ALGONQUIN COLLEGE | Occupational Health and Safety

MACHINE GUARDING PROGRAM

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Table of Contents

1.0 Purpose 4
1.1 Document Authority 4
2.0 Scope 4
3.0 References 4
3.1 Legislation 4
3.2 Standards 4
3.3 Guidance Documents 5
3.4 Related Algonquin College Documents 5
4.0 Definitions 5
5.0 Role and Responsibilities 6
5.1 Senior Leadership 6
5.2 Managers, Supervisors, and Instructors 6
5.3 Workers 6
5.4 Students 6
5.5 Occupational Health and Safety 7
5.6 Joint Health and Safety Committee 7
5.7 Contractors 7
6.0 General Program Requirements 7
6.1 Hazard Identification 7
6.2 Machine Guarding 8
6.3 Types of Safeguarding 8
6.4 Operational Safety 9
6.5 Inspection, Maintenance, and Repair 9
6.6 Signage and Labeling 10
7.0 Training and Education 10
7.1 Operator Training 10
7.2 Training Responsibilities 11
7.3 Refresher Training 11
8.0 Documentation 11
9.0 Program Review 12
10.0 Appendices 12
10.1 Appendix A: Machine Hazard Assessment Guide 13
10.2 Appendix B: Examples of Safeguarding Methods 14
10.3 Appendix C: Machine Guarding Inspection Checklist 15
10.4 Appendix D: Safe Operating Procedure Template 16
10.5 Appendix E: Machine Hazard Recognition Guide 18

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1.0 Purpose

The purpose of this program is to establish the minimum requirements for safeguarding, inspection, operation, and maintenance of machinery and equipment at Algonquin College to prevent injuries associated with moving parts and hazardous mechanical motion.

This program provides a framework for identifying machine hazards, implementing appropriate safeguarding measures, defining roles and responsibilities, and promoting the safe use of machinery in accordance with applicable legislation, recognized standards, and industry best practices.

1.1 Document Authority

This Program is established under the authority of Algonquin College Occupational Health and Safety and forms part of the College's Occupational Health and Safety Management System (OHSMS).

The Program supports the College's commitment to providing a safe and healthy workplace and learning environment and is developed in accordance with applicable occupational health and safety legislation, regulations, recognized standards, and College policies and procedures.

Where applicable legislation establishes a more stringent requirement than this program, the legislative requirements shall apply.

2.0 Scope

This Program applies to all Algonquin College employees, students, contractors, volunteers, and other individuals who operate, maintain, service, inspect, or work in proximity to machinery or equipment with hazardous mechanical motion while engaged in college activities.

This Program applies to machinery and equipment located in teaching, research, maintenance, and operational environments where workers or other individuals may be exposed to hazards associated with moving parts, points of operation, power transmission components, or other mechanical hazards.

This Program establishes the minimum requirements for the identification of machine hazards, the implementation of safeguarding measures, safe operation, inspection, maintenance, and the management of machinery throughout its lifecycle.

3.0 References

3.1 Legislation

This program is developed in accordance with applicable Ontario occupational health and safety legislation, including but not limited to:

- Occupational Health & Safety Act (OHSA)
- Regulation 851 – Industrial Establishments, ss.24-32, 75-76 (where applicable)
- Workplace Safety and Insurance Act 1997

3.2 Standards

Machinery and equipment shall be safeguarded, operated, inspected, and maintained in accordance with applicable Canadian Standards Association (CSA) Standards, International Organization for Standardization (ISO) Standards, and other recognized standards, including but not limited to:

- CSA Z432 – Safeguarding of Machinery

- CSA Z460 – Control of Hazardous Energy – Lockout and Other Methods
- ISO 12100 – Safety of Machinery – General Principles for Design – Risk Assessment & Risk Reduction
- Other applicable CSA, ISO, or recognized standards relevant to the work being performed.

3.3 Guidance Documents

The following guidance documents may be consulted to assist in the safe operation, safeguarding, inspection, and maintenance of machinery and equipment:

- Canadian Centre for Occupational Health and Safety (CCOHS)
- Workplace Safety and Prevention Services (WSPS)
- Manufacturer instructions and recommendations
- Equipment manuals and operating instructions, where applicable

3.4 Related Algonquin College Documents

This Program should be read in conjunction with other applicable College occupational health and safety programs, procedures, and standards, including but not limited to:

- PPE Program PPE-01
- Electrical Safety Program ES-01
- Lockout/Tagout Program LTO-01
- Hazard Assessment Procedure
- Incident Reporting Procedure (where applicable)
- Contractor Safety Program (where applicable)
- Workplace Inspection Procedure(s)

4.0 Definitions

For the purpose of this program, the following definitions apply:

Guard - A physical barrier or protective device designed to prevent access to hazardous moving parts or other mechanical hazards associated with machinery or equipment.

Hazardous Mechanical Motion - Any movement of machinery or equipment that has the potential to cause injury through contact, entanglement, crushing, cutting, shearing, striking, or drawing-in.

In-Running Nip Point/Pinch Point - A location where two or more machine components move together, or where a moving component passes a stationary object, creating a hazard capable of drawing in or crushing body parts, clothing, or other objects.

Interlock - A mechanical, electrical, pneumatic, hydraulic, or electronic device that prevents a machine from operating, or stops machine operation, when a guard or protective device is opened, removed, or otherwise compromised.

Machine Guard - A physical barrier, enclosure, device, or other engineered safeguard designed to prevent access to hazardous areas of machinery during operation.

Point of Operation - The area of a machine where work is performed on the material and where a worker may be exposed to a hazard during operation.

Qualified Person(s) - An individual who possesses the knowledge, training, and experience necessary to safely perform assigned work and identify potential hazards associated with machinery or equipment.

Safeguarding - The use of guards, devices, awareness measures, safe work practices, and other protective measures to prevent exposure to hazardous mechanical motion or other machine-related hazards.

Safeguarding Device - A control, sensor, interlock, or other protective device designed to reduce the risk of injury by preventing access to, or stopping exposure to, hazardous mechanical motion.

5.0 Role and Responsibilities

The successful implementation of this program requires the participation and cooperation of all individuals who work, study, supervise, teach, maintain, or otherwise interact with machinery and equipment at Algonquin College. The following roles and responsibilities establish the minimum expectations for supporting the safe operation and safeguarding of machinery across the College.

5.1 Senior Leadership

- Provide leadership and support for the implementation of this Program.
- Ensure appropriate resources are available to support machine safeguarding.
- Promote compliance with applicable legislation, standards, and College requirements.

5.2 Managers, Supervisors, and Instructors

Managers, supervisors, and instructors who oversee activities involving machinery and equipment are responsible for:

- Ensure workers and students receive appropriate instruction, training, and supervision before operating machinery.
- Ensure machinery under their authority is appropriately safeguarded and maintained.
- Ensure hazard assessments are completed where required.
- Ensure workers receive appropriate instruction and training.
- Address identified machine guarding deficiencies in a timely manner.
- Prevent the use of machinery that presents an unacceptable risk to health and safety.

5.3 Workers

- Follow this Program and applicable safe work procedures.
- Use machinery only when authorized and appropriately trained.
- Do not remove, bypass, or modify machine guards or safeguarding devices unless authorized as part of maintenance or servicing activities.
- Inspect machinery before use and report hazards, defects, or damaged safeguards.
- Report incidents, near misses, and unsafe conditions.

5.4 Students

- Follow instructor’s direction and all applicable College safety requirements.
- Operate machinery only after receiving the required instruction, training, and authorization.

- Use machinery only for its intended purpose and in accordance with established procedures.
- Immediately report damaged or missing guards, equipment defects, incidents, near misses, and unsafe conditions to their instructor or supervisor.
- Never remove, defeat, bypass, or interfere with machine guards or safeguarding devices.

5.5 Occupational Health and Safety

- Develop and maintain the Program.
- Provide guidance.
- Support hazard assessments.
- Monitor implementation.
- Assist with investigations and continuous improvement.

5.6 Joint Health and Safety Committee

- Participate in workplace inspections.
- Review hazards and recommendations.
- Promote continuous improvement.

5.7 Contractors

- Comply with this Program.
- Ensure employees follow safeguarding requirements.
- Maintain machinery brought onto college property.
- Report hazards immediately.

6.0 General Program Requirements

The following requirements establish the minimum expectations for the safe management of machinery and equipment at Algonquin College. They outline the requirements for identifying machine hazards, implementing appropriate safeguarding measures, ensuring the safe operation and maintenance of machinery, and supporting the prevention of injuries associated with hazardous mechanical motion.

6.1 Hazard Identification

Machinery and equipment shall be assessed to identify hazards that may expose workers, students, contractors, or other individuals to injury. Hazard identification shall be conducted throughout the lifecycle of machinery, including procurement, installation, operation, maintenance, modification, and decommissioning, to ensure appropriate safeguarding and risk controls are implemented.

Requirements:

- Machinery and equipment shall be assessed to identify actual and potential mechanical hazards prior to being placed into service.
- Hazard identification shall consider the machine's intended use, foreseeable misuse, operating environment, and individuals who may be exposed.

- Appropriate risk assessments shall be completed where required to determine the necessary safeguarding and risk control measures.
- Hazard identification shall be reviewed whenever machinery is installed, modified, relocated, repaired, or following an incident or significant change in operation.
- Identified hazards shall be addressed through the implementation of engineering controls, safeguarding measures, administrative controls, or other appropriate risk reduction strategies.

Hazard assessments shall be completed to identify hazards associated with machinery and equipment. See **Appendix A – Machine Hazard Assessment Guide.**

6.2 Machine Guarding

Machine guarding is a fundamental control measure used to prevent exposure to hazardous mechanical motion and reduce the risk of injury. Machinery and equipment shall be provided with appropriate safeguarding that is selected, installed, maintained, and used in accordance with applicable legislation, recognized standards, manufacturer requirements, and the nature of the work being performed.

Requirements:

- Machinery and equipment shall be equipped with appropriate guards or safeguarding devices to prevent access to hazardous mechanical motion during normal operation.
- Machine guards and safeguarding devices shall be securely installed, properly maintained, and kept in effective working condition.
- Machine guards and safeguarding devices shall not be removed, bypassed, modified, or rendered ineffective except where authorized maintenance, servicing, adjustment, or testing activities require their temporary removal and appropriate alternative control measures have been implemented.
- Machinery shall not be operated where required guards or safeguarding devices are missing, damaged, or otherwise ineffective.
- Deficiencies involving machine guards or safeguarding devices shall be reported promptly and corrected before the equipment is returned to service.
- Safeguarding measures shall be appropriate for the hazards presented by the machinery and shall not create additional hazards or unnecessarily interfere with the safe operation of the equipment.
- **Machine guarding requirements shall be reviewed whenever machinery is modified or a change may affect the effectiveness of existing safeguarding.**

Examples of common safeguarding methods are provided in **Appendix B – Examples of Safeguarding Methods**

6.3 Types of Safeguarding

Machinery and equipment may require different safeguarding methods depending on the hazards present, the operation being performed, and the characteristics of the equipment. Safeguarding shall be selected based on the results of the hazard assessment and shall provide effective protection without introducing additional hazards or interfering with the safe operation of the machinery.

6.3.1 Fixed Guards

Fixed guards shall be used where practical to prevent access to hazardous mechanical motion and shall remain securely fastened during normal machine operation.

6.3.2 Interlocked Guards

Where access to hazardous areas is required during normal operation, interlocked guards shall prevent machine operation or hazardous motion when the guard is opened or removed.

6.3.3 Adjustable and Self-Adjusting Guards

Adjustable or self-adjusting guards shall be maintained in accordance with manufacturer requirements and adjusted as necessary to provide effective protection for the work being performed.

6.3.4 Safeguarding Devices

Safeguarding devices, including presence-sensing devices, two-hand controls, or other protective systems, may be used where appropriate to reduce the risk of exposure to hazardous mechanical motion.

6.3.5 Alternative Safeguarding Measures

Where conventional machine guards are not reasonably practicable, alternative safeguarding measures shall be implemented based on a documented hazard assessment and in accordance with applicable legislation, recognized standards, and manufacturer requirements. **Alternative safeguarding measures shall be approved by the appropriate department prior to implementation.**

6.4 Operational Safety

The safe operation of machinery requires that equipment be used only as intended and in accordance with manufacturer's requirements, applicable procedures, and the training provided. Workers and students shall operate machinery in a manner that protects themselves and others from exposure to hazardous mechanical motion and other associated hazards. *Safe operating procedures shall identify any clothing, personal protective equipment, or personal conduct requirements necessary for the safe operation of specific machinery.*

Requirements:

- Machinery shall only be operated by individuals who have received the required instruction, training, and authorization, where applicable.
- Machinery shall be used only for its intended purpose and in accordance with manufacturer instructions and applicable College procedures.
- **Operators shall conduct a visual inspection of machinery and safeguarding prior to use and shall not operate equipment where defects or unsafe conditions may affect safe operation.**
- Safe operating procedures shall always be followed, including the use of required personal protective equipment.
- Machine guards and safeguarding devices shall remain in place and functional during operation unless their temporary removal is required for authorized maintenance or servicing activities and appropriate alternative control measures have been implemented.
- Work areas surrounding machinery shall be maintained in a condition that supports safe operation and does not introduce additional hazards.
- Machinery shall be shut down and removed from service where conditions present an immediate risk to the health or safety of workers, students, or others.

Departments shall develop equipment-specific safe operating procedures. A sample template is provided in **Appendix D – Safe Operating Procedure Template.**

6.5 Inspection, Maintenance, and Repair

Machine guards and safeguarding devices require ongoing inspection, maintenance, and repair to ensure they remain effective throughout the lifecycle of the equipment. Inspection and maintenance activities shall be performed in accordance with manufacturer requirements, applicable College procedures, and recognized safe work practices to maintain the integrity of safeguarding systems.

Requirements:

- Inspection, maintenance, and repair activities shall only be performed by individuals who are authorized and competent to perform the work.
- Machine guards and safeguarding devices shall be inspected and maintained to ensure they remain securely installed, functional, and capable of providing effective protection.
- Damaged, defective, or missing machine guards and safeguarding devices shall be repaired or replaced before the machinery is returned to service.
- **Maintenance, repair, or adjustment activities that expose individuals to hazardous energy shall be performed in accordance with the College's Lockout/Tagout Program.**
- Following inspection, maintenance, repair, or modification, machine guards and safeguarding devices shall be verified to ensure they are correctly installed and functioning as intended before the equipment is returned to service.
- **Inspection and maintenance records shall be maintained where required by legislation, manufacturer requirements, or College procedures.**

6.6 Signage and Labeling

Signage and labelling support the safe operation of machinery by communicating hazards, operational restrictions, and safety information to individuals who may be exposed to hazardous mechanical motion. Appropriate signage and labelling shall be maintained where required to supplement safeguarding measures and promote safe work practices. Safety signage shall be consistent with applicable legislation, recognized standards, manufacturer's requirements, and College requirements.

Requirements:

- Safety signs and labels shall be provided where necessary to communicate machine hazards, operational restrictions, or other safety information.
- Manufacturer-supplied safety labels shall not be removed, altered, or obscured unless replaced with equivalent information.
- Temporary signage shall be used where necessary to communicate hazards associated with machinery that is out of service, undergoing maintenance, or otherwise unavailable for normal operation.

7.0 Training and Education

Effective machine guarding depends on individuals understanding the hazards associated with machinery, the purpose and limitations of safeguarding measures, and the safe operation of equipment. Training and education shall be provided to ensure workers, students, and other applicable individuals possess the knowledge and competencies necessary to safely perform activities involving machinery and equipment.

7.1 Operator Training

Individuals who operate, inspect, maintain, repair, or otherwise work with or around machinery shall receive instruction and training appropriate to the hazards and activities associated with their assigned work. Training shall be provided before individuals perform work involving machinery and equipment.

Requirements:

- Individuals shall not operate, inspect, maintain, repair, or service machinery unless they have received the required instruction, training, and authorization, where applicable.
- Training shall be appropriate to the machinery, equipment, hazards, and work activities being performed.

- Training shall include, as applicable:
    - machine hazards;
    - safeguarding measures and their purpose;
    - safe operating procedures;
    - required personal protective equipment;
    - reporting hazards, defects, and incidents; and
    - emergency procedures applicable to the equipment or work area.

7.2 Training Responsibilities

Managers, supervisors, instructors, and other individuals responsible for overseeing work involving machinery shall ensure that training requirements are implemented and that individuals possess the knowledge and competencies necessary to safely perform their assigned activities.

Requirements:

- Training shall be provided by individuals who are competent in the subject matter being delivered.
- Individuals shall demonstrate competency, where required, before independently operating, inspecting, maintaining, repairing, or servicing machinery.
- Additional instruction or supervision shall be provided where an individual's competency has not yet been demonstrated.
- Training requirements shall be reviewed whenever changes to machinery, safeguarding methods, work activities, or procedures may affect the safe operation of equipment.

7.3 Refresher Training

Refresher training supports the continued safe operation of machinery by reinforcing existing knowledge and addressing changes that may affect safe work practices. Additional training shall be provided whenever necessary to maintain competency.

Requirements:

- New machinery or equipment is introduced;
- Existing machinery or safeguarding is modified;
- Safe operating procedures are revised;
- Legislation or applicable standards change;
- Deficiencies in knowledge, competency, or safe work practices are identified;
- An incident, near miss, or workplace inspection identifies the need for additional instruction.

8.0 Documentation

Documentation supports the implementation, administration, and continual improvement of the Machine Guarding Program. Records shall be created, maintained, and retained in accordance with applicable legislation, College procedures, and record retention requirements.

- Documentation required under this program shall be maintained in accordance with applicable legislation and College procedures.

- Documentation shall be accurate, current, and readily accessible to authorized individuals, where required.
- Records shall be retained in accordance with applicable College record retention requirements.

9.0 Program Review

This program shall be reviewed periodically to ensure it remains effective, current, and aligned with applicable legislation, recognized standards, College operations, and organizational objectives. Program reviews support the continual improvement of the College's Occupational Health and Safety Management System.

- This program shall be reviewed at intervals determined by the College, or more frequently where required by legislative, operational, or organizational changes.
- The program shall be reviewed following significant legislative or regulatory changes, changes to applicable standards, significant operational changes, or where incidents, investigations, inspections, audits, or other findings identify the need for revision.
- Program reviews shall consider opportunities to improve the effectiveness, clarity, and practical implementation of program requirements.

10.0 Appendices

Appendices provide supporting guidance, tools, templates, and reference material to assist with the implementation of this program. Appendices do not establish additional program requirements but are intended to support the consistent application of the requirements outlined in this document.

Appendices can be found on the next pages.

10.1 Appendix A: Machine Hazard Assessment Guide

MACHINE/EQUIPMENT HAZARD ASSESSMENT GUIDE

Purpose:

This guide is intended to assist departments in identifying hazards associated with machinery and equipment and selecting appropriate control measures. It should be used when introducing new equipment, modifying existing equipment, developing or reviewing Safe Operating Procedures (SOPs), or reassessing machine-related hazards.

Consider the Task

When assessing the machinery/equipment, consider:

- What tasks will be performed?
- Who will operate the machinery/equipment?
- Who else may be exposed?
- Is the machinery/equipment used routinely or only occasionally?
- Are there non-routine activities involved? (cleaning, maintenance, adjustments, etc)

Identify Machine Hazards

Consider whether the machinery/equipment presents hazards such as:

- Rotating or moving parts
- In-running nip points/pinch points
- Cutting, shearing, crushing, entanglement
- Flying objects or ejected materials
- Stored energy
- Electrical
- Hot or cold surfaces
- Noise or vibration
- Dust, fumes, or other airborne contaminants
- Ergonomic
- Slips, trips, falls
- Other:_____

Evaluate Existing Controls

Consider whether:

- Machine guards are appropriate and in good condition
- Safeguarding devices are suitable for the task
- Emergency stop devices are accessible and functional
- Warning signs and labels are present and legible
- Required PPE has been identified and is available
- Safe operating procedures have been developed
- Operators have received appropriate training
- Housekeeping practices support safe operation

Determine Additional Risk Controls

Where hazards remain, consider:

- Elimination
- Substitution
- Engineering controls
- Administrative controls
- Personal Protective Equipment

Review and Reassessment

Reassess the hazard assessment when:

- New machinery/equipment is introduced
- Existing machinery/equipment is modified
- Safeguarding is changed
- Operating procedures are revised
- An incident or near miss occurs
- New hazards are identified

Related Resources

Where applicable, refer to:

- Machine Guarding Program
- Safe Operating Procedure (SOP)
- Lockout/Tagout Program
- Personal Protective Equipment Program (PPE)
- Hazard Assessment Procedure

10.2 Appendix B: Examples of Safeguarding Methods

Purpose:

This appendix provides examples of common safeguarding methods that can be used to reduce the risk of injury from machinery and equipment. The examples are provided for guidance only. Safeguarding methods should be selected based on the hazards identified during the machine hazard assessment and the requirements of applicable legislation, recognized standards, and manufacturer instructions.

Safeguarding Method	Typical Applications	Common Examples
Fixed Guard	Machinery with exposed moving parts that do not require routine operator access	Belt drives, pulleys, flywheels, conveyors
Interlocked Guard	Equipment requiring access during operation or maintenance	CNC machines, laser cutters, automated equipment
Adjustable Guard	Equipment processing materials of varying sizes	Band saws, grinders, routers
Self-Adjusting Guard	Equipment where the guard automatically adjusts to the workpiece	Table saws, circular saws, jointers
Presence-Sensing Device	Automated or powered equipment where access to the hazard zone must stop hazardous motion	Power presses, robotic cells, automated manufacturing equipment
Two-Hand Control	Equipment requiring the operator's hands to remain clear during hazardous motion	Mechanical presses, hydraulic presses
Barrier/Fencing	Restricted access around hazardous machinery or automated presses	Robotic cells, automated production equipment, material handling systems

The safeguarding methods identified above are examples only and are not intended to represent all safeguarding solutions. Appropriate safeguarding shall be selected based on the hazards identified during the machine hazard assessment, applicable legislation, recognized standards, manufacturer instructions, and the intended use of the equipment.

10.3 Appendix C: Machine Guarding Inspection Checklist

MACHINE GUARDING INSPECTION CHECKLIST

This checklist is intended to assist departments in conducting routine inspections of machinery and equipment to verify that safeguarding measures remain effective and equipment is safe to operate. Departments may modify this checklist to reflect equipment-specific requirements.

General Information:

Machinery/Equipment:_____ Inspected By:_____
Location:_____Department:_____ Date:_____

Guarding:

- ☐ Guards are installed and securely fastened
- ☐ Guards are free from damage or excessive wear
- ☐ Guards have not been removed or modified
- ☐ Interlocks (where applicable) functioning properly
- ☐ Access panels and barriers operate correctly

Condition:

- ☐ Emergency stop devices are accessible
- ☐ Controls are functioning correctly
- ☐ Warning labels and signage are present/legible
- ☐ No visible damage affecting safe operation
- ☐ Equipment appears properly maintained

Work Area:

- ☐ Work area is clean and free of unnecessary materials
- ☐ Adequate lighting is available
- ☐ Housekeeping does not create additional hazards
- ☐ Required PPE has been identified and made available

Documentation and Training:

- ☐ Safe Operating Procedure is available and has been reviewed by all participating persons
- ☐ Operators have received required training
- ☐ Inspection deficiencies have been reported

Corrective Actions:

Observed Deficiencies: _____

_____

_____

_____

Corrective Actions Taken: _____

_____

_____

_____

Equipment Removed from Service:

- ☐ Yes
- ☐ No

Inspected by: _____

Signature:_____

Date:_____

10.4 Appendix D: Safe Operating Procedure Template

SAFE OPERATING PROCEDURE

This template is provided as guidance to assist departments in developing equipment-specific safe operating procedures. Departments may adapt the template as necessary to address the hazards, operational requirements, and manufacturer instructions applicable to the equipment.

Equipment Information:

Equipment Name:_____ **Manufacturer:**_____

Model:_____ **Location:**_____ **Department:**_____

Purpose:

Describe the intended use of the machinery/equipment and the activities this procedure applies to.

_____

_____

_____

Hazards:

Identify the hazards associated with operating the machinery/equipment.

- ☐ Rotating or moving parts
- ☐ Pinch points
- ☐ Flying debris
- ☐ Sharp edges
- ☐ Electrical
- ☐ Noise
- ☐ Dust
- ☐ Hot surfaces
- ☐ Stored energy
- ☐ Other:_____

Required PPE:

Identify the PPE required before operating the machinery/equipment.

- ☐ Safety glasses
- ☐ Face shield
- ☐ Hearing protection
- ☐ Protective footwear
- ☐ Gloves
- ☐ Respiratory protection
- ☐ Clothing/skin protection
- ☐ Other:_____

Authorization and Training Requirements:

List any prerequisites before operating machinery/equipment.

_____

_____

Pre-Use Inspection:

Before operation, verify:

- ☐ Guards are in place
- ☐ Emergency stop is functioning
- ☐ Equipment is free of visible damage
- ☐ Work area is clean
- ☐ Required PPE is available and in use
- ☐ No defects affecting safe operation

SAFE OPERATING PROCEDURE (continued)

Operating Procedure:

List all steps required to safely operate the machinery/equipment.

Step 1: _____
_____
_____

Step 2: _____
_____
_____

Step 3 : _____
_____
_____

Step 4: _____
_____
_____

Step 5: _____
_____
_____

Step 6: _____
_____
_____

Shutdown Procedure:

List all steps required to safely shut down the machinery/equipment.

Step 1: _____
_____
_____

Step 2: _____
_____
_____

Step 3: _____
_____
_____

Step 4: _____
_____
_____

Emergency Procedures:

Describe actions to be taken in the event of emergencies such as malfunction, guard failure, injury, emergency shutdown, fire, etc.

_____
_____
_____
_____

Lockout/Tagout Requirements:

If maintenance, servicing, adjustment, or repair exposes individuals to hazardous energy, refer to the College's Lockout/Tagout Program.

Additional Information:_

_____
_____
_____
_____

Document Control:

Prepared By:_____ **Approved By:**_____

Signature:_____ **Signature:**_____

Effective Date:_____ **Review Date:**_____

10.5 Appendix E: Machine Hazard Recognition Guide

Purpose:

This appendix provides examples of common machine hazards that may be encountered when operating, maintaining, cleaning, or working around machinery and equipment. The examples are intended to support hazard identification and should not be considered an exhaustive list.

Hazard	Description	Common Examples
Rotating Parts	Components that rotate and may entangle clothing, hair, jewelry, or body parts	Shafts, chucks, spindles, couplings
In-running Nip Points	Points where moving parts rotate toward each other or toward a fixed object	Belts and pulleys, gears, rollers
Pinch Points	Areas where body parts may become caught between moving objects	Scissor lifts, hinges, moving guards
Cutting	Components designed to cut or shear materials	Table saws, band saws, laser cutters
Crushing	Areas where body parts may be crushed between moving and stationary objects	Hydraulic presses, compactors
Flying Objects	Material or fragments ejected during operation	Grinders, lathes, woodworking equipment
Stored Energy	Energy that remains after shut-down	Springs, hydraulics, pneumatics, capacitors
Hot surfaces	Surfaces capable of causing burns	Welding equipment, ovens, heat treating equipment
Electrical	Exposure to energized components or damaged electrical equipment	Electrical panels, powered machinery
Noise	Equipment capable of producing hazardous noise levels	Saws, grinders, compressors

Hazards associated with machinery and equipment vary depending on the equipment design, intended use, operating environment, and work being performed. Hazard assessments should consider all hazards associated with the equipment throughout its normal operation, cleaning, maintenance, troubleshooting, and servicing.