixture.**
- Sand only on the side of the disk sander that is moving down towards the table.
- Move your work-piece as you sand so that it doesn't burn or clog the abrasive.
- Always use a backing block or other technique when sanding thin pieces on the belt sander.
- Do not use power sanders to form and shape parts if the operations could be better performed on other machines.
- Sand only clean, new wood.
- **Do not sand work that has excess glue or finish on the surface.**
- These materials will load and foul the abrasive.

MITER SAW & COMPOUND MITER SAW

How to use the machine:

- Hold stock firmly against back fence of saw. Keep hands clear of cutting area.
- Set desired cutting angles and lock adjustment mechanism.

DO NOT cut any work-piece that is not firmly anchored against back fence.

- Use appropriately sized stock.

NEVER interfere with the operation of retractable blade guard.
NEVER force the tool. If the saw doesn't cut properly ask a Shop Technician for help.

- Use the appropriate blade.
- If you are cutting non-wood materials, make sure the blade is appropriate for the job.
- **Beware of flying off-cuts.**
- This saw tends to fling small off-cuts. Use supplemental back fence, clamp work-piece or construct a holder to save small off-cuts.
- When using the sliding feature on the sliding compound miter saw, pull the saw toward before lowering the blade into the stock.

TABLE SAW

More shop related injuries occur on table saws than any other wood working machines.

The KEY to table saw safety is moving the material past the blade in a STRAIGHT LINE and avoiding trapping cut off pieces between the blade and other parts of the saw.

Always have the longest edge of the stock that you are cutting against the device that you are using to make it go straight !

RIPPING

When your work-piece is longer than its width, guide it along the rip fence.
Be certain to keep the edge flat against the rip fence for the entire length of the cut.

NEVER push on the “waste” side of your stock, or push the off-cut “waste” piece in to the blade.

Use the blade guard whenever possible. Use a push block if the blade guard must be moved out of your way.

CROSS CUTTING

When your work-piece is wider than it's length, use a miter gauge, cross-cut fence or other jig to guide your work-piece. Push your work-piece all the way past the blade.

DO NOT push on or handle the "waste" or off-cut piece until the saw has come to a complete stop.

NEVER use the rip fence as top when cross cutting!

WELDING MACHINE

MIG Welding
(Metal Inert Gas)
AKA: Wire Feed Welding

MIG welding is the simplest way for a beginner to produce quality welds in mild steel.

See a technician to schedule a demonstration before attempting any welding.

Use only raw mild steel (Galvanized steel and steel coated with paint and other products may off-gas toxic fumes while welding). Always ground the work-piece or table.

Always don a welding hood prior striking any arc. Turn on shielding gas. Adjust voltage and wire feed speed as appropriate for the material and work-piece thickness.

ALWAYS close shielding gas tank when you're done welding.

Welding
(Tungsten Inert Gas)
AKA: Heli Arc Welding

TIG Welding is an advanced welding process that can produce the best welds in a variety of materials (mild steel, tool steel, stainless steel, aluminum, titanium, etc).
Schedule an Orientation with Kevin before attempting any TIG welding.

Always ground the work-piece or table.

Always don a welding hood prior striking any arc.
Turn on shielding gas.

Adjust controls for the material and thickness of work-pieces. Select proper electrode for the job.

ALWAYS close shielding gas tank when you're done welding.

JIG SAW CUTTING MACHINE

How to use the machine:

Do not over reach. Keep proper footing and balance at all times.

Do not start cutting until the saw reaches its full power.

To start an external cut:

Place/rest the front of the shoe on the stock.

Make sure that the blade is not in contact with the stock.

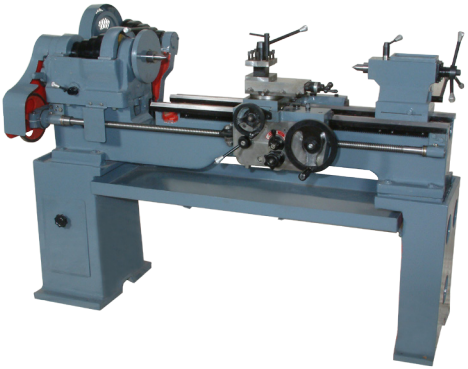
Hold the saw firmly against the stock and switch the saw on.

Feed the blade slowly into the stock maintaining an even forward pressure.

To start an inside cut:

- Drill a lead hole slightly larger than the saw blade.
- With the saw switched off, insert the blade into the hole until the shoe rests firmly on the stock.
- Do not let the blade touch the stock until the saw has been switched on.
- Keep the base/shoe in firm contact with the stock.
- Do not force the saw along a curve; allow the machine to turn with ease.
- Keep your hand/fingers away from the cutting area.
- Keep all electrical cords clear of the cutting area.
- Remember the saw blade cuts on the upstroke.
- If the blade gets stuck, then stop the saw, unplug it and safely remove the blade.
- Allow the saw to come to a complete stop before withdrawing the blade.
- Be aware of saw dust and debris from cutting.
- When finished, unplug the power cord or remove the battery pack, remove the saw blade and clean up the debris.

LATHE MACHINE



How to use the machine:

- Get the approval of a Shop Technician before using this machine.
- Mount work-piece firmly between centers, on face plate or in-chuck before turning on machine. Select appropriate speed before plugging in the machine.
- Adjust tool rest to minimal distance from work-piece.
- Rotate stock manually before applying power to guarantee proper mounting and tool rest clearance.Select appropriate turning tool for the task at hand.

ALWAYS hold turning tool firmly with both hands.
ALWAYS tilt turning tool down onto rotating work-piece.

- Consider the grain of the stock when removing material, work the cutting tool with the grain for the best results.

SHOPBOT (FAB-LAB)

a. Job Preparation

1. Please have your material stock cut to size before coming in for your reservation.

2. Secure your stock using either wood screws or clamp blocks and wedges.

3. Use general purpose or sheetrock screws with a length appropriate for securing your stock to the waste board.

4. Do not allow screws to poke through the waste board.

5. **Turn on the power to the Control Box using the red switch on the side of the aluminum case attached to the base of the ShopBot.**

6. **Press the blue RESET button on the yellow E-STOP Pendant.**

7. Before sending your job, you will need to warm up the spindle bearings if the ShopBot has not been used in the past hour.

the ShopBot


the Fab-Lab

Initializing the ShopBot

b. Spindle Warm-Up Procedure

1. **WEAR EYE AND EAR PROTECTION!**
2. **Open the ShopBot 3controller software on the iMac workstation.**
3. **Input Channels 2 & 3 should have a green circle with a solid yellow ring around it.**
4. **Input Channel 4 should have a green circle with a solid red ring around it.**
5. **If Input Channel 4 is flashing, press the RESET button on the yellow E-STOP Pendant again.**
6. Click on the yellow icon just beside the Move/Cut Preview Switch to open the ShopBot Keypad. Press alt+1or click on Output Channel 1 to turn it on.
7. A solid blue circle should appear for Output Channels 1 & 4.
8. Walk over to the VFD Box mounted on the wall and adjust the frequency for the spindle speed to 3.0 (3,000 RPM).
9. Press the green START button on the E-STOP Pen-dantto turn on the spindle.
10. Allow the spindle to run for 2 minutes 3,000 RPM. Then, continue to raise the spindle speed slowly using the keypad arrows on the VFD Box to 6.0 and run the spindle for another 2 minutes.
11. Continue to slowly raise the spindle speed and allow it to run for two minute increments at 9.0, 12.0, 15.0 and 18.0.
12. Finished, go back into the lab and press alt+1or click on Output Channel 1to turn off the spindle, and close the ShopBot Keypad window.

c. Setting an Origin

1. Open the ShopBot Keypad and use the direction arrows on the Keypad to position the tool in the X, Y, and Z axes about 2" above the mark you made on your material stock.

2. Use the right-hand rule to orient the arrows on the ShopBot Keypad with the positive X and Y axes directions marked on the pasteboard.

3. In the ShopBot Console window, open the Zero drop down menu located at the top, and select zero [2] axes (X & Y).

4. Clamp the Alligator Clip directly to the cutting tool, and position the Z-Zero Plate directly underneath.

5. Return to the lab workstation and click on the Z-Zero graphic buttons located just below the drop down menus in the ShopBot Console. Clicking the Z-Zero graphic button will open a Pause in File window.

6. Click Online the window. The cutting tool will move down in the Z-axis to make contact with the plate twice.

7. A new window will prompt you to remove the Alligature Clip and store the Z-Zero Plate.

8. After you have placed the Alligator Clip and Z-Zero Plate back in place on the gantry arm, verify that the Z-axis reads 1.000 in the ShopBot Position window.

d. Outputting Files

1. **WEAR EYE AND EAR PROTECTION!**

2. **TURN ON THE DUST COLLECTOR AND OPEN THE BLAST GATE!**

3. You are now ready to output your cutting file. Post your MOPS set from RhinoCAM and save it as an .nc file to the desktop.

4. Take the time to review the nc code and verify that positioning values for the X, Y, and Z axes seem correct.

5. Also, verify that the cutting feed rates appropriate for the material being cut. If uncertain, please consult FabLab Technician before continuing.

6. After you have verified that your .nc file is ready to go, press alt+1to turn on Output Channel.

7. This is a very important step. **BE SURE TO TURN ON OUTPUT CHANNEL 1 BEFORE LOADING YOUR PART FILE!** If you don't, the spindle will not turn on and you will damage the machine, the cutting tool, and your material.

8. If Output Channel 1 is on and has a solid blue circle, you may load your part file by pressing alt+Lor clicking the Load Part File button in the ShopBot Position window. Select your file with the correct .nc extension and click open. This will open a Pause to START ROUTER/SPINDLE! Window.

9. Walk over to the E-STOP Pendant and press the green START button to turn on the spindle.

10. Allow the spindle to turn on and rev up to speed. Adjust the spindle speed to an appropriate value for cutting your material using the arrow keys on the VFD Box mounted to the wall.

11. Turn on the dust collector and open the blast gate for the duct connected to the ShopBot. Return to the lab and click Olin the Pause to START ROUTER/SPINDLE! Window.

12. The Shop- Boot will begin outputting your job, and the cursor will become locked over the STOP button in the ShopBot Position window.

13. **Clicking on the STOP button or pressing the space bar will pause your job.**

14. If something goes wrong, hit the Big Red Button on the E-STOP Pendant to immediately cancel your job. This will immediately cut power to the machine. Never hesitate to use the Big Red Button.

e. Cleaning Up

1. When the ShopBot has finished outputting your file, close the ShopBot software and turn off the power to the Control Box.

2. Turn off the dust collector, if no one else is using it, and close the blast gate for the duct connected to the ShopBot.

3. Vacuum up all sward and dust on and around the ShopBot.

EPILOG LASER MINI

1. Set up a simple piece of artwork in your software program (e.g. CorelDraw).
2. Turn on the power to your laser and wait for a “Beep” to note the machine is initialized.
3. Turn on your exhaust.
4. Place your sample material on the table in the upper left corner (make sure the table is low enough to accommodate the material).
5. Manually focus (or set Auto-Focus button to YES when you print from the Epilog Dashboard driver). Close the door.
6. From CorelDraw click on the File pull down menu to print.
7. Select Print. Make sure your Printer Destination is the “Epilog Engraver Win32”.
8. Click Properties to go to the Dashboard to set Speed, Power, etc., for the material you are using. See the Speed and Power Recommendations section of this manual. More information on settings for the Dashboard are included in the Using the Epilog Dashboard Driver section of this manual.
9. Click onto exit out of the Dashboard driver with the settings in place.
10. Click Print to print the page to your laser.

MODELA 3D PLOTTER

- When milling a pcb and setting the Z zero position, press the down button gradually and put your hand on the table.

- You can feel the vibrations of the machine once the tip of bit touches the surface of the copper.

- When creating mill and drill files on Eagle you have to set the XY zero position of the PCB. You can include this parameter in the name of the file for reusing it in the future.

- Materials used are Wood, Plaster, Resin (modeling wax, styrenform), Chemical wood, Aluminium (A5052 according to JIS), Brass which will take not more than 20 minutes for mould it will take an hour supports .stl file type.


THINK
MAKE
DO