Machinery and Machine Guarding Program

Contact: Director of Risk Management

1. Rogue Community College is committed to the safety of all employees regarding the potential exposure to unguarded machinery in the workplace. Rogue Community College is also committed to complying with all applicable federal, state, and local health and safety codes and regulations. To ensure that all affected employees are provided with the necessary information and training, the following Machinery and Machine Guarding Program has been established. All employees of Rogue Community College will participate and comply with all sections of the Machinery and Machine Guarding Program. The written Machinery and Machine Guarding Program will be reviewed, updated, and maintained by the Rogue Community College Risk Management Department. A printed copy of the program is available at the Risk Management office and online at https://web.roguecc.edu/risk-management/campus-occupational-safety.

2. Purpose

    a. The Machinery and Machine Guarding Program was created to protect employees from the hazards associated with machinery by establishing the minimum requirements for machine guarding at RCC and ensuring compliance with all Oregon OSHA requirements.

3. Scope

    a. This Program applies to all Rogue Community College employees and students and covers all machinery, including hand-held equipment, which due to the nature of operation and/or design, possess inherent hazards caused by mechanical motion such as ingoing nip points, rotating parts, flying chips, and sparks. This Program does not apply when:
        i. Rogue Community College does not own the machinery or machine responsible for creating the hazard, and by contract or through actual practice, does not have the authority to correct or mitigate the hazard;
        ii. Sources of hazardous energy, including mechanical motion, have been isolated or controlled in accordance with the Rogue Community College Lockout/Tagout Program.
        iii. Sources of hazardous energy, including mechanical motion, have been isolated for plug-connected equipment by disconnecting the plug and tagging the equipment out of service.

4. Responsibilities

    a. Risk Management

i. Maintain this written program to meet regulatory requirements and periodically review the program to assure it is current.
ii. Provide technical assistance to ensure this program is successfully implemented.
iii. Conduct routine inspections of machine shops to verify that the requirements of this program are being met and provide oversight to ensure any findings are addressed.
iv. Assisting departments with the selection of proper machine guards and personal protection equipment (PPE) for the work.
v. Developing and assisting as necessary with safety training.

b. Department or Program Supervisors
   i. Have overall responsibility for the shop, including equipment maintenance, training, controlling access to hazardous machinery, implementing safety guidelines, and approving authorized operators.
   ii. Be capable of identifying existing and predictable hazards in the shop, which include unsanitary, hazardous, or dangerous conditions in the area, and has the authorization to take prompt corrective measures to eliminate them.
   iii. Be familiar with the safe operation of all shop machines, equipment, and tools.
   iv. Ensure this program is enforced within their areas of responsibility.
   v. Ensure that all machine safeguards are in place and operational.
   vi. Ensure employees follow machine safety operating procedures, including, but not limited to, not bypassing, removing, or defeating machine safeguards.
   vii. Maintain the owner's manuals or instructions for each piece of equipment.
   viii. Ensure shop and/or machine-specific training is provided and documented for shop personnel or machine operators as required by this program.
   ix. Complete a personal protective equipment (PPE) hazard assessment for the shop in coordination with RCC Risk Management.
   x. Ensure that equipment in need of repair or service is taken out of service and that repairs and service are made only by authorized personnel.
   xi. Maintain records such as training, shop safety inspections, and maintenance and repair records.
   xii. Ensure only trained and authorized personnel are permitted to work in the shop.

c. Employee
   i. All employees of Rogue Community College will comply with each area of the Machinery and Machine Guarding Program while employed at Rogue Community College.
   ii. Follow the requirements of this program.
   iii. Operate machines and equipment with all safeguards in place.

iv. Conduct visual pre-operation inspections of machines and equipment to ensure guards are in proper operating condition.
v. Not bypass, remove or defeat safeguards.
vi. Maintain proper housekeeping of work area.
vii. Report all missing or damaged safeguards to the Department or Program Supervisor immediately and not operate any machine or equipment with a missing or defective safeguard.
viii. Participate in required training.
ix. Not operate a machine until properly trained.

5. References

    a. General Industry
        i. Division 2/Subdivision I, Personal Protective Equipment
        ii. Division 2/Subdivision J, General Environmental Controls (Lockout/Tagout)
        iii. Division 2/Subdivision O, Machinery and Machine Guarding
        iv. Division 2/Subdivision P, Hand and Portable Powered Tools

6. Basic Safety Principles

    a. Although this program addresses point-of-operation safeguarding for specific machinery, it is also important to establish and enforce safe work practices when operating and maintaining all types of equipment and machinery. The following list includes basic rules that apply to portable and fixed machinery:
        i. Equipment (parts include blades, bits, sanding belts, dies, grinding stones)
            1. Follow the equipment manufacturer's recommendations.
            2. Use equipment only for the purpose for which its design is intended.
            3. Operate the tool at the speed and tension specified by the manufacturer.
            4. Inspect the equipment visually before use.
            5. Remove unadjusted, defective, cracked, or worn parts from service.
            6. Maintain sharp and clean parts.
            7. When provided, use equipment with an exhaust or dust-collection system.
            8. Use the appropriate size and type of part for the material and cutting action.
            9. Check to see that guards, guides, and counterweights are properly adjusted and operable.
            10. Machines designed for a fixed location shall be securely anchored to prevent walking or moving.

11. Avoid overheating the equipment.
12. Spring-loaded chuck keys shall be used with all drill presses and lathes.
13. Safeguards removed during repair or preventative maintenance shall be replaced before equipment is returned to service. Equipment with removed safeguards shall be locked and tagged in accordance with the RCC Lockout/Tagout Program.
14. All machines equipped with emergency stop (e-stop) buttons shall have the e-stops located in close proximity (within the operator's reach) to the machine operator and be red in color with a yellow background.

ii. Work practices

1. Only trained and competent personnel are permitted to utilize machine shop equipment and tools.
2. When students are present within a shop, the course instructor or supervisor shall be present at all times to ensure all tools and equipment are used properly.
3. Machine shops shall be secured when the shop supervisor or designee is not in the shop.
4. It is recommended that there are a minimum of 2 (two) personnel present in shops when equipment is in use.
5. Use only tools you can control easily.
6. Make sure hands are kept at a safe distance.
7. Follow safe procedures as outlined in the operator's manual.
8. Always wear eye and face protection and other appropriate personal protective equipment.
9. Do not wear loose clothing or long hair that may become entangled.
10. Check to see that power cords are kept away from the line of cut and other moving parts.
11. Follow proper lockout/tagout procedures during service and repair.
12. Never defeat the guard to expose the blade.
13. Never reach under the saw, workpiece, or any place you can't see clearly.
14. Direct the operation away from your body.
15. When guarding or other engineering controls are not feasible or are not fully capable of protecting the operator, consult with Risk Management for potential administrative or personal protective equipment controls.
16. The use of compressed air to clean equipment shall utilize air nozzles that, upon dead-ending the exit orifice, the static pressure is reduced to less than 30 psi. Use of compressed air for cleaning

is only permitted when there are chip guards and when PPE is used by the operator and other personnel in the area.

17. Compressed air shall never be used for cleaning personnel or their clothing.

iii. Work environment

1. Practice good housekeeping – avoid crowded, cluttered conditions.
2. Make sure combustible or flammable material is located away from spark-producing operations.
3. Provide adequate ventilation to reduce dust and other air contaminants.
4. Monitor noise levels and provide hearing protection when necessary.

7. General Requirements for all Machines

a. Machine guarding.

i. Types of guarding. One or more methods of machine guarding shall be provided to protect the operator and other employees in the machine area from hazards such as those created by point of operation, ingoing nip points, rotating parts, flying chips, and sparks. Examples of guarding methods are – barrier guards, two-hand tripping devices, electronic safety devices, etc.

ii. Guards shall be affixed to the machine where possible and secured elsewhere if for any reason attachment to the machine is not possible. If the guards cannot be affixed to the machine, please contact RCC Risk Management.

iii. The guard shall be such that it does not offer an accident hazard in itself.

iv. The guard shall prevent operator contact with the hazard by enclosing it or otherwise preventing access to the hazard by reaching over, under, around, or through a guard.

v. The guards shall be constructed of durable material that will withstand normal conditions of use.

vi. The guards shall protect objects from falling into the machine's moving parts.

vii. The guards shall allow for safe lubrication and maintenance of equipment.

viii. Point of operation guarding.

1. Point of operation is the area on a machine where work is actually performed upon the material being processed.
2. The point of operation of machines whose operation exposes an employee to injury shall be guarded. The guarding device shall be in conformity with any appropriate standards therefore, 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.

3. Special hand tools for placing and removing material shall be such as to permit easy handling of material without the operator placing a hand in the danger zone. Such tools shall not be in lieu of other guarding required by this section but can only be used to supplement protection provided.
4. All foot-operated switches shall be guarded to prevent accidental activation by personnel or falling objects.
5. The following are some of the machines which usually require point of operation guarding:
    a. Guillotine cutters.
    b. Shears.
    c. Alligator shears.
    d. Power presses.
    e. Milling machines.
    f. Power saws.
    g. Jointers.
    h. Portable power tools.
    i. Forming rolls and calendars.

ix. Barrels, containers, and drums. 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.

x. Exposure of blades. When the periphery of the blades of a fan is less than seven (7) feet above the floor or working level, the blades shall be guarded. The guard shall have openings no larger than one-half (1/2) inch.

xi. Routine Machine Guarding Checks
    1. Machinery and equipment shall be visually checked before each operation to verify that the guards are in place and that sensing devices and interlocks, if available, are functioning properly and have not been bypassed, removed, or otherwise not functional.
    2. Missing guards or defective safeguards shall be corrected immediately or the machines taken out of service until corrections are completed.

xii. Anchoring fixed machinery. Machines designed for a fixed location shall be securely anchored to prevent walking or moving.

8. Hand and Power Tools
    a. Exposed moving parts of power tools shall be safeguarded. This includes belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains or other moving parts.

b. Safeguards shall never be removed when a tool is being used.
c. Bench, pedestal and portable grinders:
    i. Bench and pedestal grinders shall have a work rest adjusted no greater than ⅛ inch away from the grinding wheel.
    ii. Tongue guards shall be no greater than ¼ inch from the grinding wheel.
    iii. Wheels mounted on abrasive wheel tools shall be inspected prior to mounting. This includes conducting a ring test on bench and pedestal grinder wheels. Instructions can be found at the following link: ring test.
    iv. When mounting a wheel, always ensure that the grinder speed does not exceed the maximum operating speed marked on the wheel.
d. Electric power tools are to be effectively grounded or be double insulated.
e. Hand and power tools shall be in good operating condition, free from defects or broken parts.
f. Power tools shall be unplugged before performing service such as blade replacement, grinding wheel replacement, etc.
g. Ground Fault Circuit Interrupter (GFCI) shall be used for electric power tools that could potentially be used in a wet environment.
h. Extension cords are not allowed to be used as permanent fixtures.
    i. There is a 90-day limit for the use of an extension cord.
    ii. Extension cords shall be inspected prior to use.
    iii. Ground Fault Circuit Interrupter (GFCI) shall be used with all extension cords servicing hand tools.

9. Other Requirements

a. Shop layout and machinery placement shall not interfere with clear access to emergency exits or emergency equipment such as fire extinguishers or electrical disconnects. Machinery shall be positioned so that a clear and safe operating area is maintained for each machine.
b. In addition to the basic safeguarding requirements specified within the Basic Safeguarding section above, all machines and safeguards must also meet any applicable mandatory and non-mandatory machine-specific guarding requirements specified within 29 CFR 1910.213, 215, 217, 219 and 243. All of which were adopted by reference by Oregon OSHA.
    i. For specific woodworking machinery requirements, refer to 29 CFR 1910.213.
    ii. For abrasive wheel machinery requirements, refer to 29 CFR 1910.215.
    iii. For mechanical power press requirements, refer to 29 CFR 1910.217.
    iv. For mechanical power transmission apparatus, refer to 29 CFR 1910.219.
    v. For portable power tool requirements, refer to 29 CFR 1910.243

10. Training
    a. Department and Program Supervisors are responsible for ensuring that employees understand the requirements of this program and that employees are trained to recognize general machine-guarding hazards. Training shall include at a minimum:
        i. A description and identification of the specific hazard(s) associated with particular machines.
        ii. 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.
        iii. How and under what circumstances safeguards can be removed, and
        iv. What to do when a safeguard is damaged, missing, or unable to perform adequate protection.
        v. Maintenance personnel must be trained in knowing which machines can be serviced while running and which ones need to be de-energized.
    b. Training shall be provided to all new operators or when any new or altered safeguards are put in service for equipment-driven machines or the process presents a new hazard or change in procedures.

11. Machine Guarding Assessments

    a. Prior to using a machine or tool, the Department or Program Supervisor shall visually ensure each machine guard, e-stop (if so equipped), and other safety devices are present and functioning properly. If these safety devices are missing or not working, the tool or machine shall be immediately taken out of service and not used until proper repairs have been made.
    b. Machine guarding safety reviews shall be conducted routinely by the Department or Program Supervisor. These are to evaluate machine and equipment safeguarding. Each review should include the following:
        i. Confirmation that machine guards and safety devices currently in use are sufficient to protect the operator from hazards.
        ii. If necessary, the development of an action list identifying safeguarding needs by machine, actions planned to address the needs, a timetable for resolution, and person(s) responsible.
    c. Risk Management shall conduct semi-annual shop assessments of each shop to review machine guarding.

12. Motions and Actions Hazards
    a. A wide variety of mechanical motions and actions may present hazards to the employee. These can include the movement of rotating members, reciprocating arms, moving belts, meshing gears, cutting teeth, and any movements that impact or shear. The different types of hazardous mechanical motions and actions are present in varying degrees for nearly all machines, and recognizing

them is the first step towards protecting the employee. The basic types of hazards are divided between mechanical motions and actions.

b. Motions
    i. Rotating motion: rotating shafts can grip hair and clothing and can force the hand and arm into a dangerous position. The danger increases when projections such as set screws, bolts, nicks, abrasions, projecting keys, or set screws are exposed on rotating parts. Collars, couplings, cams, clutches, flywheels, shafts ends, spindles, meshing gears, and horizontal or vertical shafting are some examples of common rotating mechanisms which may be hazardous.
    ii. In-running nip point: hazards are caused by the rotating parts on machinery. There are three main types of in-running nip points:
        1. Parts can rotate in opposite directions while their axes are parallel to each other. These parts may be in contact or in close proximity. Examples include: rolling mills, gears, and calenders.
        2. Nip points are also created between rotating and tangentially moving parts. Some examples would be the point of contact between a power transmission belt and its pulley, a chain and a sprocket, and a rack and pinion.
        3. Nip points can occur between rotating and fixed parts which create a shearing, crushing, or abrading action. Examples are spoked hand-wheels or flywheels, screw conveyors, or the periphery of an abrasive wheel and an incorrectly adjusted work rest and tongue.
    iii. Reciprocating motions: may be hazardous because, during the back-and-forth or up-and-down motion, a worker may be struck by or caught between a moving and a stationary part.
    iv. Transverse motion: creates a hazard because an employee may be stuck or caught in a pinch or shear point by the moving part. This refers to movement in a straight and continuous line. An example is a stationary belt sander.

c. Actions
    i. Cutting action: may involve rotating, reciprocating, or transverse motion. The danger of cutting action exists at the point of operation where finger, arm, and body injuries can occur and where flying chips or scrap material can strike the head, particularly in the area of the eye or face. Such hazards are present at the point of operation in cutting materials.
    ii. Punching action: results when power is applied to a slide (ram) for the purpose of blanking, drawing, or stamping metal or other materials. The danger of this type of action occurs at the point of operation where stock is inserted, held, and withdrawn by hand. Typical machines used for punching operations are power presses and ironworkers.
    iii. Shearing action: involves applying power to a slide or knife in order to trim or shear metal or other materials. A hazard occurs at the point of

operation where stock is actually inserted, held, and withdrawn. Examples of machines used for shearing operations are mechanically, hydraulically, or pneumatically powered shears.

iv. Bending action: results when power is applied to a slide in order to draw or stamp metal or other materials. A hazard occurs at the point of operation where stock is inserted, held, and withdrawn. Equipment that uses bending action include power presses, press brakes, and tubing benders.

13. Document Retention
    a. All training and inspections records produced by Risk Management will be maintained by the Risk Management Department. All other records will be maintained by the department that controls the machinery.

14. Definitions

    a. Emergency Stop – A hardwired stop that is generally accessible to employees in their work area and is designed to cut off power to the machine or process when activated.
    b. Ground Fault Circuit Interrupter (GFCI) – A fast-acting circuit breaker designed to shut off electric power in the event of a ground fault within as little as 1/40 of a second. It works by comparing the amount of current going to and returning from equipment along the circuit conductors.
    c. Hazards – Mechanical, electrical, and/or physical conditions that could cause harm to employees or other personnel in the vicinity of machinery or equipment. Mechanical Hazards include rotational motion, nip points, cutting, shearing, punching, and forming mechanisms.
    d. Interlock – An arrangement in which the operation of one part or mechanism automatically brings about or prevents the operation of another. Interlocks shall be durable, not easily bypassed, and shall stop all hazardous motion before employee interaction.
    e. Machine Guards – Physical structures or electrical systems used to prevent access during machinery or equipment operation. This includes barrier guards, two-hand trip mechanisms, and electronic safety devices.
    f. Nip Point – An in-running machine or equipment part, in which two in-running parts rotate towards each other, or where one part rotates toward a stationary object.
    g. Point of Operation – The point at which cutting, shaping, or forming is accomplished upon the stock, including the hazards associated with inserting and manipulating the stock.
    h. Safeguard – Term for a number of measures that provide workers with effective protection from harmful contact with moving parts or other harmful conditions. Safeguards include barrier guards, safety devices, shields, awareness barriers, warning signs, or other appropriate means, used singly or in combination.

i. Safeguarding Device – Devices used as alternatives to barrier guards, such as interlocked movable barrier guards, two-hand controls, and electronic presence-sensing devices such as light curtains and pressure-sensitive mats. These solutions are more complex and technical but are designed to provide protection during normal operation.