GENERAL INDUSTRY SEMINAR
GEORGIA TECH SAFETY AND HEALTH CONSULTATION PROGRAM

WE WILL COVER:
- Machine Guarding Principles and Regulations
- Forklift Safety
- Combustible Dust
- Safety and Health Programs

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.

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

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.
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?

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

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**INTERlocked GUARDS (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

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**PRESENCE SENSING (PRO VS. CON)**

**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

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**PULLBACKS/RESTRAINTS (PRO VS. CON)**

**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

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**2-HAND CONTROL (PRO VS. CON)**

**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

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**GUARDED????**
GUARDED???

GUARDED???

GUARDED???

GUARDED???

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

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.
Hand Tools

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.
IN-RUNNING NIP POINTS

Rotating cylinders

Belt and pulley

Chain and sprocket

Rack and pinion

BELTS AND PULLEYS
1910.219(D) & 1910.219(E)

PROJECTING SHAFTS
1910.219(C)(4)

HORIZONTAL, VERTICAL, AND INCLINED SHAFTS
1910.219(C)

CHAINS AND SPROCKETS
1910.219(F)(3)

GEARS
1910.219(F)

BENCH GRINDERS-TONGUE GUARDS
1910.215(B)(9)

- The distance between the wheel periphery and the adjustable tongue must not exceed one-quarter inch.
BENCH GRINDERS - WORK RESTS
1910.215(A)(4)
• Work rests must be kept to within one-eighth of an inch of the wheel.

PORTABLE HAND AND POWER TOOLS
1910.242 & 243
• Keep all tools in good condition
  — Regular maintenance
• Right tool for the right job
• Inspect for damage
• Manufacturer’s instructions
• PPE
• Safe work procedures

MATERIALS HANDLING & STORAGE
[1910.176 – .184]

POWERED INDUSTRIAL TRUCKS
1910.178
• Covers general industry, construction, and shipyards
• Covered under 1910.178:
  • Fork trucks
  • Platform lift trucks
  • Motorized hand trucks
  • Other specialized industrial trucks powered by electric motors or internal combustion engines

POWERED INDUSTRIAL TRUCKS
1910.178
• Not Covered under 1910.178:
  • Compressed air or nonflammable compressed gas-operated industrial trucks
  • Farm vehicles
  • Vehicles intended primarily for earth moving or over-the-road hauling
HAND & HAND/RIDER TRUCKS

- Walkie Powered Pallet Truck
- Walkie/Rider Powered Pallet Truck

GENERAL REQUIREMENTS

- Modifications
  - Need manufacturer’s written approval
- Operating Atmosphere
  - Hazardous or Non-Hazardous
    - Must be determined before use

GENERAL REQUIREMENTS (CONT.)

- Training
  - No operation unless properly trained and authorized
  - This includes supervisors!!
  - “Approved Trucks”
  - Bear label from testing laboratory
TRAINING PROGRAM IMPLEMENTATION

• Training shall consist of a combination of:
  • Formal instruction (e.g., lecture, discussion, interactive computer learning, written material);
  • Practical training (demonstrations and exercises performed by the trainee); and
  • Evaluation of the operator’s performance in the workplace.

TRAINING PROGRAM IMPLEMENTATION (CONT.)

• Training and evaluation shall be conducted by a person with the knowledge, training, and experience to train PIT operations and evaluate their competence.

TRAINING PROGRAM CONTENT

• Operators shall receive initial training in the following topics, except in topics which the employer can demonstrate are not applicable to safe operation in the employer’s workplace:
  • Truck-related topics;
  • Workplace-related topics; and
  • The requirements of the standard.

TRAINING PROGRAM CONTENT

• Truck-Related Topics:
  • Operating instructions, warning, and precautions
  • Differences from automobile
  • Controls and instrumentation
  • Engine of motor operation
  • Steering and maneuvering
  • Visibility
  • Fork and attachment adaption, operation, and use

• Vehicle capacity and stability
• Vehicle inspection and maintenance that the operator will be required to perform
• Refueling/Charging/Recharging batteries
• Operating limitations
• Other instructions, etc.
TRAINING PROGRAM CONTENT

- Workplace-Related Topics:
  - Surface conditions
  - Composition and stability of loads
  - Load manipulation, stacking, and unstacking
  - Pedestrian traffic
  - Narrow aisles and restricted areas
  - Operating in hazardous (classified) locations

- Operating on ramps and sloped surfaces
- Potentially hazardous environmental conditions
- Operating in closed environments or other areas where poor ventilation or maintenance could cause carbon monoxide or diesel exhaust buildup

The requirements of the OSHA standard on PITs must also be included in the initial operator training program.

REFRESHER TRAINING AND EVALUATION

- An evaluation of each PIT operator’s performance must be conducted:
  - After initial training;
  - After refresher training; and
  - At least once every three years.

REFRESHER TRAINING AND EVALUATION

- Refresher training is required when:
  - Unsafe operation
  - Accident or near-miss
  - Evaluation indicates need
  - Different type of equipment introduced
  - Workplace condition changes

AVOIDANCE OF DUPLICATIVE TRAINING

- If an operator has previously received training in a topic specified in this section, and the training is appropriate to the truck and working conditions encountered, additional training in that topic is not required if the operator has been evaluated and found competent to operate the truck safely.

PRE-OPERATIONAL INSPECTION

- All fluid levels
- Tires
- Hoses/Belts/Cables
- Mast/Forks
- Fuel/Battery Level
- Safety Equipment
- Gauges/Controls
- Horns/Alarms
- Steering
- Brakes
- Leaks
HAZARD??

LOADING AND UNLOADING

- Trucks and Railcars
- Wheel chocks
  - Set parking break
- Rail Stops
UNATTENDED TRUCKS

- Unattended:
  - Operator is more than 25 ft. from truck
  - Truck is no longer in operator’s view
  - Load engaging means fully lowered
  - Controls neutralized
  - Power shut off
  - Brakes set
  - Wheels chocked if on an incline

GASOLINE OR DIESEL

- Never fuel the forklift near an open flame or heat source
  - NO SMOKING ALLOWED
- Turn the unit off before refueling
- Make sure the operator knows which type of fuel to add

BATTERY-POWERED

- Battery charging installations
  - Designated areas
- Areas must be provided with:
  - Apparatus to neutralize spilled electrolyte
  - Fire protection
  - Protection for charging apparatus (from damage)
  - Hoist (or equivalent) for handling batteries
EYE WASH STATIONS

1910.151(c)
Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use.

EYE WASH STATIONS

• 15 Minutes of Flushing
• 10 Seconds Travel Time
• Tepid Water
• Clear, level, unobstructed path
• Inspections at least weekly
• ANSI Z358.1

DOCKBOARDS

• Capable of supporting maximum intended load
• Prevent transfer vehicles from running off dockboard edge
• Prevented from moving out of safe location
  • Anchored in place
  • Use devices or equipment
• Equipped with means to permit safe handling
  • Handholds

DOCK PLATES

RELEVANT OSHA STANDARDS
- 22 (Housekeeping)
- 38 (Exit Routes and Emergency Plans)
- 94 (Ventilation)
- 146 (Confined Space)
- 157 (Fire extinguishers)
- 165 (Employee Alarms)
- 176 (Material Handling)
- 178 (Forklifts)
- 261 (Pulp, Paper)
- 263 (Bakery)
- 265 (Sawmill)
- 269 (Electric Power Generation)
- 272 (Electric Power Generation)
- 307 (Hazardous locations elect.)
- 1200 (Hazard Communication)
- 5a1 (General Duty Clause)

SOME RELEVANT NFPA STANDARDS
- NFPA 61 – Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities (2020)
- NFPA 484 – Combustible Metals (2019)
- NFPA 654 – Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids (2020)
- NFPA 664 – Prevention of Fire and Dust Explosions in Wood Processing and Woodworking Facilities (2020)

NFPA 652 INCLUDES:
- Completion of Dust Hazard Analysis (New 652 deadline is 9/7/20) and requirement for DHA to be reviewed/updated every 5 years
- General requirements for managing dust fire and explosion hazards
  - Hazard Identification
  - Performance Based Design
  - Dust Hazard Analysis
  - Management Systems
  - Hazard Management – Mitigation and Prevention
- Annexes include Explanatory Material, Example DHA, Accumulated Fugitive Dust, Informational References.
QUESTIONS?

SAFETY AND HEALTH PROGRAMS

GEORGIA TECH SAFETY CONSULTATION PROGRAM

INTRODUCTION

- Research indicates benefits to companies who establish effective worker safety and health programs:
  - Reduction in the extent and severity of work-related injuries and illnesses
  - Improved employee morale
  - Higher productivity
  - Lower workers’ compensation costs

EXEMPLARY WORKPLACES

Common characteristics of effective safety and health programs:
- Assignment of responsibility to managers, supervisors, and workers
- Regular inspections to control hazards
- Employee training and orientation for the recognition and avoidance of hazards

SAFETY AND HEALTH PROGRAM GUIDELINES

Systematic approach to hazard:
- Identification
- Evaluation
- Control

SAFETY AND HEALTH PROGRAM GUIDELINES

- Goes beyond specific requirements of the law to focus on all hazards.
SAFETY AND HEALTH PROGRAM GUIDELINES

- As the size of the workplace increases so does the need for a formalized written program
- Program effectiveness more important than “In Writing”

MAJOR ELEMENTS

Keys to an effective program:
- Management commitment and employee involvement
- Worksite analysis
- Hazard prevention and control
- Safety and health training

MANAGEMENT COMMITMENT

Management provides:
- Direction and motivation
- Resources
- Activity control

MANAGEMENT COMMITMENT

- Safety and health policy statement
- Clear program goals and objectives
- Visible involvement in program from top management
- Leadership

MANAGEMENT COMMITMENT

- Assignment of safety and health responsibilities
- Clear communication of program goals

MANAGEMENT COMMITMENT

- Provides adequate authority to responsible personnel
- Holds managers, supervisors and employees accountable for meeting their responsibilities
**MANAGEMENT COMMITMENT AND EMPLOYEE INVOLVEMENT**

- Complement one another
- Management provides the motivating force and resources for safety and health programs
- Employee involvement provides workers opportunities to develop and express their own commitment to the safety and health program

**EMPLOYEE INVOLVEMENT**

Active role for employees:
- Workplace inspections
- Hazard analysis
- Development of safe work rules
- Training of coworkers & new hires

**WORKSITE ANALYSIS**

- Hazard Identification:
  - Facilities
  - Processes
  - Materials
  - Equipment
  - Use professionals that understand the processes involved

**WORKSITE ANALYSIS**

Perform job hazard analysis
- Break tasks down into elements
- Identify the hazards in each element
- Identify control measures and safe work rules for each element

**WORKSITE ANALYSIS**

- Identify existing hazards
- Anticipate hazards where procedures or operations change

**WORKSITE ANALYSIS**

- Provide for regular site safety and health inspections
- Method for reporting and correcting hazards:
  - Communication of hazards
  - Method for correcting reported hazards
  - Prioritizing work
  - Timeliness
  - Without fear of reprisal
WORKSITE ANALYSIS

• Effective system for:
  • Accident Investigations
  • Near Misses
  • Identify root causes
  • Contributing factors
  • Methods for prevention of reoccurrence

• Analyze injury and illness trends over time:
  • Identify injury type patterns
  • Identify injury task patterns
  • Analyze by department
  • Identify common causes and prevent reoccurrence

HAZARD PREVENTION AND CONTROL

• Make a determination that a hazard exists
• Where feasible, eliminate by job or task design/redesign
• If elimination is not feasible, then control the hazard:
  • Engineering controls
  • Administrative controls
  • Personal protective equipment (PPE)

• System for timely correction or control of hazards
• Safe work procedures:
  • Developed from worksite analysis
  • Training
  • Correction of unsafe performance
  • Positive reinforcement
  • Enforcement

HAZARD PREVENTION AND CONTROL

• Provide for facility and equipment maintenance
• Plan and prepare for emergencies:
  • Training and drills
  • Medical Program
  • First aid
  • Physician and emergency care

• System for timely correction or control of hazards
• Safe work procedures:
  • Developed from worksite analysis
  • Training
  • Correction of unsafe performance
  • Positive reinforcement
  • Enforcement

SAFETY AND HEALTH TRAINING

Effective new employee orientation:
• Employee safety and health responsibilities
• Protective measures
• Proper procedures for machine operation
• Understand all safeguards
• Exits and emergency procedures
SAFETY AND HEALTH TRAINING

• Cover all required employee training
• Documentation where required
• Reinforcing employee training:
  • Continual feedback
  • Refresher training as needed

QUESTIONS?

CONTACT INFORMATION

Georgia Tech Safety and Health Consultation Program
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