



CEPT UNIVERSITY WORKSHOP

USER HAND BOOK

Developed by: CEPT Workshops

CEPT Workshops

© 2015

This work is a copy right of CEPT Workshops and can only be used for non-commercial purposes





CONTENTS

| | |
|-----------|------------------------------------|
| 1 | CONTENT |
| 3 | OVERVIEW |
| 6 | Main equipment's of the workshop |
| 7 | Workshop Opening Hours |
| 8 | Contact Information |
| 10 | First Aid and Emergency Contacts |
| 14 | POLICIES AND PROCEDURES |
| 16 | Tool Check-Out |
| 18 | Safety policy |
| 20 | Personal Protective Equipment |
| 23 | Workshop Occupancy Policy |
| 30 | SAFETY RULES AND GUIDELINES |
| 44 | MACHINES AT THE WORKSHOP |



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 7760 sq.ft. The main building houses Wood, Metal, Ceramic, Textiles, Sculpture and the Fab-Lab facilities. The workshop annexure 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**

Planar, Mitre Saw, Vertical Band Saw, Jig Saw, Wood Turning Lathe, Sander Machine, Drill Press, Power Drill, Battery Drill, Router, Trimmer, Chain saw & Hot Gun

- **Metal Workshop**

Bending Machine, Pressing Machine, Buffing Machine, Power Hack Saw, Turret Lathe, Shearing Machine, Sheet Cutter, Grinding Machine, Arc Welding Machine, Drilling Machine, Air Compressor

- **Ceramic Workshop**

Electric Kiln, Test Kiln, Electric potter's wheel, Work stations, Paper Pulp Machine

- **Textile Workshop**

16 Portable Wooden Looms with 16 levers, Spinning wheels

- **CEPT Fab-Lab**

Shopbot CNC Router, ABS Plastic 3D Printer, 3D Scanner, Laser Cutter, Jigsaw Machine, Vinyl Cutter, Roland Milling Machine, Solder, Hot Gun, Power & Battery Drill

- **Model Making Studio**

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

The CEPT Workshop is overseen by the Director 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 - Sat – 10:00 am – 7:00 pm

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

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 notice board and updated on the workshop website.

EXTENSION

To avail the workshop facilities on holidays and after 7.00 p.m. on week days, student need to submit workshop utilization form and declaration form duly signed by the respective faculty to the Director of CEPT workshop on or before the preceding day. This would allow us to organize for a shop technician or a trained student assistant for supervision well in advance.

In case of unavailability 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:896)

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,
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.

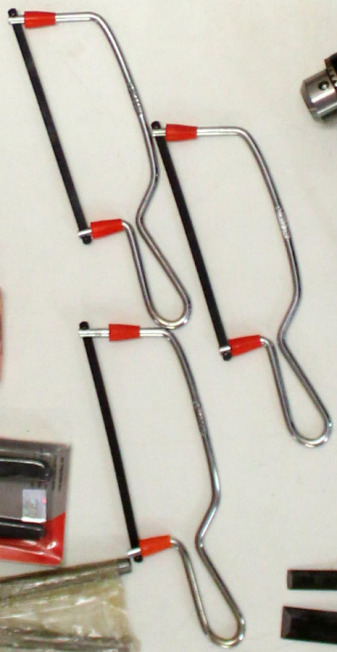
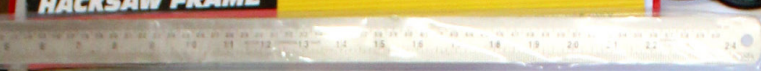
Workshop Access Privileges can be revoked at any time at the discretion of Workshop personnel. Revocation of Shop Access Privileges must be reconciled with the workshop Director.

Please Sign in EVERY time you use the workshop.

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 !



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.

NON-ACADEMIC PROJECTS

The University's Campus Office has determined that use of the CEPT University Workshop for nonacademic 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.





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 30 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 10-12 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 exceeds:

- 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 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 neighbouring 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



PROHIBITIONS

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.



Do not bring food or drinks in the workshop



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.



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.



No Drugs and Alcohol,
NEVER use the shop if you are under the influence of spirits or drugs.



Never work alone!

There must always be two adults present in the workshop



Never use a rag near moving machinery

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



GENERAL INSTRUCTIONS

Dress Properly for your work

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

Caution other students

if they are not following safe operating procedures.

Carrying Tools

Keep sharp-edged and pointed tools turned down.

Use Power tools only when they are absolutely essential.

Yellow Lines

These define the safe passage way and should kept clear of any tools, machinery or any other material.

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.

SAFETY INSTRUCTIONS

Wear Gloves

Protect your hands against scratches and cuts while working with tools and machinery.



Wear Close toed Shoes

Sandals are not allowed



Wear Masks

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



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



Wear apron

Clay workshop tends to get messy, wear apron to protect your clothes from getting soiled.



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



INSTRUCTIONS

**Sleep deprivation impairs judgment
Know when to call it a night.**

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

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

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

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

CLEANING INSTRUCTIONS

Floor safety

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.

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

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

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

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.

TOOL USAGE INSTRUCTIONS

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.

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.

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

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

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.

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.

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.



Safety matters

MACHINES AT THE WORKSHOP



WOOD WORKSHOP

MITERSAW / COMPOUND SAW



Operating Precautions:

- Miter saws are to be used for cross cuts only. It is not recommended to use a miter saw for a rip cut.
- Do not exceed the maximum recommended cut for the machine.
- Ensure proper blade is on the saw and that the blade is sharp, undamaged, and that the arbor nut is tight.

- Use clamps to secure workpiece on the table before proceeding with the cut. Workpiece should be against the fence. Do not cut free handed.
- Do not start the saw with the blade touching the wood. Allow blade to reach full speed before beginning cut.
- Keep hands and fingers at a safe distance away from saw blade.
- Avoid reaching over the saw line. No cross armed cuts.
- Allow blade to come to a complete stop before lifting blade or removing workpiece.
- Keep the machine properly oiled and serviced.
- Ensure work area is clean and uncluttered and sufficient space is given to operator using the saw.

WOOD PLANNER MACHINE

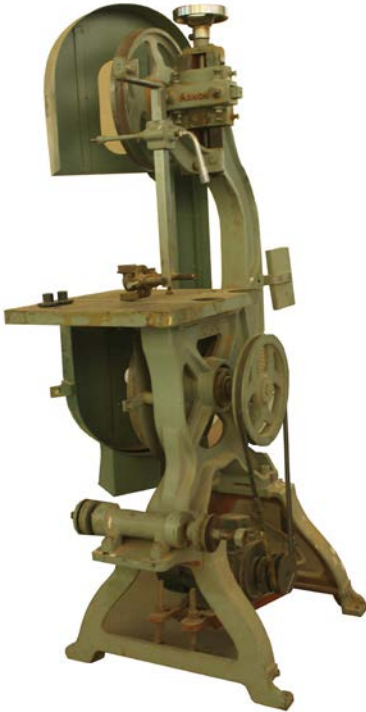


Operating Precautions:

- Work piece will be fed automatically into planer. Do not reach into cutter head area while machine is running.
- Adjust cutter head so that no more than 1/8" is removed at a single pass.
- Make sure knives and infeed rollers are properly adjusted and set as per the instructions in the OEM's operating manual.

- Use different sections of the infeed when using planer in order to avoid uneven wear of cutting blades.
- Do not change speeds while planing.
- For best results, one face should be trued up on a jointer prior to planing and the side that has been trued up should be placed face down.
- Do not stand in line with the work piece.
- Do not start the machine with the wood contacting the cutting blades and allow cutting head to reach full speed before feeding in work piece.
- To reduce risk of kick-backs: Avoid use of very poor quality lumber. There should be no loose knots, splits, or structural defects. Also, there should be no nails, screws or other foreign objects in the stock.
- Ensure blade height is correctly set and blades are in good condition.
- Avoid deep cuts. Make multiple passes using a less aggressive cut to achieve desired surface,
- Ensure work area is clean and uncluttered and sufficient space is given to operator using the machine.
- Keep the machine properly oiled and serviced.

VERTICAL BAND SAW MACHINE



Operating Precautions:

- Adjust blade guard height to about 3 mm or 1/8 inch above the top of the material being cut.
- Ensure the blade is tracking correctly and runs freely in and against the upper and lower guide rollers.
- Ensure the blade is under proper tension. A band saw equipped with automatic tension control is desirable.

- Use band saw blades that are sharp, properly set and otherwise suitable for the job (e.g., the right tooth pitch; tooth form; blade width).
- Hold stock firmly and flat on the table to prevent the stock from turning and drawing your fingers against the blade. Keep hands braced against the table.
- Use a push stick or jig to keep fingers at a safe distance from saw blade (at least 3 inches). Keep your hands on either side of the blade, not in line with the cutting line and the blade.
- Make release (relief) cuts before tight curves when doing intricate scroll-type work. Plan saw cuts to avoid backing out of curves in the stock.
- If the blade comes out of the guides or breaks, stop the machine immediately by turning off the power. Do not open the access door to the machine until the wheels have come to a complete stop. Have the instructor reposition or install a new blade.
- If the saw blade binds on a piece of stock, turn the saw off and wait until it comes to a complete stop before attempting to remove the blade from the stock.
- Keep the machine properly oiled and serviced.
- Ensure work area is clean and uncluttered and sufficient space is given to operator using the saw.

SANDER MACHINE



Operating Precautions:

- Keep hands away from sanding surface. Use a holding device or jig whenever possible.
- Never attempt to sand small pieces by hand.
- On the disc sander, only use the portion of the sander that travels down.
- Work tables should be set as close as possible to disc or belt sander (1/16" max.).

- Keep work piece flat on work bench while sanding. Do not attempt hold it by hand higher up on the disc or belt.
- Do not use excessive force when sanding.
- Do not sand in one place. Keep work piece moving along surface of disc or belt sander.
- Wait for belt to reach full speed before sanding work piece.
- Do not attempt to clean machine or make adjustments while machine is running.
- Never leave machine while it is running.
- After machine is turned off, wait till belt/disc come to a complete stop before leaving machine. The disc/belt will coast for several seconds before coming to a complete stop.
- Keep the machine properly oiled and serviced.
- Ensure work area is clean and uncluttered and sufficient space is given to operator using the sander.

BELT SANDER/ EDGE SANDER



Operating Precautions

- 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 drums and 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.

TABLE SAW MACHINE



Operating Precautions

- Use a push stick for small pieces.
- Be careful to avoid coasting blades. Do not reach into cut area until blade has come to a complete stop.
- Blade height should be set so that the top of the teeth extend no more than 1/8 inch above the wood.

- Ensure proper blade is on the saw and that the blade is sharp, undamaged, and that the arbor nut is tight.
- Do not saw freehand. Always hold the stock firmly against the miter gauge or a rip fence to position and guide the cut.
- To reduce risk of kick-backs:
 - Avoid use of poor quality lumber.
 - Use proper blade for cut being performed.
 - Ensure blade height is correctly set.
 - Operate saw at speed recommended by OEM.
 - Maintain and sharpen blade.
 - Guide stock parallel to the rip fence.
 - For rip cuts, use a spreader to prevent material from squeezing the saw or kicking back during ripping.
 - Use anti-kickback fingers to hold the stock down in the event that the saw kicks back the material.
- Stand to side of blade in case a kick-back does occur.
- Ensure work area is clean and uncluttered and sufficient space is given to operator using the saw.
- Keep the machine properly oiled and serviced.

WOOD TURNING MACHINE



Operating Precautions

- Pay close attention to work pieces that have keyway slots or other surface profiles that may increase the risk of entanglement.
- Assess the need to manually polish (e.g., emery cloth) rotating material. If necessary, consider milling keyways or other profiles after polishing or use emery cloth with the aid of a tool or backing boards.
- Always use a brush or tool to remove chips. **DO NOT USE BEAR HANDS.**

- Make sure all work pieces and work-holding devices are secure and free from defects.
- Keep metal lathe cutting tools sharp. Do not use damaged or broken metal lathe cutting tools.
- Remove the chuck key from the chuck after securing the material.
- A good rule is to never take your hand off the chuck key until you set it back onto a table. Consider using a spring-loaded or self-ejecting chuck key.
- Inspect tools prior to use and ensure worn or damaged tools are removed and not used.
- Turn the chuck or faceplate by hand to be sure there is no binding or danger of the work striking any part of the lathe.
- Don't run the machine faster than the proper cutting speed (consult speed and feed table to determine the best speed).
- Start lathe slowly and gradually increase rotational speed.
- Don't cut work completely through when turning between centers.
- Stop the machine before taking measurements or making adjustments.
- Remember that the chips are razor sharp. Do not attempt to remove chips with your fingers. Stop the machine and use pliers to remove them.
- Remove all burrs and sharp edges from the piece before removing it from the lathe.

METAL WORKSHOP

DRILL MACHINE



Operating Precautions

- Do not make adjustments to the drill press (setting depth for example), secure material to the drill press bed or reposition material while drill bit is still rotating.
- Keep hands and fingers away from the point of operation.
- Material to be drilled should be secured to drill press bed using vise, clamps, or other appropriate device suitable for the piece being worked on.

- If material slips in the vise or clamp, do not attempt to hold by hand. Shut down drill then retighten.
- Know the location of start and stop switches or buttons and keep the drill press table free of tools and other materials.
- Use only properly sharpened drill bits, sockets and chucks in good condition. Remove dull drill bits, battered tangs or sockets from service.
- Do not remove by hand metal or wood chips from the table or stock. Use brushes or other tools to properly remove chips.
- Use the correct speed and drill for the type of stock being drilled.
- The drill bit should be mounted the full depth and in the center of the chuck.
- Feed the bit smoothly into the work. If the hole being drilled is deep, withdraw the bit frequently to remove shaving on the bit.
- When an operator has finished working on the drill press, and before leaving the drill press for any reason, the power must be shut off and the machine must come to a complete stop.
- Keep machine properly oiled and serviced.
- Ensure area is clean and uncluttered and sufficient space is given to operator using drill.
- When an operator observes an unsafe condition on the drill press, or stock that is being worked on, they must report it immediately to the Supervisor and the press will be taken out of service until the problem has been corrected.

PRESSING MACHINE



Operating Precautions

- Always wear safety glasses, goggles, or safety shields designed for the type of work being done when you or anyone is operating a machine.
- Get first aid immediately for ANY injury. Report all accidents and injuries to your supervisor immediately.
- Be sure that all machines have effective and proper working guards.
- Replace guards immediately after any repairs.
- Do not attempt to oil, clean, adjust or repair any machine while it is running.

- Do not leave a machine while it is running. Someone else may not notice it is still running, and be injured.
- Do not try to stop the machine with your hands or body.
- Always see that work and cutting tools on any machine are clamped securely before starting.
- Keep the floor clear of metal chips and waste pieces. Put them in the container provided for scrap.
- Get help when handling long or heavy pieces of material.
- When working with another person, only one should operate the machine or switches.
- Do not lean against the machines.
- Concentrate on the work and the machine at all times, it only takes a moment for an accident to occur. Do not talk unnecessarily while operating a machine.
- Do not talk to others while they are operating a machine.
- Be sure you have sufficient light to see clearly when doing any job.
- Never use compressed air for cleaning machinery.
- Never use compressed air to clean your clothes or any part of your body.

PRESSING MACHINE



Operating Precautions

- Never use this machine for bending metal that is beyond the machine's capacity with respect to thickness, shape, or type. Refer to the manufacturer 'User Manual'.
- Never attempt to bend rod, wire, strap, or spring steel sheets in this machine.
- Adjust for thickness of workpiece, rotate adjusters at either end of clampbar.



- Insert workpiece and align bending edge of clampbar & bending-beam with the bend line of the workpiece.
- Press and hold the 'START' button (this applies pre-clamping pressure to the workpiece).
- Using other hand lift handle (this applies full clamping) and continue bend to required angle.
- Keep clear of moving handles and bending beam.
- Slotted or short clampbars should be used for bending box shapes – refer to 'user manual'

BUFFING MACHINE



Operating precautions:

- Never leave the machine running unattended.
- Do not bend down near machine whilst it is running.
- Use the front of the wheel only.
- Work only below the centre of the spindle.
- Small work must be securely supported with a wooden backing.
- Work should be held so that edges cannot catch.

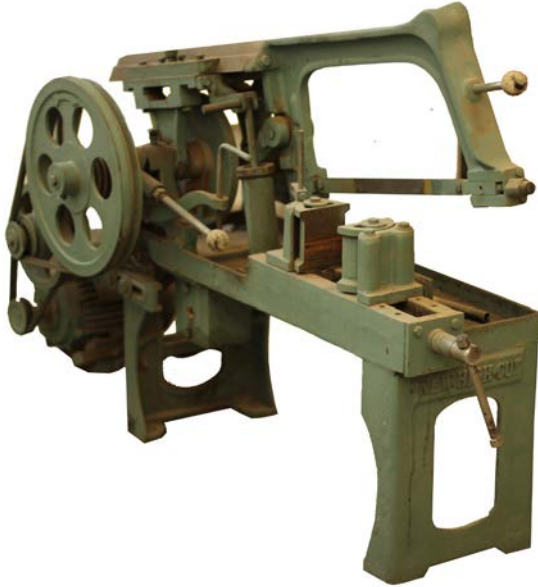
JIGSAW MACHINE



Operating Precautions:

- Always install the blade with the teeth pointing down.
- Adjust the tension according to the manufacturer's guidelines. Turn the pulley over by hand to make sure that the blade operates properly before turning on the power.
- Do not place excess force on the jigsaw blade. It can easily break and fly off.
- Adjust the blade guide and hold down properly.

POWER HACK SAW



Operating Precautions

- Ensure that the work piece is secure.
- Support overhanging work and signpost if it presents a hazard.
- Ensure no-stands in front of the saw when it is started.
- Keep clear of moving machine parts.
- Direct coolant onto blade before starting cut.
- Never leave the machine running unattended.
- Before making adjustments or before cleaning swarf accumulations, switch off and bring the machine to a complete standstill.

BENCH GRINDER MACHINE



Operating Precautions

- Stand to the side of the wheels when starting up.
- Let the wheels gain maximum speed before starting to grind.
- Do not grind on the side of the wheel.
- Small objects must not be held by hand.
- Never leave the machine running unattended.
- Do not bend down near the machine whilst it is running.
- Never force the workpiece against a wheel.
- Slowly move the workpiece across the face of the wheel in a uniform manner.
- Coolant spilt on the floor should be immediately absorbed.

WELDING MACHINE (MIG)



Operating Precautions

- Instruct others to avoid working close to the area where welding is to take place - if they are not associated with that operation.
- Position the flash blind in appropriate area to lessen the ultra violet light effect on other personnel.
- Locate cables away from the areas where there is a possibility of falling objects, which may damage cables.
- Adjust the welder to the appropriate settings to suit the job.

AIR COMPRESSOR



Operating Precautions

- Start the compressor noting pressure increase and cut-out/cut-in pressure.
- Listen for any air leaks from any flexible airlines and immediately report if any leaks are observed.
- Adjust pressure regulator to suit work requirements.
- Check the compressor at regular intervals

CERAMIC WORKSHOP

POTTERY WHEEL



Operating Precautions

- Unplug the wheel before cleaning.
- Hose rinsing is not recommended, because it's hard to control where the water goes.
- Keep water away from the control box, motor housing, foot pedal and switches.
- Keep cords and plugs out of water, glazes, and other liquids.



- Moving parts of kickwheels can cause cuts and abrasions.
- Hand contact with wet clay can cause abrasion and dryness of fingertips and hands. Some people are more susceptible or more sensitive to dry skin conditions, which may actually become painful. Use a skin moisturizer, or latex or nitrile gloves if necessary to protect your skin.
- Throwing on a potter's wheel for long periods of time can result in carpal tunnel syndrome caused by an awkward position of the hands and wrists. Pain, numbness, and or pins and needles sensations in the thumb and first three fingers are common symptoms. Keep wrists in a straight, unflexed position as much as possible to avoid carpal tunnel syndrome. Take frequent work breaks too.

ELECTRIC KILN



Operating Precautions

- Electric kilns should only be used by trained operators who are familiar with safe working procedures (including proper use of controls and safety devices) and are capable of recognising faults and coping with emergencies.
- With respect to educational establishments, students should only be allowed to use the kiln under the strict supervision of a competent operator.
- Where practicable, two or more people should be capable of operating the kiln and be familiar with the emergency procedures, in order to ensure that there is sufficient cover in the absence of the normal operator.

TEST KILN



- Written instructions outlining the safe operation and emergency procedures for the kiln should be clearly displayed in a prominent position next to it, together with a list of those people responsible for the kiln. Safe systems of work should be adopted at all times when the kiln is in use.
- Gloves providing suitable thermal protection to EN 407 and protective eye wear should be worn when removing ware while the kiln is still warm.
- In addition, protective eye wear to EN 166, fitted with filters conforming to EN 171 should be used when removing spy hole plugs to inspect cones when the kiln is hot.

FAB LAB

SHOPBOT



A. Job Preparation

- Please have your material stock cut to size before coming in for your reservation.
- Secure your stock using either wood screws or clamp blocks and wedges.
- Use general purpose or sheetrock screws with a length appropriate for securing your stock to the waste board.
- Do not allow screws to poke through the waste board.
- Turn on the power to the Control Box using the red switch on the side of the aluminium case attached to the base of the ShopBot.
- Press the blue RESET button on the yellow E-STOP Pendant.
- Before sending your job, you will need to warm up the spindle bearings if the ShopBot has not been used in the past hour.

Initializing the SHOPBOT

B. Spindle Warm-Up Procedure

- WEAR EYE AND EAR PROTECTION!
- Open the ShopBot controller software on the workstation.
- Input Channels 2 & 3 should have a green circle with a solid yellow ring around it.
- Input Channel 4 should have a green circle with a solid red ring around it.
- If Input Channel 4 is flashing, press the RESET button on the yellow E-STOP Pendant again.
- Click on the yellow icon just beside the Move/Cut Preview switch to open the ShopBot Keypad. Press alt+1 or click on Output Channel 1 to turn it on.
- A solid blue circle should appear for Output Channels 1 & 4.
- Walk over to the VFD Box mounted on the wall and adjust the frequency for the spindle speed to 3.0 (3,000 RPM).
- Press the green START button on the E-STOP pendant to turn on the spindle.
- 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.

- 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.
- After this press alt+1 or click on Output Channel 1 to turn off the spindle, and close the ShopBot Keypad window.

C. Setting an Origin

- 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.
- 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.
- In the ShopBot Console window, open the Zero drop down menu located at the top, and select zero axes (X & Y).
- Clamp the Alligator Clip directly to the cutting tool, and position the Z-Zero Plate directly underneath.
- 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.
- Click on the window. The cutting tool will move down in the Z-axis to make contact with the plate twice.
- A new window will prompt you to remove the Alligator Clip and store the Z-Zero Plate.

- 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

- WEAR EYE AND EAR PROTECTION!
- TURN ON THE DUST COLLECTOR AND OPEN THE BLAST GATE!
- 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.
- Take the time to review the nc code and verify that positioning values for the X, Y, and Z axes seem correct.
- Also, verify that the cutting feed rates appropriate for the material being cut. If uncertain, please consult FabLab Technician before continuing.
- After you have verified that your .nc file is ready to go, press alt+1 to turn on Output Channel.
- 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.
- If Output Channel 1 is on and has a solid blue circle, you may load your part file by pressing alt+L or 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.

- Walk over to the E-STOP Pendant and press the green START button to turn on the spindle.
- 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.
- Turn on the dust collector and open the blast gate for the duct connected to the ShopBot. Return to the lab workstation and click on the Pause to START ROUTER/SPINDLE Window.
- The Shop-Bot will begin outputting your job, and the cursor will become locked over the STOP button in the ShopBot Position window.
- Clicking on the STOP button or pressing the space bar will pause your job.
- 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

- When the ShopBot has finished cutting your design, close the ShopBot software and turn off the power to the Control Box.
- Turn off the dust collector, if no one else is using it, and close the blast gate for the duct connected to the ShopBot.
- Vacuum up all dust on and around the ShopBot.

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 (modelling wax, styrenform), Chemical wood, Aluminium (A5052 according to JIS), Brass.
- It supports .stl file type.

EPILOG LASER MINI



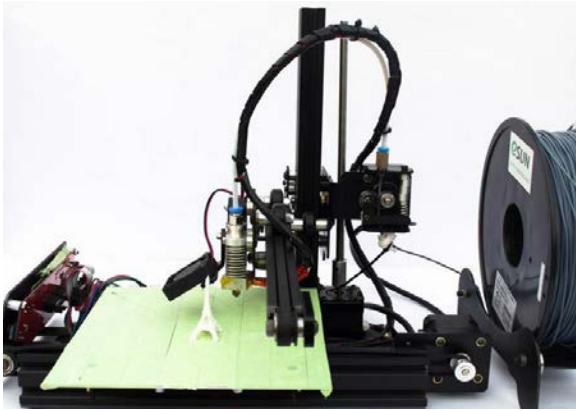
- Set up a simple piece of artwork in your software program (e.g. Rhino 3d, Inkscape).
- Turn on the power to your laser and wait for a “Beep” to note the machine is initialized.
- Turn on your exhaust.
- Place your sample material on the table in the upper left corner (make sure the table is low enough to accommodate the material).
- Manually focus (or set Auto-Focus button to YES when you print from the Epilog Dashboard driver). Close the door.
- From Inkscape click on the File pull down menu to print.
- Select Print. Make sure your Printer Destination is the “Epilog Engraver Win32”.
- 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.
- Click on close to exit out of the Dashboard driver with the settings in place.
- Click Print to send the page to your laser cutter.

ROLAN VINYL CUTTER



- Open Cut Studio, import black and white image.
- Right click on the image, then choose Trace Image Outline
- You will see an outline of your image laid on top of the picture.
- Click the Move button on the upper right to put the outline in the bottom left of the design area.
- Next, delete the picture.
- Right click on the picture and choose 'Properties'
- There are three tabs. For size, choose the size that will fit your sample piece of vinyl. The cutter measures in millimeters.
- If you need to rotate the image to fit the sticker size, you can do that in the 'Rotation' field.
- If you haven't already, put a box, oval or circle around your image to make it easier to separate later.
- Long press origin button and then use the arrow keys to adjust the origin.
- Press enter to confirm.
- Press the Cut button on the icon bar.
- The cutter head should then move side to side and the vinyl should move back and forth.
- When the design is cut, you can use the arrow keys to move the vinyl out of the machine.
- There is a groove on the front of the machine. Use a razor knife in this groove to cut the piece off.

CREATORBOT 3D PRINTER



A. Job Preparation

- Home X and Y axis to origin with Prepare > Auto home button.
- Now using Move Button bring move Z axis to towards origin with 1 mm steps. Make sure that Keep an eye on the nozzle for the hot end. Raise the Z axis until the hot end nozzle is approximately 3-4 mm away from the print bed.
- Slide a thin piece of paper underneath the nozzle in the front left corner of the bed. Adjust the Z axis end stop and home the Z axis until the tip of the nozzle applies a firm pressure on the paper. Try to slide the paper from underneath the tip of the nozzle. It should not tear, but some resistance should be felt.
- Move the hot end nozzle tip over to the far side of the X axis by using the move 1mm X axis button. Once the tip of the nozzle is near the front right corner of the bed slide the same piece of paper under the nozzle and home the Z axis. To raise or lower the front right corner of the bed adjust the third bed screw just beneath the nozzle tip.

- Adjust the front right corner of the bed until the amount of tension felt when moving the piece of paper under the nozzle feels the same as the tension felt when doing the same thing on the front left corner.
- Repeat the same process using the +Y button to move the heated bed to place the nozzle on the rear right corner of the bed. Adjust the height of the bed using the same procedure as outlined above. Finally, move the X axis carriage over to the rear left corner of the bed and perform the same leveling procedure to adjust the last corner.
- Note: The nozzle should not be pushing down on the print surface.

B. Attach The Filament

- Feed in the filament into the extruder and to the hot end
- CreatorBot Printer uses PLA as the filament.
- Pre heat the Hot End. Feed the filament into the extruder by holding the arm of the extruder. Let the filament reach till the PTFE tube holder then connect the PTFE tube to the extruder. Then move the filament till it reaches the end of the PTFE tube.
- Extrude the filament using the LCD controller to test the flow of the filament.

C. Load the file

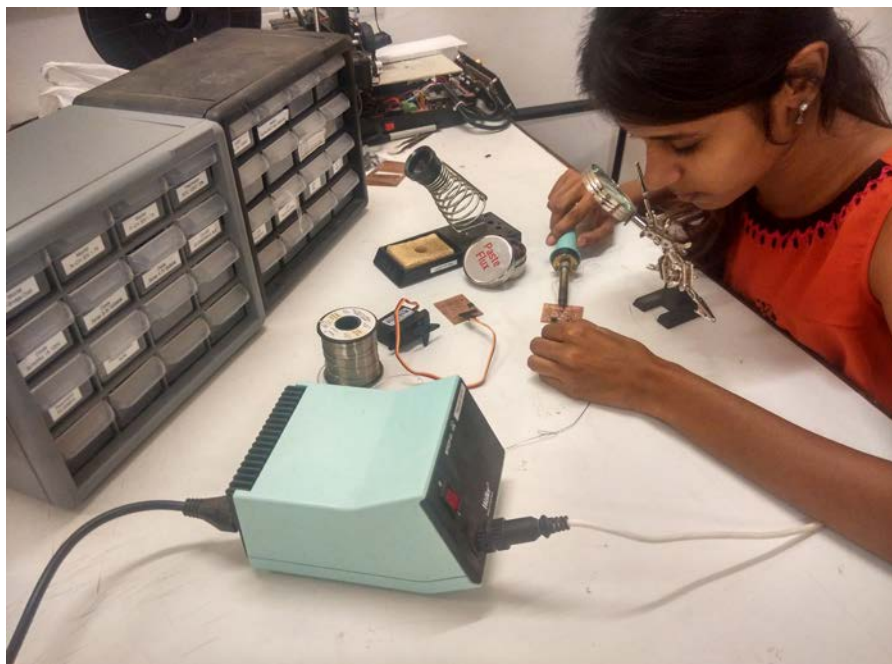
- Open the repetier host click on connect button.
- Now click on Load button in repetier, select the .stl file.
- Select the Slicer button, then click on slice with sli3r. Sli3r will slice the .stl file and generates G-code.
- Last step is to click on Run Job Button to start printing. Now you can see the printer automatically homes the axis and start preheating. Once preheating is done it will start printing the object.

NEXT ENGINE 3D SCANNER



- Click the Start button, go to All Programs, NextEngine, ScanStudioHD, and open ScanStudioHD or click on the desktop icon
- Click the green Scan arrow
- Place your specimen on the raised pad.
- Choose your scan style: 360 will scan the specimen from every angle; Bracket will scan it in three chunks, and Single will scan it from one angle.
- Choose the resolution: POINTS/IN² is how many pixels are scanned. The higher the resolution, the more time and memory the scan will take.
- Choose the Range: Depending on the size of your specimen, choose the range you want to scan at. Click on the green START button
- TRIM: Click on TRIM. This is to get rid of unwanted data in your scan
- SECOND SCAN: Click the green SCAN button again and reorient your specimen so that it is now horizontal.
- FUSE: When the scans are aligned, click the back arrow, then click FUSE, and FUSE again. This combines the multiple scans into a single mesh.
- REFINING: Click on POLISH, and RE-MESH, this should fill some holes left over. You can also smooth down any rough areas with BUFF.

ELECTRONICS DESK



Various electronics components are available for students to build design prototypes with added automation functionalities.

HAND TOOLS



Flat Chisel



Circular Gauge



Bevel Square



Protractor



Pincer



Clipper Plier



Marking Gauge



Taparia Metal Chisel



Hand Drill Machine



Hand File



Round File



Wooden File



Mortise Chisel



Round File



Mortise Chisel



Monkey Cramp



Hacksaw Frame



Pipe Hacksaw



Hand Jigsaw



Mini Iron Planner



Jack Plane



Spanner Set



Bamboo Stripper



Bamboo Stripper



Bamboo Stripper



Bamboo Stripper



Bamboo Chopper



Wire Cutter



Mini Hammer



Wire Cutter



Right angle



Rivet Gun



Rivet Gun

ELECTRIC HAND TOOLS



Grinder Machine



Cutter Machine



Jigsaw Machine



Router



Orbital Sander



Trimmer Machine



Heat Gun



Orbital Sander

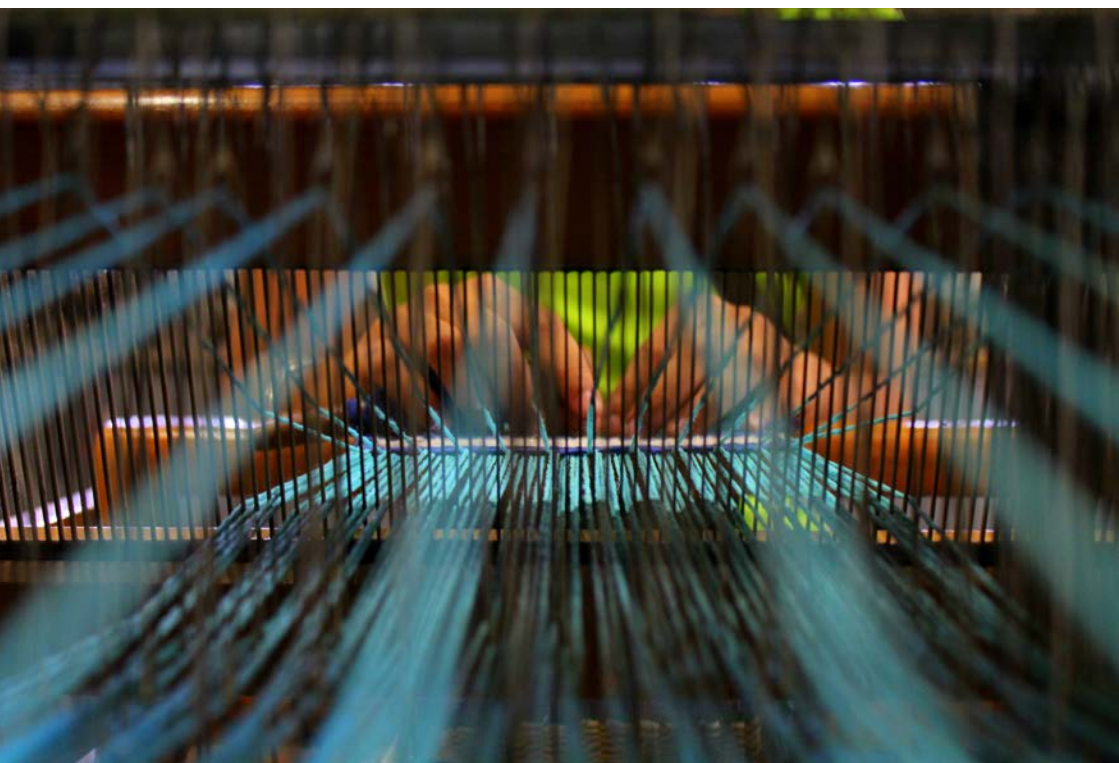


Drill Machine

MOBILE WORKSHOP



Basic workshop tools are available for use within the studios, providing quick access to model making.





**THINK
MAKE
DO**



CEPT
UNIVERSITY