

Student Shop Safety

University of Tennessee Safety Guide GS-005

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Purpose

Machine shops are present in many departments and academic laboratories that are used by the faculty, staff and students. Shop equipment and tools are routinely used to complete various projects that, if not handled properly, may result in a serious injury or death. The purpose of this program is to provide a basic overview of the common hazards associated with the use of hand and power tools and equipment that are found in machine shops in laboratories or otherwise, to establish fundamental shop safety rules and to outline the use of safe work practices and use of proper personal protective equipment. Each user of a machine shop is required to attend general shop safety training. However, this training is not a substitute for a machine-specific safety training that should be provided by your Shop Supervisor. Employee awareness of potential hazards combined with the following proper safety procedures can reduce accidents and injuries significantly. It is therefore, of vital importance that supervisors become familiar with those sections and standards in this policy that pertain to the operation(s) under their control. The success of this program depends upon the cooperation and support of everyone, including: students, staff, faculty and the shop supervisor.

It should be understood that these are minimum standards that apply to all University academic shops, present on all campus. More detailed shop specific rules may be developed by Shop Supervisors and Departments, must also be followed.

This document identifies the requirements for University machine shops to operate safely and educate students on safe techniques to use the equipment.

Scope and Applicability

This guideline applies to all machine shops and other areas on University property where power tools are typically operated. These tools include, but are not limited to lathes, milling machines, table saws and drill presses.

Definitions and Abbreviations

Abbreviations

EHS: Environmental Health and Safety

OSHA: Occupational Health and Safety Administration

Definitions

Machine Shop: A workshop or area where power-driven tools are used for making, finishing, or repairing machines or machine parts. Machining processes include, but are not limited to turning, drilling, milling, shaping, planing, boring, broaching and sawing. Advanced machining techniques include electrical discharge machining (EDM), electro-chemical erosion, laser cutting, or water jet cutting to shape work pieces. These machines might have automatic capability but might not be equipped with automatic part handling or bar-feed

mechanisms nor automatic tool changing systems.

Safety data sheet (SDS): Detailed information bulletin prepared by the manufacturer or importer of a chemical that describes the physical and chemical properties, physical and health hazards, routes of exposure, precautions for safe handling and use, emergency and first aid procedures, and control measures.

Roles and Responsibilities

Students, Staff, Facility (Shop Workers):

- i. Must never work alone in the shop.
- ii. Must complete general shop safety training and machine-specific training before using any machine.
- iii. Must observe all shop safety rules in this policy when working in the machine shop.
- iv. Must observe all shop-specific rules beyond the scope of this policy.
- v. Must report all injuries to a Shop Supervisor promptly, regardless of seriousness.
- vi. Must promptly report unsafe conditions, actions or near-miss incidents to Shop Supervisor.

Shop Supervisors who have employees and students under their control:

- i. Shall ensure that all users of shop are familiar with general and shop-specific safety rules.
- ii. Shall enforce all safety rules and make all users aware of the consequences of rule violations.
- iii. Shall ensure that all users of shop have attended general shop safety and machine-specific training before starting their work in the shop.
- iv. Shall provide tool/equipment specific training to each user of the equipment they will be using.
- v. Must report all accidents and near-miss incidents and ensure timely correction of unsafe conditions.
- vi. Must give full support to all safety procedures, activities and programs.
- vii. Must maintain all training records
- viii. Must maintain access to Safety Data Sheets (SDS) for all chemicals used in the shop.
- ix. Must clearly display Shop Safety Rules signs and shop hours on the shop door.

EHS shall:

- i. Review and update this policy and training.
- ii. Conduct periodic audits of various shops and provide technical assistance and consultation when requested.
- iii. Provide general shop training when requested
- iv. Provide respirator fit testing when requested.
- v. Conduct accident investigations in shops in cases of accidents and near-miss incidents.

Departments/Responsible Units:

- i. Must ensure that adequate supervision is provided for the shop staff.
- ii. Must provide adequate resources for maintenance, repairs and safe guarding equipment.
- iii. Must inform all shop users to follow University policy and safety rules.

Training

Both general and machine specific shop safety training is required before students can work in the shop. General shop training can be provided by the department or EHS and should be completed before machine specific training. Specific training should involve instructions and hands-on demonstration.

Machine Specific Training should include the following components:

- i. Description and identification of the hazards associated with a particular machine;
- ii. Proper safety precautions when working with a particular machine;
- iii. Limitations of the tools/equipment and when and what NOT to use;
- iv. Safeguards, protection they provide, and ensuring their presence before using a machine;
- v. Proper personal protective equipment and how to use it.
- vi. What to do (e.g., contact supervisor, tag the machine) if a damaged guard, missing part unusual noise, etc., is noticed.
- vii. How to use emergency buttons and other measures, when needed.
- viii. Maintenance and cleaning procedures

References

OSHA Standard 29 CFR 1910.22 General requirements

OSHA Standard 29 CFR 1910.35. Means of Egress

OSHA Standard 29 CFR 1910.133. Eye and Face Protection

OSHA Standard 29 CFR 1910.134. Respiratory Protection

OSHA Standard 29 CFR 1910.135. Hand Protection

OSHA Standard 29 CFR 1910.136. Foot Protection

OSHA Standard 29 CFR 1910.178. Powered Industrial Trucks

OSHA Standard 29 CFR 1910.212. General Requirements for all Machines

OSHA Standard 29 CFR 1910.242. Hand and Power Tools and Equipment, General

OSHA Standard 29 CFR 1910.243. Guarding of Portable powered Tools.

OSHA Standard 29 CFR 1910.252. General requirements for Welding

Appendices

Appendix A: General Shop Safety Guidelines

Disclaimer

The information provided in these guidelines is designed for educational use only and is not a substitute for specific training or experience.

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Appendix A: General Shop Safety Guidelines

EHS has developed these guidelines for those who currently, or might in the future, use power tools and heavy machinery in shops and laboratories. These guidelines DO NOT serve as a replacement for formal training in lab techniques or shop safety. Only trained personnel should use shop equipment after they have been trained by their supervisor. Failure to follow proper precautions can result in serious injury or death.

1. Never Use a Machine If You Are NOT Trained – Always Get Training Before Operating Any Machinery.

You must attend general safety training and specific training on the machine you intend to use. If you are unfamiliar with a particular tool or instrument, do not use it until you are properly trained on its usage.

2. Never Work Alone – Always Use “Buddy System”.

At least two adults must be in the shop when power tools are being used. You must get permission from your Shop Supervisor for off-hours and weekend work if the shop permits off-hours work.

3. Never Use Machine When Impaired

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

4. Never Start Work If You Cannot Do The Job Safely - Just Don't Do It.

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

5. Never Wear Open Toe Shoes - Use Closed-Toe Shoes in the Shop.

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

6. 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.

7. 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 shop supervisor for appropriate attire.

8. Never Bring Hands Close to Sharp Objects – Always Keep Your Hands At a Safe Distance From Sharp Tools.

Make sure that nothing that you do will cause you to be cut by working too close to a sharp tool or moving machine part. Maintain a safe distance.

9. Never Create a Dusty and Smoky Environment - Dust, Chemicals and Smoke Can Be Dangerous to Your Health, so Work in Well-Ventilated Areas, Minimize Contamination and Use Appropriate Protective Equipment (PPE).

Only use dust or fume-generating machines in their intended areas. Ensure the shop is well ventilated and appropriate PPE is used when working with such machines.

10. Never Be Shy to Seek Help – Always Ask If You’re Unsure about the Safe Operation of a Tool or Any Aspect of a Job – Have Shop Staff Check the Tool or Work with Which You Are Unfamiliar.

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

11. Never Leave Your Work Area Disorganized – 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.

12. Never Remove Safety Guards – They are Present for a Reason

Safety guards must never be disabled or removed under any circumstances. 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.

13. Never Use Gloves While Using Rotating Equipment – Check With Supervisor, if Needed. Remove Them Before Starting Work.

Gloves can become entangled in rotating machine parts resulting in serious injuries.

14. 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 Supervisor to arrange repair before next use.

15. Never Make Any Adjustments to a Machine When it is in Operation -Always Talk to Your Supervisor for Permission When 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 and safety devices are in place.