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MACHINE GUARDING

MODULE DESCRIPTION

This module explains how to be safe when working with machines or in areas where machines are being operated.

OBJECTIVES

After completing this module, students will be able to:

- Explain the importance of machine guarding
- Identify types of mechanical hazards
- Describe common methods of machine guarding
- Explain safe work practices when working with or around machines

MODULE OUTLINE

1. Why Machine Guarding Matters

Since machines are so common in the workplace, it is likely that most workers will use them on the job or work in an area where machines are being used.

A lack of proper machine guarding or unsafe work practices around machines can lead to crushed fingers or hands, amputations, burns, blindness, or worse.

In addition to the many OSHA regulations on machine guarding, the Fair Labor Standards Act (FLSA) has designated certain non-farm jobs as particularly hazardous for workers under the age of 18. The FLSA prohibits employees younger than 18 years from operating the following machines at work:

- Band saws
- Circular saws
- Punching and shearing machines
- Meat packing, processing, or slicing machines
- Paper products machines
- Woodworking machines
- Metal forming machines

2. Types of Mechanical Hazards

A wide variety of mechanical elements may create a hazard. These can include rotating parts, moving belts, meshing gears, and parts that impact or cut.

Three main types of mechanical hazards are:

- Hazards caused by mechanical motions
- Hazards caused by mechanical actions
- Hazards caused by debris or sparks

Mechanical motions are the movements that transfer power from one part of a machine to another. Flywheels, pulleys, and belts are some of the power-transmission components that effect mechanical motions. Mechanical motion hazards include:

- **Rotating motion** - Rotating parts can create a mechanical hazard that could grab your clothing or hair and pull you into the danger area.
- **In-running pinch points** - When parts rotate in opposite directions or when one part rotates or moves past a stationary object, this creates an in-running pinch point (or nip point) that could, for example, trap your fingers and pull your hand into the machine.
- **Reciprocating motion** - A back-and-forth or up-and-down mechanical motion could hit or trap you between a moving part and a stationary object.
- **Transversing motion** When machine parts move in a straight, continuous line, you could be caught in a pinch point.

Mechanical actions are the movements, or actions, that take place at the point of operation. The point of operation is the point where work (such as cutting, shaping, boring, or forming) is performed on a piece of material. The majority of machine-related injuries occur at the point of operation. Mechanical hazards occur, for example, on machines that perform the following actions:

- **Cutting** Machines that cut material can create a cutting hazard at the point of operation.
- **Punching action** Machines that remove, or punch out a section of material can create a puncture or crushing hazard at the point of operation.
- **Shearing action** Machines that trim materials can create a cutting hazard at the point of operation.
- **Bending action** Machines that bend or shape material can create a crushing hazard at the point of operation.

Debris or **sparks** created by mechanical actions can also be hazardous and machine guarding may be necessary to shield you and other workers from the hazard. Even small pieces of debris projected by a machine can cause a serious injury.

- Wearing personal protective equipment, such as safety glasses or goggles, can provide added protection, but does not replace the need for proper machine guarding.

3. Methods of Machine Guarding

The purpose of any machine guarding method is to provide a secure barrier between you and the hazard. It is your responsibility to make sure any method does not create an additional hazard or interfere with the machines operations.

Four method categories of machine guarding are:

- Guards
- Devices
- Location or Distance
- Safety Aids

Guards provide physical barriers that prevent access to dangerous areas. General types of guards include:

- **Fixed guard** A guard attached to a machine that prevents the operator from making contact with a hazardous area.
- **Interlocking guard** A guard that turns off the machines power when opened and prevents the machine from starting up when the guard is not properly placed.
- **Adjustable guard** A guard that must be adjusted for each job.
- **Self-adjusting guard** A guard that adjusts or moves based on the size of the material entering the machine.

Devices control access to a hazardous area.

- A safety device may perform several functions. It may:
 - Stop the machine if you enter the danger area.
 - Restrict you from the danger area during operation.
 - Require you to use both hands on the machine controls throughout operations.
- The five general types of devices are:
 - 1) **Presence Sensing Device** A device that stops the machine from operating when someone or something enters the sensing field or when a set amount of weight is applied to the sensing field.
 - 2) **Restraints** A set of cords connected to your wrists so you cant reach the point of operation.
 - 3) **Pullback Cords** A set of cords connected to your wrists designed to automatically withdraw your hands from the point of operation at a set time in the machines cycle.

- 4) **Safety Controls** - Devices that stop or start a machine once specific conditions are met.

Safety trip control A pressure-sensitive body bar, triprod, or tripwire that stops the machine when it is tripped.

The trip could occur when pressure is applied or when pressure is removed, depending on the design of the

device.

Two-hand control or trip A device that requires both of your hands to be on the machines controls in order for the machine to operate.

5) **Safety Gates** A moveable device that provides a barrier between you and the point of operation.

Location or distance guarding methods involve positioning or designing a machine so that the points of hazard are separated from areas where employees may walk or work.

- A common way this is done is by installing walls or fences that restrict access to the machine.

Safety aids are intended to help protect you from mechanical hazards. Though safety aids are useful, alone they are not a sufficient means of machine guarding. The proper guards and devices should be used at all times. Some safety aids include:

- Tools used to feed material into a machine or remove it from a machine.
- Foot controls to start a machine and keep hands away from the point of operation.
- Shields or personal protective equipment to protect you from flying particles.

4. Proper Training

Proper training for working with and around machinery is critical. Specific and detailed training is needed and only trained employees should operate machines in the workplace.

Training should, at least, include the following:

- Information about all potential hazards in your work area.
- The purpose of workplace machines and their safeguards.
- The correct use of workplace machines and their safeguards.
- Safe operating procedures and work practices.
- Personal protective equipment that may be required.
- Methods for reporting unsafe conditions.

5. Safe Work Practices

Safe work practices have an important role in controlling mechanical hazards and preventing injuries.

While using machinery, it is important to use these and other safe work practices:

- Keep the work area free of fall hazards.
- Don't wear loose clothing or jewelry around machinery.
- Always use the right tools, machines, and materials for the job.
- Use safety aids when possible.
- Wear the proper personal protective equipment.