29 CFR 1910.212- General Requirements for all Machines, **29 CFR 1910.213**- Woodworking Machinery, **29 CFR 1910.215**- Abrasive Wheels, **29 CFR 1910.217**- Power Presses, **29 CFR 1910.219**- Power Transmission.

Machine Guarding

Preparation

1. Read Applicable Background information and related Company Policy Chapter.
2. Make _____ Copies of this Lesson Plan for Personnel
3. Make Transparency, procure transparency pens, etc.
4. Coffee, tea, snacks

Material

1. Types of machines the employee is expected to operate

Objective

By the end of this session, personnel shall be able to describe:

1. Management and Employee Responsibilities regarding machine guarding
2. Machine Guard Characteristics
3. Machine Guard Requirements
4. Machine Guard Definition of Terms

Background

Placing and *keeping* guards on exposed machinery is a major step in preventing lacerations and amputations of body parts. It is also a requirement of Federal OSHA Safety and Health Standards. In general, these standards explain guarding requirements in the following terms:

- Machines which have a grinding, shearing, punching, pressing, squeezing, drawing, cutting, rolling, mixing or similar action, including pinch points and shear points, whereas an employee comes within the danger zone, shall be guarded at the point of operation in a manner that provides protection for the employee.
- Keys, set screws, projections or recesses which create a hazard not guarded by the frame of the machine or by location shall be removed, made flush or guarded.

Some people consider such guards a nuisance. Others consider them as a necessary evil. How do you see them?

Notes

Lesson

Management and Employee Responsibilities

Management

Ensure all machinery is properly guarded

Provide training to employees on machine guard rules

Ensure new purchased equipment meets the machine guard requirements prior to use

Supervisors

Train assigned employees on the specific machine guard rules in their areas

Monitor and inspect to ensure machine guards remain in place and functional

Immediately correct machine guard deficiencies

Employees

Do not remove machine guards unless equipment if locked and tagged

Replace machine guards properly

Report machine guard problems to supervisors immediately

Do not operate equipment unless guards are in place and functional

Only trained and authorized employees may remove machine guards

Machine Guard Characteristics

In general, guards should have the following characteristics:

1. **They Should Prevent Contact**: The safeguard must prevent hands, arms, or any other part of a worker's body from making contact with dangerous moving parts. A guard should not only prevent accidental contact but should prevent workers from intentionally going around or bypassing the guard.

Notes

Machine Guard Characteristics (continued)

2. **They Should Be Secure**: If the guard is easily removable, this means it will be ineffective. The guards should be of durable material and most should be bolted or screwed on so that they require tools for removal.
3. **They Should Create No New Hazards**: The guard itself should not create a new hazard. For example, sharp or jagged edges could cause lacerations. The guards should be affixed in a manner that eliminates sharp edges.
4. **They Should Create No Interference**: A good guard should allow the employee to work comfortably and efficiently--since otherwise it may be removed.
5. **They Should Allow Safe Maintenance**: If possible, guards should be designed so as to allow minor maintenance on the machines without either removing the safeguards or being exposed to the hazard. If the guard must be removed or deactivated, then lock-out procedures should be followed before any maintenance is performed.

Machine Guarding Requirements

Most machines are designed to provide at least minimum protection for the operator. The operator and maintenance person must respect the hazards of equipment, know the operating & adjustment procedures, and report any equipment problems immediately.

Types of Engineered Safeguards

- Covers & Plates - the most common
- Interlocks - shuts down machine if covers are opened
- 2 Hand Controls - prevents operator reaching in
- Presence Sensing Devices - detects objects at point of operation
- Emergency Stop Controls - located near operator
- Pressure Sensing Devices - resistance to movement stop machine

Machine Hazards

- Electric Shock
- Amputation
- Chemical Exposure
- Crushing & Pinching

Notes

Machine Guards Are Required For

- Machine hazards within 7 feet of a work surface
- Pinch, shear or in-roll points
- Shaft ends that are exposed more that 1/2 the diameter or have non-smooth areas such as collars or keyways.
- Gears, chains, pulleys, rope pulls, fan blades
- Reciprocating parts
- Electrical Circuits

Administrative Controls

- Trained Operators & Maintenance people
- Lock & Tag before adjusting or maintenance
- Restricted access to equipment rooms
- Startup & Shutdown procedures

Additional Machine Guarding Requirements

- Guards shall be affixed to the machine where possible and secured.
- A guard shall not offer an accident hazard in itself.
- The point-of-operation of machines whose operation exposes an Employee to injury shall be guarded.
- Revolving drums, barrels and containers shall be guarded by an enclosure which is interlocked with the drive mechanism.
- When periphery of fan blades are less than 7 feet above the floor or working level the blades shall be guarded with a guard having openings no larger than 1/2 inch.
- Machines designed for a fixed location shall be securely anchored to prevent walking or moving. For example; Drill Presses, Bench Grinders, etc.
- Guards must prevent hands, arms or any part of an Employees body from making contact with hazardous moving parts. A good safeguarding system eliminates the possibility of the operator or other Employees from placing parts of their bodies near hazardous moving parts.

Notes

Additional Machine Guarding Requirements (continued)

- Employees should not be able to easily remove or tamper with guards. Guards and safety devices should be made of durable material that will withstand the conditions of normal use and must be firmly secured to the machine.
- Guard should ensure that no objects can fall into moving parts. An example would be a small tool which is dropped into a cycling machine could easily become a projectile that could and injure others.
- Guard edges should be rolled or bolted in such a way to eliminate sharp or jagged edges.
- Guard should not create interference which would hamper Employees from performing their assigned tasks quickly and comfortably.

Definitions of Machine Guarding Terms

1. Guards: Barriers that prevent Employees from contact with moving portions or parts of exposed machinery or equipment which could cause physical harm to the Employees.

2. Enclosures: Mounted physical barriers which prevent access to moving parts of machinery or equipment.

3. Point-of-Operation: The area on a machine or item of equipment, where work is being done and material is positioned for processing or change by the machine.

4. Power Transmission: Any mechanical parts which transmit energy and motion from a power source to the point-of-operation. Example: Gear and chain drives, cams, shafts, belt and pulley drives and rods. NOTE: Components which are (7) feet or less from the floor or working platform shall be guarded.

5. Nip Points: In-Running Machine or equipment parts, which rotate towards each other, or where one part rotates toward a stationery object.

6. Shear points: The reciprocal (back and forth) movement of a mechanical part past a fixed point on a machine.

Notes

7. Rotating Motions an exposed mechanism are dangerous unless guarded. Even a smooth, slowly rotating shaft or coupling can grasp clothing or hair upon contact with the skin and force an arm or hand into a dangerous position. Affixed or hinged guard enclosure protects against this exposure.

8. Reciprocating: Reciprocating motions are produced by the back and fourth movements of certain machine or equipment parts. This motion is hazardous, when exposed, offering pinch or shear points to an Employee. A fixed enclosure such as a barrier guard is an effective method against this exposure.

9. Transverse Motions: Transverse motions are hazardous due to straight line action and in-running nip points. Pinch and shear points also are created with exposed machinery and equipment parts operating between a fixed or other moving object. A fixed or hinged guard enclosure provides protection against this exposure.

10. Cutting Actions: Cutting action results when rotating, reciprocating, or transverse motion is imparted to a tool so that material being removed is in the form of chips. Exposed points of operation must be guarded to protect the operator from contact with cutting hazards, being caught between the operating parts and from flying particles and sparks.

11. Shearing Action: The danger of this type of action lies at the point of operation where materials are actually inserted, maintained and withdrawn. Guarding is accomplished through fixed barriers, interlocks, remote control placement (2 hand controls), feeding or ejection.

Closure

Don't be another OSHA statistic--an employee who lost a finger, hand or an arm. Remember to always maintain the guards on the machines and to replace them if they must be removed for maintenance.

What questions do you have?

Notes