



SAFE OPERATION OF SHOP MACHINERY

Students and staff may encounter numerous potential hazards when in proximity to or working with stationary machines (e.g., lathes, saws, drills) and hand tools which include but are not limited to:

- **Mechanical hazards:** points of operation, pinch points, shear points, power transmission points
- **Operational hazards:** heat, metal chips, noise
- **Chemical hazards:** coolants, cleaning solvents, lubricants
- **Electrical hazards:** exposed wiring, malfunctioning equipment

To minimize potential hazards, students, and staff must adhere to the following safety practices:

IMPORTANT:

1. Only trained and authorized personnel shall use shop machinery and tools.
2. When using shop machinery and tools, at least one other authorized person is to be present in the shop. Requests to work alone, after hours, or on the weekend must be approved by the Shop Supervisor and user's Principal Investigator/Supervisor.
3. ***Failure to strictly adhere to these safe operation procedures may result in loss of access to the shop, impact to class grade, and/or other disciplinary action.***

A. GENERAL GUIDANCE

1. Complete machine shop safety training and sign requisite training documentation form.
2. Know the local shop rules and emergency procedures.
3. Only operate equipment and tools you have been specifically trained and authorized to use.
4. Follow manufacturer's instruction manual or shop-developed safety procedure for each shop tool as directed by supervisor.
5. Check the Material Safety Data Sheet (<http://msds.stanford.edu>) for health hazards of working with special materials (e.g., western red cedar, beryllium, chromium) and hazardous chemicals (e.g., lubricants, solvents).
6. Report damaged or malfunctioning equipment.
7. Do not operate machinery when tired or in a hurry.
8. Know location of emergency equipment (e.g., emergency eyewash safety shower, fire extinguisher, first aid kit, chemical spill clean-up kit, fire blanket).
9. Never allow unauthorized personnel into work area.

B. PERSONAL PROTECTIVE EQUIPMENT

Wear appropriate street clothing and use Personal Protective Equipment (PPE):

1. Street Clothing:

- a) Wear long pants and closed-toed shoes.
- b) Wear closely fitting clothing (no loose shirt sleeves, loose apron ties/straps, etc.).
- c) Confine long hair/beards to prevent entanglement in machinery (e.g., hair of a length that can be put up via bun, pinning-up ponytail or hairnet).
- d) Do not wear jewelry (rings, necklaces, etc.) or other items that could catch on or be grabbed by moving parts.

2. Personal Protective Equipment (PPE):

- a) **Eye protection:** ANSI Z87.1 safety glasses or goggles are required when working around machines or with hand tools.
- b) **Face protection:** Face shields are required if flying fragments/particles are likely to be generated.

- c) **Hand/body protection:** Properly selected gloves are required when using hazardous chemicals and handling scrap metal or wood, sharp-edged stock, and unfinished lumber, as well as protective sleeves, aprons, etc.
 - **IMPORTANT:** *Do not wear gloves while machining, as they can get caught in moving equipment.*
- d) **Foot protection:** ASTM F2412-05 approved steel-toed boots (ANSI Z41 approved if boots purchased on or before January 26, 2007) may be required where potential dropping of heavy objects (e.g., tools, steel stock) exists.
- e) **Hearing and respiratory protection:** For loud work or operations with respiratory hazards, contact EH&S at 723-0448 for assessment and recommendations.

C. BEFORE STARTING UP EQUIPMENT

Ensure:

- 1. Safety devices are in good condition and adjusted in place (i.e., guards, interlocks).
- 2. Work piece is held securely in place as appropriate.
- 3. Chuck keys and adjusting wrenches are removed.
- 4. Proper setup to eliminate awkward posture or hand positioning – sudden slippage can cause a serious injury.
- 5. Adequate lighting of piece being worked.
- 6. Check with supervisor if unsure about proper setup.

D. WHILE EQUIPMENT IS RUNNING

- 1. Concentrate on task; do not get distracted.
- 2. Stay clear of moving parts:
 - a. Use a push stick/block as appropriate.
 - b. Never slow down machinery with hands/body.
- 3. Never leave a running machine unattended.
- 4. Do not oil, clean, make adjustments/measurements while machine is running.

E. HOUSEKEEPING

- 1. Keep floors and work surfaces clean and free of debris.
- 2. After tool use, promptly return tools and stock to storage location.
- 3. Compressed air use:
 - a. As possible, sweep or vacuum debris instead of blowing.
 - b. Never use compressed air to clean clothing or hair.
- 4. Fire prevention:
 - a. Control dust accumulation.
 - b. Dispose of oily rags appropriately.

F. CHEMICAL STORAGE / LABELING / DISPOSAL

- 1. Store chemicals per SU's Laboratory Chemical Safety Toolkit (<http://chemtoolkit.stanford.edu/ChemStorage>)
- 2. Manage hazardous waste per SU's Laboratory Chemical Safety Toolkit (<http://chemtoolkit.stanford.edu/ChemWasteDisposal>)

G. INCIDENT REPORTING

Report all incidents to supervisor, including injuries, equipment damage, and near misses.