**SUBPART O – MACHINE GUARDING**

**GEORGIA TECH SAFETY AND HEALTH CONSULTATION PROGRAM**

**WE WILL COVER:**
- Machine Guarding Principles
- Subpart O - Highlights
- Lockout/Tagout Overview

**WHY ARE MACHINES NOT GUARDED?**
- No one would stick their arm, hand, finger, head, etc. in there.
- No one is supposed to be back there, in there, around it while it is running.
- The machine came that way; it never had a guard.
- I’ve been doing it this way for twenty years without any problems.

**WHY ARE MACHINES NOT GUARDED? (CONT.)**
- The guard is in the way
- The OSHA inspector didn’t say anything about it
- We’ll put it back on if OSHA comes

**EMPHASIS ON AMPUTATIONS: WHERE CAN THEY OCCUR?**
- Power Presses
- Saws
- Shears
- Press Brakes
- Slicers
- Conveyors
- Printing Presses
- Roll Forming/Bending Machines
- Drill Presses/Milling Machines

**WHERE MACHINE HAZARDS OCCUR:**
- Point of operation
- Mechanical power transmission
- Other moving parts
MACHINE GUARDING REQUIREMENTS

• Prevent contact
• Be secure
• Protect from falling objects
• Create no new hazards
• No interference
• Maintainability and accessibility

MACHINE GUARDING REQUIREMENTS

• Must NOT be able to reach under, through, over or around the guards or otherwise access the hazard!

Any Hazards?

Any Hazards?

IN-RUNNING NIP POINTS

- Rotating cylinders
- Belt and pulley
- Chain and sprocket
- Rack and pinion

METHODS OF MACHINE SAFEGUARDING

• Physical guards
• Devices
• Location/Distance

Guards v. Safeguarding Devices

• Fixed
• Interlocked
• Adjustable
• Self-adjusting
• Presence sensing
• Pullback
• Restraint
• Safety controls and trips
• Gates
FIXED GUARD

Provides a barrier - a permanent part of the machine, preferable to all other types of guards.

INTERLOCKED GUARD

When this type of guard is opened or removed, the tripping mechanism and/or power automatically shuts off or disengages, and the machine cannot cycle or be started until the guard is back in place.

ADJUSTABLE GUARD

Provides a barrier which may be adjusted to facilitate a variety of production operations.

SELF-ADJUSTING GUARD

Provides a barrier which moves according to the size of the stock entering the danger area.
SAFEGUARDING DEVICES

- Presence sensing
- Pullback
- Restraint
- Safety controls and trips
- Gates

PRESENCE SENSING DEVICES

PULLBACKS AND RESTRAINTS

TWO-HAND CONTROLS
SAFETY TRIPWIRE CABLES

• Device located around the perimeter of or near the danger area
• Operator must be able to reach the cable to stop the machine

OTHER METHODS

GATE

• Movable barrier device which protects the operator at the point of operation before the machine cycle can be started
• If the gate does not fully close, machine will not function

SAFEGUARDING BY LOCATION/DISTANCE

• Locate the machine or its dangerous moving parts so that they are not accessible or do not present a hazard to a worker during normal operation
• Maintain a safe distance from the danger area

PROTECTIVE SHIELDS

These do not give complete protection from machine hazards, but do provide some protection from flying particles, splashing cutting oils, or coolants.
FIXED GUARDS (PRO VS. CON)

**PROS:**
- Many applications
- Often built in-house
- Can provide maximum protection
- Minimal maintenance
- Suitable for high production, repetitive

**CONS:**
- Can interfere with visibility
- Can be limited to specific operations (e.g. where point of operation access not necessary)
- Machine adjustment and repair can require removal, requiring other protection of maintenance

INTERLOCKED (PRO VS. CON)

**PROS:**
- Can provide maximum protection
- Allows access for removing jams without time-consuming removal of guards (subject to lockout requirements)

**CONS:**
- Requires careful adjustment and maintenance
- May be easy to disengage or defeat

PRESENCE SENSING (PROS VS. CONS)

**PROS:**
- Can allow more movement for operator into point of operation

**CONS:**
- Limited to machines that can be stopped
- Does not protect against flying objects
- May require frequent alignment and calibration

PULLBACKS/RESTRAINTS (PROS VS. CONS)

**PROS:**
- Eliminates need for additional guarding
- Smaller risk of mechanical failure for restraints

**CONS:**
- Limits movement of operator
- May obstruct work space around operator
- Adjustments must be made for each operation and individual
- Requires frequent inspections and maintenance
- Requires close supervision of the operator

2-HAND CONTROLS (PROS VS. CONS)

**PROS:**
- Operators hands at a predetermined location (if controls fixed)
- Operators hands free to pick up parts

**CONS:**
- Requires partial cycle machine with a brake
- Some 2-hand controls can be defeated
- Protects only the operator

GUARDED???
**GUARDED??**

**GUARDED??**

**GUARDED??**

**GUARDED??**

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**SUBPART O - MACHINERY AND MACHINE GUARDING**

- 211 - Definitions
- 212 - General requirements
- 213 - Woodworking machinery
- 215 - Abrasive wheel machinery
- 216 - Mills and calendars
- 217 - Mechanical power presses
- 218 - Forging machines
- 219 - Mechanical power transmission

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**TYPES OF GUARDING**

1910.212(A)(1)

- One or more methods of machine guarding shall be provided to protect the operator and other employees in the machine area from hazards such as those created by the point of operation, in-going nip points, rotating parts, flying chips and sparks.
POINT OF OPERATION

1910.212(A)(3)(II)

• The point of operation of machines whose operation exposes an employee to injury, shall be guarded.

FANS

1910.212(A)(5)

• When the periphery of the blades of a fan is less than seven (7) feet above the floor or working level, the blades shall be guarded. The guard shall have openings no larger than 1/2 inch.
ANCHORING MACHINERY
1910.212(B)
• Machines designed for a fixed location shall be securely anchored to prevent walking or moving.

BENCH GRINDERS-WORK RESTS
1910.215(A)(4)
• Work rests shall be adjusted closely to the wheel with a maximum opening of one-eighth inch to prevent the work from being jammed between the wheel and the rest, which may cause wheel breakage.

BENCH GRINDERS-TONGUE GUARDS
1910.215(B)(9)
• The distance between the wheel periphery and the adjustable tongue must not exceed one-quarter inch.

RING TEST
1910.215(D)(1)
• Immediately before mounting, all wheels shall be closely inspected and sounded by the user (ring test) to make sure they have not been damaged.

RING TEST
• Hold the wheel in a vertical position
• Strike the wheel with a non-metal object
• If the wheel creates the ringing effect it is in good condition
• Crack will create a dead space
See what can happen?

Wheel Disintegration

Factors Contributing to Wheel Breakage
- Improper mounting of the wheel
- Excessive speeds
- Abusive operation
- Careless handling
- Improper maintenance

Improper Speed

Safety Criteria
- Ensure the wheel is designed for the speed of the machine
- There are different types of wheels designed to be used at varying speeds (i.e., non-reinforced resin — 9500 SPM and reinforced resin — 12,500+ SPM)

Grinders Exercise — Hazard Hunt

For this exercise, you are going to look at the following slides. From the pictures, be prepared to discuss the following:
- What are the hazards in the slide?
- How would you correct the issues or the problems that you see in the slides?
• Plastic shield is not sufficient
• Wheel not centered
• No tongue guards
• Material on periphery of wheel-can clog pores and cause wheel to explode

• No tongue guard
• No side guard (spindle end and nut exposed)
• Tool rest may need to be further adjusted
• Wheel may be too small for grinding machine (look at size of guard)

• No tongue guard
• No tool rest
• Material on periphery of wheel-can clog pores and caused wheel to explode
• Is it anchored?
FLYWHEELS
1910.219(B)(1)

• Flywheels located so that any part is 7 feet or less above the floor or platform shall be guarded.
• Wherever flywheels are above working areas, guards shall be installed having sufficient strength to hold the weight of the flywheel in the event of a shaft or wheel mounting failure.

SHAFTING
1910.219(C)

• If located 7ft or less above floor or platform:
  • Horizontal, vertical, and inclined shafting must be enclosed
  • Must be enclosed by stationary casing or by a trough
  • Includes guarding shafts under work tables

PROJECTING SHAFT ENDS
1910.219(C)(4)

• Must not project more than \( \frac{1}{2} \) the diameter of the shaft unless guarded by a non-rotating cap or safety sleeve
PULLEYS
1910.219(D)
• Pulleys 7’ or less from the floor or working platform must be guarded
• Broken or cracked pulleys must not be used

BELT, ROPE, AND CHAIN DRIVES
1910.219(E)
• Horizontal belts and ropes 7’ or less from the floor or working platform must be guarded
  • Guard must extend to at least 15” above the belt
  • Belt shall be fully enclosed if located 42” or less from the floor
**VERTICAL AND INCLINED BELTS**

*1910.219(E)*

- Vertical and inclined belts below 7’ must be enclosed.
- Vertical belts more than 7’ must be completely enclosed if:
  - Traveling 1800ft or more per minute
  - The belt is more than 8” in width

**GEARS**

*1910.219(F)*

- Meshing gears must be guarded (nip-point hazard)
- Guarding of hand-operated gears is highly recommended
- Mesh point must be enclosed

**CHAINS AND SPROCKETS**

*1910.219(F)(3)*

- All chains and sprockets located 7’ or less above the floor or platform must be enclosed.
- If the drive extends over other machines or working areas, protection against falling must be provided.
PORTABLE POWERED TOOLS - GENERAL SAFETY PRECAUTIONS

• 1910.242(a)
  o Employers responsibility
    • Safe condition of tools
    • Including personal tools
  o 1910.242(b)
    • Compressed air not used for cleaning except where reduced to less than 30 p.s.i. and only when effective chip guarding and PPE.

POWER TOOLS (CONT.)

• 1910.243 (a)(1) – Portable Circular Saws
  – Upper blade guard
  – Lower blade guard
  • Automatically returns to starting position
POWER TOOLS (CONT.)

- 1910.243(a)(3)
  - Portable belt sanding machines
    - Guard nip point where belt runs onto pulley
    - Guard unused run of belt

PNEUMATIC POWER TOOLS AND AIR HOSES

- 1910.243(b)
  - Tool Retainer – A tool retainer must be installed on each piece of equipment where ejection could result
  - Air hose – Hose and hose connections must be designed for the pressure and service to which they are subjected

PNEUMATIC TOOL CONNECTIONS

- Unacceptable
- Acceptable

PORTABLE ABRASIVE WHEELS

- Exposure angle will not exceed 180 degrees.
- Top portion of the wheel must be guarded.
PORTABLE ABRASIVE WHEELS

- 1910.243(c)(1)(i)
  - Exceptions
    - Wheels used within the work
    - 2” or smaller in diameter
    - Cones, plugs, etc. where work offers protections
- 1910.243(c)(6) – Other exclusions
  - Natural sandstone wheels
  - Metal, wooden, cloth, or paper discs having a layer of abrasive surface

POWDER ACTUATED TOOLS

- 1910.243(d)
  - Operators and assistants must wear eye protection
  - Head and face protection dependent on working conditions

- Must have protective shield or guard at least 3 ½ inches in diameter.
- Firing must be dependent on at least 2 separate and distinct operations.
- Firing mechanism must prevent tool from firing during loading, while preparing, if dropped.
Fasteners/Charges Used in Powder Actuated Tools

- Concrete
- Concrete/wood
- Wood

Specific size = Specific operation

Be sure to use the right size charge with right size fastener

LITTLETON, Colo. -- A dental office X-ray reveals a four-inch nail embedded in the skull of Patrick Lawler, 23, which was removed at Littleton Adventist Hospital in suburban Denver. Lawler unknowingly shot himself with a nail gun Jan. 6 while working in Breckenridge, a ski resort town in the central Colorado mountains. The accident left Lawler with what he thought was a minor toothache and blurry vision. When painkillers and ice failed to stop the ache six days later, he went to a dental office where the nail was discovered. (01/14/05 AP Photo/The Family Dental Center via KUSA-TV via The Denver Post)

SEOUL, Korea -- The X-ray picture shows a 5-centimeter nail stuck in an unidentified South Korean patient's skull Thursday, Dec. 2, 2004. According to a Seoul hospital, doctors found the nail after the man came to the hospital, complaining about a severe headache. They speculate that the nail stuck in the man's head four years ago in an accident but the man didn't know about it. The nail was removed in a surgery last Saturday. (12/07/04 AP photo)

MACHINE CONTROLS AND EQUIPMENT
1910.213(B)

- A mechanical or electrical power control shall be provided on each machine to make it possible for the operator to cut off the power from each machine without leaving his position at the point of operation.

RESTART AFTER POWER FAILURE
1910.213(b)(3)

- On applications where injury to the operator might result if motors were to restart after power failures, provision shall be made to prevent machines from automatically restarting upon restoration of power.
OPERATING CONTROLS
1910.213(B)

• Operating controls must be placed so the operator has access to them without reaching over the cutting blade.
  o Must be placed within reach of their regular work station.

• Machines operated by electrical motors must have controls capable of being rendered inoperative.
  o For maintenance, repairs, adjustments, etc.

FOOT PEDALS AND FEEDER ATTACHMENTS
1910.213(B)

• Operating treadles must be protected from unintended operation.

• Feeder attachments must have feed rolls or other moving parts covered to protect operator from pinch points.

HAND-FED RIPSAWS
1910.213(C)

• Each circular hand-fed ripsaw shall be guarded by a hood which shall completely enclose that portion of the saw above the table and that portion of the saw above the material being cut. The hood and mounting shall be arranged so that the hood will automatically adjust itself to the thickness of and remain in contact with the material being cut without considerable resistance.
SPREADER
1910.213(C)

• Each hand-fed circular rip saw shall be furnished with a spreader to prevent material from squeezing the saw or being thrown back on the operator.

NON-KICKBACK FINGERS/DOGS
1910.213(C)

• Each hand-fed circular rip saw shall be provided with non-kickback fingers or dogs so located as to oppose the thrust or tendency of the saw to pick up the material or throw it back toward the operator.

ANTI-KICKBACK FINGERS

HAND-FED CROSSCUT TABLE SAWS
1910.213(D)

• Each circular crosscut table saw shall be guarded by a hood which shall meet all the requirements of 1910.213(c)(1) for hoods for circular re-saws.

SELF-FEED CIRCULAR SAWS
1910.213(F)

• Self-feed circular saws
  o Guarded by a hood or guard to prevent hands of operators from coming in contact with the in-running rolls.
  o If self-fed saws are used for ripping they must be equipped with anti-kickback devices (dogs).
SWING CUT OFF SAWS
1910.213(G)

- Provided with a hood that completely covers the upper half of the blade and the arbor.
- Provided with a guard that will protect the point of operation.
- Must be provided with a means to return to its resting position
- Limit chain to limit the travel beyond or behind the working table

RADIAL SAWS
1910.213(H)

- The upper hood shall completely enclose the upper portion of the blade down to a point that will include the end of the saw arbor....The sides of the lower exposed portion of the blade shall be guarded to the full diameter of the blade by a device that will automatically adjust itself of the thickness of the stock and remain in contact with the stock.

RETURN TO STARTING POSITION
1910.213(H)

- Installation shall be in such a manner that the front end of the unit will be slightly higher than the rear, so as to cause the cutting head to return gently to the starting position when released by the operator.

ADJUSTABLE STOP
1910.213(H)

- An adjustable stop shall be provided to prevent the forward travel of the blade beyond the position necessary to complete the cut in repetitive operations.

NON-KICKBACK FINGERS/DOGS
1910.213(H)

- Each radial saw used for ripping shall be provided with non-kickback fingers or dogs located on both sides of the saw.
• Ripping and ploughing shall be against the direction in which the saw turns. The direction of the saw rotation shall be conspicuously marked on the hood.

• All portions of the saw blade (bandsaws) shall be enclosed or guarded, except for the working portion of the blade between the bottom of the guide rolls and the table.
Each hand-fed jointer with a horizontal cutting head shall have an automatic guard which will cover all the section of the head on the working side of the fence or gage.
WOOD SHAPERS AND SIMILAR EQUIPMENT
1910.213(M)

• The cutting heads of each wood shaper, hand-fed panel raiser, or other similar machine not automatically fed, shall be enclosed with a cage or adjustable guard so designed as to keep the operator's hand away from the cutting edge.

WOOD SHAPER

SHAPER WITH ADJUSTABLE GUARD

PLANING
1910.213(N)

• Planers
  ○ Guard covering the cutting heads
  ○ If exhaust hood used, must be integral to the guard
  ○ Guard/hood must protect the feed rolls/in-running nip points

PLANERS
**SANDING MACHINES**
1910.213(P)

- Drum sanders must be protected above the table by a guard or exhaust hood except for that portion of the sander which is necessary for the stock.

**BELT SANDING MACHINES**
1910.213(P)

- Where the sanding belt runs over rollers a guard must prevent the operator from coming into contact with the in-running nip points.
- The unused run of the sanding belt shall be guarded against accidental contact.

**DISK SANDERS**
1910.213(P)

- Disk sanders must have a guard or exhaust hood enclosing the revolving disk. Allowing only enough exposure which is necessary for the application.

*Sources: Health and Safety Guide for Wooden Furniture Manufacturing and Machine Guarding—Assessment of Need, NIOSH*
MISCELLANEOUS WOODWORKING MACHINES
1910.213(R)

• The mention of specific machines in paragraphs (a) thru (q) and this paragraph (r) of this section, inclusive, is not intended to exclude other woodworking machines from the requirements that suitable guards and exhaust hoods be provided to reduce to a minimum the hazard due to the point of operation of such machines.

INSPECTION MAINTENANCE OF WOODWORKING MACHINERY
1910.213(S)

• All knives and cutting heads of woodworking machines shall be kept sharp, properly adjusted, and firmly secured. Where two or more knives are used, they shall be properly balanced.

INSPECTION MAINTENANCE OF WOODWORKING MACHINERY
1910.213(S)

• Sharpening or tension of saw blades or cutters shall be done by persons of demonstrated skill.

• Emphasis shall be placed on the importance of cleanliness of the woodworking area.

PUSH STICKS
1910.213(s)

• Push sticks and push blocks shall be provided for small pieces of wood and for pushing the stock past the blade.

ROBOT SAFETY STANDARDS

• Current National Standards
  o ANSI/RIA R15.06-2012
  o CSA Z434-14 (Canadian)
• Current International Standards
  o ISO 10218-1:2011 Industrial robots
  o ISO 10218-2:2011 Industrial robot systems and integration
• Technical Reports
  o RIA TR R15.306-2014 – Task-based risk assessment
  o RIA TR R15.406-2014 – Safeguarding
  o RIA TR R15.506-2014 – Existing Applications
ROBOT SAFETY – ANSI/RIA R15.06 2012

RISK ASSESSMENT

• Give particular consideration to:
  o Intended operations of the robot including teaching, maintenance, setting, and cleaning
  o Unexpected start-up
  o Access by personnel from all directions
  o Reasonably foreseeable misuse
  o Effect of failure in the control system
  o Hazards associated with the specific robot application

ANSI/RIA R15.06 2012

• Standard provides requirements for the safety of personnel associated with the use of robots and robot systems
• Excludes specific robot applications
• Standard applies to industrial robots used in industrial automation applications

SAFEGUARDING

• Required when design does not remove hazards or adequately reduce risks
• Guards and protective devices can (See RIA TR R15.406):
  o Prevent access to the hazard(s)
  o Cause hazard(s) to cease before access
  o Prevent unintended operation
  o Contain parts and tooling
  o Limit other process hazards
• Guards or sensitive protective devices used for perimeter safeguarding
• Selection take into account all the hazards within the safeguarded space

REQUIREMENTS FOR GUARDS

• Only removable by the use of a tool
• Perimeter safeguarding not installed closer to the hazard than the restricted space
• Openings in any fixed guard shall not allow a person to reach over, under, around or through any opening or gap and access a hazard

REQUIREMENTS FOR GUARDS (CONT.)

• Max opening at bottom: 7 inches
• Minimum height at top: 55 inches
• Moveable guards shall open laterally or away from the hazard, and not into the safeguarded space and bring any hazards to a safe state before an operator can gain access
COLLABORATIVE ROBOTS


WHAT IS A MECHANICAL POWER PRESS?

- Mechanical Full Revolution Clutch
  - Can not be disengaged during full stroke
- Mechanical Part Revolution Clutch
  - Can be disengaged at any time during a full stroke
- Guarding is dependent on which type of press
  - Example – Presence sensing devices or two hand controls can’t guard a full revolution – the stroke can’t be disengaged when device is activated

MECHANICAL POWER PRESSES
POINT OF OPERATION
1910.217(c)(1)
• Use of point of operation guards or properly applied and adjusted point of operation devices on every operation performed on a mechanical power press. See Table O-10.

EXAMPLES OF GUARDS/SAFEGUARDS

POINT OF OPERATION GUARDS
1910.217(c)(2)
• Prevent entry of hands or fingers into point of operation by reaching through, over, under, or around guard
• Conform to O-10.
• Create no pinch point between guard and moving parts
• Utilize fasteners not readily removable by operator
• Facilitate inspection
• Offer maximum visibility of the point of operation

POINT OF OPERATION DEVICES
1910.217(c)(3)
a) Prevent and/or stop normal stroke if hands inadvertently placed in point of operation (light curtain); or
b) Prevent operator from inadvertently reaching into point of operation or withdrawing hands as the dies close (pull-back); or
c) Prevent the operator from inadvertently reaching into point of operation at all times (restraint);

POINT OF OPERATION DEVICES (CONT.)
1910.217(c)(3)
d) Requiring the application of both of operators hands to machine operating controls (2-hand trip or control); or
e) Enclosing the point of operation before a press stroke can be initiated and maintaining closed until motion has ceased (type A gate); or
f) Enclosing point of operation before a press stroke can be initiated so as to prevent an operator from reaching into point of operation prior to die closure or prior to cessation of slide motion during the downward stroke (type b)
PRESENCE SENSING DEVICE
1910.217(c)(3)(iii)
• Prevent and/or stop normal stroke of press if operator’s hands inadvertently placed in point of operation
• May not be used on full revolution clutch machines
• May not be used as tripping means to initiate motion

PRESENCE SENSING DEVICE (CONT.)
1910.217(c)(3)(iii)
• Muting permitted during the upstroke
• Safety Distance \( D = 63 \text{ inches/second} \times T(S) \) where \( T(S) \) is stopping time measured at 90 degree position
• Unprotected areas otherwise guarded

TWO-HAND CONTROL
1910.217(c)(3)(vii)
• Require both hands to machine operating controls and locating controls at safety distance
• Meet 217(b)(7)(v) – Includes: Concurrent use of both hands, permit adjustment requiring both hands, incorporate anti-repeat, require release of operators’ hands before interrupted stroke can be resumed

TWO-HAND CONTROL (CONT.)
1910.217(c)(3)(vii)
• Safety Distance \( D(s) = 63 \text{ inches/second} \times T(s) \)
• Fixed in position so only supervisor or safety engineer can relocate
• Separate controls for each operator designed to require concurrent application

TWO-HAND TRIPS
1910.217(c)(3)(viii)
• Requires application of both operator’s hands to machine operating controls and controls located a safety distance
• Trip provided for each operator
• Construction requirements of 217(b)(6)
• Safety Distance \( D(m) = 63 \times T(m) \) – maximum die closure time
• Trips fixed in position

MECHANICAL POWER PRESSES
• Periodic and regular inspections
• Foot pedal protected to prevent unintended operation
• Machine guarding power transmission apparatus same as other equipment
• The employer must report all point-of-operation injuries within 30 days of occurrence
QUESTIONS?

ENERGY CONTROL PROCEDURES
LOCKOUT/TAGOUT
29 CFR 1910.147

GEORGIA TECH SAFETY CONSULTATION PROGRAM

LOCKOUT/TAGOUT DIRECTIVE
Directive Number: CPL 02-00-147

LOCKOUT/TAGOUT E-TOOL

WHAT IS COVERED UNDER 29 CFR 1910.147?

- Servicing and maintenance
- Normal production operations where:
  - Employees by-pass guard(s)
  - Employees place any part of their body in a hazardous area

WHAT IS NOT COVERED?

- Construction, agriculture, and maritime
- Normal production operations (subpart O)
- Cord-and-plug under the control of employee (written procedure still required)
- Exposure to electrical conductors (subpart S and electrical-safety related work practices)

- THIS JUST MEANS THEY ARE NOT COVERED UNDER 29 CFR 1910.147 – DOES NOT MEAN LOCKOUT TAGOUT DOES NOT APPLY IN THESE CASES
PURPOSE OF LOCKOUT/TAGOUT

Prevent injury due to the unexpected energization or startup of machines or equipment during service or maintenance.
- Including release of stored energy

LOCKOUT APPLIES WHEN:
1. Workers are performing servicing and maintenance
2. There is a potential for injury from unexpected start-up or release of stored energy.
   - Normal production operations are not taking place.

LOCKOUT ALSO APPLIES WHEN:
Service and maintenance that takes place during normal production, if employee:
- Must remove or bypass a guard or safety device; or
- Must place any part of their bodies into the danger zone

ENERGY TYPES
- Electrical
- Mechanical
- Hydraulic
- Pneumatic
- Chemical
- Thermal
- Other

LOCKOUT VERSUS TAGOUT
If capable of being locked out:
- Prefer lockout
- Tags allowed, if employer can demonstrate FULL EMPLOYEE PROTECTION

Machine Modifications
- If you alter a machine you must make the machine capable of accepting a lock.
FULL EMPLOYEE PROTECTION
• Tags attached at the same location as locks
• Full compliance with all tagout provisions in 29 CFR 1910.147
• Additional means when necessary (e.g., removal of a valve handle)

FULL EMPLOYEE PROTECTION

SERVICING AND MAINTENANCE INCLUDES
• Setting up
• Adjusting
• Inspecting
• Modifying
• Installing

SERVICING AND MAINTENANCE INCLUDES

FULL EMPLOYEE PROTECTION

LOCKOUT/TAGOUT REQUIREMENTS
• Written program
• Written energy control procedures
• Training of employees (not just maintenance employees)
• Periodic review of procedures

LOCKOUT/TAGOUT REQUIREMENTS

ENERGY CONTROL PROCEDURE
• Notification of employees
• Preparation for shutdown
• Machine or equipment shutdown
• Machine or equipment isolation
• Lockout/tagout device application
• Stored energy
• Verification of isolation
• Release from lockout/tagout

ENERGY CONTROL PROCEDURE

DOCUMENTATION EXCEPTIONS
• Machine has no potential for stored energy
• Machine has a single energy source
• Isolation of that source will completely de-energize
• Machine is isolated and locked out during maintenance

DOCUMENTATION EXCEPTIONS

DOCUMENTATION EXCEPTIONS
(CONT.)
• A single lockout device will achieve locked-out condition
• Lockout device under exclusive control of employee
• Maintenance does not create hazard to others
• No previous accidents involving unexpected energization on this equipment

DOCUMENTATION EXCEPTIONS
(CONT.)

Note: must meet all 8 items before exception applies

Note: must meet all 8 items before exception applies
ENERGY ISOLATION

STORED ENERGY EXAMPLES

- Batteries and capacitors
- Pressure differential
  - Hydraulic
  - Pneumatic
  - Vacuum
- Springs
- Gravity

Lock/tag removal if authorized employee is not available?

- Verify that authorized employee is not at facility
- Make reasonable efforts to inform him or her
- Ensure that he/she knows of removal upon re-entering
- MUST INCLUDE THIS PROCEDURE IN WRITTEN PROGRAM

HARDWARE MUST BE:

- Provided by the employer
- Singly identified
- Only devices used for control
- Not used for other purposes

HARDWARE REQUIREMENTS

- Durable
- Standardized
- Substantial
- Identifiable
LOCKS, HASPS AND TAGS

PERIODIC INSPECTION

- Performed at least annually
- Lockout – include review with authorized employees
- Tagout – include review with authorized and affected employees
- Certification record kept:
  - Identify machine or equipment
  - Date of inspection
  - Employees performing and including in inspection

TRAINING AND RE-TRAINING

- Authorized employees
  - Recognition of hazardous energy
  - Type and magnitude of hazardous energy
  - Methods of isolating energy
  - How to verify isolation
- Affected – Purpose and use of procedure
- Other – Procedure and Prohibition from tampering
- Tagout provisions

RE-TRAINING IS REQUIRED WHEN:

- Change in job assignment
- Change in machine or process
- Change in lockout/tagout procedure
- Inadequacies revealed in periodic review

TRAINING CERTIFICATION

- Certify that the training has been conducted and kept up to date:
  - Employee names
  - Date(s) of training
OUTSIDE PERSONNEL - CONTRACTORS

When outside servicing personnel are engaged in activities covered by this standard, the on-site employer and the outside employer shall inform each other of their respective lockout or tagout procedure.

GROUP LOCKOUT

- Personal lock or tag (usually)
- Lockbox or master tag system with principal authorized employee
- “Shall utilize a procedure which afford a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device”

TESTING OR POSITIONING MACHINES

- Clear the machine of tools and materials
- Remove employees from the area
- Remove lockout/tagout devices
- Energize and proceed with testing/positioning
- De-energize and re-apply energy control measures

MINOR SERVICING EXCEPTION

- Activities which are routine, repetitive, and integral to the use of the equipment for production are not covered by this standard if alternative measures provide effective protection.
- Activity must be conducted during normal production operations.
- Activity must be routine (regular course of procedure in accordance with established practices), repetitive (regularly repeated as part of production), and integral (essential to the production process).

Which OSHA Standard applies?

- Employee is running product in a mixer. The guard is removed from the top of the mixer so the operator can see the consistency of the product.
- Is this a problem?
- Which OSHA standard applies?
ANSWER

• This is a machine guarding problem (Subpart O). The activity is taking place during normal production operations. It is not a servicing or maintenance activity. The guard should not be removed.
• Note: May want to change the guard so they can see the consistency of the product without removing the guard.

Which OSHA Standard applies?

• Employee is changing out the die on a press for the next product. The guards are removed and the equipment is not locked out.
• Is this a problem?
• Which OSHA standard applies?

ANSWER

• This is a lockout/tagout problem (29 CFR 1910.147). The activity is a servicing/maintenance activity. The equipment is being set up for the next product and the guards are removed exposing employees to potential hazardous energy. Therefore, lockout/tagout should have been applied prior to removing the guards.

SUMMARY

• Written program including written procedures for each machine
• Training of employees
• Periodic review of program/procedures

ENFORCEMENT

QUESTIONS?

CONTACT INFORMATION

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