MODULE DESCRIPTION
The purpose of this training module is to provide information that helps you recognize and avoid common caught-in and caught-between hazards in your work environment.

OBJECTIVES
After completing this module, you will be able to:

• Identify common caught-in and caught-between hazards.
• Describe types of caught-in and caught-between hazards.
• Protect yourself from caught-in and caught-between hazards.
• Recognize employer requirements to protect workers from caught-in and caught-between hazards.

MODULE OUTLINE

1. Introduction
   o Construction work sites are full of heavy objects that can move, such as vehicles, equipment, machinery, and materials. All of these objects under the wrong circumstances are potential caught-in or caught-between hazards to construction workers.
   o For example:
     ▪ Objects raised off the ground can move unexpectedly and fall on a worker.
     ▪ A worker can become caught between a falling object and the ground or another object.
     ▪ A worker can become caught in moving machinery parts.

2. Definition of Caught-In and Caught-Between Hazards
   o The Occupational Safety and Health Administration (OSHA) defines, caught-in and caught-between hazards as injuries resulting from a person being squeezed, caught, crushed, pinched, or compressed between two or more objects, or between parts of an object. This includes individuals who are caught or crushed
     ▪ in operating equipment
     ▪ between other mashing objects
     ▪ between a moving and stationary object
     ▪ between two or more moving objects.

3. Distinguish Between a Caught or Struck Event
   o Events classified as caught incidents include:
     ▪ Cave-ins during trenching
     ▪ Being pulled into or caught in machinery and equipment, this includes strangulation from clothing caught in running machinery or equipment
4. Leading Causes of Construction Industry Deaths
   - The Bureau of Labor Statistics (BLS) of the US Department of Labor is the principal Federal agency responsible for measuring working conditions. The BLS determined that the top four causes of construction fatalities are falls, being struck by equipment or machinery, being caught-in or caught-between equipment or machinery, and electrocutions. These events are known as the "Fatal Four" events. According to the BLS, Fatal (Focus) Four events caused almost three out of five (59%) construction worker deaths.
     - Fatal work injuries involving caught-in or -between hazards increased overall by approximately 10% from 2003 to 2008.
     - In 2008, 975 private-industry construction workers died on the job and 92 of these deaths (9%) were due to caught-in or -between hazards.
     - Fatalities involving caught-in or -between hazards in the construction industry decreased by about 20% since 2003.
     - Fatalities due to caught-in or -between incidents during excavation or trenching activities decreased from 44 in 2003 to only 16 deaths in 2008.
   - Although there were fewer fatal injuries to American workers in 2008, the decline may not be due to safer work practices alone. The bad economy was a factor decreasing fatalities because fewer people were working in 2008 than in 2007, particularly in the construction industry, which historically accounts for the most worker fatalities. Therefore, employers and workers must continue to improve workplace safety practice to reduce the number of work-related deaths.

5. Types of Caught-In and Caught-Between Hazards
   - The most common types of hazards are:
     - Working with machinery with unguarded moving parts
     - Being buried in or by something
     - Getting pinned between objects
   - Machine with unguarded moving parts
     - Workers can get a hand or foot caught in rotating equipment with unguarded moving parts, like augurs, rollers, or wheels. Workers are also at risk when they do not properly lockout machinery during maintenance.
   - Being Buried
     - Workers risk being buried during trenching, excavation, or demolition activities.
   - Getting Pinned
     - Workers are in danger of being pinned by:
       - Vehicles or heavy equipment that turn over while driving
       - Equipment or machinery during maintenance
       - Rigging used to lift or pull heavy material

6. Machinery with Unguarded Moving Parts
   - Almost all construction sites use machinery with moving or rotating parts that require maintenance or repair at some point. Many power tools and equipment contain dangerous moving parts, such as belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating, or moving parts to which workers are exposed. These types of tools can be powered by electricity, pneumatics, liquid fuel, hydraulics, or powder-actuated.
As a result, construction workers are at constant risk for caught-in or caught-between injuries, such as amputations, fractures, even death. Workers handling machines or power tools can get clothes or body parts caught in machinery if they do not properly:

- Guard machinery during regular use, or
- Lockout or de-energize machinery during maintenance or repair.

Many accidents occur because workers fail to lockout and tagout machinery properly. Lockout and tagout (LOTO) or lock and tag is a safety procedure that:

- Locks the device or power source and prevents the turning on of hazardous power sources while performing maintenance or servicing work.
- Requires workers to place a tag on the locked device indicating that it should not be turned on. When using a tag, other energy isolation techniques may be necessary to maintain worker safety.

### 7. Machinery with Unguarded Moving Parts

Follow these guidelines to avoid caught-in or caught-between accidents while working with power tools and machinery.

- Keep safety guards in place when using power tools.
- Do not wear loose clothing or jewelry that can get caught in moving parts.
- Always de-energize or turn off tools to ensure they cannot start accidentally.
- Disconnect tools from their power sources when not in use, before servicing, and when changing accessories, like blades, bits, and cutters.
- Lower or block blades on bulldozers, scraper blades, end-loader buckets, dump bodies, and similar equipment when doing repairs, maintenance or not using them.
- Turn off vehicles completely before doing maintenance or repair work.

OSHA requires employers to support, secure, and otherwise make safe any equipment with parts that workers could be caught between or crushed by. Employers must take precautions to protect workers using hand-held power tools and other heavy equipment by:

- Fitting tools with appropriate guards and safety switches for electric, pneumatic, liquid fuel, hydraulic, or powder-actuated machinery.
- Guarding exposed moving parts, such as belts, gears, shafts, pulleys.
- Guarding points-of-operation where the worker applies a tool to materials. For example, power saws require point-of-operation guarding.
- Guarding in-running nip points, such as where a sanding belt runs onto a pulley in a belt sanding machine.

Providing a LOTO program or equivalent system to ensure that equipment is not accidentally energized during maintenance or repair. Lockout and tagout procedures are specifically required for equipment used in concrete and masonry operations.

### 8. Burial Dangers to Workers

Workers in a variety of industries must spend a significant amount of time working below ground or in trenches. These are very dangerous work environments with many seen and unseen dangers, including:

- Threat of being buried, crushed, or suffocated to death
- Danger of drowning in water, sewage, or chemicals

Exposure to shocks, burns, or electrocution when working near underground utilities

Workers in unprotected trenches and excavations are exposed to:

- Water deep enough to drown in
- Sewage
• Chemicals
  • Working in a Trench - Workers dealing with underground utilities are at risk for burns, electrocution, or explosions from steam, hot water, gas, or electricity.
  • Working with Demolitions - Workers can be buried and crushed by collapsing walls and debris during a demolition.
  • Working Around Scaffolds - Workers underneath a large scaffold can be buried if the scaffold collapses.

9. Protecting Workers from Burial Dangers
  • Sloping - Cutting back the sides of a trench to a safe angle to prevent collapse.
  • Benching - Using a series of steps to approximate a safe sloping angle depending on the soil type.
  • Trench box or shield - Helps protect workers if a cave-in occurs.
  • Shoring - Uses wooden structures or mechanical or hydraulic systems to support the sides
  • OSHA defined several standards on trenching and excavation to keep workers safe and requires employers to take certain precautions, including:
    • Designating a competent person to inspect trenching operations.
    • Using various protection systems for excavations and trenches five feet deep or more.
    • Preventing equipment or materials from falling or rolling into excavations.
  • Designate a Competent Person
    • Employers must designate a competent person responsible for:
      • Receiving training about soil classifications, using protective systems, and OSHA’s standards and requirements.
      • Identifying hazards properly.
      • Using authority to eliminate hazards immediately.
      • Inspecting excavations, adjacent areas, and protective systems.
  • Use Protection Systems
    • OSHA requires employers to:
      • Protect all excavations and trenches five feet deep or more, but less than 20 feet.
      • Use sloping, benching, trench boxes, shields, or shoring, as needed, to protect these types of trenches.
      • Provide adequate means of access and egress from an excavation.
      • Get a professional engineer to design the protection system if an excavation is more than 20 feet deep.
  • Protect from Equipment and Materials
    • Workers in trenches risk injury from
      • equipment or materials that could fall or roll into excavations
      • spoils that can fall in and bury workers.
    • Employers must take the following steps to protect workers:
      • Use a warning system, such as barricades, hand or mechanical signals, or stop logs when workers use mobile equipment next to or near the edge of an excavation, or an operator cannot see the edge of an excavation.
      • Keep excavated soil and other materials at least two feet from trench edges.
      • Grade away from the excavation, when possible.
      • Prevent the use of cranes or earthmoving equipment directly over the top of a trench with workers present below.
      • Keep heavy equipment away from the edge of a trench.
  • Prepare for Demolitions
During demolition, employers must:
- Ensure that stand-alone walls, more than one story tall, have lateral bracing, unless a wall is self-supporting.
- Conduct an engineering survey before demolition of a structure and adjacent structures to which workers are exposed.
- Identify hazards from weakened or deteriorated floors, walls, or loosened material.

Safeguard Scaffolds
- When working with scaffolds, OSHA expects employers to:
  - Designate a competent person to erect, move, dismantle, and alter scaffolds.
  - Train workers on the correct procedures and hazards of scaffold erection.

10. Dangers of Getting Pinned
- Accidents where workers are pinned between objects can result in broken bones, asphyxiation, or death. Employees can be hurt if they get pinned between:
  - equipment and a solid object, such as a wall or other piece of equipment
  - materials being stacked or stored and a solid object
  - shoring and construction materials in a trench.

11. Protecting Workers from Pinning Dangers
- Follow these guidelines to protect yourself from being pinned between equipment, materials, or other objects:
  - Be aware of the equipment around you at all times and stay a safe distance away.
  - Never stand between moving equipment or materials and an immovable structure, vehicle, or stacked materials.
  - Do not work under suspended or raised loads or materials.
  - Ensure that all loads carried by equipment are stable and secure.
  - Steer clear of the swing radius of cranes and other equipment.
  - Wear a seatbelt, if required, to avoid being thrown from a vehicle and, possibly, crushed by the vehicle if it tips over.
- To comply with OSHA’s regulations, employers must:
  - Take measures to prevent workers from being pinned between various objects.
  - Ensure that only the necessary personnel are present during demolition operations that involve balling or clamming.
  - Use proper bracing between heavy plates when shoring a trench.
  - Create a clear travel path when loading, unloading, stacking, and storing materials to prevent workers from getting caught between objects.

12. Protecting Workers Using Heavy Equipment
- A person can be crushed by heavy equipment if it tips over. The best way to avoid this is to prevent equipment from tipping over in the first place. For example, a crane can tip over if you exceed the load capacity or drive it on ground that is not level or is too soft.
- OSHA requires employers using certain heavy equipment on their work sites to:
  - Designate a competent person to inspect crane operations and identify hazardous conditions.
  - Ensure that a crane’s support surface is firm and able to support the load.
  - Equip material handling equipment with rollover protection structures.
  - Provide seat belts on all motor vehicles, forklifts, and earthmoving equipment.
• Require that employees use seat belts to prevent being thrown from a vehicle or equipment and subsequently crushed if the vehicle or equipment tips over.

13. Protecting Workers Using Heavy Equipment
   o Providing workers with proper training on equipment and hazards helps ensure they work safely and avoid caught-in and caught-between hazards. In general, OSHA requires employers to:
     • Inform workers about how to identify and avoid unsafe conditions.
     • Tell employees the regulations that apply to their work environment to control or eliminate hazards and other exposure to illness or injury.
     • Train workers how to perform the job and use equipment safely.