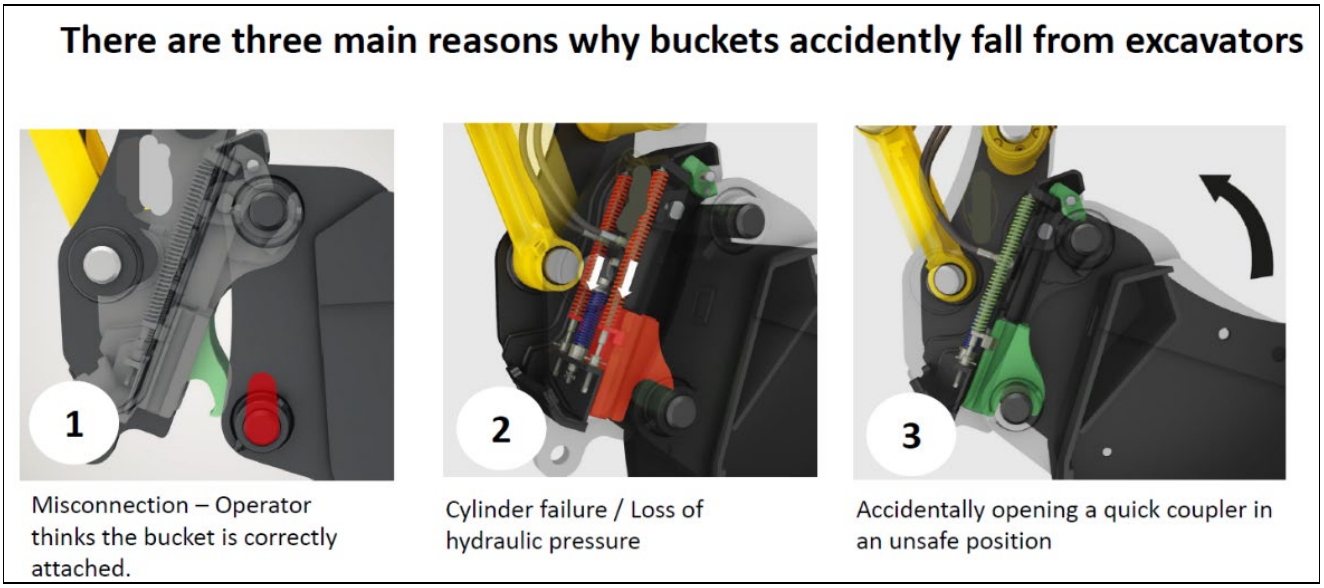
# Preventing Excavator Quick Coupler Attachment Struck-by Fatalities and Injuries

Excavator quick coupling devices (quick couplers) are widely used on construction job sites to rapidly change buckets and other attachments for various tasks. Quick couplers can use powered, manual, or combination systems. Additionally, different manufacturers use different mechanisms to keep the quick coupler engaged with the bucket or other attachment. While this factsheet focuses on buckets, these recommendations apply to any quick coupler attachment. There are three main reasons why buckets or other attachments unintentionally fall from excavators using quick couplers: (a) improper attachment of the bucket or attachment; (b) quick coupler mechanical or hydraulic failure; or (c) operator opening of the quick coupler in an unsafe position.




***Three main reasons why buckets unexpectedly fall from excavators – example of quick coupler with powered mechanism.***
*Photos/Credit: Geith International, Ltd.*

Being struck by falling buckets or other attachments has caused severe injury or death to nearby workers. An Occupational Safety and Health Administration (OSHA) Safety and Health Information Bulletin published in 2005 is available on this topic. These types of incidents continue to occur, including the three incidents summarized in this fact sheet. Employers, supervisors, and equipment suppliers should share and apply these recommended practices at the worksite to help prevent deaths, injuries, and close calls related to excavator quick couplers.

**Centers for Disease Control and Prevention**
National Institute for Occupational Safety and Health

## Planning and Equipment Maintenance

- Use quick couplers manufactured with design features and processes to prevent unintentional release of buckets or other attachments. For example, some quick couplers include:
    - LED lights, alarms, or other alerting systems that indicate whether the pairing was successful. This helps operators to engage the locking mechanism correctly.
    - Mechanisms which keep the bucket or other attachment in a default locked position even with a loss of hydraulic or electric power.
    - Control systems that only allows the bucket or other attachment to be released in a safe position.
- When possible, choose models of quick couplers that include smart technologies such as human detection systems and/or cameras that can alert operators when workers are within the swing radius of the excavator arm.
- When possible, consider installing manufacturer-approved retrofit safety kits on older quick coupler devices.
- Plan and design job tasks such that manufacturer's recommendations for equipment use are followed.
    - Many manufacturer's instructions state that ground workers should not be within the swing radius/swing zone of the excavator arm.
- Conduct regular maintenance of quick couplers according to manufacturer's guidelines.

## Job Hazard Analysis

Employers should develop and implement policies for a designated person(s) to conduct a job hazard analysis (JHA) on all worksites. The JHA will identify worksite hazards and necessary steps to eliminate or reduce those hazards. JHAs should be regularly reviewed and discussed with workers during on-site safety meetings and/or with the use of toolbox talks.

## Training

Train all workers on best work practices in languages they understand. Training should apply to the specific equipment in operation and be based on the manufacturer's recommendations. Effective training is an important part of a strong health and safety program that follows the hierarchy of controls and can help create a strong safety climate and safety culture. Workers should adhere, with supervisor reinforcement, to training guidelines and safe practices to protect themselves and their co-workers. Supervisors and equipment operators need to be aware that different manufacturers use different quick-coupling features. Therefore, equipment-specific training is necessary for workers using quick couplers.

- All workers and supervisors who work with or near excavators should be trained on the following topics:
    - Workers not standing, working, walking, or otherwise passing below an elevated bucket, attachment, or load.
    - Procedures that will allow workers to perform necessary tasks outside of the excavator boom swing radius/swing zone.
    - Appropriate signals or other methods of communication between equipment operators and workers in the area.

- Equipment operators and ground workers using quick couplers should be trained on the following topics:
    - Proper use of quick coupling devices. This includes the manufacturer's recommendations for inspection, installation, maintenance, and use of the specific brand and model.
        - Keep the quick couplers clean and free of debris.
        - During maintenance, do not approach the equipment unless the attachment is resting on the ground.
    - Proper procedures for engaging and disengaging excavation attachments.
        - Use of approved quick coupler safety checks, visual indicators, and/or warning devices.
    - Proper procedures for equipment operation in the presence of other workers.
        - Never operate equipment when ground workers are underneath a raised excavator arm and bucket or other attachment.
        - Know where the excavator blind spots are located.
    - Know and understand load capacities for the specific equipment.

# Safe Work Practices

*Prior to Task or Activity*

- Establish communication methods before starting work. Hand signals, radios or other agreed upon means of communication should be maintained between the operator and ground workers.
- Ensure that machine operators always perform pre- and post-operation visual inspections on the excavator and quick coupler. This can identify any equipment deficiencies and prevent malfunctions that may cause an unintended release of the excavator's bucket or work tool.
    - Dirt and grease accumulation can create hazards for many quick coupler systems; proper maintenance includes keeping the quick couplers clean and free of debris.
    - Ensure the operator performs a connection test and verification process, following all manufacturer instructions, prior to lifting or using an attachment.
- Do not use any excavator that has signs of problems (such as damaged components, malfunctioning controls, faulty safety features, or other problems). For excavators removed from service for repair, lock the controls and attach warning tags (such as a "DO NOT OPERATE" sign) on the machine to prevent unauthorized operation.
- Ensure the bucket or other attachment is in a stable and level position before attaching or detaching the quick coupler.

*During Task or Activity*

- Do not allow workers to stand under, work, walk, or otherwise pass below an elevated bucket, attachment, or load.
- Follow manufacturer's recommendations for use of equipment.
    - Follow procedures that will allow workers to perform necessary tasks outside of the excavator boom swing radius/swing zone.
    - When using a lift point on a quick coupler, note that many manufacturers will recommend lifting only after work tool attachments are removed from the quick coupler.
- Workers in the area of an excavator should keep the excavator in view and remain in view of the operator.
- Operators should lower the excavator arm/attachment to the ground before exiting the cab.
- Equipment operators and members of the ground crew should have authority to stop work if they recognize unsafe conditions.

# California FACE Reports

The NIOSH Fatality Assessment and Control Evaluation (FACE) program aims to prevent occupational fatalities by identifying and investigating work situations at high risk for injury. The program then formulates and disseminates prevention strategies to those who can intervene in the workplace. California is one of the states funded by NIOSH to perform fatality assessments. Three recent reports from the California FACE program documented deaths from excavator buckets (weighing thousands of pounds) that fell from quick coupler attachments.

### California FACE Case Study #1

***The bucket that disconnected from the coupler in Case Study #1. Photo: CA FACE program***

In 2020, a 21-year-old heavy equipment trainee was killed when he attached a bucket using a quick coupler and stood below the bucket to inspect it. The bucket detached while the worker was beneath the bucket, and he was immediately struck and killed.

### California FACE Case Study #2

In 2020, a 67-year-old pipefitter was killed while working in a trench below the bucket of an excavator using a quick coupler. The bucket detached during digging operations and landed on the pipefitter.

### California FACE Case Study #3

***View into the trench where the victim was standing and where the bucket detached from the quick coupler in Case Study #3. [Note – chain placed on equipment post-incident]. Photo: CA FACE program***

In 2021, an excavator bucket detached from a quick coupler and struck a 54-year-old worker. The crew was installing an underground storm drainage system on a residential street. The victim was in a trench when the excavator operator moved the boom over a trench to dig. The bucket detached from the quick coupler, fell, and struck and killed the victim.

---

**Get More Information**
Find NIOSH products and get answers to workplace safety and health questions:
1-800-CDC-INFO (1-800-232-4636) | TTY: 1-888-232-6348
cdc.gov/cdc-info | cdc.gov/niosh
NIOSH monthly newsletter: cdc.gov/niosh/eNews

DHHS (NIOSH) Publication No. 2024-102

DOI: https://doi.org/10.26616/NIOSHPUB2024102

October 2023