Student Design & Experiential Learning Center

General Shop Safety Training
Training Opportunities

General Shop Safety Training:
Training Opportunity levels
Shop rules
After hours shop procedures
PPE
Safe Practices
Emergency Situations
ICE Medical, Tornado, Fire, Hostage, Active shooter,
Bomb threat
Emergency contacts
Walk through of shop
Training Opportunities

Basic Machine Shop:

Band saws
Bench grinder
Drill press
Cold saw
Hand held power tools
Chop Saw (wood and metal)
Reciprocating Saws
Drills
Circular Saws
Hand Grinders
Dermal Tools (pneumatic and electric)
Pneumatics
Sanders
Tubing bender
Training Opportunities

Electronics Lab:
Oscilloscopes
Soldering Irons
Hot-Wire Tweezers
De-Soldering Stations
Bitrode Battery Charger/Tester
Volt Meters
Training Opportunities

Welding Training:
Plasma Cutter
Oxy-Acetylene
GMAW (MIG)
GTAW (TIG)
Training Opportunities

Machine Specific:
- Mill
- Lathe
- Table Saw
- CNC Mill and Lathe
- Water Jet (in conjunction with Rock Mechanics)
- CNC Hotwire Cutter
Training Opportunities

Vehicle Training:
- Driver Safety
- Truck and Trailer
- Passenger Van
Training Opportunities

OSHA Certifications:
  10-hour General Industry
  10-hour General Construction
  30-hour General Industry
  30-hour General Construction
Training Opportunities

Other:
Composites & Vacuum Pumps Training
Travel Out-Of-Country Training
First Aid, CPR, and AED Training
**Shop Rules**

Students are not allowed to use the equipment in the Shop without going through safety training including check-out specific machines, passing a written safety test, and completion of the Risk Release form (with appropriate approvals). Upon completion of the above a student will be given access to the appropriate shop area and equipment.

Students with access to areas and equipment will NOT allow other student access using their ID nor allow other students to use equipment under their supervision. The ONLY person who can train or authorize students to use equipment is the Safety and Shop Operations Manager or Designee.
Shop Rules

- Persons with access may give brief tours of the shop areas they have access to.
- The visitors must abide by the eye protection rule and stay clear of all equipment in use.
- If a visiting person approaches a machine in use, the operator should pause the operation or ask the visitors to stay clear until the operation can be paused.
- The visitor leaves when the guide leaves.
Shop Rules

• No one is allowed to use machinery alone. This applies to the machine shop, welding operations, and other area where risk of significant injury is great.

• If the Shop Manager is not in the shop, students are required to work in pairs.

• This is particularly important when working after normal working hours.
Shop Rules

• Tools or equipment may not be taken from the shop area without being signed out form the shop manager.

• Equipment is to be returned promptly after use or competition of travel.
Shop Rules

• The user of a machine shall be responsible for cleaning each machine after use.
• Cleaning consists of taking all chips off the machine, wiping the machine down with shop cloths, sweeping the floor area, and disposing of all chips and mess created by the user. Making it look like the user was never there and CLEAN.
• The user is responsible for returning all tools to their appropriate locations.
• Violation of this rule will get the user suspended from the shop.
Shop Rules

• The Shop is not a depository for junk.
• Any project or other material left in the Shop will be discarded, unless special permission is obtained from the Shop Manager.
Shop Rules

• Teams are responsible for their own tooling. Although the Shop contains certain standard tooling (drills, end mills, etc.), as a general rule a team working on a project should be prepared to purchase tooling, as required. See Shop Manager if you have questions.

• If tooling belonging to the Shop is broken, the student is required to notify the Machine Shop Manager ASAP.
Shop Rules

• Teams are responsible for providing their own materials.
• Although there is a limited stock of material in the Shop area, it belongs, in general, to specific projects.
• This stock may only be used with the explicit approval of the Shop Manager with respect to team ownership.
Shop Rules

IF IN DOUBT............. ASK !!!
After Hours Procedures

• No students are permitted to operate power tools in the lab alone.

• After hours, the stock room and many of the tools are secured. Arrangements for access to the required tools and materials should be made with the shop manager during normal hours.

• Students should not remove tools from the lab unless prior arrangements have been made with the shop manager.

• Ensure all doors are locked and lights out if last one in shop
PPE

SAFETY GLASSES and SHIELDS
Safety glasses must be worn at all times while in the general fabrication or machine shop areas.

AT ALL TIMES!!
**Eye Protection**

Eye protection that meets the ANSI Z-87.1-1989 standard **MUST BE WORN AT ALL TIME** while in the SDEL, except for offices, restrooms, and break areas. Safety glasses with side shields are posted at each entrance door for occasional users and visitors. Frequent users of these facilities are encouraged to purchase their own safety glasses. For people who wear corrective glasses, eye protection must be of the type that can be worn over glasses. Prescription-ground safety lenses may be substituted if they provide equivalent protection and if side shields are firmly attached to the glasses frame.
Eye Protection

All users and visitors who are welding or viewing welding activities must wear eye protection from the radiation produced by welding. Appropriate eye protection will be provided at the welding areas. Arc welding or arc cutting operations require the use of welding helmets with an appropriate filter lens. Goggles with filter plates or tinted glass are required for gas welding or oxygen cutting operations. Full-face shields and safety glasses are required for portable hand grinding or bench grinding operations.

EYE INJURIES ARE THE MOST PREVENTABLE OF ALL INJURIES
PPE

WATCH WHAT YOU WEAR

Long sleeved shirts or loose clothing should not be worn while running machinery. Moving parts of machinery can catch them.
Gloves must not be worn when operating any rotating machinery. Gloves are recommended for handling sheet metal and sharp tools. Gloves are required when working with welding processes.
GLOVES

Chemical resistant gloves must be worn whenever paints, epoxies, solvents, or other chemicals are used. Disposable nitrile gloves are provided that are effective barriers for most chemicals found in the shop areas. Other glove types will be provided if nitrile gloves are insufficient for a specific chemical needed in the shop areas.
If you have long hair, you must tie your hair back or put it in a cap to keep it out of the way of moving machinery.
PPE

**JEWELRY**
Remove rings, watches, bracelets and other jewelry while working in shop.

E.T. says OUCH!!
Respiratory Protection

Wear a dust mask when working with composites, all sanding and grinding operations, working with concrete, or any operation that produces airborne particulates.

Whenever welding is occurring inside the shop areas ensure you have adequate ventilation.
FOOT Protection

Closed-toe shoes must be worn when working with any machine tools or equipment, hand tools, sheet metal or metal scraps, and welding equipment.

NO SANDLES or TOE SHOES IN SHOP
PPE

**Hard Hats**
Protect your Mellon!!
The hats are for your personal protection!
Hard hats must be worn in designated areas.
Hard hats must be worn on construction projects.
PPE

*Welding Clothes*

All welding safety equipment is available in near the welders. You must have special training to do any type of welding. Wear appropriate clothing when near someone welding.

NO POLYESTER CLOTHES!!

Do NOT watch the light of a welder or plasma cutter.
PPE

**Hearing Protection**

Protect your hearing, it doesn’t heal or recover from loss.

Use protection don’t take the chance!!
Safe Practices

Do **NOT** do repairs to the machines. If the machine does not run properly, turn it off and contact the shop manager.
Safe Practices

**Chemical Safety**

All oil and other chemical waste are to be disposed in the hazardous waste MUST be properly disposed of. The SDELC Manager must be consulted before a new waste material is added to a container other than what is already listed on the container waste label.

MSDS information is located in the Student Machine Shop area by front door. Always consult the MSDS when using a chemical for the first time, or when a review of the safety precautions is needed.
Safe Practices

Chemical Safety MSDS Sheet

S:\Dual purpose vacuum pump oil.pdf
Safe Practices

Chemical Safety

The SDELC Manager must be informed whenever a new chemical is brought into the SDELC. Any new chemical, cleaner, or solvent that is brought into the SDELC must have a copy of the MSDS on file.

Flammable chemicals must be stored in a designated flammable cabinet. Acids, bases, and strong oxidizing chemicals must be stored in segregated cabinets.

Do NOT dump any thing down the drain of a sink!!!!!
Safe Practices

**Compressed Gas Cylinder**

- Compressed gases are unique in that they represent both a physical and a potential chemical hazard (depending on the particular gas). Gases contained in cylinders may be from any of the hazard classes described in this section (flammable, reactive, corrosive, or toxic).

- Because of their physical state (gaseous), concentrations in the laboratory can increase instantaneously if leaks develop at the regulator or piping systems, creating the potential for a toxic chemical exposure or a fire/explosion hazard. Often there is little or no indication that leaks have or are occurring.

- Finally, the large amount of potential energy resulting from compression of the gas makes a compressed gas cylinder a potential rocket or fragmentation bomb if the tank or valve is physically broken.
Safe Practices

Compressed Gas Cylinder

- **Special Handling Procedures**
  - The contents of any compressed gas cylinder should be clearly identified. No cylinder should be accepted for use that does not legibly identify its contents by name. Color coding is not a reliable means of identification and labels on caps have no value as caps are interchangeable.
  - Transport gas cylinders in carts one or two at a time only while they are secured and capped. All gas cylinders should be capped and secured when stored. Use suitable racks, straps, chains or stands to support cylinders. All cylinders, full or empty, must be restrained and kept away from heat sources. Store as few cylinders as possible in your laboratory.

- **Always use the correct pressure regulator.** Do not use a regulator adaptor.
- All gas lines leading from a compressed gas supply should be clearly labeled identifying the gas and the laboratory served.
**Safe Practices**

**Compressed Gas Cylinder**

- Place gas cylinders in such a way that the cylinder valve is accessible at all times. The main cylinder valve should be closed as soon as the gas flow is no longer needed. Do not store gas cylinders with pressure on the regulator. Use the wrenches or other tools provided by the cylinder supplier to open a valve if available.

- Use soapy water to detect leaks.

- Oil or grease on the high pressure side of an oxygen cylinder can cause an explosion. *Do not lubricate an oxygen regulator or use a fuel/gas regulator on an oxygen cylinder.*

- Never bleed a cylinder completely empty. Leave a slight pressure to keep contaminants out (172 kPa or 25 psi). Empty cylinders should not be refilled in the laboratories unless equipped to prevent overfilling.

- All gas cylinders should be clearly marked with appropriate tags indicating whether they are in use, full, or empty. Empty and full cylinders should not be stored in the same place.
Safe Practices
Lifting Correctly
Limit it to 50 pounds; if the load is over 50 pounds, get help.
Lift with your legs, not your back.
Long pieces over 6 feet should be carried horizontally by two people.
Save your back!
Safe Practices

• Do not work if you are ill. Since your condition may cause an accident and injury to yourself or others.

• Sleeping in the shop is prohibited.
Safe Practices

• Report defective machinery, equipment, and hazardous conditions to the Shop Manager as soon as possible.

• Do NOT remove guards from machinery and equipment.

• Use appropriate PPE
Safe Practices

• The possession or use of alcoholic beverages on University premises is prohibited; no person shall use the shop while under the influence of intoxicants.

• The use of narcotics, tranquilizers, or barbiturates by University personnel while using the shop is prohibited without the cognizance of the Office of Health Services and Shop Manager.
Safe Practices

• Strongly advised to NOT use contact lenses if using chemicals in the shop. Prescription safety glasses must meet Federal specifications for safety.

• The use of volatile or flammable chemicals, such as gasoline, lacquer thinner, spray oils (WD-40), or paint thinner, as a skin cleansing agent is prohibited.
Safe Practices

• Lock out tags for defective equipment—The lock out center is in the shop supply cabinet.
• It contains padlocks, lockout tags, and lockout devices.
• Do NOT remove a red padlock without permission from the shop manager.

Green locks represent equipment locked out that need training prior to use.
Safe Practices

• Machine tools and hand tools that are unsafe should not be used, and should be reported immediately to an SDELC staff member. Red “Out of Service” tags should be attached to a machine tool or hand tool that needs repair. SDELC staff will then lock the machine out until repairs can be made.
Safe Practices

• Personal entertainment devices (e.g. IPODS) with ear pieces cannot be used while using machine tools and welding equipment.

• Machine operators should not be startled while in contact with the machine. Avoid sudden loud noises when others are using machine tools in the same room.
Safe Practices

• Electrical panels must be kept clear of obstructions so that emergency personnel can access if needed.
• Do NOT remove fire extinguishers from the shop
Emergency Situation

• First survey the area to see if it is safe to enter.
• Immediately send someone to call emergency responders
• Stabilize anyone who is unconscious, has a broken limb or injured back but do not move them unless they are in immediate danger.
• Administer first aid as trained. Practice Universal Precautions to avoid exposure to blood.
• Do check for breathing/open airway, and administer rescue breathing if needed.
• Do administer CPR if needed (and you are trained).
• Do try to stop severe bleeding.
• Treat for shock and make patient comfortable.
• Do get all information concerning the patient and accident or illness if person is conscious (signs, and symptoms, allergies, medication taken, pertinent past illnesses, last oral intake, events leading to pertinent past illnesses, events leading to the illness/injury).
Emergency Situation

- Injuries, no matter how small, must be reported to the SDELC Shop Manager immediately. Anyone who is injured, other than small superficial cuts and abrasions, must be seen by a medical professional as soon as possible.
I.C.E.

In Case of Emergency

Tornado

- In office- move to hall way downstairs or bathrooms
- In shop or annex- when sirens are heard immediately move to Havener basement at loading dock.
- If tornado is immanent move to corner away from any windows or under stairs.
Emergency Situation

Fire in a University building is the most likely campus emergency that could result in loss of property and threat to lives. It is, therefore, most critical that individuals react quickly and responsibly to any indication of fire in their surroundings. However be cautious if near the electronics or welding rooms.

Procedures:
If you **SMELL** smoke or gas:
From the nearest safe phone call the Department of Public Safety, 911 from an outside line.
If you **observe** fire or smoke:
Do not shout “Fire!” Remain calm.
Pull the nearest fire alarm.
Notify those in immediate danger.
I.C.E.

Fire Emergency

• From the nearest safe phone call the Department of Public Safety at 911 of the exact location of the fire.
• If possible and safe to do so after initiating the fire alarm, attempt to extinguish the fire with a fire extinguisher.
• Never use a fire extinguisher on a fire that is large enough to frighten you or when you do not have a way of escape.
• No matter how small the fire, never use an extinguisher without sounding the fire alarm, in case you are overcome.
• If you cannot extinguish the fire by yourself with one extinguisher, leave the area and let the professionals handle it.
I.C.E.

Fire Emergency

• Do not prop any fire doors open. (Fire doors have automatic closers on them.)
• Evacuate, using appropriate exits and escape routes (do NOT use elevators). Provide assistance for those who need it.
• If the fire alarm sounds:
• All alarms should be treated as a valid fire alarm until Public Safety personnel verify that it is a false alarm.
• Stop what you are doing immediately, remain calm and follow instructions.
• Do not look for other people or attempt to take along belongings (other than your purse or backpack) – don’t take the time to gather up your “stuff,” your life is more important!
• Do not lock doors behind you
I.C.E.

Fire Emergency

• Using the nearest appropriate exit or escape route (do NOT use the elevators), leave the building quickly and calmly.

• Persons with disabilities should be assisted out of the building or removed to a safe haven to await evacuation by emergency responders.

• Proceed to safe ground at least 50 feet away from the building and out of the fire lane(s). The instructor/supervisor should notify emergency response personnel of missing or disabled persons.

• Do not obstruct fire hydrants or any fire/rescue workers.

• Do not re-enter the building until informed by a uniformed officer.

• Reporting: After contacting Public Safety, and after meeting with the University Police, contact your supervisor.

• Any time that the fire alarm is activated, the building is to be immediately evacuated.
Fire Extinguisher

Use the correct Extinguisher
I.C.E.

Hostage situation

• Remain calm and avoid any action that might incite the suspect to act violently. The suspect may be nervous. Further excitement by the employee can cause the suspect to panic and harm the employee or bystanders.
• Obey the suspect’s instructions, even if it appears that employees cannot be harmed. Money and property are not worth the price of a life.
• Call the department of Public Safety at 911
**I.C.E.**

*Active shooter situation*

- If possible get out of the building and go in opposite direction of location of person

- If approached by authorities-- keep hands visible and in air

- If shooter is in immediate area-- barricade your self in room
- Use furniture or other items such as belt to secure door
- Close shades on door and turn out lights
- Stay out of visible sight and keep quiet

- If person is head coming in room-- everyone throw as much as possible at person while others subdue the person
- Cover weapon do not pick it up for any reason
I.C.E. Bomb Threat

• Any person on campus who receives a bomb threat via telephone call, voice mail, e-mail message, letter, or other communication should proceed as follows.

• All S&T personnel receiving a bomb threat by telephone call should:
  • remain calm and listen carefully
  • keep the caller on the line as long as possible. For example, ask the caller to repeat the message: "I'm sorry, what did you say?"
  • identify and record the number from the display on the phone, if available
  • record every word spoken by the person
  • gather as much information as possible
  • call Public Safety, ext. 4300
I.C.E. Bomb Threat

• If the bomb threat is received via written communication, do not handle the communication any more than is absolutely necessary and turn the document over to the police when they arrive. The police will want to know the following information: Who found it? Who else was present? Where was it found or how was it delivered? When was it found or delivered? Who has touched it? Have any previous threats been received?

• A Public Safety officer will obtain the information about the bomb threat. The officer will immediately notify the local authorities.

• Public Safety may request people working in the area to assist in sweeping the building. This may be done because people working in the area will be most familiar with what does and does not belong.

• If a suspicious package or object is located, do not touch it. Immediately notify Public Safety at 4300
Emergency Contacts

Medical or other immediate emergency
DIAL 911
All other non emergency call 341-4300

Then call:
Richard Dalton  573-578-2074
richard.dalton@mst.edu

Sign up for text or phone emergency alerts