WELCOME

# Keeping Workers Safe Around Machines

# Objectives

During this webinar, we will discuss:

- Common hazards of machines
- Photographs of improperly or unguarded machines
- Explain adequate machine safeguarding options, and
- Offer steps for moving forward

# Why Machines Must Be Properly Guarded

- 800 deaths each year
- High injury rates
  - Amputations, fractures, lacerations, and crushing
  - Electric shock and burns

# OSHA Requirements

- 1910.211 – definitions
- 1910.212 – General Requirements
  - One or more methods
  - Protect operator and other employees
  - From hazards created by point of operation, ingoing nip points, rotating parts, flying chips and sparks
  - Protection may include: barrier guards, two hand tripping devices, electronic safety devices, etc.

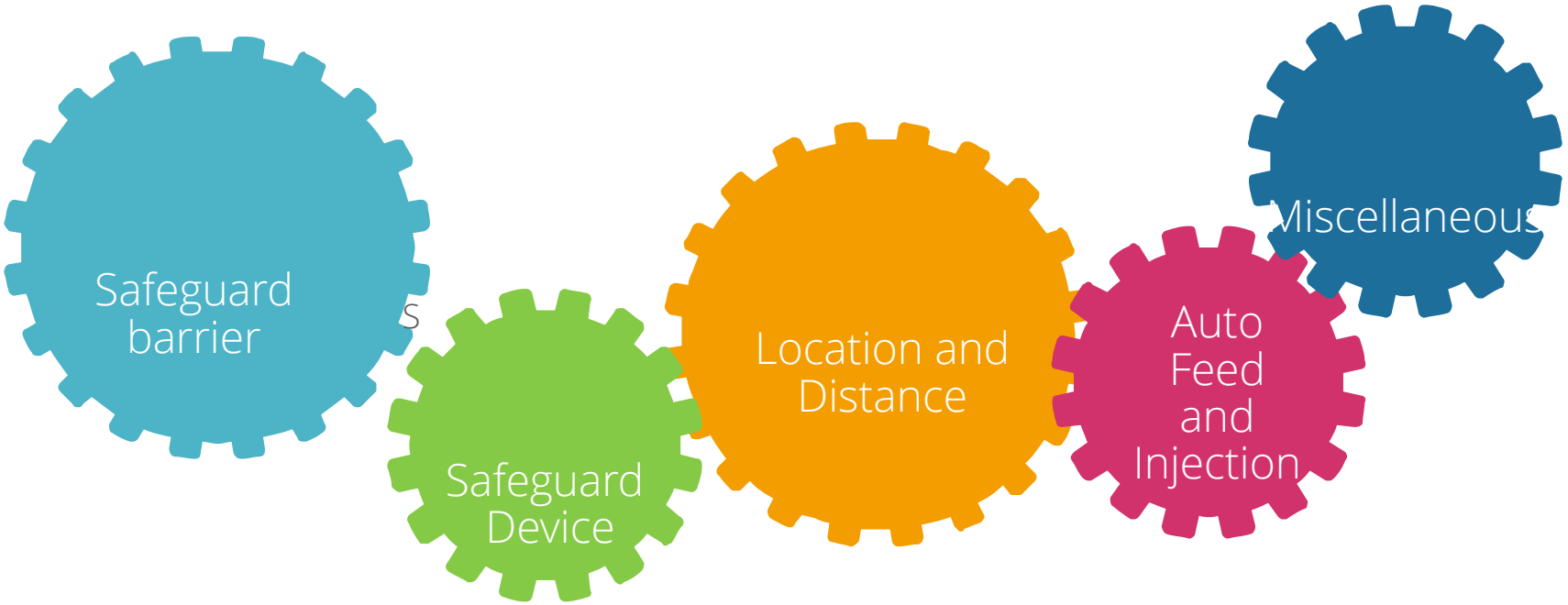
# Additional Standards

1. 1910.213 – 1910.244 (Subpart O0
    1. Woodworking
    2. Cooperage
    3. Abrasive Wheel
    4. Mills and Calenders
    5. Power Presses including certification/validation of safety systems for presence sensing device
    6. Forging machines
    7. Mechanical Power Transmission Apparatus
        1. Projecting shaft ends

# Poll Question

- True or False?
- If the machine is old or is being used as provided by the manufacturer, then the safe guarding is always satisfactory.

# Safeguard Classifications

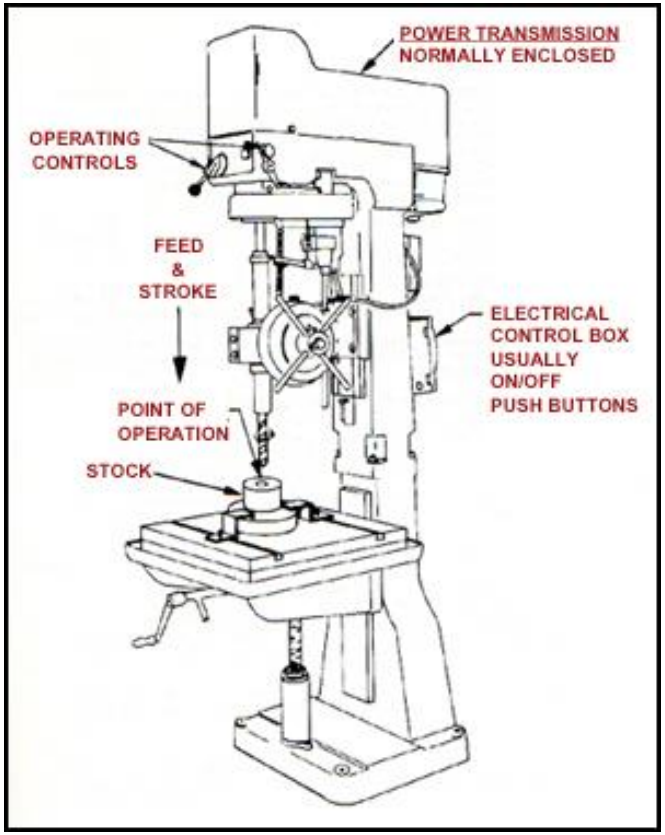


# Effective Machine Guards/Safeguard Barrier

- Prevent contact with hazard zones
- Are secure
  - Fasteners require tool for removal (best practice)
- Create no new hazard
- Do not create interference
- Allow for safe lubrication
- Withstand work conditions
- Allow for safe routine maintenance

# Point of Operation Functions

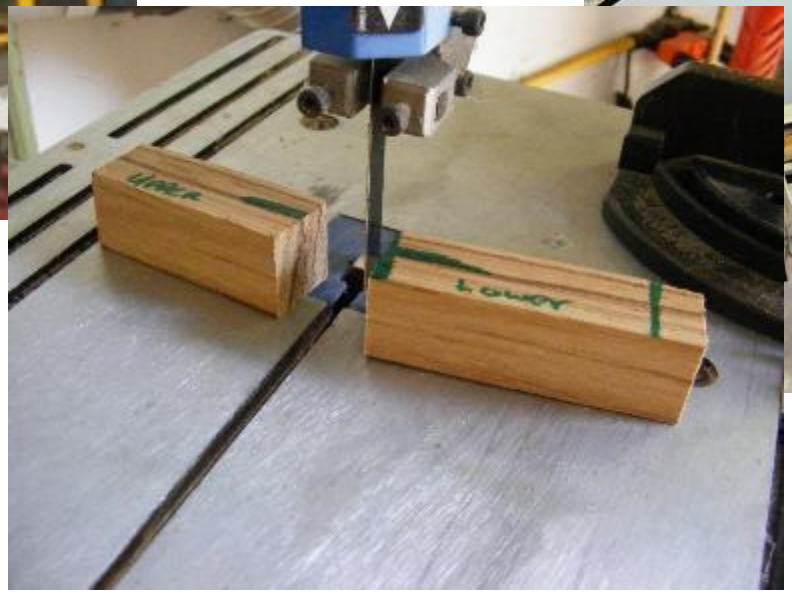
- Cutting
- Punching
- Shearing
- Bending
- Compressing



# Cutting Machines and Actions

- Hazard—Cutting action, flying chips, or scrap material cut fingers or strike the head or body
- Machines
  - Band and circular saws
  - Boring or drilling
  - Lathes and milling
- Actions
  - Rotating, reciprocating, or transverse motion

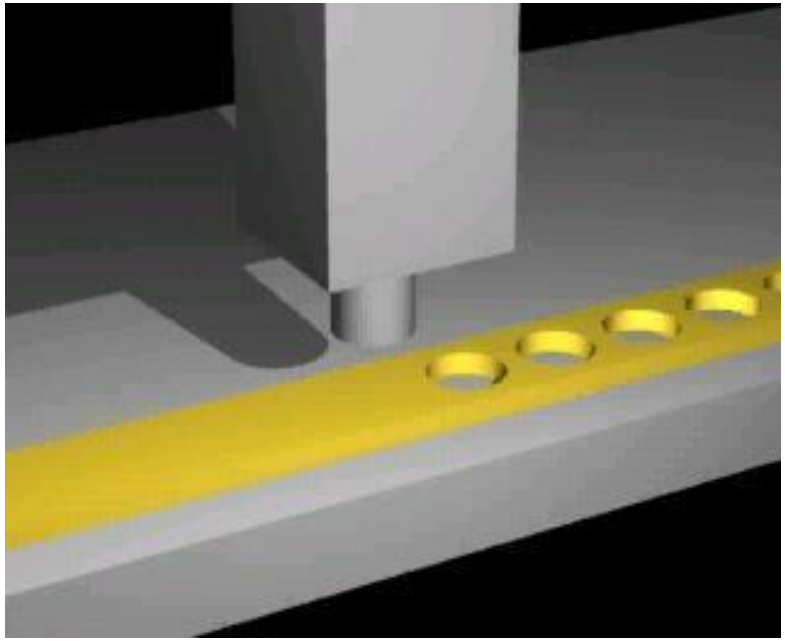
# Cutting Machines



# Milling Machines

# Punching Machines and Actions

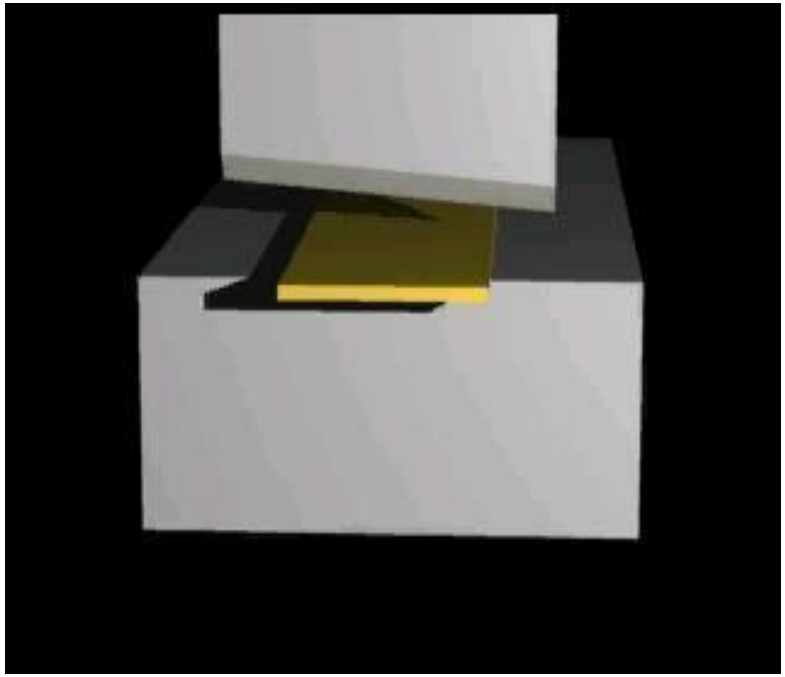
- Hazard—Fingers can be crushed where material is inserted, held, or withdrawn
- Machines
  - Power presses
  - Ironworking equipment
- Action of ram mechanism
  - Bending, drawing, or stamping



# Punching Machines Example

# Shearing Machines and Actions

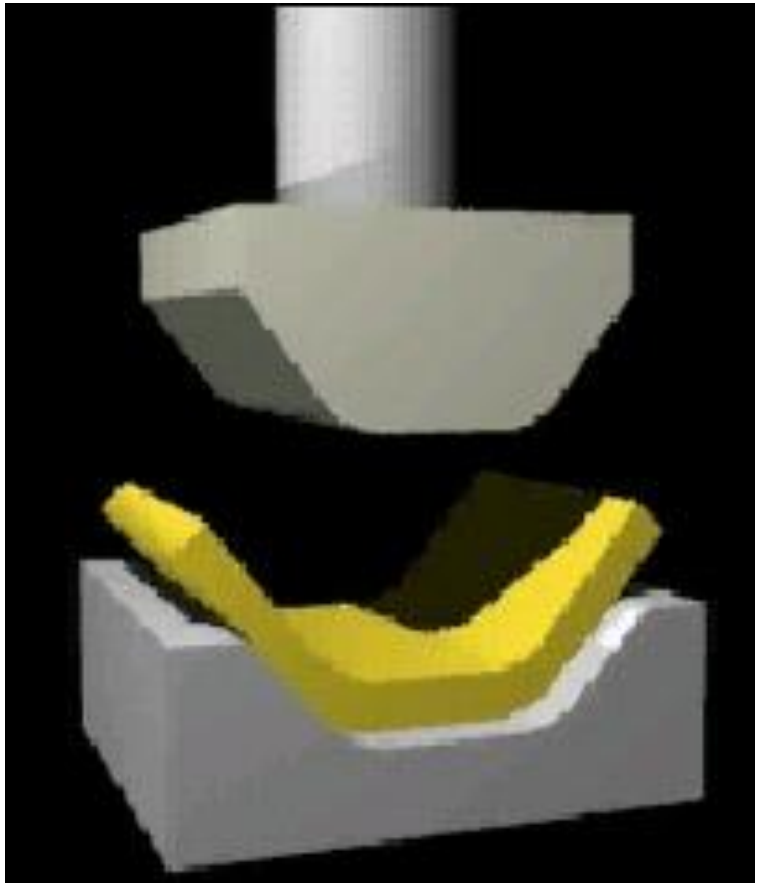
- Hazard—Crush or tear body parts where material is inserted, held, or withdrawn
- Machines:
  - Hydraulic shears
  - Mechanical shears
  - Pneumatic shears
- Actions
  - Powered slide or knife to trim or shear metal or other materials



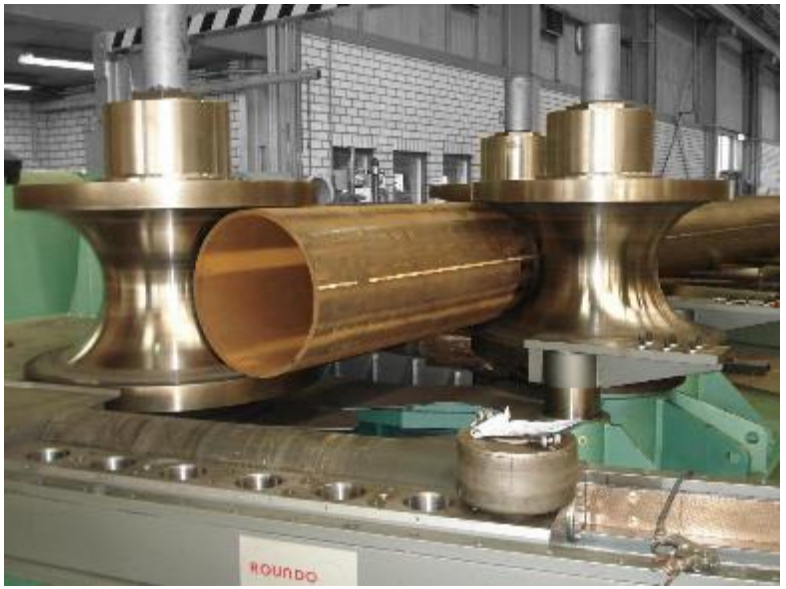
# Shearing Machines Example

# Bending Machines and Actions

- Hazard—Crushing body parts where material is inserted, held, or withdrawn
- Machines
  - Power presses and press brakes
  - Tubing benders
- Actions
  - Draw or stamp



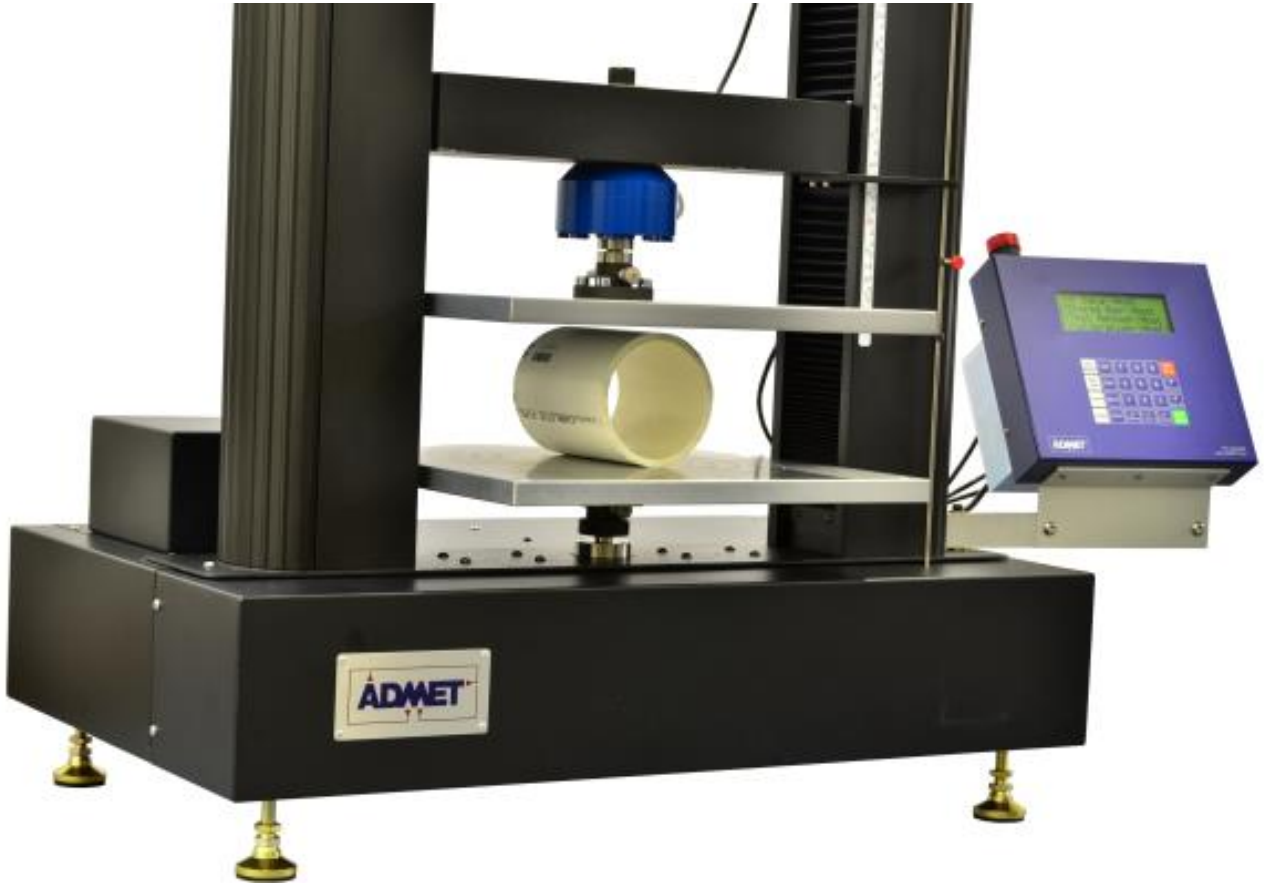
# Bending Machines
# Example



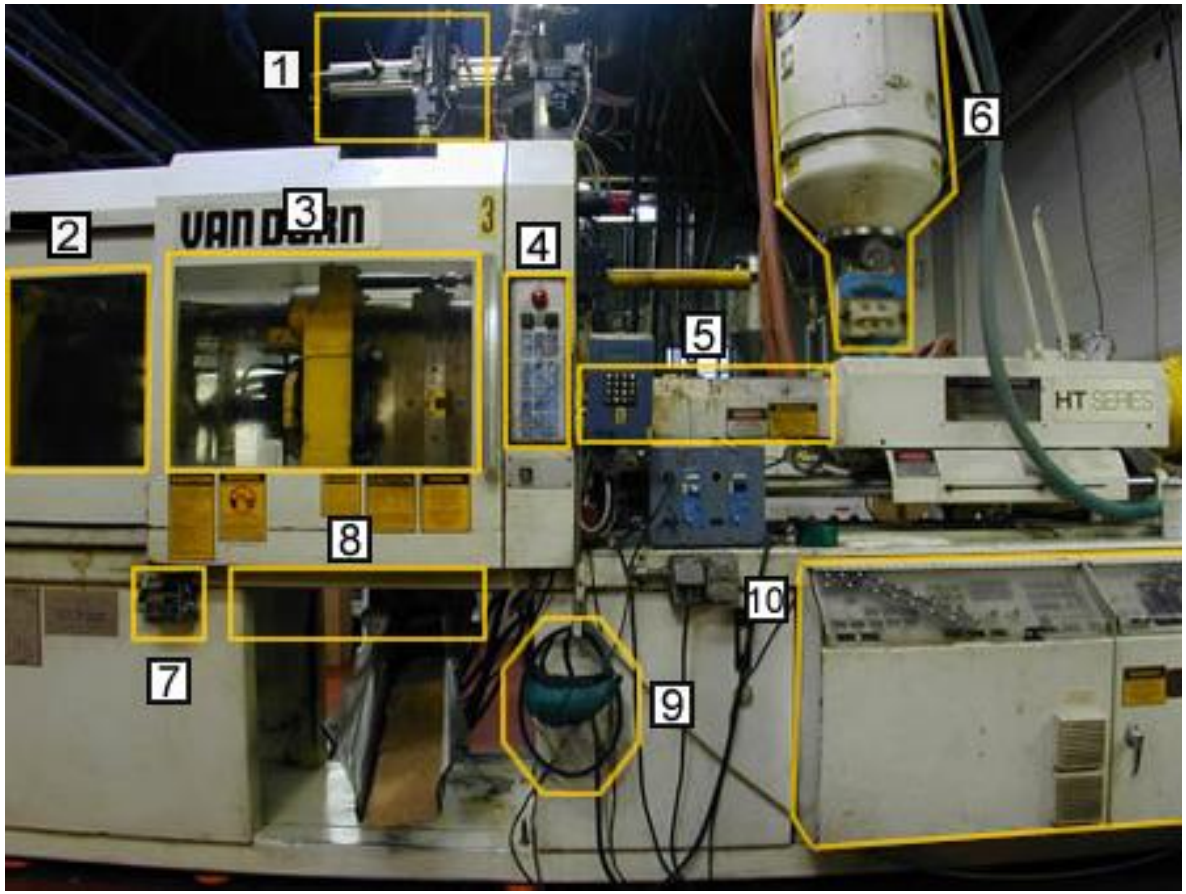
# Compressing Machines and Actions

- Hazard—Compression crushes body parts
- Machines
  - Compactor (*example: trash compactor*)
  - Molding
- Actions
  - Squeezing, extruding, and pressing

# Compressing Machines Example

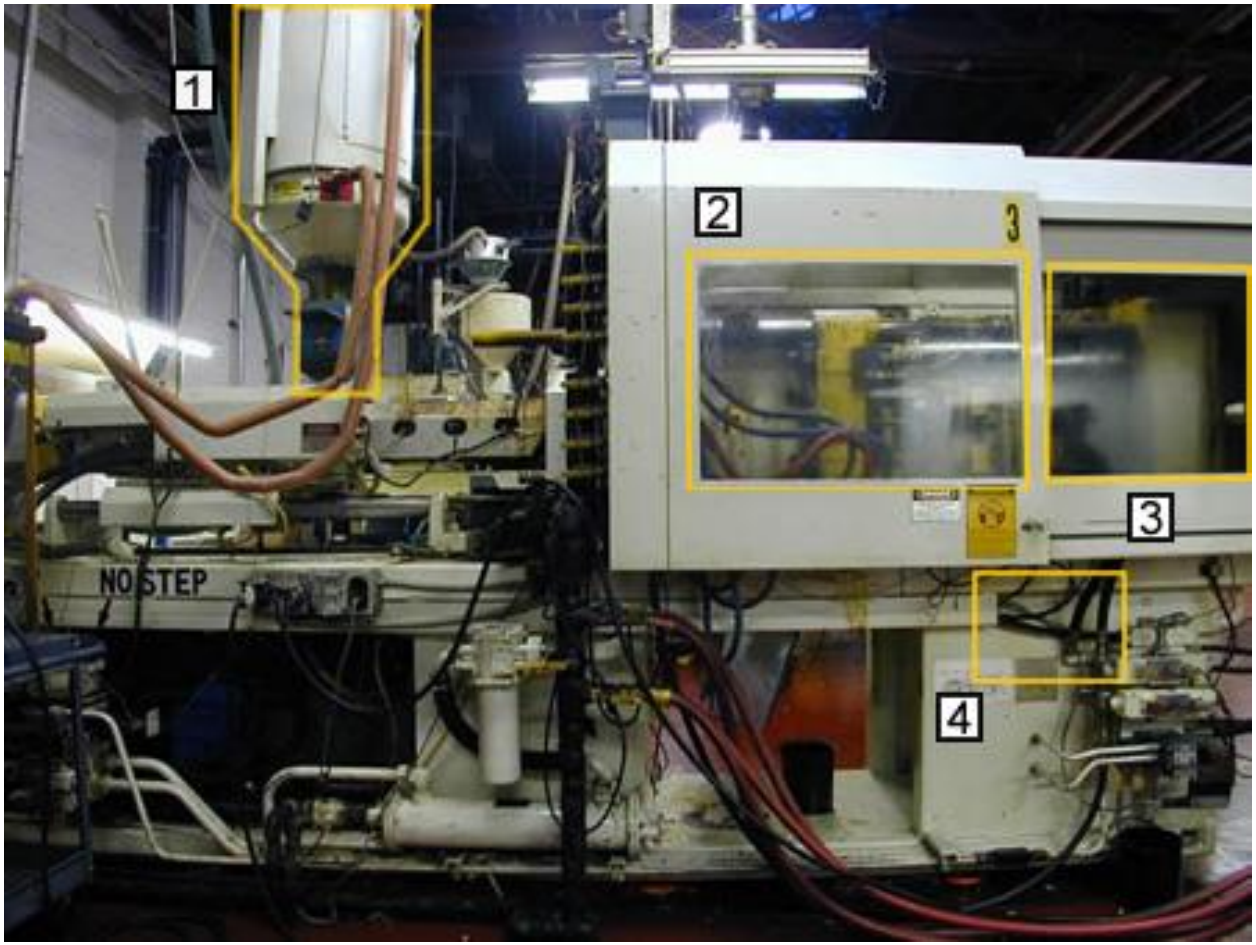


# Horizontal Injection Molding



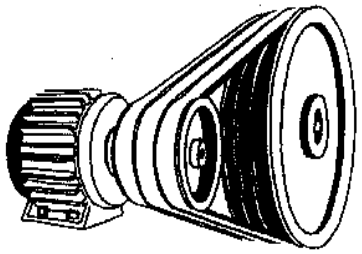

Source: osha.gov

# Horizontal Injection Molding



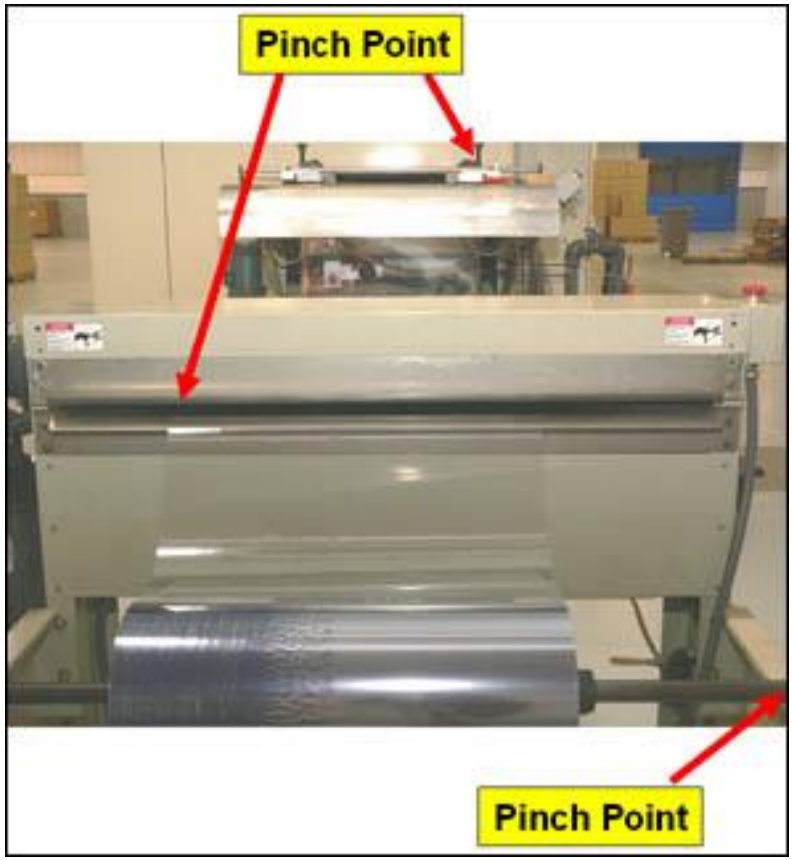
# Power Transmission Apparatus

- Hazard—Grab, nip, cut, or strike body parts
- Machines and parts include:
  - Power transmission belts and pulleys, gears, sprockets and chains, shafts, collars, couplings, flywheels, clutches, and other power transmission apparatus
- Action
  - Grabbing, nipping, cutting, flying or falling objects, reciprocating motions, transverse motions, or a combination of these



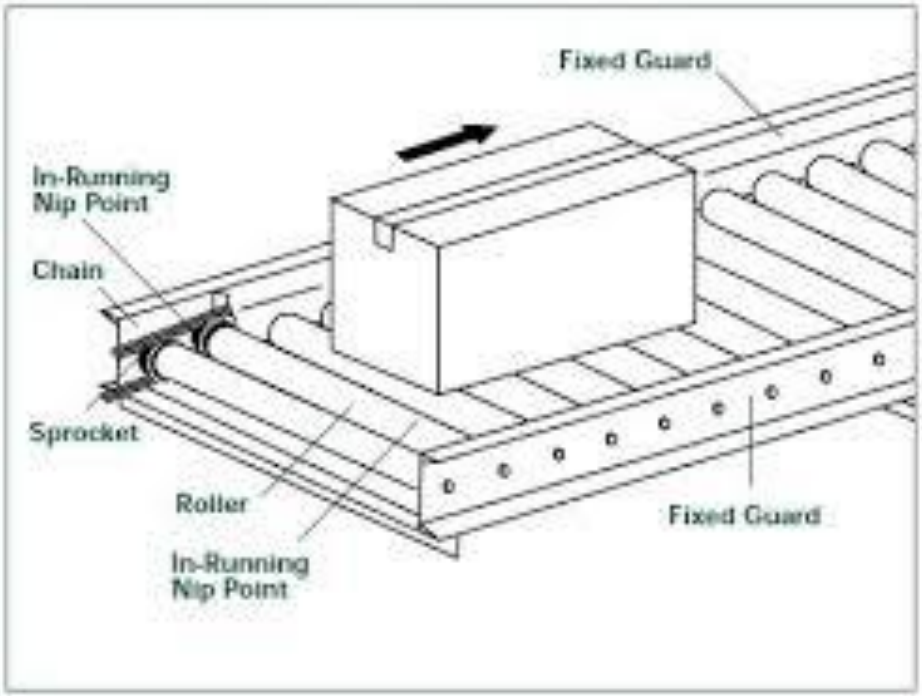
# Power Transmission Apparatus Example

# Other In Running Nip Points



# Conveyors

*Figure 29* Chain Driven Live Roller Conveyor




# Drill Press Incident


# Drill Presses:

# Pedestal / Bench Grinders:

-Tongue guard must be no more than 1/4” away from the wheel

- Tool rest must be no more than 1/8” away from the wheel

# Safeguard Barriers

## Fixed Safeguards

- Permanent part of the machine or apparatus
- Best and simplest guard protection
- Power transmission apparatuses are best protected by fixed guards or barriers that enclose the danger area

# Safeguard Barriers

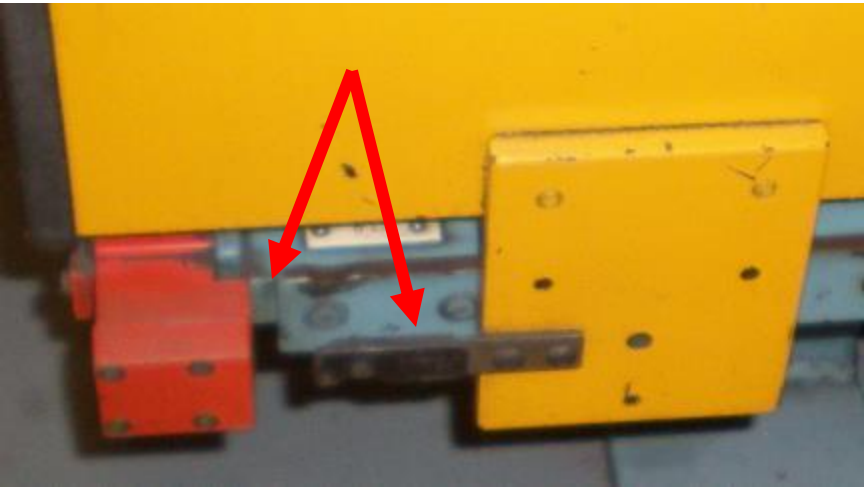
## Adjustable or Self-Adjusting Safeguards

- Adjustable to accommodate varying sizes of material placed at the point of operation
- Self-adjusting types move according to the size of the stock

# Safeguard Barriers

## Interlocked Safeguards

- Interlock device automatically shuts off and quickly stops the machine when the barrier guard is moved to expose the hazard



# Poll Question

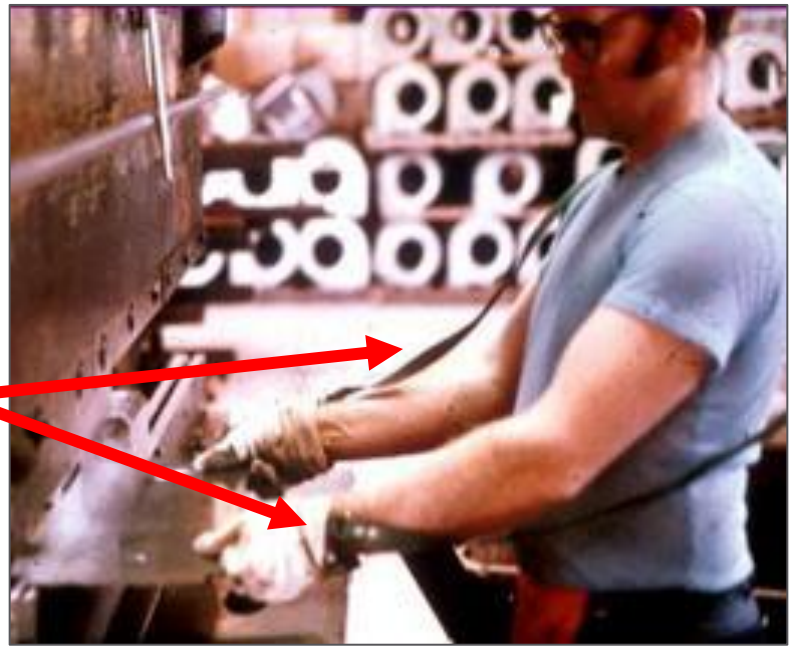
- How frequently do you inspect and document the inspection of equipment safeguards?
  - Monthly
  - Quarterly
  - Annually
  - Periodically
  - UH?!

# Classifications of Safeguards

1. ~~Safeguard barrier (“hard guarding”)~~ 
2. Safeguard device
3. Location and distance
4. Automatic stock feed and ejection method
5. Miscellaneous aids

# Safeguard Devices

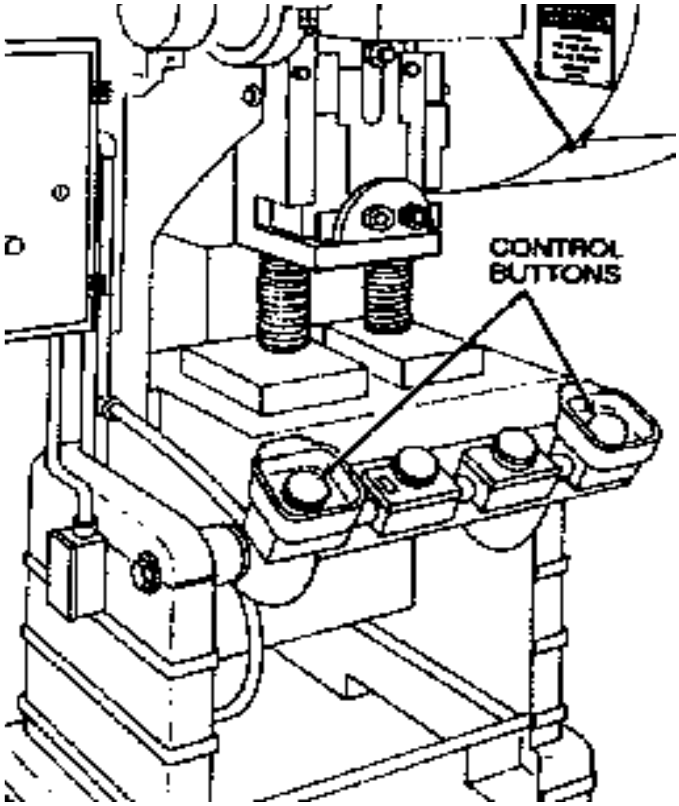
- Presence-sensing devices automatically shut down equipment
  - Photoelectrical
  - Radio frequency
  - Electromechanical
- Pullbacks or restraints
- Safety trip control
  - Pressure-sensitive body bar
  - Safety tripwire cable



# Safeguard Devices

Two-hand devices

- Two-hand controls require constant two-hand pressure during the entire machine cycle
- Two-hand trips activate the machine, then allow hands to be free while machine completes its cycle

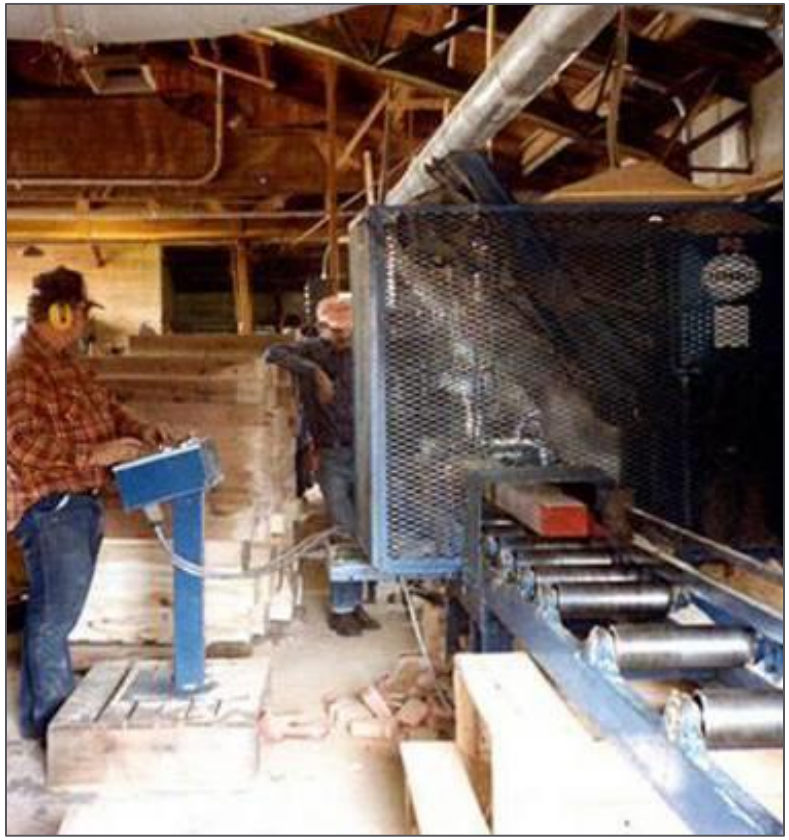


# Guarding Pedal

# Light Curtain

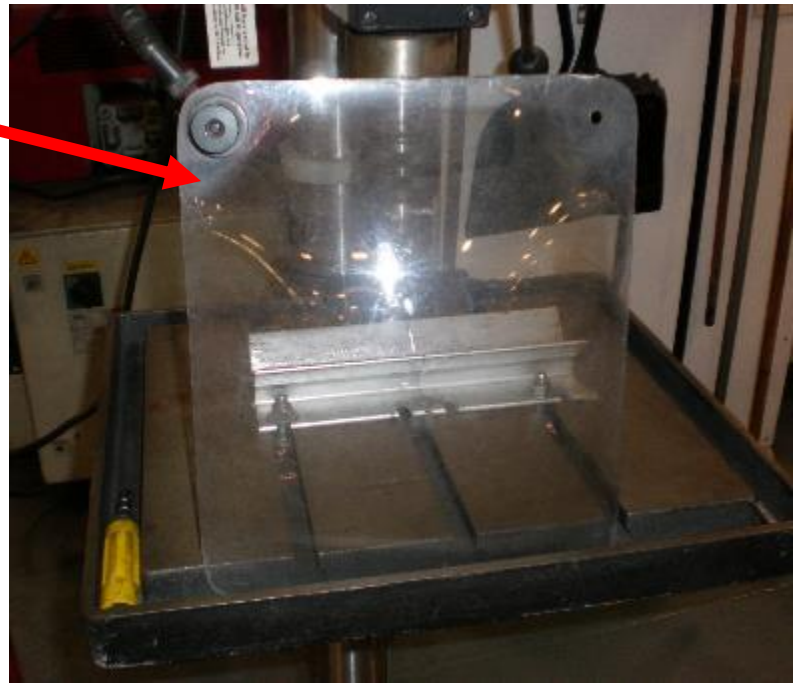
# Location and Distance

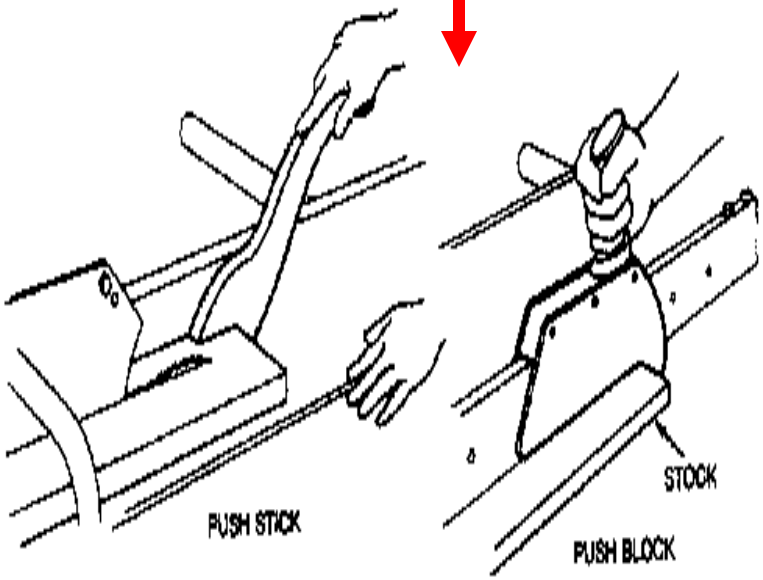
- Separates operators from the equipment
- Makes it virtually impossible to contact moving parts
- Limited by the available workspace



# Miscellaneous Aids

- Awareness barriers
- Protective shields
- Hand-feeding tools and holding fixtures





# Classifications of Safeguards

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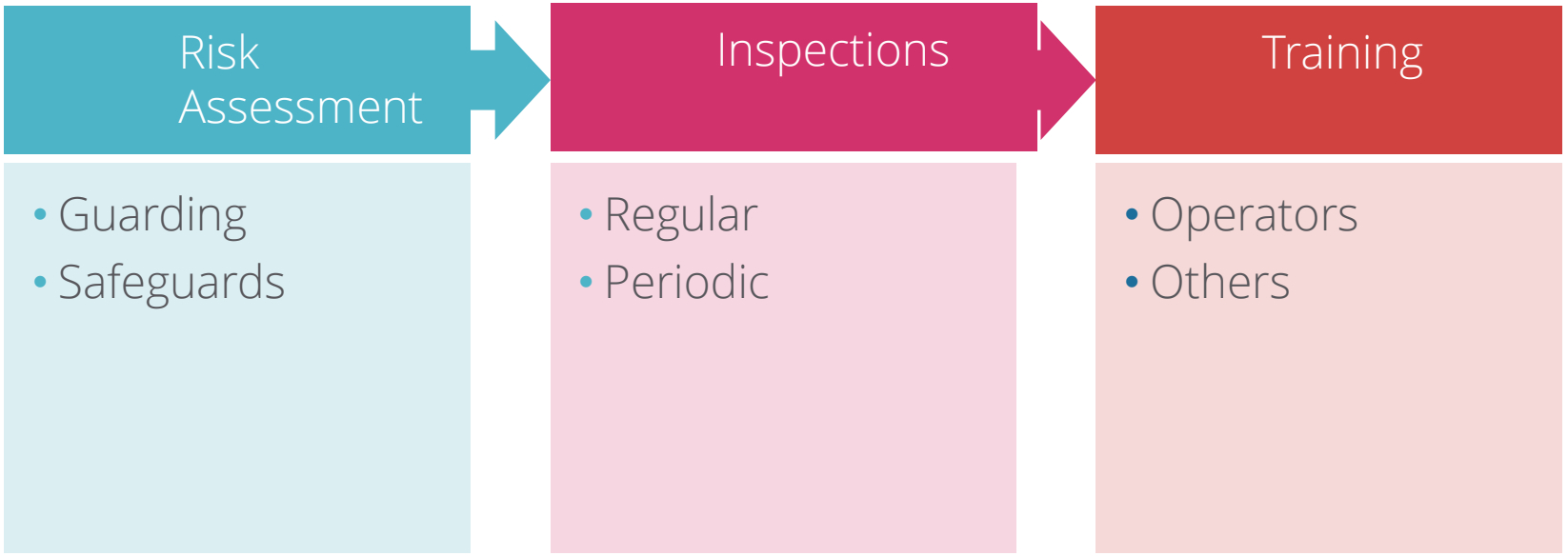
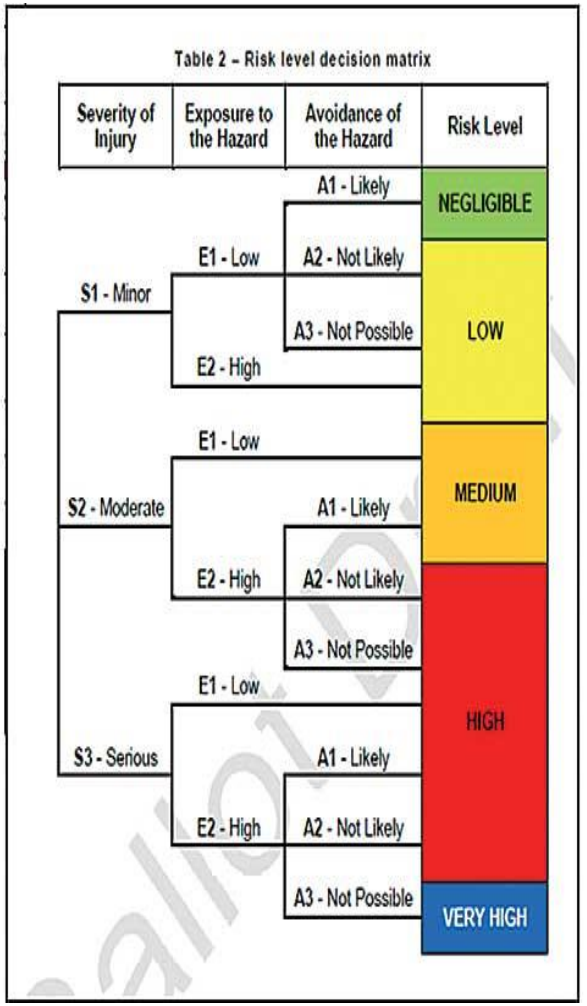
# Going Forward



# Risk Assessment Machine Safeguards

- ANSI B11.0 (risk assessment)
- ISO 13849-1 and 2
- IEC 60204-1
- Acceptable Risk

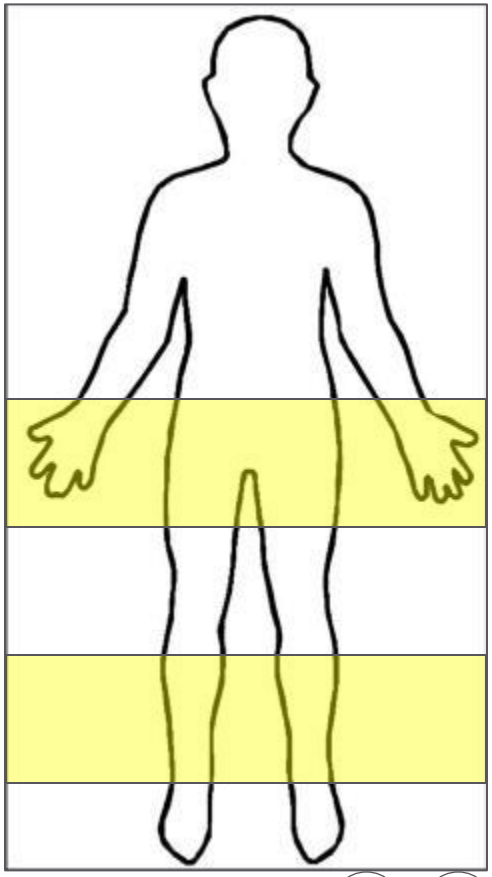


# Periodic and Regular Inspections

- Inspect
  - All equipment
  - Auxiliary equipment
  - Safeguards
- Record:
  - Certificate of inspection
  - Date
  - Name & signature of individual who inspected equipment
  - Press number or ID #

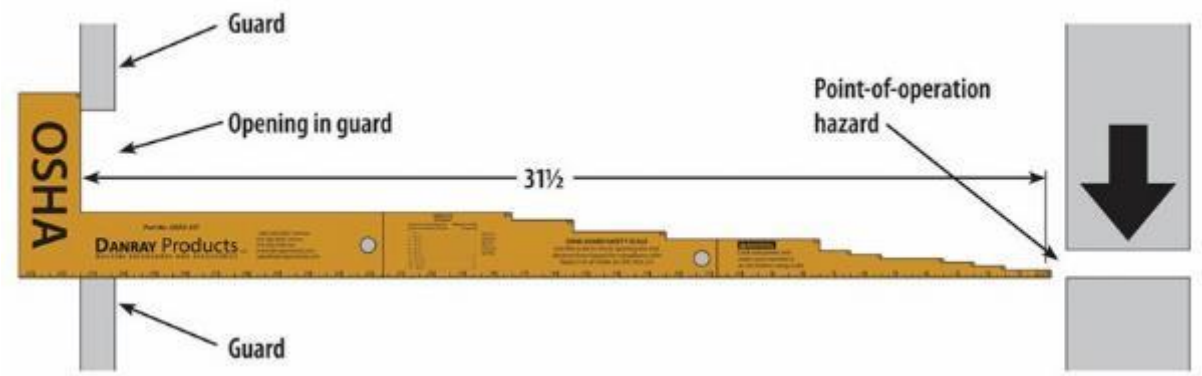
# Where to Begin Looking

- Vulnerable Neutral Body Parts
  - Mid-thigh to belt buckle
  - Below knee to top of foot
- Where hand interactions occur
- Machine Guard Stickers



# Essential Tools For Evaluating Machine Guards

- OSHA Guard Safety Scale




- Bench Grinder Scale


- OSHA Machine Guarding eTool:

https://www.osha.gov/SLTC/etools/machineguarding/index.html

# Bench Grinder Safety Gauge

# Poll Question

- How often are your equipment operators trained on safeguards of equipment? What to look for, how to utilize, etc.?
  - Orientation
  - Annually
  - After an accident
  - Nothing formalized

# Training

- The employer is responsible for training the following employees that are involved with power presses

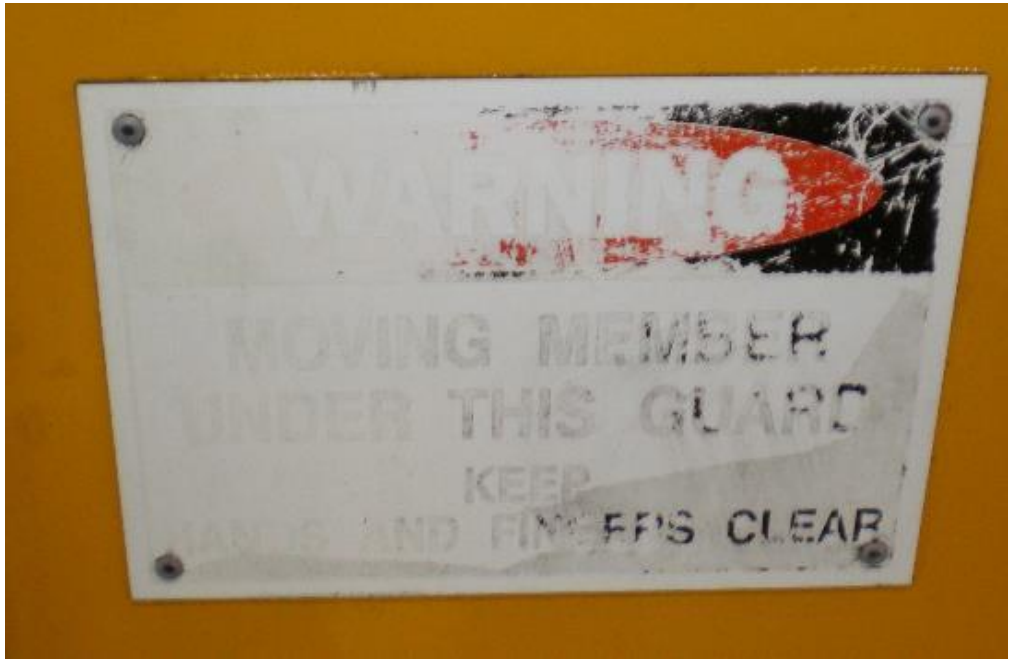
  - Personnel caring for presses
  - Inspecting presses
  - Maintaining
  - Operating

# Safeguarding
# Best Practices

- Operate equipment only when guards are in place and properly adjusted
- NEVER remove or defeat safeguards then using a machine
- Remove guards only when machine is locked / tagged out or energy is isolated in some equally effective manner (interlock devices, cord unplugged and in your control)
- No loose clothing, long hair or jewelry

# Safeguarding Best Practices

- Inspect guarding daily
- Make sure warning signs are legible
- Report problems immediately



# Action Items

- Assess 3 different types of machines in your facility & answer the following questions

1. *Do they have guarding now?*
2. *Is the guarding adequate or inadequate?*
3. *What type of machine guarding solution would best protect your employee?*

# Resources:

- OSHA Machine Guarding eTool:
- https://www.osha.gov/SLTC/etools/machineguarding/index.html

- OSHA Website
- https://www.osha.gov/SLTC/machineguarding/

- OSHA Publication
- OSHA 3170
- https://www.osha.gov/Publications/OSHA3170/osha3170.html