



Shop Safety Program

Purpose

This program outlines Clemson University guidelines for working within onsite shops that perform maintenance and material repair for the overall operation. The operation, maintenance, safety, and training for the operations of these shops is summarized in the below protocol. This program is intended to assure that:

- Employees and students are provided with training and information on how to protect themselves from machinery and equipment hazards.
- Recommended maintenance of equipment is performed.
- Only employees trained and knowledgeable are to use the machinery and equipment.
- All work is performed in accordance with standard operating procedures.
- All work is performed in accordance with the manufacturer's guidelines and recommendations.

This program includes provisions to assist with protecting employees and students from hazards. To meet this objective:

- Safety Officer will survey workplaces to identify shop areas covered by this program.
- Safety Officer has identified a Shop Manager or Supervisor who will manage this program for the shop.
- The Shop Manager, Supervisor, or Safety Officer will provide training to individuals who work within shop areas.

Scope and Application

These requirements apply to Clemson University students and employees working in machine shop locations.



Responsibilities

This program includes provisions to assist with protecting employees from the hazards associated with the operation and maintenance of machinery and equipment. To meet this objective the following responsibilities have been established:

Safety Officer (Coastal REC Safety Coordinator)

- Observe and document location of applicable shops and garages.
- Surveying workplaces to identify machinery and equipment covered by this program.
- Review hazards associated with shop machinery and equipment during workplace inspections.
- Review and update the site's shop machinery and equipment program.
- Develop and provide training to affected individuals and employees. (SciShield)
- Document employee and student training.
- Identify a Manager or Supervisor for each shop to manage their shop(s).
- Work with Shop Manager and Supervisors in establishing appropriate PPE.
- Document and provide required PPE.
- Work jointly with Shop Manager or Supervisors in the development of safety protocols for shop machinery and equipment that present a unique hazard to employees and students.
- Evaluate the effectiveness and use of this program and its components.

Shop Manager or Supervisor(s)

- Provide employees and students with hands-on training on the specific machinery and equipment within their machine shop.
- Establishing operational and safety guidelines for machinery and equipment utilized within the machine shop.
- Ensure the proper use of PPE.
- Ensure that guards and switches on machinery and equipment are in place and functioning.
- Keep all machinery and equipment used by employees or students in good condition.



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- Ensure unsafe machinery and equipment is removed from service until repaired.
- Establish regular machinery and equipment inspection procedures and provide repair when machinery and equipment are damaged or malfunctioning.
- Document inspection, maintenance and care of machinery and equipment.
- Implement the operational and safety guidelines for machinery and equipment.
- Ensure housekeeping is conducted.
- Document those employees and students permitted to use machinery and equipment and the supervision required.

Employees and Students

Only trained, qualified, and authorized employees and students will be permitted to use machinery and equipment. Employees and students are responsible for:

- Operating machinery or equipment only after being trained by the Shop Manager or Supervisor(s).
- Following standard operating procedures for the machinery and equipment.
- Become acquainted with work hazards.
- Ensuring that safeguards are utilized.
- Dressing appropriately (no loose jewelry, clothing, or unsecured long hair).
- Utilizing appropriate PPE.
- Reporting to their Shop Manager or Supervisor any machinery and equipment that needs to be serviced.
- Following safety guidelines for the use of machinery and equipment and according to manufacturer's instructions.
- Participating in training.
- Reporting injuries to the Shop Manager or Supervisor so that an Incident Report can be documented. Follow link on OES website.



Training

Prior to using machinery and equipment, employees and students must be trained to use the machinery and equipment correctly. No one will be permitted to use any machinery and equipment without receiving proper training. Instruction on the following shall be included in the training program:

- Selecting the right machinery and equipment for the job.
- Hazards and their controls.
- Common causes of injury.
- Safety precautions.
- Personal Protective Equipment.
- Inspection/Maintenance.
- Safe operation.

All users of machinery and equipment must complete applicable training and follow the safety requirements of this program.

Machine Shop

Operating Requirements

All machinery and equipment shall be operated in accordance with the manufacturer's operation manual and standard operating procedures. If there are questions as to the proper and safe use of machinery and equipment, the manufacturer's manual and/or the Shop Manager or Supervisor will be consulted. *The user shall not use machinery and equipment if they are unsure how to use it in a safe manner.*

Inspection and Maintenance Requirements

Machinery and equipment will be inspected and maintained according to the manufacturer's recommendations. This information, along with safety-related guidelines, can be found in the operator's manual. If a manual is not available, the manufacturer shall be contacted to obtain one. The manufacturer's manual may be located on their websites as well.



User Inspections

- Visually inspect all machinery and equipment before use to ensure that the machinery and equipment is in a safe and usable condition.
- All damaged and/or defective machinery and equipment will be immediately reported to the Shop Manager or Supervisor.
- Unsatisfactory equipment should be Locked out and Red Tagged displaying a “Do Not Use” tag.

Shop Manager or Supervisor(s)

- Responsible for periodic inspection and maintenance of all machinery.
- Remove machinery and equipment from use that is unsafe or not operating within manufacturer’s specifications.
- Document inspections and repairs of machinery and equipment.

Care and Use

The user shall become familiar with the machinery and equipment by reading the manufacturer operation manual before use. Unusual working conditions will require additional instructions from the Shop Manager or Supervisor. Conduct a pre-use inspection of the machinery and equipment. Modifications to machinery and equipment without the manufacturer’s prior written approval are prohibited.

Nameplates and Marking

Machinery and equipment ratings and capacities may be found on a tag affixed to the machinery and equipment. If no tag is found, report it to the Shop Manager or Supervisor. These tags contain essential information such as UL testing, load, and operating specifications.

Housekeeping

Keep floors, machines, and other surfaces free of dirt, wood and metal chips, sawdust, oil and grease and other debris.

If floor surfaces are wet, slippery, or become wet during work activities, they should be protected with a non-slip coating or covering. Stop

machine before cleaning.

Keep machines and hand tools clean.

Use brush and not cloth to remove chips.



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Use cloth to clean oily surfaces.

Do not place tools and materials on machine table.

Never place tools or materials on floor close to machine.

Return stock to storage rack after cutting.

Never use compressed air to remove chips from machine.

Electrical

Where machinery is hard-wired into the electrical system, an accessible and labeled disconnect (if not obvious) shall be provided.

Where machinery is cord-and-plug connected to the power supply, proper grounding shall be maintained.

Exposed energized electrical hazards, such as missing knockouts, covers, damaged cords, shall be corrected immediately.

Proper lockout procedures must be followed for all servicing and maintenance of machinery and equipment.

Material Storage and Handling

Stock materials will be stored in such a manner as to prevent falling, slipping, or rolling.

Material shall not be stored on the floor and may not be stored where they will impede egress from the area.

Shelves or cabinets will be used, as appropriate, to store materials.

Mezzanines used to store materials shall be load rated and marked accordingly. Mezzanines shall not be overloaded.

Chemicals/Gases

Chemicals will be stored in approved safety cabinets designed for that use.

Incompatible Chemicals will not be stored together.

Safety Data Sheets for all chemicals used will be maintained in the shop area. SDS's can be obtained using the SciShield link.

Compressed gas cylinders must be stored, used, and handled in accordance with safe work practices.



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Flammable and Combustible Liquids

Flammable and combustible liquids include, but are not limited to, materials such as gasoline, oils, paints, lacquers, thinners, cleaners, and solvents. To determine if a material or product is flammable or combustible, the Safety Data Sheet will be reviewed or manufacturers label on the product will be read.

Cloth or paper rags, or material that has been saturated with flammable or combustible liquids will be stored in approved safety cans. All employees and students should be aware of the waste can location(s). These materials shall be removed daily and placed into a 55-gallon metal drum with tight fitting lid located in an approved storage location. Let the Shop Manager know when the container is full.

Always remove/replace clothing that has become saturated with a flammable or combustible liquid. Saturated clothing can easily ignite if exposed to an ignition source, such as radiant heat, flame, sparks from hot work, or an electrical arc.

Access

The shop area will be used only by people who have received training consistent with this program.

Layout/Egress

Aisles and walkways will be kept free of debris and obstructions and a clear path will be maintained to the exit.

All exits shall be properly identified.

Machinery will be placed so that a clear and safe operating area is maintained for each machine.

Environment

The shop area will have adequate lighting to perform the work safely.

Sufficient ventilation will be provided for welding and cutting areas.

Noise control or hearing protection may be necessary.

Harmful dust, mist, and fumes must be properly controlled.

Procedures

No person will work in a shop area alone.

Hours of operation shall be established.



The Shop Manager or a Supervisor will be present during all hours of operation.

Emergency contact numbers, and a means of summoning help, will be readily available.

Shop Guidelines

The Shop Manager or Supervisor(s) shall establish shop specific information such as hours of operation, controls over who can access the space, and general housekeeping rules. This information should be posted near the shop entrance. Shop guidelines and rules will be clearly posted.

Machinery

General Machinery and Equipment Hazards

Hazards exist with all types of machinery. Shop and machine users must be aware of these hazards.

Point of Operation refers to the area where work (e.g., cutting, shearing, shaping, boring) is performed on a stock material. Point of operation guarding must be in place during operation.

Nip or Pinch Points: refers to an area other than a point of operation where a belt contacts a pulley, or one or more rotating parts come together where it is possible for a part of the body to get nipped or pinched by the moving parts.

Power Transmission: refers to areas where power is transferred from one part to another such as a drive shaft, belt, or chain. Belts, pulleys, flywheels, and rotating parts must be guarded to prevent entanglement and amputations. Older machinery is notorious for not providing this type of guarding.

Rules for all Machines

The owner's or operator's manual will be in the shop area with the machine. A standard operating procedure indicating safety features and their appropriate use will be made available to the user.

The area of operation will be free and clear of obstructions. Space will be provided between each machine and other objects, including other machine operating areas, as needed, to allow safe operation of the machine.

Older Equipment

Old shop equipment may not have appropriate guarding when compared to newer standards and design requirements. Machine guarding issues are not grandfathered by OSHA and must be addressed before the machine is used. Check with the manufacturer first to see if a retrofit kit is available. If so, it must be purchased and installed. If a retrofit kit is not available, a guard may have to be manufactured and installed.

Machine Specific Information

Machinery and equipment must be inspected and maintained according to the manufacturer's recommendations. This information, along with safety-related guidelines, can be found in the operator's



manual. If a manual is not available, the manufacturer should be contacted to obtain one. Manufacturers post their operator's manuals on their websites.

Shop Safety Controls

Engineering controls must be given priority. If engineering controls are not feasible, then an appropriate administrative control must be used. If an administrative control will not control the hazard, then PPE will be utilized by the machine user.

Engineering

Engineering controls include guards, ventilation systems, and dust collection systems.

Guards

There are three main types of guards. At least one type of guard can provide protection from most machine hazards.

1. Fixed Guard refers to a guard that is a permanent part of the machine but is not dependent upon moving parts of the machine to perform its guarding function. A fixed guard that can be manually set into the appropriate position before machine operation is sometimes referred to as an "adjustable guard". A fixed guard that completely separates the user from the hazard is often called an "enclosure guard".
2. Interlocked Guard refers to guards that are connected to a mechanism that cuts power to the machine when the guard is tripped or moved out of position.
3. Self-adjusting Guard refers to a guard that adjusts automatically to the thickness and movement of the stock material. An example is a floating guard on a table saw that raises up and floats along the top of the stock while the stock is guided across the saw.

Ventilation

When chemical or flammable liquid work is performed, ventilation may be required. This may include fume hoods or other types of local exhaust ventilation.

General Safety Guidelines:

The following general guidelines are specified for all shop areas:

- No long sleeve shirts.
- No loose shirt tails (tuck into pants).
- No neck ties, scarves, or hood strings.
- No loose jewelry (i.e., necklaces, bracelets, watches, rings.)
- No gloves (recommended for material handling only, not during machinery use)



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- No open-toed shoes (i.e., sandals, flip flops).
- Long pants recommended.
- Hearing protection is highly recommended and may be required.
- Hair below the collar of the shirt must be secured (tied back and tucked in shirt or covered by a hat).
- Long beards must be covered.
- Safety glasses must always be worn.
- Face shields are required when using grinders.
- Other machine-specific clothing/equipment as recommended by the manufacturer.
- Students are not permitted to use any machinery and equipment without the presence of a Shop Manager or Supervisor.
- No one shall wear headphones/earphones while operating machinery and equipment.