

WORKSHOP

USER POLICY



THE WORKSHOP

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INTRODUCTION

The Workshop at the University of Waterloo, Cambridge School of Architecture, is a facility that supports experimentation in design and materials, and provides equipment and space for the fabrication of architectural and landscape models, furniture and 3-D sketches. The shop is equipped with machinery and tools to handle fabrication in wood and wood products, paper products, metal, plastics and poured materials requiring moulds (i.e. epoxies, concrete, and plaster). The Architecture Workshop is approximately 5000 square feet and located on the ground floor of the School building with easy internal and external access (Rm. 1006). It consists of four primary areas; machine tools, bench/assembly, metal working and digital fabrication.

hours and is supervised and managed by the Workshop Manager.

WOOD & METAL SHOP

In the main shop students have access to a comprehensive joinery shop with a wide variety of hand and power tools. Students are provided with instruction and facilities for model-making, furniture building, and general fabrication techniques. The facility enables and encourages experimentation with materials such as concrete, metal, and plastics, and allows for the creation of substantial projects.

ASSEMBLY AREA

A large portion of the workshop space is dedicated to the bench/assembly area which provides students ample area to construct, assembly and work on their various works and projects. A wall of windows provides abundant natural light directly to the 16 work benches in the assembly area. A student tool cabinet is provided to allow students rudimentary tools for after hour work.

DIGITAL FABRICATION LAB [dfab]

The Digital Fabrication Lab is a bridge between the digital and the physical and is encouraged to be utilized as an integral component of the design process. The Digital Fabrication Lab is located within the main workshop adjacent to the main shop doors in room 1006B. The range of dFAB equipment consists of various digitally driven additive and subtractive tools including 3D printing, laser cutting and 3-axis CNC milling.

The lab schedule is generally the same as the Workshop

HOURS OF OPERATION

The workshop is supervised by the Workshop manager and the Workshop Technician and access to the equipment is dependant on the availability of one or both of these individuals.

Monday	9-5pm	CLOSED 12-1pm
Tuesday	9-5pm	CLOSED 12-1pm
Wednesday	9-5pm	CLOSED 12-1pm
Thursday	9-5pm	CLOSED 12-1pm
Friday	9-5pm	CLOSED 12-1pm
Saturday	CLOSED	
Sunday	CLOSED	

Note:

The shop is typically closed 12:00-1:00 for lunch

Outside of the regular supervised hours, students have key access to the workshop, but power to the machines will be off. There is no power tool usage during lunch if the shop technicians are not available to supervise.

Any changes to the regularly supervised shop hours will be posted on the workshop door and the School's e-group. Please note that due to unforeseen circumstances, these hours are subject to last minute changes.

EXTENDED HOURS

The Workshop will try to accommodate requirements for additional Workshop access for special projects and busy deadline periods whenever possible.

A faculty member must make requests for the extending the workshop hours, preferably two weeks prior to the requested date. To justify the adjustments in scheduling, the workshop requests a commitment of a minimum of 10 students per request.

Requests made with less than the required 2 week notice may require supervision services to be contracted. If such a service is required, it will be at the class' expense.

Please contact Heinz Koller by email at hkoller@uwaterloo.ca with these requests.

LEVELS OF AUTHORITY

Workshop Manager: **Heinz Koller**

It is the Workshop Managers responsibility to ensure safe and operational facilities and equipment. It is their responsibility to ensure that procedures and rules are being followed in the use of all tools and equipment; to provide information on safe procedure, on materials and suppliers; and to maintain and repair equipment.

Workshop Technician: **Dan Jessel**

Reports to the Workshop Manager
Has authority to ensuring that safe and proper procedures are being followed in the use of all tools and equipment; to provide information on safe procedure, on materials and suppliers; and to maintain and repair equipment.

Commissionaire:
When the shop is not supervised, the Commissionaire on duty has authority.

General Manager: **Jeff Lederer**

Any disputes that cannot be resolved in the shop are to be taken to the General Manager for resolution.

GENERAL POLICY – RULES, REGULATIONS, REQUIREMENTS

1. The Workshop attendant's primary responsibility is to ensure the proper and safe use of the tools, machines and equipment of the workshop.
2. The Workshop attendant can also provide technical information about construction, materials and model making. Some assistance with fabrication projects including modest amounts of specialty or high risk machining. However during high activity periods, technician's available time to directly assist in production may be extremely limited.
3. The dust collector system is used to remove dust from the Shop. If you are using a power tool that requires dust collection, make sure that the dust collector is **TURNED ON** and that the **GATE VALVE** is **OPEN** for the machine that you are using. After turning the machine off close the dust collector gate valve, if provided.
4. Any breakage of tools, bits, blades shall be reported immediately to the shop supervisor.
5. Tools may be used outside of the Workshop however they must be signed out. A sign-out sheet is maintained in the workshop office. No tools are to be signed out on an indefinite loan. Tools not signed and removed from the shop will be considered stolen.
6. The "white tools" in the student use cabinet provide students 24hr access to common hand tools. They are meant to be used in the workshop and are not to be removed from the room. Tools that go missing will not be replaced until the beginning of the next term provided funding is available.
7. The tools are for all to use, and when students take tools for their personal use, everyone else suffers from the lack of appropriate tools. Be considerate of your fellow students.
8. All tools are to be returned to their proper place when you are finished using them. Do not leave bits in the drill press, hand drills or on benches.
9. Clean up your area after using the shop. Do not leave a mess for someone else to clean up, it is your responsibility to clean up after yourself.
10. Place all waste in the proper containers.
11. Storage of large materials & projects in the Workshop is allowed only by the Managers approval. Materials and projects left for several days without prior notice will be removed without notice.
12. Personal projects allowed only at the discretion of staff during slow times.
13. No treated wood can be used inside the UWSA Workshop.
14. Used or reclaimed materials are prohibited in the Workshop.
15. Storage for projects is provided under the benches in the assembly area. Use the lower shelf to safely store your project and materials with your name and date. Materials stored for longer than 2 weeks will become trash or workshop property.
16. Bring your own tape, paper, pencils, fasteners and other consumable supplies for working in the workshop. These are not typically provided.
17. Shop will be cleaned at the end of each term and all unclaimed items will be removed or become workshop property.

Property Damage & Loss:

The UWSA is not responsible for damage or loss of or to your property, including: belongings, projects and materials or your intellectual property. Anyone found responsible for causing intentional damage or loss to Workshop property or that of another student will be prohibited from entering the Workshop and may be the subject of legal action.

Deliveries:

Deliveries can be arranged through the Workshop. If you are expecting a truck delivery please let Workshop staff know so they can prepare to receive it. Workshop staff will not remove materials off the truck without prior notification, and unexpected materials will be refused. You or your authorized representative must be present to accept large, heavy, or hard to handle materials. Any materials brought in must be placed in racks or other designated storage areas of the Workshop. We are not responsible for any damage or loss to materials during delivery to, storage in, or use at the Workshop.

Materials and Supplies:

If you didn't buy it or bring it in, it's not yours. Generally the Workshop does not supply materials for your projects. If you need materials, talk to a Workshop Technician. Some materials are available for the taking but you must ask the Workshop staff what specific materials are available.

Academic Use Policy

The primary mission of the UWSA Workshop and its staff is to serve the needs of UWSA students in their academic work.

UWSA faculty, staff and currently registered UWSA students may use the Workshop during regularly scheduled hours for course related projects. Students not currently registered may not use the workshop or its resources. Parents and friends are not permitted to perform work in the workshop.

Non–Academic Use Policy

The primary mission of the UWSA Workshop is to provide a facility for UWSA students and faculty to complete course related work. To assure that use of the Workshop unrelated to courses does not interfere with the primary mission, the following policy has been adopted:

UWSA faculty, staff and currently registered UWSA students may use the Workshop during regularly scheduled hours for non-course related projects under these conditions:

- All policies and procedures are followed
- Users are current UWSA students or employees.
- Users have attended a User Orientation Safety Session and signed the acknowledgment form.

- The use does not interfere with users undertaking course-related work in any way.
- Shop management approves the use.
- No consumable shop supplies are used (glue, abrasives, hardware, etc.)
- No commercial, professional or financial gain is to be made by any party using the UWSA workshop facilities or equipment. Failure to comply can result in suspension of workshop access.

Non–Academic Use for Commercial Gain

If any commercial, professional or financial gain is to be made by any shop user as a result of the use of the Workshop, the user must declare the project before any work begins. All such users will need to sign an agreement stating they will assume responsibility for any damage to the facility or equipment and will reimburse the workshop for any such damages.

An hourly fee of \$20.00/hr shall be paid to the UWSA for use of the equipment and facility.

Students not currently registered may not use the workshop or its resources. Parents and friends are not permitted to perform work in the workshop.

Failure to perform the outline requirements will result in lost of all Workshop privileges.

UW Faculty of Engineering Non UWSA Users

All University of Waterloo Faculty of Engineering students have access to the facilities and equipment however; priority is given to UWSA students. As with all UWSA students, any Faculty of Engineering shop users are required to have passed the WHMIS training and complete the basic orientation and safety tour, test, and sign the acknowledgement form. Students who have not participated in the orientation or have not submitted a signed form will be prohibited from using the power equipment.

Arrangements must to be made with the Workshop manager to schedule the expected usage.

By Provincial Law, the Workshop is required to abide by the OH&S act. Shop Attendants on duty have the authority and responsibility to determine whether any such work is permitted. Projects will be evaluated on a

case by case basis.

Other UW Departments \$30.00 /hr.
Non-UW clients \$50.00 /hr

Academic Contracted Services-WA Workshop Fabrication Services

The Workshop often receives requests to work on projects within the School of Architecture and on occasion, external projects. The priority of working on special projects depends on the urgency, difficulty and scope of the project. Workshop manager will add the project to a list of projects. Many factors such as urgency, difficulty, time and space requirements, etc, will be considered in determining the priority of these projects. The Workshop can make no guarantee as to completion dates on any special projects. If students are using the Workshop, work on special projects will not be done if it interferes with student shop use.

UWSA staff and faculty requesting a special project need to provide the Workshop manager with an account number to use for purchase of materials. Actual cost of materials used in the completion of a project will be charged to the requesting unit. Depending on the circumstances additional help may need to be contracted, if this is the case, hours will be billed to the unit requesting the project. If a project can be completed during the normal shop schedule, the unit will not be charged for staff time. Projects completed during the normal shop schedule are subject to all other demands on the Workshop and staff. During a typical week there may be only a few hours in which shop staff are able to work on special projects.

Contracted Services-WA Workshop Fabrication Services

On occasion the Workshop will act as a service bureau and do projects on a contract basis. The priority of these projects again, depends on the urgency, difficulty and scope of the project. The Workshop manager will add the project to a list of projects. Workshop work on special projects will not be done if it interferes with student requirements.

The WA Workshop has a tiered policy for shop rates:

Non academic within UWSA: \$25.00/ hr.
Academic: UWSA: undergraduate \$15.00/ hr.
Academic: UWSA: graduate \$15.00/ hr.
Academic: Faculty of Engineering: \$20.00/ hr.

WORKSHOP OCCUPANCY

The primary responsibility of the workshop staff is to monitor the safety of shop users. The number of users which an individual shop technician can effectively monitor is affected by many factors. It shall be each Shop Attendant's responsibility to determine how many users they can effectively monitor under any given circumstances.

Generally, each shop technician should be able to monitor 15-20 users. This limit may be adjusted upward or downward at the shop technician's discretion dependant upon conditions.

A maximum of 40 students will be allowed in room 1006 at any given time.

Application of this policy will be left to the discretion of Shop Attendant(s) on duty.

Resolution of any disputes regarding the application of this policy shall be the responsibility of the Workshop Manager in conjunction with the General Manager and the Director.

Please consider these occupancy limits when assigning projects and deadlines. Notify workshop management of expected heavy shop use so that adequate staff can be scheduled. If workshop occupancy is expected to exceed 40 users as a result of your class, you should make arrangements for additional shop attendants to be scheduled 2 weeks prior to the day of expected shop use.

SAFETY PROTOCOL – GENERAL RULES & REGULATIONS

All students taking courses offered by the Faculty of Engineering must have appropriate instruction on The Workplace Hazardous Material Information System (WHMIS). The requirements are satisfied by obtaining a credit for WHMIS training. Those who do not have a WHMIS credit will not be granted access to the Workshop facilities.

WORKSHOP ORIENTATION

New students receive orientation where they are shown the layout of the machine shop, identification of all the machinery, cutting tools, hand tools, First Aid Kit, fire extinguishers, Emergency Shut-offs and Eye Wash Station. Brief explanations as to how the machines are used. Focus is on safety and working safely. Students will be required to sign off on an acknowledgment form upon completion.

All persons that use the shop must complete the basic orientation, pass a written test, undergo a practical assessment and sign off on the Policy Acknowledgement Form. Students who have not completed all the requirements or have not submitted a signed form will be prohibited in using the power equipment.

Graduate students continuing their studies at UW will be required to participate in a safety refresher orientation and sign off on a Grad Policy Acknowledgement Form before being allowed access to the machine tools.

No unauthorized person shall use the workshop. (Guests are prohibited to use any shop tools or equipment). No children, non-student, non-staff, or non-faculty shall be allowed access to the workshop.

This is a "Safety First" environment.

FIRST AID

In the event of an injury occurring when the shop is not supervised, one student will lie or sit the student down in a prone position to avoid collapse and possible concussion, and apply First Aid, while a second student if available, is to locate the Commissionaire or office staff to continue First Aid attention.

Contact local emergency by phoning 911

The First Aid cabinet and Eye Wash station are located by the sink at the north-west corner of the shop (Do not remove any First Aid equipment or material from the cabinet unless it is to be used directly on an injury). Large red Emergency power shut off buttons are located around the workshop as shown on the floor plan. If you

observe that an injury is about to occur and you are unable to stop the user in time, or in the event of an injury on any of the machines, hit the nearest shut off button.

In the event of an injury, inform the shop supervisor immediately. The supervisor will provide appropriate First Aid treatment and arrange for transportation to the Hospital if required. Students should be prepared to assist if necessary.

Hospital emergency staff recommends that antiseptics not be used on any wound, since they may cover the wound or require extra clean up by medical staff in the emergency room. Washing in cold water and wiping with sterile wipes provided in the cabinet are the only actions required.

All incidents must be reported and the supervisor must complete a University of Waterloo Incident Report with the victim within 24 hours following the injury.

Non-injury Accidents

In the event of accidents resulting in machine damage, material "kick-back", jamming, or other unsafe events, a meeting is required between the user(s) involved in the accident and the shop manager before shop access may resume.

GENERAL SAFETY RULES

[See Workshop Safety Manual for more]

All shop users are responsible for reading over these rules and procedures and use is conditional upon agreeing to follow all rules and procedures. Violation of these policies and procedures will result in the revocation of some or all shop privileges.

1. Report **ANY** and **ALL** injuries to the Workshop Technician or Manager immediately. After hours injuries must be reported to the Commissionaire on duty.
2. Students must fully co-operate with the shop supervisor and must follow the rules without exception

3. It is the student's responsibility to receive and understand instruction in the proper use of any and all tools and equipment available in the Shop before he or she attempts to use the tools or equipment.
4. Do not enter shop while tired or under the influence (Drugs, Alcohol, and any Medications causing Drowsiness)
5. All students using the workshop or hand tools must wear safety glasses, goggles or face shield to protect their eyes.
6. Shoes covering the entire foot must be worn at all times when in the shop. No open heels, toes or sides of the foot will be accepted. Students will not be allowed to work if not appropriately attired.
7. Hair should be tied back. Dangling jewelry should be removed. Avoid loose clothing: adjust to keep cuffs, drawstrings out of hand's way
8. Ear protection is encouraged but not mandatory.
9. Dust Masks are encouraged when you are cutting plywood or MDF or particleboard
10. All materials must be kept off the floor and all tools need to be put away at the end of each work period.
11. Sawdust and scrap material must be cleared away.
12. No treated wood or wood products can be used in the Workshop areas.
13. Cell phones and MP3's, headphones are prohibited when using the machine tools: your complete attention is necessary to detect potential malfunctions and safety issues.
14. No spray painting/gluing in the shop.
15. Use extreme care that all lumber is free from nails, bolts, metal or loose knots before machining.
16. Keep your work area free of debris clean up immediately after finishing at a tool or work area.
17. Make sure you are comfortable with the operation of any tool or piece of equipment. If you are unfamiliar with a particular operation, seek assistance from the technician.
18. Report any damaged equipment or strange sounding equipment immediately to the workshop technician.
19. To protect everybody's health, no grinding/sanding of toxic materials such as concrete or fiberglass is permitted.
20. All safety guards must be kept in position while machines are being operated.
21. All adjustments are to be checked and secured before the power is turned on.
22. Never make adjustments or repairs to machines.
23. Remove all wrenches and other tools from the machine before turning the power on.
24. Have the instructor check special or unfamiliar set-ups before machining.
25. Shut the power off when you are finished or if you are leaving the machine, never leave the machine running unattended.
26. Materials should never be fed into a machine faster than it will cut or sand.
27. "HORSEPLAY" is absolutely forbidden in the shop or lab.
28. KEEP HANDS AWAY FROM CUTTING AREA. Keep hands away from cutters and the cutting area. Include the safe zone in all your work operations.
29. Personal power tools are prohibited in the workshop. The only exceptions being hand sanders, drills and Dremel tools.
30. The Shop Supervisors shall have the authority to alter these policies and procedures.

DEMERIT POINT OFFENCES

[See Workshop Safety Manual for more]

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To help instill a safety first mindset, the UWSA Workshop has adopted a demerit point system to help improve student behavior and protect against others who abuse the workshop privileges. Shop users are responsible for understanding the **Workshop User Policy** and following all the safety rules outlined in the **Workshop Safety Policy**. The system is based on the accumulation of “points” per term. The critical point value is 5 and if any one individual receives a total of 5 demerit points in any given term- their workshop privileges will be suspended. In addition, if any individual receives infractions of the same offence 3 times, that individual will also have their workshop privileges suspended. Suspension will last the duration of the term. Once the term is completed the suspension is lifted and the individuals’ demerits are wiped clean. Any individual who has been suspended will need to take the safety tour and test before their workshop privileges are reinstated.

HOUSE KEEPING

The UWSA janitorial staff does not clean the workshop facility. Shop users are responsible for cleaning up after using the shop.

1. Each student is personally responsible for clean up and tool return.
2. Each machine and work area should be cleaned immediately after use. Students consistently failing in their clean-up responsibilities may be denied shop access.
3. Tools are for use while in shop. Anyone removing tools or abusing tools by incorrect use will lose privileges at Manager’s discretion.
4. Anyone purposely damaging property will lose privileges (i.e. painting of property, nailing tables, etc.)
5. Every Monday morning all materials and projects remaining will be removed unless they are registered with the shop staff and clearly marked as an ongoing project.

6. Appropriate precautions must be taken when using materials like paint, concrete and plasters to keep the workspace clean, (use of drop sheets, tarps, etc.
7. If following a class project the shop has not been properly cleaned, any further shop access for that class or any individual students in the class will be Suspended until the house keeping has been addressed properly.
8. Throw away the small pieces and put the larger pieces under the free material storage benches or in a designated place.
9. Pick up the scrap pieces and off-cuts from the machines and dispense with them appropriately.
10. Do not dump plaster or concrete mixtures, paint or glue into the sink – these should be emptied into containers, cardboard boxes or garbage bags and disposed of in the appropriate garbage bins
11. Flammable and combustible liquids must be stored in approved flammable cabinets.

Students failing in their responsibilities:

- First offense: Warning.
- Second offense: Loss of shop privilege for 48 hours.
- Third offense: Loss of shop privilege until meeting with shop manager.

FIRE

Fires are divided into three “classes”. Any of these classes of fires could occur in the shop.

1. **Class A:** Fires with ordinary combustible materials, such as wood, rags, and rubbish.
2. **Class B:** Fires with flammable liquids, such as gasoline, oil, grease, paints & thinners.
3. **Class C:** Fires in or near electrical equipment such as motors, switchboards & electrical wiring.

For any fire to start or remain burning, it must have the following three things:

1. Fuel - Any combustible material.
 2. Heat -Enough to raise the fuel to its ignition temp.
 3. Oxygen -Necessary to sustain combustion.
- If any of the three is missing, a fire cannot be started. With the removal of any one, a fire will be extinguished.

Fire Alarm

If you hear the fire alarm:

1. Stop what you are doing
2. Shut off all machinery
3. Leave through nearest exit and go to the parking lot

UW Fire Wardens will instruct you to leave by the nearest exit and remain away from the building. When the shop is not supervised the Commissionaire has the authority of warden. Some wardens will be posted outside of the building to assist you in your exit and to ensure that no one returns to the building. Return to the building only if and when the wardens have given approval to re-enter.

Tool Checkout Policy

Hand tools and some portable power tools may be loaned out to UWSA students who have attended the shop safety orientation.

Tools are loaned out for a period of one business day, and are due at 10:00am the next day. A tool checked out on a Friday is due the following Monday morning.

Tools left out in the shop are not checked in. They must be returned to the Workshop staff and checked off to be considered returned.

Tools returns will be subject to late fees

- Power tools: \$2.00 per day late per item
- Hand tools: \$1.00 per day late per item

All tools borrowed must be returned in the condition in which it was checked out. If a tool is lost or damaged, the student is responsible for the tool's replacement or repair. Failure to pay may result in a hold placed on the student's records or suspension from access to the shop and equipment

Digital Fabrication Lab

The Lab is located within the main workshop adjacent to the main shop doors in room 1006B.

The lab schedule is generally the same as the Workshop hours and is supervised and managed by the Workshop Manager.

Due to the high demand of the Fabrication Lab can experience peak periods where the tools are in high demand. During these periods access is maintained by a strict schedule. Anyone who has not prepaid for their scheduled use will not have a guaranteed time slot and anyone missing their scheduled time will be billed for their booked time. People who do not complete their cutting will need to stop their job and reschedule for the next available time.

Priority of access

Priority of access to the dFAB facility is as follows:

- Specific course offerings which teach digital fabrication technology
- Other course offerings, including studios, which arrange for access on a term by term basis.
- Faculty research projects
- Individual students who have taken the requisite training and wish to use the technology. Priority within this group is established by sign-up on a first-come-first-served basis.
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LASER CUTTER

See Laser User Guide for a complete overview of the Laser Cutter

The UWSA dFAB lab currently has 2 Universal Laser Systems laser cutting machines. One is a X600 50 watt machine with an 18"x32" bed and the other is a X2 660 100watt also with an 18"x32" bed. Both are equipped with their own workstations that use AutoCAD or CorelDraw.

REQUIREMENTS FOR USE:

All currently registered UWSA students and faculty are welcome to use the equipment, however each user must comply with the following

1. Complete Fabrication Lab laser training session by authorized trainer
2. Understand and agree to information outlined in the Laser cutter user policy
3. Sign the User agreement form

Training

All those using the laser cutter must complete a required training tutorial on the on the machine and its operation.

A list of certified users list will be kept and maintained by the school office and in the Digital Fabrication Lab.

Training is currently available through

- a) Special arrangement with lab attendants
- b) Digital Design electives
- c) Training sessions as advertised

A log of qualified users is keep and only qualified users can use the equipment.

Training sessions can be arranged with the Workshop staff and will be scheduled based upon their availability. It strongly recommended that students get trained well before the day they think the may need to use the equipment.

COST

The laser equipment is charged out by the hour:

100watt X2-660 \$15.00/hr

50watt x-600 \$12.00/hr

All laser bookings must be pre-paid before entering the Lab.

Agreement

You agree to pay use charges, to take responsibility for the machine during your work session and to follow all rules governing safe use. You agree that if damage to the machine results while in your care, cost of repair is your responsibility.

HOURS OF AVAILABILITY

Access and supervision of the digital Fabrication Lab will be provided during regular workshop hours **9:00am-5:00pm** pending availability of the Work Shop Manager or other qualified attendant.

Access outside of these hours can be arranged with certified lab attendants. The lab attendants can be contacted via e-mail at the addresses listed on the posting in the digital lab. The listed attendants are providing their service as a courtesy to you and are not under any obligation to provide this service. Please provide as much notice as possible when booking with them. After hour bookings will be billed at a higher rate than regular hour bookings to help offset costs of the supervisors.

Time may be reserved in advance to a maximum one session per day lasting a maximum of two hours per session. You may extend your session if no work is scheduled following yours, or if scheduled work does not appear. You are advised to book time well in advance.

Reservations:

The booking list is maintained at the Workshop office by the Workshop manager and a copy is kept on the door of the Digital Fabrication lab.

Laser cutter reservations are non-transferable; the person listed on the reservation must be present during the operation of the laser cutter for their reservation. This applies to group projects. The person on the reservation is the person who is officially responsible for the laser cutter during their reservation.

If you no longer require reserved time, release it for the use of others. Time not released in advance will be charged for. If you are not available at the reserved time, you will forfeit your time slot.

CNC Router : *See CNC user guide for a complete overview of the CNC Router*

The Techno IseI CNC Router is a small format industrial tool capable of routing and milling complex geometries in 3 axes. The 58 inch X-axis x 48 inch Y-axis x 4 inch Z-axis processing size, combined with a 3 hp spindle and manual tool holder allow extremely accurate and complex shapes to be made in a relatively streamlined manner. 2D and 3D shapes drawn in digital design environments can be processed through VisualMill to produce Numerically Controlled cutting files that are sent directly to the machine tool. Prototypes, models, contours and full-size building components can be subtractively machined from wood, engineered wood products, plastics, modeling and structural foams. Cutting of any metals is prohibited. Note that undercuts are not possible with single sided machining.

Priority of access to the CNC equipment is established as follows:

- Specific course offerings which teach CNC technology
- Other course offerings, including studios, which arrange for access on a term by term basis.

- Faculty research projects
- Individual students who have taken the requisite training and wish to use the technology. Priority within this group is established by sign-up on a first-come-first-served basis.

Access to the CNC Router is scheduled by sign up in the Workshop Office on a first come first serve basis. Times are scheduled from Monday-Friday based on the availability of the CNC Technician.

Please provide as much advance notice as possible prior to your anticipated use when scheduling CNC time. The technician needs to schedule their time accordingly and same day bookings may not be accommodated. Due to the nature of CNC programming, set-up and machining, time slots are allocated to half-day bookings. More extensive projects will require full-day booking. Due to the nature of the milling process, once a project is begun, it must be completed in its entirety.

Bookings will be guaranteed only after the service charge has been paid in advance.

If bookings need to be cancelled please provide as much advance notice as possible. Staff schedule their time based on the demands. Please be considerate. During peak busy periods- if bookings are cancelled, the service charge may be forfeited as someone else may have booked this time.

It is highly recommended that new users discuss their projects with the Workshop manager to familiarize themselves with file requirements, material recommendations, time allocation etc. Typically a review of the CAD file is recommended.

Please contact Heinz Koller directly in the workshop Office or email at hkoller@uwaterloo.ca to schedule times

CNC Fees

To help cover tool and machine upkeep and maintenance, the following cost structure has been implemented

Half day: \$15.00
Full day: \$30.00

Tooling Charges

Users may choose to purchase their own tooling and cutters, in which case they would not incur any of the following additional tool charges which are in addition to the CNC fee.

Material Tool Wear Surcharge

Due to the nature of the CNC routing process, projects will quickly wear and often break the cutting tools. To help offset the cost of sharpening and purchasing new cutters, a charge is applied to most materials.

Half day: \$5.00
Full day: \$10.00

Materials not requiring any additional costs include:

- Rigid polystyrene (pink/blue insulation foam)
- Expanded Polystyrene Foam (beaded white foam)
- Composite Modeling board (Renshape)
- Machinable Wax

Abrasive Material Surcharge

Abrasive materials require an additional surcharge to offset the cost of the excessive tool wear.

- MDF
- Particleboard
- Plywood
- Acrylic

All the above listed materials will be considered “abrasive” and will be charged the following in addition to the CNC Fee:

- Half day: \$10.00
- Full day: \$20.00

User Expectations:

All those using the equipment must be involved in the CNC process from file set up, CNC programming and machining. The student is expected to attend the machining operation from beginning to end. When the CNC router is actively in operation, the user must be present and awake at all times. Users will not leave the room with the machines running, even for a moment. If one needs to leave, the machine must be paused or stopped.

Upon completion the user is expected to clean the CNC area, return all tools to their proper location and vacuum the router and sweep the floor.

No machine – computer or fabrication - will be reconfigured or otherwise modified by users beyond that which is part of the normal operation of such machine. This includes any hardware and/or software(s) used to build objects or to drive the fabrication process.

All users of the machines must clean up after their work, using established guidelines for cleaning that are posted and covered during training.

In the event of any problems or difficulties with the operation or maintenance of the machines, all work on such machine will cease, and the Workshop Manager or Technician must be notified immediately.

Access to any damaged machine will be revoked until such time as that machine has been fixed, as determined by the Workshop Manager.

Users can only operate the equipment in presence of the shop supervisor.
Eye protection is always required when operating the CNC router

3D PRINTING

The 3D Printer works by making repeated passes with an inkjet-like mechanism to spray a binder over very thin layers of plaster-based powders. After each pass, a new thin layer of loose powder is spread over the previous layer and the object is incrementally built up. Once the object is finished, the excess powder is blown off using compressed air. Objects can be up to 8" x 10" x 8" with resolutions as fine as .0035" per layer. This equipment is developed by Z Corporation based on the Three Dimensional Printing (3DP) process from MIT. CAD files are transferred to the system, where they are sliced and drawn, one cross-section at a time, by printing binder over a thin layer of powder. The binder fuses the powder particles to form a solid mass that matches the CAD design. As each layer is drawn, the prototypes take shape within the system.

3D Printing Fees

Fees are charged to cover the costs of consumables and maintenance.
Printer charges are based on volume of the printed model: **\$4.50/cubic inch**

Volume calculations and cost estimate can be provided prior to running projects when the files are submitted to the **dfAB** technician for review.

Since the printing cost is determined by the amount of powder and binder consumed, you may consider modifying your computer model by creating cavities or making walls thinner.

The Lab technician can make recommendations regarding geometry and construction of the CAD model, however this is no guarantee of perfect parts. There is a risk of breakage during the excavation and de-powder process and if breakage results, the student is still required to pay the printing fees. Part failures due entirely to Lab error will not be billed.

REQUIREMENTS FOR USE:

1. The use of this 3D printer is primarily intended academic work. If you plan to use it for personal projects; work for professional firms, or for academic work outside of the University of Waterloo, it must be declared and billed accordingly.
2. The ZCorp z402 requires a general knowledge base to understand how the equipment works and perhaps more importantly how to model appropriately for the limitations of the technology. You must be approved to use any of the equipment in the digital Lab. Tutorials and training are available to all UWSA students.
3. The file submitted is what is processed. A file with errors or problems has the potential of building problematic parts. The Lab Manager is not required to modify or edit CAD files.
4. Students may not operate the 3D printer without the guidance of trained personnel. Unauthorized use of the 3D printing equipment will result in immediate suspension of Workshop privileges.
5. The user is required to monitor the build process as issues can arise. Regular and periodic checks are required throughout the build process. If damage occurs due to an unmonitored build process the user will be liable. The dfab will not be responsible for bad parts or damage to the equipment.

6. Once the printing process is completed it is recommended that you allow the plaster powder and binder resin component to sit in the powder for at least an hour to “cure”. Longer cure times help minimize part failure during removal.
7. Students are responsible for removing their own parts and de-powdering them.
8. All users of the machines must clean up after their work, using established guidelines for cleaning that are posted and covered during training.
9. In the event of any problems or difficulties with the operation or maintenance of the machines, all work on such machine will cease, and the Lab manager must be notified immediately.
10. Access to any damaged machine will be revoked until such time as that machine has been fixed, as determined by the Workshop Manager.

LIST OF AVAILABLE EQUIPMENT

Hand Tools:

Wrenches & Socket Sets: inch & metric
Wire Cutters & Strippers
Riveters
Pliers & Vise Grips
Scales & Rules
Tri Square
Combination Square Sets
Protractors
Screwdrivers
Allen Key Sets
Hammers & Mallets
Hand Files, Rasps & Sure-Forms
Drills
Router Bits
Sheet Metal Snips
Tape Measures
Thread Pitch Gages
Wire Brushes
Ball Peen Hammer
Claw Hammer
Multi-tester
Digital Angle finder
Dowel Jig: Wolfcraft model 4641
Cross Slide Vise
Miter-Trimmer

Power Tools:

Orbital Sander: DeWalt DW421
Cordless Drill Driver : DeWalt 18V (2)
Cordless Drill Driver : Mastercraft 18V (2)
Cordless Drill Driver : Mastercraft 14V (2)
Cordless Drill Driver: Makita 1/2 18V LI-ION BDF452H
Hammer Drill: Bosch
Flex Shaft: Freedom Model SI-23A
Soldering Iron
Router: Dewalt
Dremel
Drill Bit Sharpener: Drill Doctor Model
Engraver: Dremel Model 290-01
Electric Drill: DeWalt
Angle Grinder / Sander: DeWalt DW402
Rotary Tool: Mastercraft
Cordless Reciprocating Saw: Mastercraft 18V
Heat Gun
Cordless Drill /driver: DeWalt DC759
Jigsaw: orbital DeWalt DW318
Hand Power Planer: DeWalt
Plunge Router: 2hp DeWalt DW621
Fixed Base Router
Circular Saw: 8 ¼" HD DeWalt DW384

Trim Router
Belt Sander: Dewalt variable speed DW433 (2)
Palm Sander
Power Planer: Dewalt DW680
Finish Nailer: DeWalt D51275
Brad Nailer: DeWalt D51236
Compressor DeWalt D55140
Compressor DeWalt D55141
Plate Joiner: Dewalt DW682

Woodworking:

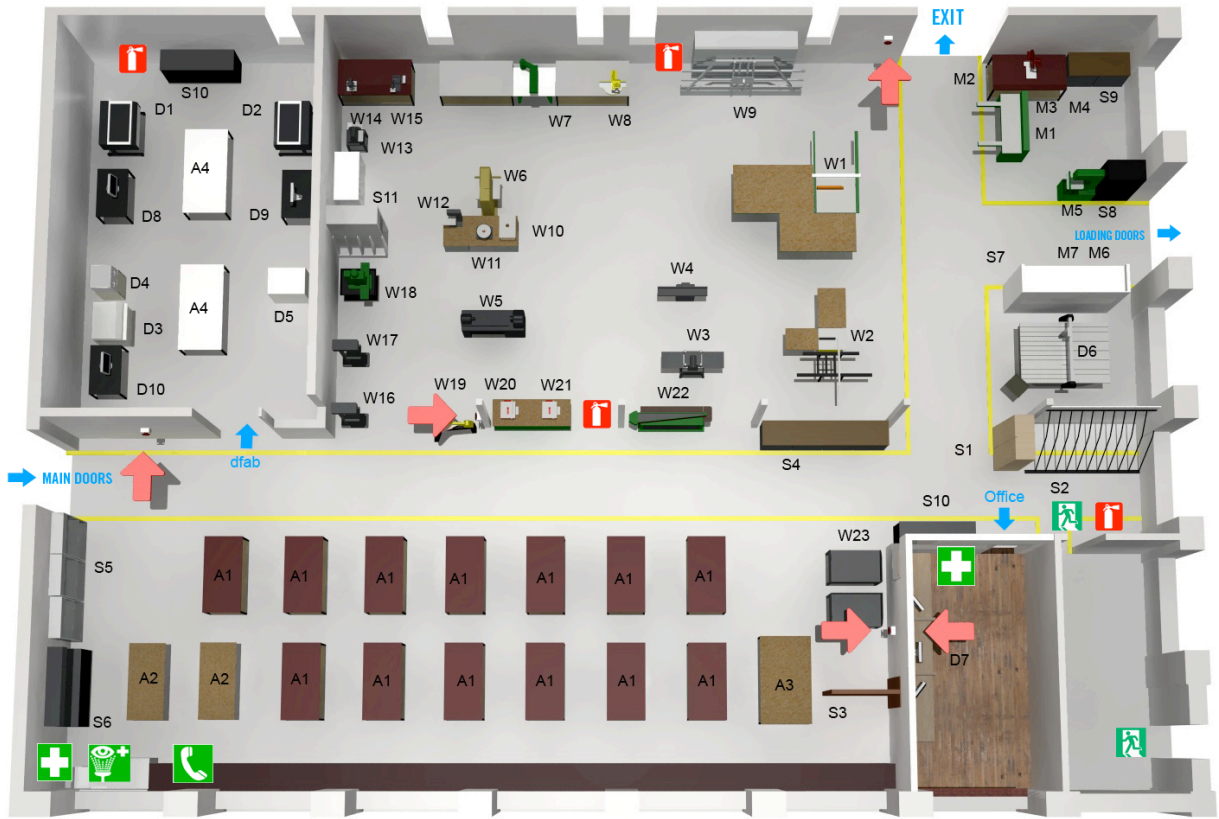
Radial Arm Saw: 14" General V-154
10" Table Saw: DeWalt DW746
12" Disk 6" Belt Sander: Delta AFM-20-1
Router Table: Veritas
20" Band Saw: Powermatic model 81
Wood Lathe: Rockwell 12" gap bed
Jointer 6": Rockwell 37-22
13" Planner: Delta Model DC-33
Scroll Saw: DeWalt
Hollow Chisel Mortiser: Delta 14-650C
Compound Miter Saw: 12" DeWalt DW705
Drill Press: Delta 17-925
Bandsaw 10": Craftsman
Table workshop: Hegner MK4 (2)
Panel Saw: SSC
1" Belt/8" Disc Sander" Delta SA180
Edge Belt Sander: Progress PMC-150
Vacuum Press: Mercury MVP50
Vacuum Bag: 20MIL 2'x4'
Vacuum Bag: 20MIL 4'x6'
Oscillating Spindle Sander: Delta Model 31-780C

Plastic Working:

Disc Sander: 12"
Hot Wire Foam Cutter: Demand Model
Hot Wire Foam Cutter: Demand Multi-Cut
Hot Rod:

Metalworking:

Bandsaw: 15" General Model 590
Milling/Drilling Machine: General Model 75-880
Abrasive Cut-Off Saw: Milwaukee
Bench Grinder: DeWalt
Metal Shear: Tennsmith
Brake: 24"
Metal Notcher: 18 Gauge: Tennsmith Model 16
Groz Metal Bender`



WOOD WORKING

- W1 14" Table saw
- W2 10" Table saw
- W3 13 Planer
- W4 6" Jointer
- W5 12" Wood Lathe
- W6 20" Bandsaw
- W7 14: Radial Arm Saw
- W8 Compound Miter Saw
- W9 Panel Saw
- W10 Router table
- W11 Spindle sander
- W12 10" Bandsaw
- W13 6" Belt/disc sander
- W14 Mortiser
- W15 1"belt/disc sander
- W16 16"Drill press
- W17 16"Drill pess
- W18 Drill/mill machine
- W19 Scroll saw

WOODWORKING

- W20 4" Table saw
- W21 4" Table saw
- W22 Edge sander
- W23 Down draft table(2)
- M1 52" foot shear
- M2 Bench grinder
- M3 Cut-off saw
- M4 12" Disc sander
- M5 15" Bandsaw
- M6 24" Brake
- M7 Notcher

ASSEMBLY

- A1 30"X72" Work bench
- A2 34"X72" finishing bench
- A3 36"X84" assembly table
- A4 36"X84" assembly table

STORAGE

- S1 Wood hand tools
- S2 Materials storage
- S3 Clamp Rack
- S4 Tool Cabinets
- S5 Student Tool Cabinet
- S6 Paint/flammables
- S7 Metal misc.storage
- S8 Tool cabinet
- S9 Metalwork tools
- S10 Power tool cabinet
- S11 Scraps materials

DIGITAL FABRICATION

- D1 100W Laser cutter
- D2 50W Laser cutter
- D3 ZCorp 3D Printer
- D4 Depowdering unit
- D5 FDM 2000 3D printer
- D6 CNC Router
- D7 CAM Workstation
- D8 Laser Workstation
- D9 Laser workstation
- D10 3D print workstation

EMERGENCY SERVICES

- First aid
- Emergency shut-off
- Emergency exit
- Fire extinguisher
- Eye-wash station
- Telephone





WA | Fabrication Labs

POLICY ACKNOWLEDGEMENT FORM

The UWSA Workshop requires all users to meet the following requirements.

- Have completed the WHMIS training
- Read the Workshop Policy
- Read the Workshop Safety Manual
- Taken the Workshop Safety Orientation
- Passed the Workshop Safety Quiz
- Complete the Workshop Safety Practical Assessment

All requirements must be signed off that they have been completed before access will be granted the Workshop facilities and equipment.

ACKNOWLEDGEMENT OF REQUIREMENTS:

All completed requirements must be initialed

Initials

1. *I confirm that I have read and understand the **Workshop Policy*** _____
2. *I confirm that I have read and understand the **Workshop Safety Manual*** _____
3. *I confirm that I have completed the **WHMIS training*** _____
4. *I confirm that I have completed **Workshop Safety Orientation*** _____
5. *I confirm that I have completed **Workshop Safety Quiz*** _____
6. *I confirm that I have completed **Workshop Safety Practical assessment*** _____
7. *I confirm I have attended the **Workshop Safety Orientation** that demonstrates safe and proper shop, machinery and tool practice. I understand the inherent risks of shop activity and I consent to exposure to these risks. In the interests of shop safety, I agree to comply with the requirements of the Workshop and the Workshop Supervisors*

Print Name _____

Signature _____

Date _____

Student Number _____

Email _____

Phone: _____

Workshop Supervisors Signature _____