MACHINE GUARDING & OPERATOR SAFETY

This easy-to-use Leader's Guide is provided to assist in conducting a successful presentation. Featured are:

INTRODUCTION: A brief description of the program and the subject that it addresses.

PROGRAM OUTLINE: Summarizes the program content. If the program outline is discussed before the video is presented, the entire program will be more meaningful and successful.

PREPARING FOR AND CONDUCTING THE PRESENTATION: These sections will help you set up the training environment, help you relate the program to site-specific incidents, and provide program objectives for focusing your presentation.

REVIEW QUESTIONS AND ANSWERS: Questions may be copied and given to participants to document how well they understood the information that was presented. Answers to the review questions are provided separately.

INTRODUCTION

When used properly, various types of machine guarding and safety devices allow machine operators to perform the jobs safely and efficiently; unfortunately, many operators choose to cheat, defeat or override these types of safety devices, often resulting in severe injury and death. This is why operators have a responsibility to respect the power of their equipment and the hazards it can present. This responsibility includes understanding the hazards presented by the specific equipment in their work area and following the necessary precautions and safe work practices required to prevent injury. This program explains these hazards and discussed how injuries can be avoided through the proper use of machine guarding, safety devices and safe work practices.

Topics include common machine and equipment hazards, basic safe work practices, fixed and adjustable guarding, electrical interlocks, presence-sensing devices, two-hand controls and two-hand trips.

PROGRAM OUTLINE

THE MACHINE-GUARDING PROGRAM

- Most organizations have a written program in place to ensure that all machine guards, safety devices and work procedures are routinely monitored and reviewed to ensure their effectiveness.

- This written program will include a list of all machine guards and guarding methods used to protect workers from exposure to equipment hazards.

- This list is often used as a reference to evaluate the guarding on new machines brought into the workplace or when existing machinery is modified.

- The machine-guarding program will also include an auditing plan for inspections.

- The frequency of machine guarding inspections is determined by the probability that a guard may be removed, the complexity of the guarding and the severity of any injury that could occur should the guarding be defeated or removed.

- The machine guarding program will also define the roles and responsibilities of those involved in machine guarding at your facility.

- This will include the responsibility of the operator to ensure all safety devices are in place and functional before using a machine; the responsibility of supervisors to perform regular inspections and audits to make sure guards are not removed or bypassed; the responsibility of maintenance personnel to ensure that new or modified guarding functions properly and that all guards and safety devices are properly maintained; and, the responsibility of safety professionals to resolve any problems regarding machine guarding and to provide all appropriate employee training.

MACHINE AND EQUIPMENT HAZARDS

- As an operator, you must understand the various hazards presented by the machine or equipment you intend to use. Remember that all machine hazards must be controlled to prevent injury.

• Let's first discuss the point of operation. This is where a machine performs its work such as cutting, drilling, bending, punching or other actions.

• Coming into contact with a machine's action near its point of operation can cause horrific injuries.

• Another potential hazard is the power source of the machine. Many machines are powered by electric motors; electricity is an extreme hazard and operators must be protected from exposure to energized parts.

• Other types of power sources use pressurized steam, air or fluid to drive equipment. The unexpected release of pressure from these types of systems can also be hazardous to an operator.

• In addition to the machine's action at the point of operation, there are often other moving parts that present hazards. For example, feed mechanisms and conveyors that move stock or materials; as well as belts, chains, gears, and similar components can all present serious hazards to machine and equipment operators.

• Finally, operators should understand that the immediate area around any operating machinery may be subject to flying debris, falling objects, sparks, harmful light or other hazards caused by the machine's operation.

• When any of these types of hazards cannot be eliminated through the engineering design of the machine or equipment itself, then machine guards, safety devices, protective equipment and safe work practices must be used to control the operator's exposure to the hazards.

SAFE WORK PRACTICES

• You must be trained and authorized to operate each machine you intend to use. Attempting to operate tools, equipment or machines with which you are not familiar can quickly lead to an injury.

• Safe machine operation requires your undivided attention. You simply cannot allow distractions to cause you to lose focus on your work. It only takes a brief moment of inattention for an injury to occur.

• Operators must always practice good housekeeping. For example, eliminating excess materials and debris from near the point of operation can help prevent flying debris hazards and keeping walkways and work areas clear of tripping hazards can prevent a trip or fall, which can be very dangerous near running machinery.

• Be aware that long hair, loose clothing and jewelry should be not be worn around any type of moving machinery or equipment.

• These types of items can easily get past a guard and into the moving parts of running equipment, where they can easily become entangled and pull you into the machine's action or quickly amputate a finger or detach a scalp.

• Be aware that gloves can also become an entanglement hazard and should not be worn when operating machinery unless the material being handled is sharp and presents a greater hazard. Check with your supervisor before wearing gloves near any moving equipment.

• Always maintain an awareness of where you are placing your hands and avoid placing them near the point of operation or any type of in-running nip point or material feed.

• Whenever possible, use push sticks or other approved tools to feed material or retrieve parts from the machine.

• Always guard against complacency. Don't allow the routine nature of certain tasks to lull you into a false sense of security around machine hazards.

FIXED GUARDS

• Fixed guards are stationary protectors that are difficult to remove and are primarily used to shield workers from hazardous areas that seldom require access, such as a machine's drive train.

• These types of fixed guards are constructed in such a manner that an employee's body parts either cannot pass through any openings or if body parts can pass through, the guard's design will prevent the worker from coming close enough to contact the hazard.

• If you feel a fixed guard doesn't provide enough protection and may allow you or a co-worker to contact the hazard, report your concerns to your supervisor.

• Also, if you discover a fixed guard that has been removed, damaged or tampered with, do not operate the machine. Report the hazardous condition to the proper authority so it may be repaired or replaced.

• Qualified workers who are following proper lockout tagout procedures are the only ones authorized to remove fixed guarding. This is typically limited to repair or maintenance operations.

ADJUSTABLE GUARDING

• In some instances, fixed guarding may interfere with a machine's action or operation. When this is the case, some type of adjustable guarding is commonly used.

• Some types of adjustable guarding will adjust automatically while work is being performed. This allows maximum protection for the operator while not limiting the movement of the machine or tool.

• Operators should never remove or impede the movements of these types of adjustable guards. This is just asking for trouble.

• Other types of adjustable guards must be positioned manually by the operator prior to operating the machine.

• The proper adjustment of manual guarding will allow the material to enter into the point of operation while preventing the operator's hand or other body parts from contacting the hazard.

• To be effective, adjustable guarding must be set carefully and correctly before operation begins.

• If you have any questions about the proper adjustment of the guarding on your tools, machine or equipment, stop working and check with your supervisor.

• Remember that machine guarding is in place to prevent injury. Never remove, cheat or defeat any type of machine guarding.

ELECTRICAL INTERLOCKS

• Electrical interlocks are often used in combination with machine guarding to better protect employees. Electrical interlocks are designed to prevent a machine from operating anytime a machine guard is not in its proper position.

• Electrical interlocks consist of switches or sensors that allow an electric control circuit to be completed when a machine's guarding in the appropriate place. When complete, this control circuit allows the machine to run properly.

• When the circuit is broken, such as when a guard is moved out of position, the machine will shut down.

• Never disable or defeat these safety interlocks. Operators who override interlocks to manipulate guarding often suffer injury.

• Also, do not use this type of interlock switch as a substitute for performing a proper lockout/tagout. Only a complete lockout of the machine's power sources will provide adequate protection to perform repairs or maintenance.

PRESENCE-SENSING DEVICES

• In addition to machine guarding, there are other types of safety devices used to protect workers from the hazards of machinery. A large category of these devices is referred to as presence-sensing devices.

• Presence-sensing devices are often used when other types of guarding are not practical or would interfere with the operation of the machine.

PHOTOELECTRIC DEVICES

• Photoelectric devices, commonly referred to as "light curtains" are a common example of a presence-sensing device used to protect workers.

• Light curtains use various types of light beams directed into photoelectric sensors to detect the presence of an object.

• If an object, such as an operator's hand, interferes with one of these light beams, a switch is tripped, shutting down the machine.

• To be effective, a light curtain must be set up properly. It must allow material to pass through without triggering a shutdown while stopping the machine if an operator's body part enters the danger zone.

• Only trained and authorized employees are permitted to adjust a light curtain.

• On many machines, the light curtain must be adjusted when the size of the stock changes. Many injuries have occurred when operators change from large stock to smaller stock without adjusting the light curtain.

• Be aware that the beam of light is not usually visible to the operator and the operator cannot visually confirm if the light curtain is working properly.

• This is why light curtains and other photoelectric devices must be inspected and tested often.

• It's a good idea to test each beam of a light curtain at the beginning of your shift. Always use a device approved by your organization to test a light curtain.

• Never attempt to place a body part into the point of action as a means to test a light curtain.

• Because each machine and application is unique, operators should be trained how to test the light curtain on the specific machine they operate. If you have any questions about the frequency of the testing or how to properly test a light curtain, ask your supervisor.

PRESSURE-SENSITIVE TRIPS

• Another type of presence sensing device are those that are activated by the presence or absence of a pre-determined amount of pressure. These are often referred to as pressure-sensitive trips.

• One common form of a pressure sensitive trip is a cable attached to a switch. The switch will trip and shut down the machine or conveyor when a worker contacts it with the appropriate pressure.

• This type of trip cable must be inspected periodically for proper tension and to confirm it will shut down the machine when pressure is applied.

• Pressure-sensitive mats are another common type of pressure sensitive trip. These types of mats are often used in narrow or cramped areas near a machine's point of operation to prevent a worker from standing in the danger zone. When a worker steps onto the mat the machine will shut down.

• Pressure sensitive mats can also be used to require the operator to stand in a specific safe location. The mat can be configured to shut down the machine unless the presence of the operator is detected.

• Of course, like all other types of guarding and safety devices, operators who are determined to be unsafe may be able to cheat the system and find a way to "outsmart" these types of safety devices.

• Always remember that these devices are installed for your protection and trying to out-smart them is really not very smart at all.

TWO-HAND CONTROL/TWO-HAND TRIP

- Two-hand control or two-hand trip is another common safety measure used to prevent the operator's hands from entering a machine's point of operation.

- Each of these methods requires the concurrent use of both hands in order to activate the operating cycle of a piece of machinery or equipment.

- Requiring the use of both hands ensures they are not near the point of operation when the machine cycles.

- These types of control systems must be "anti-tie down," meaning that if one control is tied down, the other control will not cycle the machine when pushed independently.

- They must also be "anti-repeat," which means that both controls must be released before another cycle can be initiated.

- Two-hand control systems require that the two control buttons be held down for a specific period of time, called the hold time. This allows the machine to cycle through its action before the controls can be released.

- If you are the operator of a machine using a two-hand control or two-hand trip, make sure you understand its proper operation.

- If you suspect the controls are not functioning as intended, report it right away so they may be repaired or adjusted.

PREPARE FOR THE SAFETY MEETING
Review each section of this Leader's Guide as well as the program. Here are a few suggestions for using the program:

Make everyone aware of the importance the company places on health and safety and how each person must be an active member of the safety team.

Introduce the program. Play it without interruption. Review the program content by presenting the information in the program outline.

Copy the review questions included in this Leader's Guide and ask each participant to complete them.

Make an attendance record and have each participant sign the form. Maintain the attendance record and each participant's test paper as written documentation of the training performed.

Here are some suggestions for preparing your video equipment and the room or area you use:

Check the room or area for quietness, adequate ventilation and temperature, lighting and unobstructed access.

Check the seating arrangement and the audiovisual equipment to ensure that all participants will be able to see and hear the program.

CONDUCTING THE PRESENTATION
Begin the meeting by welcoming the participants. Introduce yourself and give each person the opportunity to become acquainted if there are new people joining the training session.

Explain that the primary purpose of the program is to discuss how machine operators can avoid injury through the proper use of machine guarding, safety devices and safe work practices.

Introduce the program. Play it without interruption. Review the program content by presenting the information in the program outline.

Lead discussions about the hazards of specific machinery and equipment in operation at your facility and the precautions employees can take to prevent these hazards from causing injury.

After watching the program, the viewer will be able to explain the following:

- What the common hazards of machinery and equipment are;
- What safe work practices all operators should follow to prevent injuries;
- How fixed and adjustable guarding are used to protect operators;
- How presence-sensing devices are used to prevent body parts from entering the danger zone;
- How two-hand controls and two-hand trips prevent hands from entering a machine’s point of operation.

MACHINE GUARDING & OPERATOR SAFETY
Review Quiz

Name_____Date_____

Please provide answers to the following to show how well you understand the information presented during this program.

1. How is the frequency of machine guarding inspections determined?

a, by the probability that a guard may be removed
b. by the complexity of the guarding
c. by the severity of any injury that could occur if the guarding was defeated or removed,
d, all of the above

2. Long hair, loose clothing and jewelry may be worn around moving machinery as long as you keep these items away from the point of operation.

a. true
b. false

3. Fixed guards are stationary protectors that are easy to remove.

a. true
b. false

4. You should re-check the position of adjustable guarding when the size or shape of the working material changes.

a. true
b. false

5. Electrical interlocks are often used in place of machine guarding to protect employees.

a. true
b. false

6. Presence sensing devices are often used when other types of guarding are not practical or would interfere with the operation of the machine.

a. true
b. false

7. Only trained and authorized employees are permitted to adjust a light curtain.

a. true
b. false

8. The beam of light of a light curtain is usually visible to the operator.

a. true
b. false

9. Pressure-sensitive mats are only used to shut down a machine when a worker steps onto the mat.

a. true
b. false

10. The length of time a two-hand control must be held down for a machine to complete its cycle Is called the _____.

a. cycle time
b. hold time
c. run time
d. trip time

ANSWERS TO THE REVIEW QUESTIONS

1. d
2. b
3. b
4. a
5. b
6. a
7. a
8. b
9. b
10. b