Safety in the Engineering Machine Shop

Tools in the shop are not unsafe, but they are all potentially quite dangerous. Equally, tools in the shop can be quite safe when using the proper technique and attitude.

Making Safety a Habit
Why do we go on about safety in the shop? First, we want to keep all of the people that use the shop injury free. Second, none of us who work here want to have to deal with the consequences of unsafe practices.

When you work with machinery, you tend to get into a pattern of behavior; you do something that you have done before, and you feel comfortable with it. The problem is that if what you are doing is unsafe and you continue to do it, it is just a matter of time until that unsafe practice (and probability) catches up with you. Conversely, if you get into the habit of safe procedure, the likelihood of your being injured is greatly diminished.

You need to know what a safe procedure is and practice safe procedure every time you do a task. That way it becomes a habit.

Every time before you start the machine to move material, go through an examination: Where are my body parts in relation to the cutting edge? Will I come in contact with a cutting tool? Will I have control through the complete operation? If there is a question, stop, reset, and start again. Time lost is much better than any injury.

The Basic Rules
If you ignore the basic rules, you will be asked to leave the shop area.

Gear
Safety Glasses protect your eyes from flying chips, dust and anything else that might be flying about a machine shop (your eyelashes and eyelids aren't even in the same class, as far as protection of this ~2 square inches of extremely sensitive area of your body is concerned).

Shoes help protect your feet from sharp or hot or heavy items that are in the shop. Minimum requirement for footwear is closed toe, leather is preferred and steel toe might not be a bad idea if you work around the shop a lot.

Clothing protects your skin from sharp edges, chips, sparks, etc. that might be in the shop. Long pants are a good idea.

Hearing Protection in the form of ear plugs or muffs are available in the shop. The shop is a potentially noisy environment and the use of hearing protection is highly recommended.

Shop Rules
No loose items including gloves, loose clothing, long sleeves, strings on hoodies, long hair, necklaces, bracelets, watches, rings or anything else that might get caught in moving machinery and drag you in.
Never work alone. At least two adults must be in the shop when power tools are being used.

Never work when you are impaired. This includes when you are too tired, stressed or hurried to work carefully.

If you cannot do a job safely in this shop, don't do it. There are limits to what we can build here.

Keep your hands away from sharp tools. Make sure that nothing that you do will cause you to be cut.

Work in well-ventilated areas, minimize contamination, and use appropriate protective equipment. Dust, chemicals, and smoke can be dangerous. The safety equipment cabinet is located in room G450 SC.

Ask for help. If you are unsure about the safe operation of a tool or any aspect of a job, ask about it. Have shop staff check you out on a tool the first time you use one with which you are unfamiliar.

Clean up after yourself. It should not be necessary to clean up someone else’s mess before you start your project. Before you leave the shop each day, all tools must be returned to the toolbox, the machine cleaned and wiped down, and the floor swept. Leave 10-15 minutes for cleanup.

Shop Hours
Regular hours are M-F 8am-12pm, 1pm-4:30pm. Access to the student shop may be limited during scheduled classes and holidays. During busy periods the shop may be opened in the evening or on weekends by special permission by T.A.s or other staff. Contact shop staff for additional information.

Sign-in Book
All users must sign in before beginning work. The sign-in book is inside the entrance to the shop, G450 SC.

In an Emergency
Call 911 from the shop phone. For non-emergency: (319) 335-5022. The shop is located in G450 Seamans Center (Engineering Building).

General Safety Guidelines
1. Do not attempt to remove foreign objects from the eye or body. If injured, report to the student health service for medical treatment. If chemicals get in the eye(s), wash eye(s) for 15 minutes in an open flow of water before proceeding for medical treatment. Call 911 for assistance.

2. Avoid excessive use of compressed air to blow dirt or chips from machinery to avoid scattering chips. Never use compressed air guns to clean clothing, hair, or aim the gun at another person.

3. Machines must be shut off when cleaning, repairing, or oiling.

4. Do not wear ties, loose clothing, jewelry, gloves, etc., around moving or rotating machinery. Long hair must be tied back or covered to keep it away from moving machinery.

5. Wear suitable gloves for hand protection when handling hot objects, glass, or sharp-edged items. Do not wear gloves when using moving machinery (see #4 above).
6. Wear appropriate clothing for the job; i.e., do not wear short-sleeved shirts or short pants when welding.

7. Do not work in the shop if you are tired or in a hurry. These conditions almost always ruin the work, and often result in injury.

8. No horseplay in the shop.

9. All machines must be operated with all required guards and shields in place.

10. A brush, hook, or special tool is preferred for removing chips, shavings, etc. from the work area. Never use your hands to clean cuttings; the cuttings are sharp.

11. Keep your fingers clear of the point of operation of machines by using special tools or devices, such as push sticks, hooks, pliers, etc. Never use a rag near moving machinery.

12. Do not use a hard hammer to strike a hardened tool or any machine part. Use a soft-faced hammer.

13. Keep the floor around machines clean, dry, and free from trip hazards. Do not allow chips to accumulate.

14. Think through the entire job before starting. Ask for help if you have questions.

15. Before starting a machine, always check it for correct setup and always check to see if machine is clear by operating it manually, if possible.

16. Do not drink alcoholic beverages before or when working in the machine shop area. Do not bring food or snacks into the shop.

17. If you have not worked with a particular material before, check the hazardous materials data sheets book for any specific precautions to be taken while working with the material. Also, ask shop personnel before cutting any unusual material.

18. Do heavy sanding and grinding only in well-ventilated areas.

19. If painting in the lower shop, make sure that there is an appropriate backstop for overspray and that the vent fan is turned on. If painting in the alley, make sure that there is an appropriate backstop for overspray and that the doors to the shop are closed.

20. Follow all appropriate precautions when working with solvents, paints, adhesives, or other chemicals. Use the appropriate protective equipment.

21. Check the safety and machinability of all materials intend to be worked on. Check the Banned Materials list below.

22. Check the power cords and plugs on portable tools for wear before using them.

23. Always store oily rags in an approved metal container.

24. Wear hearing protection around loud noise sources. Ear phones or ear buds are not allowed on the shop
floor. For your safety, you should always be able to hear what is going on around you, without distraction.

**Banned Materials**

The following are some examples of materials that cannot be used in the shop:

- Magnesium and its alloys (flammable)
- Beryllium and its alloys (carcinogenic, dust, toxic)
- G10 (toxic, glass filled)
- Fiberglass (glass filled)
- Phenolic (toxic)
- Titanium (special tooling)
- Ceramics (abrasive, special tooling)
- Graphite (dust)
- Hardened Steels (special tooling)
- Higher Alloys (Super Alloys) such as Hastelloy or niobium alloys (requires special tooling)

If you have a question about the material that you plan to work with, talk to one of the shop supervisors.