Title: Machine Guarding

Overview

Participants will gain knowledge and understanding of the job hazards to employees working around unguarded equipment and how the OSHA regulations for general industry, construction, and agriculture industries are intended to protect workers from amputations, lacerations, crushing injuries, abrasions and death. The participants will gain this knowledge by presentation of machine guarding lecture, including open discussion of what methods their employers are using to guard rotating and transverse motions and cutting, punching, shearing, and bending operations. The hands-on element of the training will provide participants to examine the various types of guarding methods (fixed, interlocked, adjustable, and self-adjusting).

Objective

Participants will:

- Understand the risk hazards to employees working around unguarded equipment
- Gain knowledge and understanding of the machine guarding standards for general industry, construction, and agriculture industries.
- Shared knowledge and lessons-learned of pros/cons of current machines guarding methods used by other industries using open-discussion.
- Use of hands-on guarding methods to re-inforce a better understanding of the various types of guarding methods and how they can implement and/or improve their current methods of machine guarding, including how best to guard any unguarded equipment.

Materials

- Machine Guarding presentation
- White board with markers/eraser
- Note pad with pencils
- Hands-on guarding methods
    - Fixed guard for in-going nib point application
    - Adjusting guard on vertical band saw
    - Self-adjusting guard for drill press operation and grinder
    - Interlock for paint shaker operation

Lesson Directions:

1. Ice-breaker exercise to introduce instructor and participants (20 minutes – lapse time: 20 minutes)
2. Lecture/group discussion of: (45 minutes – lapse time: 65 minutes)
    a. OSHA Data on accidents related to machine guarding
    b. Statistics of injuries

    c. Common machine related injuries
    d. What about PTSD
    e. OSHA Machine guarding standards
        i. 29 CFR 1910 Subpart O
        ii. 29 CFR 1926 Subpart I
        iii. 29 CFR 1928 Subpart D
3. Lecture/group discussion/hands-on for types of guards (45 minutes – lapse time: 110 minutes)
    a. Fixed Guards
        i. Discuss applications where fixed guards are suitable to provide a barrier
        ii. Show application of fixed guard for a coupling and end shaft
        iii. Discuss design parameters for a fixed guard
        iv. Discuss how a fixed guard can be inadequate based on the size of mesh in relationship to the distance of the hazard.
    b. Interlocked
        i. Discuss applications where interlocked are suitable for preventing a machine from starting when the guard in open
        ii. Show example of interlocked application in a paint shaker
        iii. Discuss limitations and how operators can bypass the interlocked to override the shut off when the guard is open
    c. Adjustable
        i. Discuss applications where adjustable guards facilitate a variety of production operations
        ii. Show examples of adjustable guards on grinder and vertical saw
        iii. Discuss importance of proper training of operators to ensure guards are at proper adjustments prior and after usage of equipment
    d. Self-adjusting
        i. Discuss applications where self-adjusting provides a barrier that moves according to size of material entering the danger zone
        ii. Discuss limitations
        iii. Show example of shop saw with inadequate self-adjusting guard and corrective actions to correct
4. Break (15 minutes – lapse time: 125 minutes)
5. Lecture/group discussion for types of Devices (20 minutes – lapse time: 145 minutes)
    a. Presence sensing devices
        i. Discussion on what is a presence sensing device
        ii. Discuss the various types, including advantages and limitations of each
        iii. Discussion on where they can be used in the industrial environment
    b. Restraints
        i. Discussion on what is the purpose of a restraint device

ii. Discussion of the advantages
iii. Discussion on where they can be use in the industrial environment

c. Pullback devices
    i. Discussion on what is the purpose of a pullback device
    ii. Discussion on what type of manufacturing operations are best suited for pullback devices
    iii. Discussion of limitation and impact on the operator using the pullback device

d. Safety trip controls
    i. Discussion on the purpose of safety trip controls
    ii. Discussion on the various types and applications
        1. Pressure sensitive body bar
        2. Safety triprod
        3. Two-hand control
        4. Two-hand trip
    iii. Discussion on limitations and how equipment may have to be modified with a brake for adequate stoppage when activated

e. Gates
    i. Discussion on the purpose of a gate barrier
    ii. Discussion on the various types and applications
    iii. Discussion on the limitations

6. Open discussion on requirements for machine guarding (60 minutes – lapse time: 205 minutes)
    a. Rotating motion
        i. Discussion on rotating motion found in industry
            1. Gears, pulleys, chain drives
            2. Shafts and couplings
        ii. Discussion on the requirements for proper guarding with discussion on:
            1. Does the guard prevent body contact in the danger
            2. Is the guard secure
            3. Does the guard create no new hazards
            4. Does the guard protect from falling objects
            5. Does the guard allow for safe lubrication
            6. Can work be done with the guard in-place
    b. Transverse motions
        i. Discussion on what is transverse motion and hazards associated with transverse motion
        ii. Discussion on the requirements for proper guarding with discussion on:
            1. Does the guard prevent body contact in the danger
            2. Is the guard secure
            3. Does the guard create no new hazards

4. Does the guard protect from falling objects
5. Does the guard allow for safe lubrication
6. Can work be done with the guard in-place

c. Cutting action
    i. Discussion on what is cutting action and hazards associated with cutting actions
    ii. Discussion on the requirements for proper guarding with discussion on:
        1. Does the guard prevent body contact in the danger
        2. Is the guard secure
        3. Does the guard create no new hazards
        4. Does the guard protect from falling objects
        5. Does the guard allow for safe lubrication
        6. Can work be done with the guard in-place

d. Punching, shearing and bending
    i. Discussion on what is punching, shearing and bending and the hazards associated with each operation
    ii. Discussion on the requirements for proper guarding with discussion on:
        1. Does the guard prevent body contact in the danger
        2. Is the guard secure
        3. Does the guard create no new hazards
        4. Does the guard protect from falling objects
        5. Does the guard allow for safe lubrication
        6. Can work be done with the guard in-place

7. Robots in the workplace (25 minutes – lapse time: 230 minutes)
8. Q&A (10 minutes – lapse time: 240 minutes

Evaluation

Participants will fill out a training survey to rate the value of the training, including rating the materials, training environment, and instructor. The survey will be used to make improvements to future training classes.

Assess Participants

- Pre-test to test general knowledge in regards to machine guarding
- Post-test to document knowledge achieved

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