



# MACHINE GUARDING

Innovations Manufacturing, Inc. (the Company)

Version: 2

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## **Purpose**

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The purpose of this procedure is to minimize the risks associated with the operation of machinery and equipment by providing requirements for the protection of machine operators, shop users, and others who work or traverse an area with machining hazards.

## **Scope**

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This procedure applies to all Company employees. This procedure applies to all contractors working on Company policy who do not have a machine guarding procedure.

## **Responsibilities**

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### **Safety Director**

- Ensure this procedure has been implemented in all operations.
- Ensure machine specific training is provided and documented for shop affected machine operators as required.
- Maintain this written procedure to meet regulatory requirements and periodically review the program to assure it is current.
- Provide technical assistance to ensure this program is successfully implemented.
- Conduct routine inspections of machine shops to verify that the requirements of this procedure are being met and provide oversight to ensure any findings are addressed.

### **Production Manager/s**

- Responsible for equipment maintenance, training, controlling access to hazardous machinery, implementing safety guidelines, and approving authorized operators.
- Be familiar with the safe operation of all shop machines, equipment, and tools.
- Ensure this procedure is enforced within their areas of responsibility.
- Ensure that all machine safeguards are in place and operational.
- Ensure employees follow machine safety operating procedures, including, but not limited to, not bypassing, removing, or defeating machine safeguards.
- 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.

### **Machine Operators**

- Follow the requirements of this program.
- Operate machines and equipment with all safeguards in place.
- Conduct visual pre-operation inspections of machines and equipment to ensure guards are in proper operating condition.
- Not bypass, remove, or defeat safeguards.
- Maintain proper housekeeping of work area.
- Report all missing or damaged safeguards to the supervisor or designee immediately and not operate any machine or equipment with a missing or defective safeguard.
- Participate in required training.
- Not operate a machine until properly trained.

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## Definitions

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**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.

**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.

**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, and cutting, shearing, punching and forming mechanisms.

**Hot Work Activity:** Any use of open flames such as welding, torch use or soldering. In addition this includes any activity which creates sparks such as grinding.

**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.

**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.

**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.

**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.

**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.

**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.

## General Requirements

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- Only trained and competent personnel are permitted to utilize machine shop equipment and tools.
- Machine shops shall be secured when the shop supervisor or designee is not in the shop.
- It is recommended that there are a minimum of 2 (two) personnel present in machine shops when equipment is in use.
- Appropriate personal protective equipment (PPE) shall be worn while working in machine shops or when using hand/portable power tools that may be hazardous to the operator.
- Damaged or broken equipment/tools shall be removed from service and tagged "DO NOT USE" or similar. Repairs shall be made prior placing equipment back into service.

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- When guarding or other engineering controls are not feasible or are not fully capable of protecting the operator, conduct a written Job Safety Assessment (JSA) to identify all the hazards and devise remediations to protect against the hazards before proceeding.
- Machines designed for a fixed location shall be securely anchored to prevent walking or moving.
- Spring loaded chuck keys shall be used with all drill presses and lathes.
- 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.
- 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.
- 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. Compressed air shall never be used for cleaning personnel or their clothing.

### **Machine Guarding Requirements**

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- One or more methods of guarding shall be provided to protect operators and other personnel in the area from machine hazards.
  - Hazard examples include those created by point of operation, nip points, rotating parts, flying chips and sparks.
  - Examples of guarding methods include fixed guards, barrier guards, two-hand tripping devices, electronic safety devices, etc.

### **Routine Machine Guarding Checks**

- 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.
- Missing guards or defective safeguards shall be corrected immediately, or the machines shall be taken out of service until corrections are completed.

### **Machine guards shall meet the following requirements:**

- 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.
- Firmly attached to equipment or secured elsewhere by use of fasteners that requires a tool to remove. If the guards cannot be affixed to the machine, a job safety analysis should be performed to ensure all hazards are identified and controlled.
- Guards must be constructed of durable material that will withstand normal conditions of use.
- Guards must protect objects from falling into the machine's moving parts.
- Guards must not introduce any new hazards or create unintended machine operations.
- Guards shall allow for safe lubrication and maintenance of equipment.

### **Point of operation guarding**

- The point of operation of the machine shall be guarded. The guard shall be designed and constructed to prevent the operator from having any body part in the danger zone during the operating cycle.

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- Special hand tools for placing and removing material should be used. If used, the tools shall permit easy handling of material without the operator placing a hand in the danger zone. Such tools shall only be used to supplement a guard.
- All foot operated switches shall be guarded to prevent accidental activation by personnel or falling objects.

### **Hand and Power Tool Guarding Requirements**

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- Exposed moving parts of power tools shall be safeguarded. This includes belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other moving parts.
- Safeguards shall never be removed when a tool is being used.
- Bench, pedestal, and portable grinders:
  - Bench and pedestal grinders shall have a work rest adjusted no greater than  $\frac{1}{8}$  inch away from the grinding wheel. Tongue guards shall be no greater than  $\frac{1}{4}$  inch from the grinding wheel.
  - 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.
  - When mounting a wheel, always ensure that the grinder speed does not exceed the maximum operating speed marked on the wheel.
- Electric power tools are to be effectively grounded or be double insulated.
- Hand and power tools shall be in good operating condition free from defects or broken parts.
- Power tools shall be unplugged before performing service such as blade replacement, grinding wheel replacement, etc.