MACHINE
GUARD
AWARENESS
What’s Inside

Facilitator’s Guide

a  Overview
b  Getting started
d  Presentation Guidelines
f  Lesson Plan
h  Frequently Asked Questions

1  Introduction

2  The Hazards

5  Purpose & Function

10  Safe Work Practices

14  Summary

15  Quiz

18  Quiz Answers

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Machines play a vital role in the production process. They help save time and make the production process more efficient, but these machines can also create hazards to the operator. Many machines include safeguards to prevent the operator from entering a point of operation where they could be seriously injured. However, these safeguards are not effective if they can be easily removed or are not used properly. For this reason, it is important for operators to be aware of the hazards associated with the equipment they use and know how to properly use the safeguards provided. By following these safe work practices, operators can reduce the risk of injury to themselves and their co-workers.
Getting Started

Training Materials

Collect all of the necessary materials and supplies before training begins. Here are some suggested materials and supplies:

• A training location that is free of distractions, has good lighting, and a comfortable temperature.

• Desks and chairs arranged so that everyone will be able to see the viewing screen, the facilitator, and each other.

• The video, a VCR, and a TV with a remote. Make sure the video is rewound.

• An employee handbook and pen/pencil for each trainee. Each handbook includes a quiz at the back, which can be used to test comprehension and document training.

• Other supplies and equipment you may need - blackboard chalk, paper, handouts, transparencies, overhead projector, markers, notepads, etc.

• Additional information, such as a copy of the regulation or other reference tools.
Preparation

A successful presentation requires preparation and planning. Give yourself several days before the training session to get organized.

• Locate and schedule the training site as soon as possible.

• Notify trainees of the training date and time, the training schedule, and proper dress.

• Obtain all necessary equipment and supplies.

• Make sure you know how to operate the TV, VCR, and other equipment. Check to ensure that it is working properly. Replace or repair any damaged equipment.

• Review all training materials, including the Facilitator’s Guide, handouts, and any other reference materials.

• Prepare your presentation, including a lesson plan or outline of the training. Include the training goals and objectives. Some presentation guidelines are included on the next page. A sample lesson plan has been included on page “f” of this Facilitator’s Guide.

• A day or so before conducting the training session, you may want to have participants take the quiz as a pre-test. The results of this test can help you to determine weak areas to focus on during the training session.

• Preview the videotape. Note any key points you want to expand upon in your training.
How you present the training course can have a great impact on learning. By following these simple presentation guidelines and keeping your objectives in mind, you can effectively and efficiently get the most out of your training session.

Organize Training Time Efficiently
In today’s busy work climate it can be difficult to find the time needed for training, so it is important to be organized and well-prepared when you do schedule training sessions. Whether you use Summit’s suggested lesson plan or not, it is important to have a lesson plan prepared that you can implement comfortably. This ensures that time spent in training is productive and beneficial for everyone.

Stress the Purpose and Goals of Training
Training needs to be goal-oriented. State the purpose of training in a clear, specific manner - whether it’s to reduce injuries, increase production, improve quality, improve working conditions, etc. Review the goals and objectives of the training so trainees know what is expected of them.

Capture Their Attention
Training needs to be interesting and compelling to hold trainees’ attention. To help motivate learners, give them specific evidence that their effort makes a difference and provide feedback on their progress. Also, remember that the first experience with a new subject usually forms a lasting impression on the learner. By making that experience a positive one, you can help ensure your audience retains the information learned.
Make New Learning Experiences Pleasant
For some adults, past experiences with education were unpleasant and not helpful. Adults learn best when they feel comfortable. By making the learning environment open and friendly, you can help adults to feel secure in their new learning experience. Offer support and feedback as often as possible, and be ready to provide extra attention to those who may require it.

Ask If There are any Questions
When most adults learn new information that conflicts with what they already know, they are less likely to integrate those new ideas. It is very important to make sure participants fully understand the training and do not have any unresolved questions. Provide for a question and answer period so participants can resolve those questions and/or answer questions throughout the training session.
Lesson Plan

As a qualified trainer, your job is to effectively communicate a great deal of information in a well-organized manner. By preparing a lesson plan, you can ensure that each minute of the training session is productive. Summit has provided a suggested lesson plan for your use.

1. Program Objective
This guide reviews *Machine Guard Awareness*. In it, we will cover:
  • The Hazards
  • Purpose & Function
  • Safe Work Practices

2. Show the Video: “*Machine Guard Awareness*”

3. Discussion and Demonstration
To help relate the training to your site, you may wish to incorporate your own discussion topics and exercises. Key issues you might consider include:

  • What procedures must be followed if an employee notices another employee operating a machine without a safeguard?
  • What steps must be followed in the event of an emergency?
  • What type of PPE is appropriate for the job tasks?
4. Use Handbooks to Reinforce Training
The handbooks increase comprehension and reinforce the information learned in the video program by explaining the main points and expanding on the original material. For increased employee information retention, go over one section at a time and stop to answer questions. The quiz at the back of the Facilitator’s Guide is provided to document employee training. Answers to the quiz are provided on a separate page.

5. Questions and Answers
Provide for a Q&A session to answer any questions. It may be necessary to review some of the material when providing answers. The employee handbook, equipment manuals, and other reference tools may be helpful.
Frequently Asked Questions

What is the A.U.T.O. Principle?
The A.U.T.O Principle is used in determining whether a safeguard is effective. An effective safeguard should prevent an operator from contacting a hazard by going Around, Under, Through, or Over. It should prevent the operator from placing parts of their body in harms way. If a safeguard can be easily removed or tampered with it is not an effective safeguard after all.

As a machine operator, what are my responsibilities?
Your main responsibility is to work safely and follow proper procedures. Never remove machine guards and always be sure to perform a thorough hazard analysis prior to operating a machine. Be aware of any hazards or malfunctions. If a machine can’t be operated safely, do not use it. Equipment that’s in a hazardous condition must be reported to your supervisor immediately to prevent injury to you and your co-workers. Always wear the appropriate PPE and clothing required for tasks and perform good housekeeping practices. With complete concentration on your tasks you can help reduce potential hazards on the job.
Introduction

Machines create many hazards. The injuries from these hazards can range from minor cuts and burns to electrocution and death.

The list of possible machinery-related injuries is long and horrifying. Fourteen percent of all workplace fatalities are classified as struck by or caught in. Nearly 30 percent of all injuries are the result of contact with a piece of equipment. This is why machine guarding is necessary. The purpose of machine guarding is to protect the machine operator and other employees in the work area from hazards created by ingoing nip points, rotating parts, flying chips and sparks. Workers who operate and maintain machinery suffer approximately 18,000 amputations, lacerations, crushing injuries, abrasions, and over 800 deaths per year.

In this program, Machine Guard Awareness, we will discuss:

• The different hazards associated with machines
• The purpose and function of machine guards
• Safe work practices you can follow to ensure your safety.
The Hazards

All machines consist of three fundamental areas; the point of operation, the power transmission device, and the operating controls.

Despite all machines having the same basic components, their safeguarding needs widely differ due to varying physical characteristics and required operator involvement. A machine guard provides a barrier of protection against dangers and must also allow you to perform your tasks safely and effectively. Any machine part, function, or process, which may cause injury, must be safeguarded.

A wide variety of mechanical motions and actions may present hazards to the worker. Different types of hazardous mechanical motions and actions are basic in varying combinations to nearly all machines and recognizing them is
the first step toward protecting workers from the dangers. Some examples of hazards that a machine can have, are: in-running nip point, crushing, shearing, pinchpoint, optical, noise, temperature, projectile, transversing, reciprocating, puncture, and electrical shock. There are three primary types of hazards that result from working with machinery that can be eliminated through guarding: exposure to energized parts or the accidental release of stored energy...moving parts such as gears, flywheels, or in running nips on rolls ...and projectiles such as scrap material, sparks, or tools dropped in the machinery.
Motions such as rotating, reciprocating, and transversing, become hazardous when clothing, jewelry, or skin contact moving parts. Even smooth slowly rotating shafts can grip hair and clothing, and through minor contact force the hand and arm into a dangerous position. A large portion of the machines found in the working environment use some type of action to process your end product. Actions occur at the point of operation and usually involve one of the three motions described earlier. Actions include: cutting, punching, shearing, and bending. The danger for these actions exists at the point of operation where finger, arm and body parts may contact the point of operation and injuries can occur.
Machine guarding provides a simple yet important function. They must prevent contact with dangerous parts of the machine. Tools, hands, arms, and any other part of the workers body must be prevented from contacting moving parts or hazardous energy. Machine guards come in many different shapes and sizes. They can be fixed physical guards provided by the machine manufacturers, or added after installation, two hand controls to keep the operators hands away from the hazard while in operation, fences to keep the operator a safe distance from the hazard, or presence sensing devices designed to stop the machine when an employee passes through an invisible barrier.

Safeguards are put in place to protect the individual. They are designed for your safety and should be taken seriously.
There are minimum general requirements for all safeguards. The safeguard must prevent hands, arms, and any other part of a worker’s body from making contact with dangerous moving parts. Use the A.U.T.O. principle when determining if a guard is effective. The machine guarding device should be as foolproof as possible to prevent an operator from contacting a hazard by going AROUND, UNDER, THROUGH, or OVER. A good safeguarding system eliminates the possibility of the operator or another worker placing parts of their bodies near hazardous moving parts. Workers should not be able to easily remove or tamper with the safeguard, because a safeguard that can easily be made ineffective is no safeguard at all. They must firmly be secured to the machine or disable the machine if the guard is removed or opened. The safeguard should ensure that objects cannot fall into...

**The A.U.T.O Principle**

*Is it possible to contact a hazard by going...*

A round
U nder
T hrough
O ver

*...the safeguard?*
moving parts. A small tool dropped into a cycling machine could easily become a projectile that could injure someone. A safeguard defeats its own purpose if it creates a hazard of its own such as a shear point, a jagged edge, or an unfinished surface which can cause a laceration. Any safeguard which hinders a worker from performing the job quickly and comfortably might soon be overridden or disregarded. There is often a balance between protecting the employee with 100% protection of guarding and allowing the employee to properly conduct his or her work in a safe manner. Proper safeguarding can actually enhance efficiency as it can relieve concerns about injury. Lastly, if possible one should be able to lubricate the machine without removing the safeguards.
Types of Machine Guards

All types of machine guards fall into one of three categories. Barrier guards...distance guards... and physical guards. These can be fixed, interlocked, adjustable, and self-adjusting. Physical guards are the most preferred method of protection due to their simplicity and effectiveness. They can be permanent or adjustable and are usually made of metal, wire or heavy plastic. Physical guards block the individual from coming in contact with hazardous parts of the machine. Remember the A.U.T.O. principle.

Barrier guards are designed to keep the machine operator outside a pre-determined perimeter. Fenc-
es, gates, presence sensing devices and restraint cables all keep the worker at a safe distance from the danger zone. Barrier guards are easier to override or ignore than physical guards, so you should be aware of their capabilities and limitations. Installation of locks or interlocked controls to shutdown equipment if the barrier is opened or removed should be considered.

Location or distance guarding refers to positioning the hazardous parts of the machine so they are inaccessible or do not pose a threat during normal operation. The position of operation controls is an example of location guards. Two-handed trips require the operator to place both hands on the trip, ensuring their hands are a safe distance from the hazard during operation.
Personal protective equipment, engineering controls and safe work practices such as lockout/tagout are all important parts of a safe working environment.

Machine guards are only one part of this safety blueprint. It is your responsibility to never remove or override these safeguards. A guard that is overridden or disregarded is the same as no guard at all. Removing a guard to speed up production may seem to save time in the short run, but the long term risks may be quite serious.

If your facility receives new or significantly revised equipment it must be reviewed by a qualified person before it can be released for production. If you are using new equipment, do not relax simply because it is new. Pay attention and look for any hazards that may have been overlooked.
As the machine operator, it is your responsibility to perform your job safely. Machine guards are placed for your safety. There is no acceptable reason to remove or override them. Never operate a piece of equipment without guards in place, or other features of the machinery in proper operating order.

It is important to conduct a thorough hazard analysis prior to working in an area. Make sure the guards are secure and properly in place before operating the equipment. Machine guards are designed to work with the machine and not hinder the production process. Removing the guards does not enhance the production process, it only increases the risks. Inspect the machine guards on a regular basis. Report any missing or malfunctioning guards immediately.
Additional safe work practices you should follow to help ensure your safety when working around moving equipment includes... being aware of what is happening around your work environment. Keeping work areas around operating equipment clean and free of waste material at all times. A good portion of machine guarding injuries occur from the employee slipping, tripping, and falling into a machine that is operating. Remember to wear the proper PPE, however PPE is only a secondary means of protection.

Remove loose jewelry and other items that could get caught in the equipment. Tie back or contain any long hair. Avoid loose clothing. Gloves should not be worn where there is a chance that the loose fitting glove gets caught in the machine. When possible, use a feeding device.
Before service or maintenance work on machines, turn them off and disconnect them from their energy sources. To further ensure safety, lockout using energy-isolating devices and tagout the machine to notify others in the area.

Maintain complete concentration on the task you are performing. Listen to the equipment. If something doesn’t sound right report it to your supervisor. You must understand and respect the potential hazards. Like other forms of protective equipment, machine guards are there for your safety, but they are only effective if properly used.
Summary

Know the potential hazards associated with the machines you use...understand the role of machine guards and their function...and follow safe work practices when dealing with machines. The machines you work with can contain several moving parts with many hazards. Machine guards create a barrier of protection against these dangers. Don’t tamper with the guards. Let them do their job, so you can do yours safely.
Quiz

To review your knowledge of Machine Guard Awareness, answer the questions below.

Your name    Date

1. If any machine part, function, or process may cause injury to a worker it must be safeguarded.
   a. True
   b. False

2. Which of the following primary types of hazards can be eliminated through guarding?
   a. Exposure to energized parts
   b. Exposure to moving parts
   c. Exposure to projectiles
   d. All of the above

3. What does the acronym A.U.T.O stand for when determining whether a guard is effective?
   a. Always Understand Total Operation
   b. Awareness Under Team Operations
   c. Around, Under, Through, Over
   d. Above, Under, Toward, Over

4. An effective machine guard is one that can be easily removed.
   a. True    b. False

5. A two-handed trip is considered to be a type of location or distance guard.
   a. True    b. False
6. A guard may be removed if it will save time and speed up production.
   a. True       b. False

7. If your facility receives a new piece of equipment, which of the following steps should be taken to ensure safe operation? Select all that apply.
   a. Have a qualified person inspect it before use
   b. Start using it immediately. After all, it is new.
   c. Pay attention
   d. Watch for hazards

8. If a guard is missing from a piece of machinery, should you go ahead and use the machine anyway?
   a. Yes       b. No

9. Which of the following are considered safe work practices prior to operating a machine? Select all that apply.
   a. Perform a hazard analysis
   b. Remove loose jewelry, clothing, or gloves
   c. Make sure work area is clean
   d. Make sure guards are secure

10. If maintenance must be performed on a machine which of the following safe work practices should be followed? Select all that apply.
    a. Turn off machine
    b. Disconnect from energy sources
    c. Perform proper lockout/tagout procedures
    d. Leave the machine on
Quiz Answers

1.  a  True
2.  d  All of the above
3.  c  Around, Under, Through, Over
4.  b  False
5.  a  True
6.  b  False
7.  a  Have a qualified person inspect it before use
    c  Pay attention
    d  Watch for hazards
8.  b  No
9.  a  Perform a hazard analysis
    b  Remove loose jewelry, clothing, or gloves
    c  Make sure work area is clean
    d  Make sure guards are secure
10. a  Turn off machine
     b  Disconnect from energy sources
     c  Perform proper lockout/tagout procedures