


<p><b>Carnegie Mellon University</b>  Environmental Health &amp; Safety  FIRE   LAB   WORK </p>	<p><b>Environmental Health and Safety</b>  <b>Machine Shop Safety - Guideline</b></p>
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### 1. Purpose:

This guideline outlines the safety requirements which apply to all users including undergraduate and graduate students while working in university shops. The guideline also describes the roles, responsibility and authority of department heads, shop managers, shop staff, student shop managers, students, monitors and partners.

### 2. Objective:

This guideline applies to all university departments that have a designated shop area that includes any machine equipment as defined in Section III. This guideline also sets safety standards for all shops and apply to all students who use them.

### 3. Definitions:

- a. Hazardous Process - Process that uses fixed machine equipment that has the potential to cause serious injury.
- b. Machine Equipment – Any electrically, pneumatically, or hydraulically powered pieces of equipment, including but not limited to a drill press, lathe, band saw, table saw, milling machine, grinder, shear, metal punch, jointer, swing arm saw, planer, slitter, roll-form machine, cold header, multi-slide machines, drum sanders, belt sanders, veneer cutters, splices, alligator shears, and any other fixed powered equipment.
- c. Monitor – A student worker (such as a teaching assistant or graduate assistant) who has received training as described in Section V. and whom the shop manager or student shop manager has approved to supervise other students for the work being conducted.
- d. Partner - Carnegie Mellon student who has received training on Hazardous Processes Shop safety rules as described in Section VII. Partners assist other students to avoid working alone.
- e. Qualified Faculty – A faculty member (including special faculty) who is experienced with fixed machine equipment and has shop specific training and experience.
- f. Shop – a university facility which contains at least one piece of fixed machine equipment.
- g. Shop Manager – A single staff or faculty member appointed by the Dean or Department Head as the designated employee who is responsible for the supervision and management of one or more shops. The shop manager has power to grant or deny access to the shop and use

of machine equipment in the shop. Shop managers may also adopt additional safety rules based on the particular needs of each shop.

- h. Shop Staff - Qualified faculty or staff members approved by the shop manager. All shop staff must be employees of Carnegie Mellon.
- i. Student Organization Shop – A shop that is used by an officially recognized student organization. Student Organization Shops must be approved by both the Office of Student Activities (OSA) and Environmental Health and Safety (EH&S) prior to use by any student organization.
- j. Student Shop Manager – A member of an officially recognized student organization who is responsible for managing safety procedures in any Student Organization Shops used by the student organization. Each student organization that desires to use a shop should have two (2) Student Shop Managers.

#### 4. Responsibility:

- a. Department Head or Dean- is responsible for:
  - i. Ensuring the effective and safe operation of the departmental shop.
  - ii. Hiring or appointing a shop manager with authority to enforce safety requirements in each shop.
  - iii. Authorizes the shop manager to provide oversight for safety and training programs for the departmental shops.
  - iv. Designating a representative to the Shop Safety Committee.
  - v. Ensuring student safety in all departmental shop activities.
  - vi. Provides the lab manager with a list of qualified faculty who can allow access to the student shops.

When a particular shop is shared among multiple departments, the Dean of the college shall select the shop manager.

- b. Shop Managers
  - i. Shop manager responsibilities also include all the responsibilities of shop staff detailed below:
    - 1. Supervise and manage shop staff.
    - 2. Approve, supervise and manage monitors.
    - 3. Represent the Department Head's or Dean's authority for the overall safety, use and training of students.
    - 4. Develop specific safety training for each piece of machine equipment in the shop, as required by Section V.
    - 5. Adopt additional safety rules as necessary based on the particular needs of the shop.
- c. Shop Staff (qualified faculty or staff members approved by the shop manager).
  - i. Enforce the Hazardous Process Shop Safety Rules set forth the in Section VII.
  - ii. Provide instruction on machine equipment use to all shop users according to manufacturer's requirements and/or local shop rules set forth in Section V.

- iii. Coordinate maintenance and service for machines under their jurisdiction.
  - iv. Approve:
    - 1. Access to machine equipment based on students demonstrated skill and training.
    - 2. Procedure that deviates from the Hazardous Process Shop Safety rules and/or local shop safety rules.
    - 3. Requests from student to run work that will be unattended.
  - d. Monitor
    - i. Will enforce the Hazardous Process Shop Safety Rules set forth the in Section VII.
    - ii. Provide instruction on machine use to all shop users according to manufacturer's requirements and/or local shop rules.
    - iii. Report to shop staff, shop manager, or student shop manager
  - e. Environmental Health and Safety
    - i. Develops and maintains general shop safety training course.
    - ii. Performs periodic audits for OSHA and University guideline compliance.
  - f. Partner
    - i. Has been trained in the Hazardous Process Shop Safety Rules set forth the in Section VII.
    - ii. Assists another student, when necessary, to ensure that no student works alone.
    - iii. Will summon help should an incident arise.
  - g. Shop Safety Committee
    - i. Will serve as an advisory board to EH&S and the campus community.
    - ii. Will recommend procedures and guidance to the University for Best Practices for our students in shops with high powered machinery.
  - h. Student Activities Office
    - i. Acts as advisor to student run shops
    - ii. Ensures student run shops have adequate resources to work safely
    - iii. Approve student shop areas
  - i. Student Shop Managers
    - i. Each student shop must:
      - 1. Register, annually, with the Office of Student Activities and Environmental Health and Safety. (Attachment 1. Registration Application) to ensure that the necessary training requirements and work practices are satisfied.
      - 2. Act as a liaison between the student organization, the Office of Student Activities (OSA), and Environmental Health and Safety (EH&S) with respect to safety issues in any Student Organization Shop used by the student organization.
      - 3. Work with OSA and EHS to enforce the Hazardous Process Shop Safety Rules set forth in Section VII.
      - 4. Work with OSA and EHS to adopt additional safety rules as necessary based on the particular needs of the Student Organization Shop.
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5. Work with OSA and EHS to ensure that members of the student organization who use equipment in a Student Organization Shop are appropriately trained prior to using such equipment.
6. Reporting any safety concerns, safety violations, maintenance needs or other issues to OSA and EHS.
7. Each student organization that uses a Student Organization Shop must appoint two (2) Student Shop Managers. Generally, Shop Managers should be from different classes to encourage effective transition from year to year.
8. Student Shop Managers may appoint monitors for Student Organization Shops.

j. Student

- i. Will obey all shop safety rules.
- ii. Before working on machine equipment, students must be trained and demonstrate competency to the shop manager, shop staff and/or qualified faculty.
- iii. Students are limited to using machines tools they have been previously signed off as qualified to use.
- iv. Cannot work alone. Students may only access shops and use machine equipment in the presence of at least one shop staff member, qualified faculty, monitor or partner.

## 5. Training and Work Practices

- a. The qualified faculty, shop manager or shop staff approve access to the shop and are responsible for ensuring that students:
  - i. Have attended and successfully completed both:
    1. The general shop safety course offered by Environmental Health and Safety.
    2. Specific shop and safety training for each type of machine they operate. Documentation of the training can be in the form of a class syllabus or outline.
  - ii. Have demonstrated competency on the machines they are operating.
  - iii. Have been instructed on shop emergency procedures including, but not limited, to the use of emergency equipment (e.g., emergency eyewash and safety showers, fire extinguishers, shop emergency stop buttons) and the proper procedures for reporting emergencies and summoning help.

With respect to Student Organization Shops, the Student Shop Managers must coordinate with the Office of Student Activities and Environmental Health and Safety to ensure that the forgoing training and work practices are satisfied.

## 6. Supervision

Students are prohibited from operating machines or performing any other activities in a University shop unless supervised by the shop manager, shop staff, qualified faculty member, student shop manager or monitor. Only students who have been approved by the previous list

supervisory of people may work unsupervised and only if they are accompanied by a partner. Working alone by students is strictly prohibited.

- a. Work performed by students in shops is permitted only during designated times established by the shop manager and must only occur between the hours of 8:00 AM and 11:00 PM., unless written permission is received from the shop manager. Even with special permission a student cannot work alone.
- b. Shop managers, shop staff, and student shop managers may prohibit shop access or machine use by an individual or a group for insufficient training or experience or for noncompliance with shop safety rules. Serious violations will be referred to the sponsoring faculty member, academic department head or the Dean of Student Affairs as appropriate.
- c. Student Organization Shops:
  - i. All Student Organization Shops must be approved by the OSA and EHS. If the specific shop is managed by another department, such as an academic department, approval by the shop manager is also required.
  - ii. Each student organization wishing to access a shop must separately apply for approval from OSA and EHS. Approval of one organization to access a shop does not constitute approval for other organizations.
  - iii. Access to shops by a student organization is a privilege not a right. OSA and EHS may revoke the privilege of shop access for violations of this policy, violations of shop specific safety rules, or any other safety concern.
    - o Students who wish to work before the hours of 8:00 AM and after 11:00 PM must obtain an “after hours” permit from the Student Shop Manager.
      1. Permit allows work to be conducted on a specific project.
      2. Must detail what hazardous processes, equipment and a list of materials that will be use.
      3. Who buddy or partner will be.
      4. Emergency contact information.
      5. Permit will expire within one week of application. Reapplication will be needed should project extend longer.
      6. Location of work area.

## 7. Hazardous Process Shop Safety Rules

Carnegie Mellon University Environmental Health and Safety (EH&S) and the Hazardous Process Shop Safety Committee have developed these guidelines for those students who currently, or might in the future, use machine equipment in shops and laboratories. These guidelines DO NOT serve as a replacement for formal training in lab techniques or shop safety. Only after receiving proper training by the local shop manager or other shop staff may students use shop equipment.

Each shop may have it is own rules that supplement of expand or these general guidelines. Failure to follow proper precautions can result in serious injury or death.

- a. Never work alone – Always use “Buddy System”.

At least two persons must be in the shop when machine equipment is being used; minimally, this included the trained person and a partner.

Students working with partners are limited to using machines tools they have been previously signed off as qualified to use.

Work performed by students in shops is permitted only during designated times established by the shop manager and must only occur between the hours of 8:00 AM and 11:00 PM., unless written permission is received from the shop manager. Even with special permission a student cannot work alone.

- b. Appropriate personal protective equipment must be worn at all times.  
Never work without proper eye protection - always wear appropriate safety glasses or goggles when working or cleaning tools.

The minimum standard for protective eyewear is safety glasses with side-shields. Machine users must observe this standard at all times. Eyewear which offers additional protection against splashing or other hazards may be indicated based on a risk assessment of the process or procedure. Prescription glasses with plastic lenses must meet ANSI Standard Z87.1 for safety.

Never use gloves while using rotating equipment. Remove them before starting work. Gloves can become entangled in rotating machine parts resulting in serious injuries.

- c. All appropriate guards and shields must be secured.  
You must ensure that safety guards are in place on moving parts before you start working.

Follow all appropriate shut-down procedures before working on a machine if the repair requires removal or alteration of guarding.

Exceptions must receive prior training or assistance from the shop manager or shop staff.

- d. Inspect equipment.  
If equipment does not appear to be operating normally, report the issue to the shop manager or shop staff.

Never leave broken or damaged tools or abnormal equipment unreported – Always inform your supervisor to remove broken items from service for repair.

Broken parts or equipment can result in serious injuries and delays. Make sure you tag broken or damaged equipment and inform shop manager or shop staff to arrange repair before next use.

- e. Never Work With Loose Hair, Jewelry, Clothing, etc.  
Always remove or secure anything that might get caught in moving machinery.

All shop users must secure or remove personal items that may become entangled in a machine. Long hair, necklaces, ties, dangling ID badges, jewelry, loose clothes, watches or rings, may get caught in tools and can drag you along resulting in serious injury or death. Check with supervisor for appropriate attire.

Sandals, flip-flops or other open-toed shoes are prohibited at all times in shops. Tools, chips and fixtures are sharp, and often hot. Shoes will help protect your feet from injury. Flame retardant clothing and shoes are recommended when welding.

- f. Aisles, exits and access to emergency equipment must be kept clear. Access to doors, eyewash stations and fire extinguishers must remain clear and free from obstructions. A clear pathway should remain at all times for easy access out of the room and to life safety equipment.
- g. Food and drinks are permitted in designated areas only. Working with high powered machinery requires your undivided attention. Food and drink must be consumed when one is not working directly with equipment. A designated area for food and drink consumption should be clearly marked and widely accepted. This area can be in the shop but in a place where there is no opportunity for items like; wood chips, metal shavings or oil to contaminate food.
- h. Compressed air must not be used to clean skin or clothing. Air pressures coming off the compressor are not reduced or regulated and can cause physical damage to the skin. Under these operating pressures, embolisms or air bubbles can enter the blood stream. Air bubbles reaching the heart can be fatal.
- i. Stop any person you see working unsafe if it is safe to do so. Report continued unsafe practices to the shop manager and/or shop staff.
- j. Shop managers and shop staff have full authority to prohibit shop or tool access and/or use at any time. Shop managers and shop staff will enforce the Hazardous Processes Student Shop Safety Rules. They will approve access to machines based on a student's demonstrated skill and training and can stop work when they believe there is an imminent danger.
- k. Stay focused. Do not distract others. A shop is a place where one's full attention is required. Personal electronic devices. Use of phones MP3 players, radios, etc. are a distraction. Anything that can take your full attention from the task at hand is prohibited.
- l. Never work impaired. You must be alert at all times. The use of alcohol or drugs prior to the use of shop machinery is strictly forbidden and is ground for suspension or termination of shop access privileges.
- m. Attend all running machines. Never leave a machine to run unattended. Exceptions must receive prior approval from shop manager.
- n. Health and safety concerns? Always ask if you're unsure about the safe operation of a tool or any aspect of a job – have the shop manager check the tool or work with which you are unfamiliar.

Exercise common sense and clarify your tasks and responsibilities before starting work.

If you need accommodation for a disability, notify the shop manager or Disability Services if you have health issues that could impair or limit your ability to work safely (including seizures, disabilities or other physical limitations).

Be aware of other situations which may impair your ability to work safely, including illness, tiredness, stress, or hurrying, or the use of medication that could make you drowsy.

There are limits to what can be built in a given shop and in a given time. You can't do it safely if you are in a hurry. If it cannot be done safely don't start it.

- Never be shy to seek help.
- o. Obey and adhere to all additional local shop rules. The Hazardous Processes Shop Safety rules are a minimum standard. Local shop rules may be posted and applied to provide additional and specific guidance for the use of machine tools.
  - p. Report all injuries and accidents to shop manager immediately.
  - q. Keep your hands away from sharp objects –  
Maintain a safe distance from the cutting edges of sharp tools or moving machine parts.
  - r. Leave Your Work Area Organized – Always Clean Up After Yourself.  
Before you leave your work site all tools must be returned to their storage location, machines must be cleaned and wiped down and the floor swept, as necessary. Leave appropriate time for cleanup at the end of your project.
  - s. Make adjustments or repairs to a machine when it is fully powered down. -Always talk to your supervisor for permission when an adjustment is needed.  
Make sure you are competent and have permission from your supervisor to affect repairs.  
Ensure power is off, equipment is properly locked out, tagged and safety devices are in place.

8. Update Log

August 14, 2012	
August 31 (Dan Munsch)	
October 15, 2012 (Larry Hayhurst)	
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Sept 12, 2013 (Dan Munsch)	
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