Overview

Safe Work Practices

Personal Safety

- Dress Code & PPE

Shop Hazards

- Housekeeping
- Fires
- Lockout/Tagout
- Machine Safety

Injury Management

Safety

- **Safety** is not often thought about as you proceed through your daily tasks.
  - Often you expose yourself to needless risk because you have experienced no harmful effects in the past.
  - Unsafe practices become a habit and is performed on autopilot.

Safety

- **Safety** becomes economically valuable to you and to your employer.
- Years spent training and gaining experience can be wasted in an instant if you have an accident.
  - Possible permanent physical handicap for you and hardship on your family.

Safety

- **Safety** is an attitude that should extend far beyond the machine shop and into every facet of your life.
- You must constantly think about safety in everything you do.

Working Safely in the Machine Shop

- **DO NOT** allow unauthorized persons enter the machine shop.
- Shop users are only allowed to operate machines and power tools when machine shop staff are present in the shop.
- Only authorized users who have up-to-date training are allowed working in the machine shop.
- Only **one** person can operate a machine at a time.

Working Safely in the Machine Shop

- Horseplay can result in serious injury to you, a fellow student, or worker.
  - Practical jokes can also be hazardous.
- Horseplay and practical joking **will result in access to the machine shop being revoked**.
- Loud noises, shouting, whistling, and so on, can startle people and cause injuries in the shop.
- Food or Drinks are **NOT** allowed on the shop floor.

Non-Compliances

- Shop Users MUST follow the protocols, procedures and practices outlined in the Machine Shop Manual and this training.
- Failure to comply will result in progressive disciplinary actions, at the discretion of the machine shop staff, that commensurate with the level of the offense.

Non-Compliances

1. **First Time Non-Compliance:** Verbal warning (to be recorded and filed) and removal from the machine shop for the remainder of the day
2. **First Repeat Offence:** Written formal warning letter, removal from the machine shop for one week and retraining of the online training
3. **Second Repeat Offence:** Loss of shop privileges for a set duration (determined by the machine shop staff in consultation with faculty member/course instructor) and completion of full training again

Personal Safety

- Be aware of your surroundings and what others are doing in your vicinity.
- Pay attention to your work.
- Do not talk to others or use cell phones while operating equipment.
- Ask yourself if what I am doing is safe to myself and others.
- The words of the Machine Shop staff are LAW. All safety rules and instructions by the shop staff must be followed.

PPE & Dress Code

Personal Protection Equipment (PPE) examples:

- Safety Glasses
- Safety Shoes
- Face Shield
- Shop Coats/ Pants
- Respirators
- Gloves

Eye Protection

- Eye protection is a primary safety consideration around the machine shop.
- Machine tools produce metal chips that may be ejected at high velocity.
- Most cutting tools are made from hard materials that occasionally break or shatter.
- **Eye protection must be worn at all times in the machine shop.**

Eye Protection

- Several types of eye protection are available.
- Plain safety glasses are required in the shop.
- Prescription glasses may be covered with a pair of safety goggle, or a full face shield.
- Prescription glasses can be made with safety glass.

Eye Protection

- Full face shields must be worn when using an angle grinder or similar tool.
- All eye protection used must meet CSA standard Z94.3.1-16.

Types of Eye Protection

Face Shield & Goggles

Safety Glasses

Foot Protection

- Machine shops present a modest hazard to the feet; therefore, close toe, close heel shoes **must be worn at all times** while inside.

- The shop floor is often covered with razor-sharp metal chips.
  - Light shoes such as; slippers, tennis shoes and sandals are ***not*** permitted.
  - **NEVER** enter a machine shop with bare feet.

Foot Protection

- Safety shoes with a steel toe shield or toe covers/caps designed to resist impacts is **<u>mandatory</u> when working in the machine shop**.

Hearing Protection

- Even an instructional machine shop presents a noise problem.
  - Exposure to excessive noise can cause damage to hearing or even worse, permanent hearing loss.
  - Safety regulations regarding exposure are strict.
- Sudden sharp or high-intensity noises are the most harmful to the eardrums.
- Several types of sound suppressors and noise-reducing earplugs may be worn.

Hearing Protection

- Decibel levels
  - Noise is considered a hazard if it is continuously above **85 decibels** (dB).

Decibel Level	Sound
130	Painful, Jet engine on the ground
120	Airplane on the ground
110	Power saw at 3 feet
100	Motorcycle or snowmobile
90	Truck traffic
80	Telephone dial tone
60-70	Normal conversation at 3-5 feet
30	Whisper or quiet library
0	Faintest audible sound

Hearing Protection

- Hearing protection must be worn when operating specific equipment
  - Water Jet (All occupants in the shop)
  - Angle Grinder
  - Most Air tools/power tools

- Ear plugs are supplied at the Lassonde Machine Shop. They are located at the front entrance.

Dress Code, Hair & Accessories

- Wear a short-sleeved shirt or roll up long sleeves above the elbow.
  - Keep your shirt tucked in.
  - Do not wear fuzzy sweaters around machine tools.
- Do not wear loose or baggy clothing. Moving parts of the machinery can catch the clothing, pulling you in with it.

Dress Code, Hair & Accessories

- Tie up long hair in pony-tail and tuck under shirt collar.
- Remove wristwatches, bracelets and rings before operating equipment.

Hand Safety

- Next to your eyes, your hands are the most important tools you have.
  - No device will totally protect your hands from injury.
  - It is up to you to keep them out of danger.

- **Never** touch a rotating tool or moving part of the machinery with your hands.

Hand Safety

- **Do not** use your hands to remove chips from a machine, use a brush.
  - Chips are razor sharp, and often extremely hot.
  - Long chips are extremely dangerous.

Hand Safety

- **Do not** wear gloves when operating machinery.
  - If a glove is caught in a moving part, it will be pulled in, along with the hand inside it.
- **Never touch a rotating tool or moving part.**
- Exceptions to when gloves can be worn:
  - handling raw material, using angle grinders, Welding

Hand Safety

- Use chemical resistant gloves when handling solvents or chemicals.
- Cutting oils, coolants, and solvents may affect your skin. The result may be a rash or an infection.
  - Avoid direct contact with these products as much as possible.
  - Wash your hands as soon as possible after contact.
- **Never** wash hands with solvents.

Lifting

- Exercise proper lifting techniques to prevent back injuries.
- If you must lift a large or heavy object, get some help or use a hoist or forklift.
- Do not try to be a "***superman***."

Lifting

- Objects within your lifting capability can be lifted safely by using the following procedure:
  1. Keep your back straight.
  2. Squat down, bending your knees.
  3. Lift smoothly, using the muscles in your legs to do the work.
     - Keep your back straight.
     - Bending over the load puts an excessive stress on your spine.
  4. Position the load so that it is comfortable to carry.
     - Watch where you are walking when carrying a load.
  5. If you replace the load back at floor level, lower it in the same manner in which you picked it up.

Lifting

- If material is over 6 ft long, it should be carried in the horizontal position.
- If the material is both long and over 40lb, it should be carried by two people.
- Heavy stock, even if it is short, should be carried by two people.
- Lifting equipment should be used for materials over 50lbs.
- Ask shop staff for help.

Shop Hazards

- **Physical:** temperature, noise, vibration, sharps, radiation, slips, trips, machinery
- **Chemical: c**hemicals, fumes, toxic dust
  - Completion of WHMIS II is required.
- **Ergonomics:** highly repetitive motion or action, awkward postures, poor body mechanics, improper lifting, pushing, pulling

Shop Hazards

- Burns is a common injury in machine shops.
  - Cutting metals create a lot of heat. While this heat should transfer into the chips, what often happens is that the heat transfers into the part or tool.
  - Use caution when changing cutting tools or handling parts after they have been machined.

Compressed Air

- Large amount of energy stored in a compressed gas (ex. air).
    - Releasing this energy presents an extreme danger.
- Compressed air is **lethal** if it enters your body.

Compressed Air

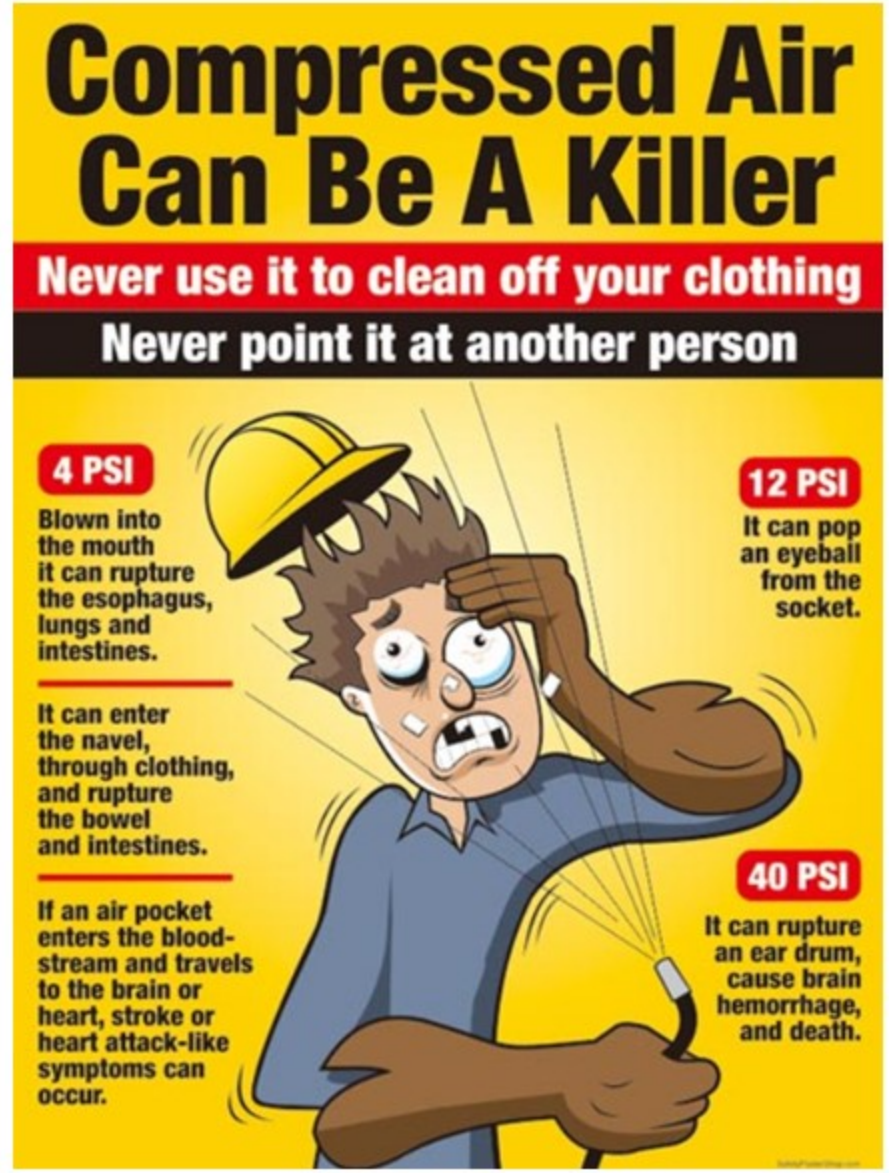
- Do not blow chips from a machine tool using compressed air, which will propel metal particles at high velocity.
  - Use a brush to clean chips off the machine.

Compressed Air

- Never blow compressed air on clothing or skin.

- Air can be a hazard to ears as well.
  - An eardrum can be ruptured.
  - Do not blow compressed air into the ears.

Compressed Air



Housekeeping

- The Machine Shop is a shared space. Before leaving, machinery and area must be cleaned and left in the same/ better condition than first use.
    - loss of shop privileges may occur if not followed.
- Clean machines and tools after each use.
- Return tools to the appropriate storage area in clean and good condition.
- Keep the work area and floors clear of scrap and excessive chips.

Housekeeping

- Clean up and report spills promptly.
- Keep aisle and walking paths clear.
- Hazardous chemicals (including wastes) must be stored in appropriate containers and storage unit/location.
- Dispose of wipes and rags in proper containers.

Oil Spills

- Several preparations are available to absorb spilled oil or coolants.
- Oil and coolant spills and be cleaned up by applying an absorbent powder to the area then sweeping it up.
- Clean oil on floors **immediately** to prevent slip and falls.

Rags & Wipes

- Dispose of used oily rags in a safety can, to prevent possible fires from spontaneous combustion or igniting from hot chips and sparks.

Safety Equipment in the Machine Shop

- **First Aid Kit**
  - Located near the main entrance outside of room 035B
  - Available for shop users to use, to treat cuts and bruises and minor injuries.
- **Eyewash Stations**
  - Located on the east wall of the shop near staff office and hand washing station.

Safety Equipment in the Machine Shop

- **Fire Extinguishers**
- There are two class ABC fire extinguishers in the LSE Machine Shop.
  - One is located in the fire hose cabinet adjacent to the Machine Shop Staff office.
  - The second one is located in the hallway corridor outside of the shop.
- The extinguishers may be used for small manageable fires, or in emergency situations where evacuation is required, and an egress path need to be clear.

Fire Types

- **Class A Fires**
  - Involve common combustibles such as paper, cloth, wood, rubber, many types of plastics, and so on.
  - An extinguisher rated for a Class A fire uses pressurized water as the media.
  - A Class A fire extinguisher should only be used on a Class A fire, never on any other type of fire.

Fire Types

- **Class B Fires**
  - Involve oils, gasoline, lacquers, some types of paints, solvents, grease, and most other flammable liquids.
  - Class B fire extinguishers use carbon dioxide or dry chemicals as the media.

Fire Types

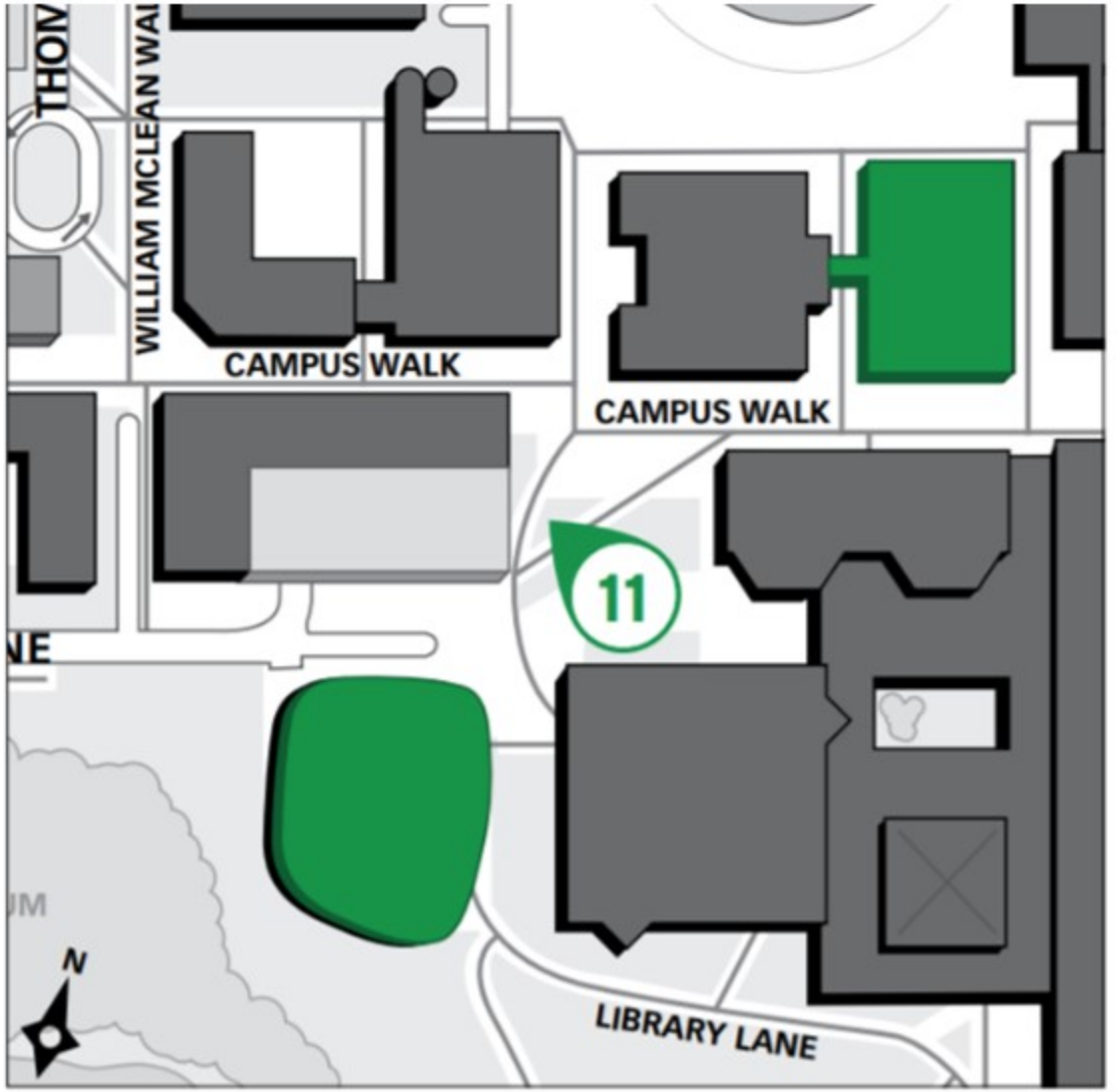
- **Class C fires**
  - Electrical fires.
  - These can occur in wiring, energized electrical equipment, fuse boxes, computers, and so on.
  - Class C fire extinguishers utilize carbon dioxide or a dry chemical as the extinguishing media.

Fire Types

- **Class D fires**
  - Involve metals such as powders, flakes or shavings of combustible metals such as magnesium, titanium, potassium, and sodium.
  - These can be very dangerous fires.

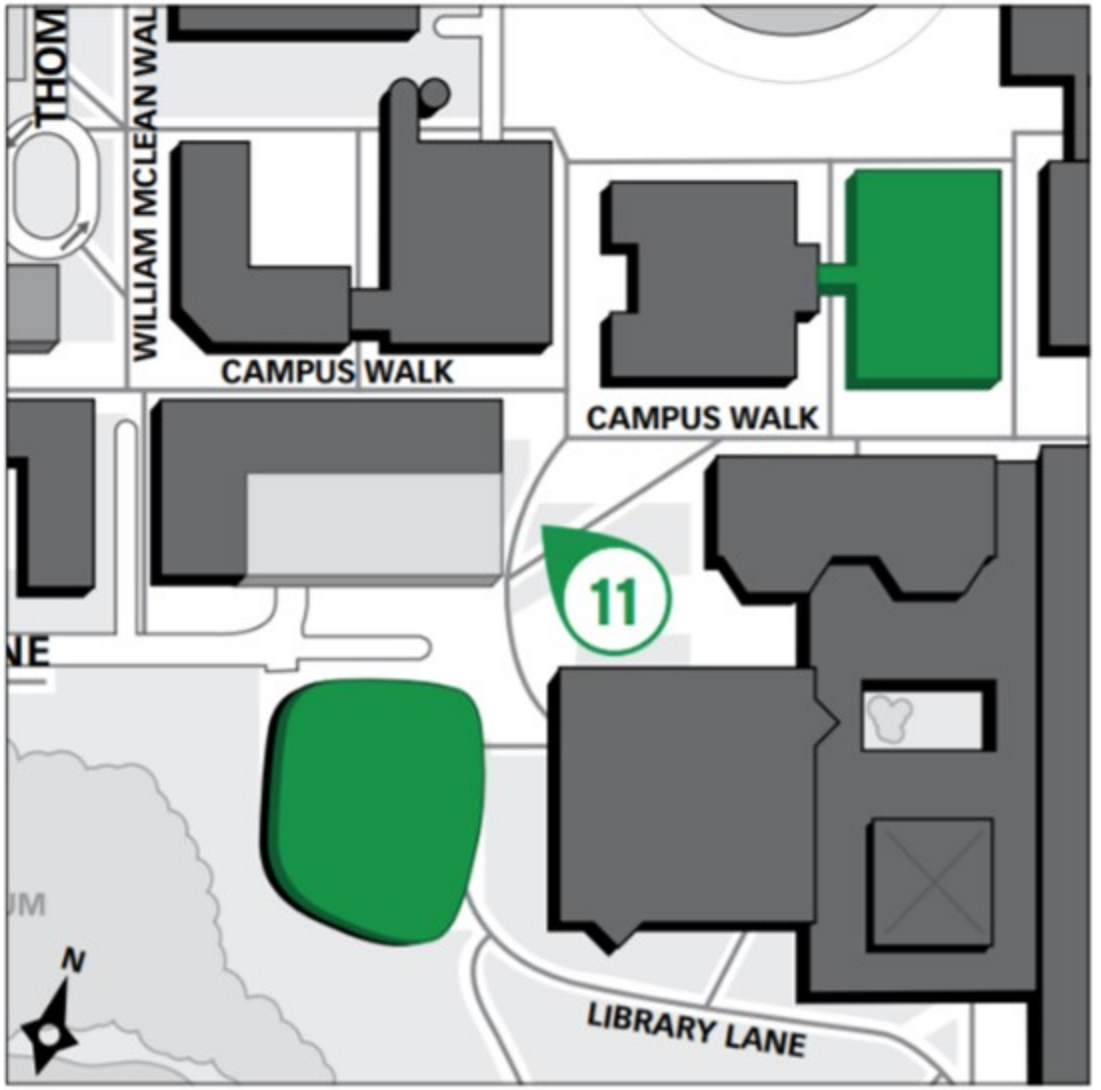
Fire Procedure

- In Case of Fire,
  - Stop what you are doing
  - Turn equipment off (de-energize)
  - Leave the area immediately and close doors behind you
  - Call 911 from a safe location
  - Activate nearest fire alarm



Fire Procedure

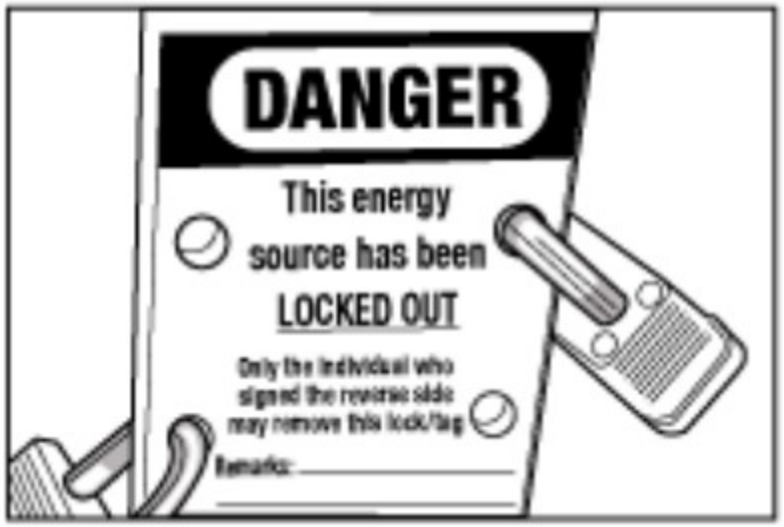
- In response to a fire alarm,
  - All persons are required to exit the building upon hearing a fire alarm.
  - Upon evacuation, head to assembly point #11, located between the Arboretum Lane Parking Garage and Scott Library.



Lockout/Tagout

- Lockout is defined as:

  "placement of a lock or tag on an energy-isolating device in accordance with an established procedure, indicating that the energy-isolating device is not to be operated until removal of the lock or tag in accordance with an established procedure."



Lockout/Tagout

- **NEVER** remove, operate, tamper with, deface or alter in any way equipment or tools with a Lockout/Tagout (LOTO).

- **It is an offence** to attempt to start, energize, or operate a machine/equipment that has been locked out of service, or to remove a lock or tag without authorization.

Non-Compliances

- Any non-compliance with respect to LOTO will result in **machine shop privileges being immediately revoked and additional disciplinary** the discretion of the machine shop staff.

Machine Safety

- **DO NOT** use machines, equipment or tools that are damaged or found to be defective.
- Use machines and tools only for its designated purpose.
- **NEVER** leave machines and tools running unattended.
- Only use machines that you have been trained on by machine shop staff.

Machine Safety

- **NEVER** temper with, defeat, bypass or disengage safety mechanisms on machines/tools.
- **DO NOT** manually adjust work pieces or attempt to measure a work piece while the machine is running.
- Machine controls must be accessible and unobstructed at all times.

Machine Safety

A machine cannot distinguish between cutting metal and cutting fingers.

You are not strong enough to stop a machine should you become tangled in moving parts.

Do not rush, machining takes time to properly set up and operate.

Machine Safety

Think

- When operating a machine, think about your task before carrying it out.

Plan

- Plan out each feature and the order they should be done.

Check

- Go over a safety checklist for each operation.

Safety Checklist

Do I know how to operate this machine?

What are the potential hazards involved?

Are all guards in place?

Are my procedures safe?

Am I doing something I probably should not do?

Safety Checklist

Have I made all proper adjustments and tightened all locking bolts and clamps?

Is the workpiece secured properly?

Do I have the proper personal protective equipment?

Do I know where the STOP switch is?

Incident Reporting

- An **incident** is an occurrence, condition or situation arising in the course of work that resulted in or could have resulted in injuries, illness, damage to health or fatalities.

- When an incident occurs, no matter big or small, **report** it to the machine shop staff/ your Supervisor/ Course Instructor/ Teaching Assistant (TA).

Incident Reporting

- Reporting an incident allows for an investigation to take place so that we can find out what are the contributing factors to the incident, come up with corrective actions to address and prevent them from happening again.

Reporting an Incident

1. Get first aid treatment right away.
2. Report the incident to machine shop staff/your supervisor/ course instructor/ TA.
3. Machine shop staff/ supervisor/ course instructor/ TA completes and submits a YU Incident Report Form (for students) or WIR form (for employees).
4. Machine shop staff/ supervisor/ course instructor/ TA conducts an incident investigation with appropriate stakeholders.

Critical Injury and Fatalities

- A **critical injury** is defined as an injury of a serious nature that:
  - places a life in jeopardy
  - produces unconsciousness
  - results in substantial loss of blood
  - involves the fracture of a leg or arm but not a finger or toe
  - involves the amputation of a leg, arm, hand or foot, not a finger or toe
  - consists of burns to a major part of the body
  - causes the loss of sight in an eye

Reporting Critical Injuries

1. **Call 911** for immediate medical attention.
2. **DO NOT** disturb the scene.
3. Inform machine shop staff and notify Security Services, HSEWB and a Lassonde JHSC member/ co-chair **immediately**.
4. Remain on scene to provide support as needed.