



1. Purpose: The Machine Guarding Program is designed to protect Virginia Commonwealth University (VCU) employees from the hazards involved in moving machinery. There are many hazards in a maintenance shop and production environment. Any part, function, or process which may cause injury must be properly safeguarded. This program was developed to ensure compliance with OSHA standards contained within 29 CFR 1910 212, 213, 215, 217, 219 and 243.
2. Scope / Applicability: This Program applies to all Virginia Commonwealth University employees who may work with moving machinery and pieces of equipment, which due to nature of operation and/or design possess hazards such as those created by point of operation, ingoing nip points, rotating parts, flying chips, and sparks.
  - a. Out of Scope: This program does not apply when:
    - 1) Virginia Commonwealth University does not own the machine or machinery responsible for creating the hazard;
    - 2) Sources of hazardous energy have been isolated or controlled in accordance with VCU's Control of Hazardous Energy Program;
    - 3) Sources of hazardous energy have been isolated for plug-connected equipment by disconnecting the plug and tagging the equipment out of service.
3. Definitions:
  - Abrasive wheel: Cutting tool consisting of abrasive grains held together by organic or inorganic bonds. Diamond and reinforced wheels are included.
  - Guards: Barriers that prevent employees from contact with moving portions or parts of exposed machinery or equipment which could cause physical harm to the employee.
  - Employee-driven machine: Machines that have a "point of operation", or area on or near the machine in which work is performed by an operator (e.g. portable power tools, power saws, work working equipment, etc.).
  - Enclosures: Mounted physical barriers which prevent access to moving parts of machinery or equipment.
  - Point-of-Operation: The area on a machine or item of equipment, where work is being done and material is positioned for processing or change by the machine.
  - Power Transmission: Any mechanical parts which transmit energy and motion from a power source to the point-of-operation. NOTE: Components



which are (7) feet or less from the floor or working platform will be guarded.

- Nip Points: In-Running Machine or equipment parts, which rotate towards each other, or where one part rotates towards a stationary object.
- Self-driven Machine: Machines that do not have a specific "point of operation" and which do not have an operator during normal operation (e.g. elevators, pumps, compressors, ceiling fans, etc.).
- Shear Points: The reciprocal (back and forth) movement of a mechanical part past a fixed point on a machine.
- Rotating Motions: Rotating motions on exposed mechanism are dangerous unless guarded. Even a smooth, slowly rotating shaft or coupling can grasp clothing or hair upon contact with the skin and force an arm or hand into a dangerous position. Affixed or hinged guard enclosures protect against this exposure.
- Reciprocating: Reciprocating motions are produced by the back and forth movements of certain machine or equipment parts. This motion is hazardous, when exposed, offering pinch or shear points to an employee. A fixed enclosure such as a barrier guard is an effective method against this exposure.
- Transverse Motions: Transverse motions are hazardous due to straight line action and in-running nip points. Pinch and shear points also are created with exposed machinery and equipment parts operating between a fixed or other moving object. A fixed or hinged guard enclosure provides protection against this exposure.
- Cutting Actions: Cutting action results when rotation, reciprocating, or transverse motion is imparted to a tool so that material being removed is in the form of chips. Exposed points of operation must be guarded to protect the operator from contact with cutting hazards, being cause between the operating parts and from flying particles and sparks.
- Shearing Action: The danger of this type of action lies at the point of operation where materials are actually inserted, maintained and withdrawn. Guarding is accomplished through fixed barriers, interlocks, remote control replacement (2 hand controls), feeding or ejection.

#### 4. Responsibilities

- a. Safety and Risk Management (SRM) is responsible for:
  - i. Developing the Machinery and Machine Guarding Program and revising the Program as appropriate;
  - ii. Performing inspections of machinery and report any hazardous conditions to the appropriate departments;
  - iii. Assisting departments with the selection and proper machine guards upon request; and



- iv. Investigating injuries related to machine operation and/or lack of machine guarding.
- b. Departments/Supervisors are responsible for:
  - i. Ensuring all machines are properly guarded in accordance with this Program;
    - 1. All unguarded machines shall be removed from service until all necessary guards are in place
  - ii. Inspecting machines for adequate guarding as specified in this Program;
  - iii. Providing adequate guarding solutions for machines in accordance with this Program (i.e. engineering controls);
  - iv. Providing personal protective equipment (PPE);
  - v. Disciplining employees who violate the requirements of this Program;
  - vi. Ensuring that machine-specific training is provided as specified in this Program and maintaining proper training documentation;
  - vii. Providing machine-specific operator training that includes instruction and hands-on training;
  - viii. Documenting all problems, deficiencies and ways to correct problems associated with a machine; and
  - ix. Identifying potential equipment hazards by conducting a Job Hazard Analysis (Appendix A) and implementing any corrective actions in a timely manner.
- c. Employees are responsible for:
  - i. Complying with this Program and all applicable federal and state regulations regarding machine guarding;
  - ii. When applicable, wearing appropriate PPE;
  - iii. Shall not remove machine guards unless equipment has been locked out and tagged;
  - iv. Shall not operate equipment unless guards are in place and functional;
  - v. Immediately reporting all damaged or malfunctioning machines or powered hand tools to their supervisor and/or appropriate department;
  - vi. Performing pre-use inspections as specified in this Program;
  - vii. Wearing appropriate attire around machines and machinery and refrain from:
    - 1. Wearing loose-fitting clothing, jewelry or other items that could become entangled in machinery; and
    - 2. Not tying back long hair – long hair shall be contained.



### 5. General Requirements

- a. At least one method of machine guarding shall be provided to protect the operator and other employees in the machine from hazards such as those created by the point of operation, ingoing nip points, rotating parts, flying debris, and sparks.
- b. Guards shall be affixed to the machine where possible and secured elsewhere if for any reason attachment to the machine is not possible. The guard shall be such that it does not offer an accident hazard in itself.
- c. The point of operation whose operations exposes an employee to injury, shall be guarded. The guarding device shall be in conformity with any appropriate standards, or, in the absence of applicable specific standards, shall be so designed and constructed as to prevent the operator from having any part of his body in the danger zone during the operating cycle.
- d. Special hand tools for placing and removing material shall be such as to permit easy handling of material without the operator placing a hand or other body part in the hazardous zone near the point of operation. Such tools shall not be in lieu of other guarding requirements, but can only be used to supplement protection provided.
- e. Revolving drums, barrels, and containers shall be guarded by an enclosure which is interlocked with the drive mechanism, so that the barrel, drum, or container cannot revolve unless the guard enclosure is in place.
- f. When the periphery of the blades of a fan is less than seven (7) feet above the floor or working level, the equipment shall be guarded. The guard shall have openings no larger than one-half (1/2) inch.
- g. Machines designed for fixed locations shall be securely anchored to prevent walking or moving.

### 6. Basic Safeguarding: All safeguards must meet the following performance requirements:

- a. Prevents contact: The safeguard shall prevent hands, arms, and any other part of an employee's body from making contact with moving parts.
- b. Prevents tampering: Employees shall be not able to easily remove or tamper with the safeguards. Guards and safety devices shall be made of durable material that will withstand the condition of normal use. They should be firmly in place.
- c. Protects from falling objects: The safeguard shall prevent objects from falling into moving parts resulting in the objects becoming projectiles.
- d. Creates no new hazard: A safeguard defeats its own purpose if it creates a hazard on its own such as a shear point, a jagged edge, or



an unfinished surface that could cause laceration. The edges of guards, for instance, shall be rolled or bolted in such a way that they eliminate sharp edges.

- e. Creates no interference: Any safeguard which impedes an employee from performing the job quickly and comfortably might be overridden or disregarded. Proper safeguarding can actually enhance efficiency since it can relieve the employee's apprehensions about injury.
- f. Allows safe lubrication: If possible, employees shall be able to lubricate the machine without removing the safeguard.

7. Machine-specific safe guarding: In addition to the basic safeguarding requirements, all equipment must meet any applicable mandatory and non-mandatory machine-specific guarding requirements specified by OSHA and all other applicable VCU Safety and Risk Management programs.

- Woodworking machinery requirements: 29 CFR 1910.213
- Abrasive wheel machinery requirements: 29 CFR 1910.215
- Mechanical power press requirements: 29 CFR 1910.217
- Mechanical power transmission apparatus: 29 CFR 1910.219
- Portable power tool requirements; 29 CFR 1910.243

8. Inspections

- a. Employee driven machines (e.g. portable power tools, power saws, word-working equipment, power presses, etc.) shall be visually inspected prior to each use by the operator to ensure all necessary guards are in place to mitigate hazards.
- b. Self-driven machines do not require inspections at specific intervals, however, it is good practice to visually inspect all equipment before use.
- c. Employees are required to report any unguarded machinery to the appropriate department and/or supervisor. If the department is unknown, deficiencies shall be reported to SRM Occupational Safety.
- d. The applicable department is responsible for providing guards for their machinery, and taking the equipment out of service until the appropriate guards are in place.

9. Training and recordkeeping: Employees shall be trained on machinery and equipment they will be using. Only trained personnel or those undergoing supervised on-the-job training will be allowed to operate machinery or equipment. Operator training shall be tailored specifically to an employee's work environment. At a minimum, training will include the following:

- a. The nature of the hazard for each piece of machinery or equipment;
- b. Proper operation and shutdown for each piece of machinery or equipment;



- c. Safety procedures for machinery that requires special set-ups for each tool;
- d. How work will be performed in a safe manner;
- e. The safeguards on the particular machines including, but not limited to; how they provide protection; the hazards for which they are intended; and how to use them; and
- f. What to do if a safeguard is damaged, missing, or unable to provide adequate protection (e.g. contact supervisor).

### 10. References

- 29 CFR 1910.212 – General requirements for all machines
- 29 CFR 1910.213 – Woodworking machinery requirements
- 29 CFR 1910.215 – Abrasive wheel machinery
- 29 CFR 1910.217 – Mechanical power presses
- 29 CFR 1910.219 – Mechanical power-transmission apparatus
- 29 CFR 1910.243 – Guarding of portable powered tools

### 11. Appendix

#### Appendix A – Job Hazard Analysis