



CONSTRUCTION **SAFETY** PARTNERSHIP

Introduction to Quick Hitch guidelines

The Joint Safety Council for the construction industry has been charged with the task of identifying emerging hazards in the industry and to disseminate our findings to industry stakeholders. A number years ago we identified falls from heights as the main hazard in our industry which accounted for 50% of the fatal accidents at that time. We responded by raising awareness and we succeeded in convincing the industry that the simple control measure of edge protection and well constructed and maintained scaffolding would lead to the saving of lives and a major improvement in the safety performance of our industry.

Having consulted widely with supervisors and workers and having the expert advice of the Health and Safety Authority we now have concluded that fatal accidents involving quick hitch operations are on the increase. We believe that the simple control measure outlined below if adopted at site level could save lives. We would ask that you download this document and bring it to the attention of machine operators and supervisors.

Quick-Hitches

What is a Quick-hitch?

A quick-hitch is a device designed to facilitate the efficient connection and removal of attachments (such as buckets, grapples and rock breakers) to plant and equipment. It is often affixed to the end of the dipper arm of an excavator, as a means of enabling different types and sizes of excavator bucket (for example) to be changed at will.

Types of Quick-hitch

Quick-hitches are usually supplied by manufacturers but in a lot of cases independent companies also supply quick hitches, rather than the machine original equipment manufacturers.

There are two broad classifications of quick-hitch, these being:

- the dedicated quick-hitch; and
- the 'pin system' quick-hitch.

Dedicated Quick-hitch

This type of quick-hitch is *dedicated* to a particular machine attachment or series of attachments, which will each have a receptive component fitted to match that specific quick-hitch design. The advantage of this system is that it does not significantly change the geometry in the relationship between the attachment and the dipper arm, so that the bucket tip radius and breakout force at the bucket is not greatly affected. The practical disadvantage of the dedicated quick-hitch is that it is restrictive, in that a machine will only (should only) be able to use attachments that are compatible with the dedicated quick-hitch, resulting in a considerable investment in dedicated attachments.

Pin System Quick-hitch

The pin system quick-hitch takes advantage of the two pins that are used to attach a 'standard' type bucket to a machine's dipper arm. Pins of this kind are fitted to all attachments that the machine intends to use and the quick-hitch connects to the attachments by engaging with (and retaining) these two pins. The manufacturers securing clip must be used to secure the pin in place and no pieces of rebar etc. If plant operator is changing machine additional information and training on safe operation may be required.

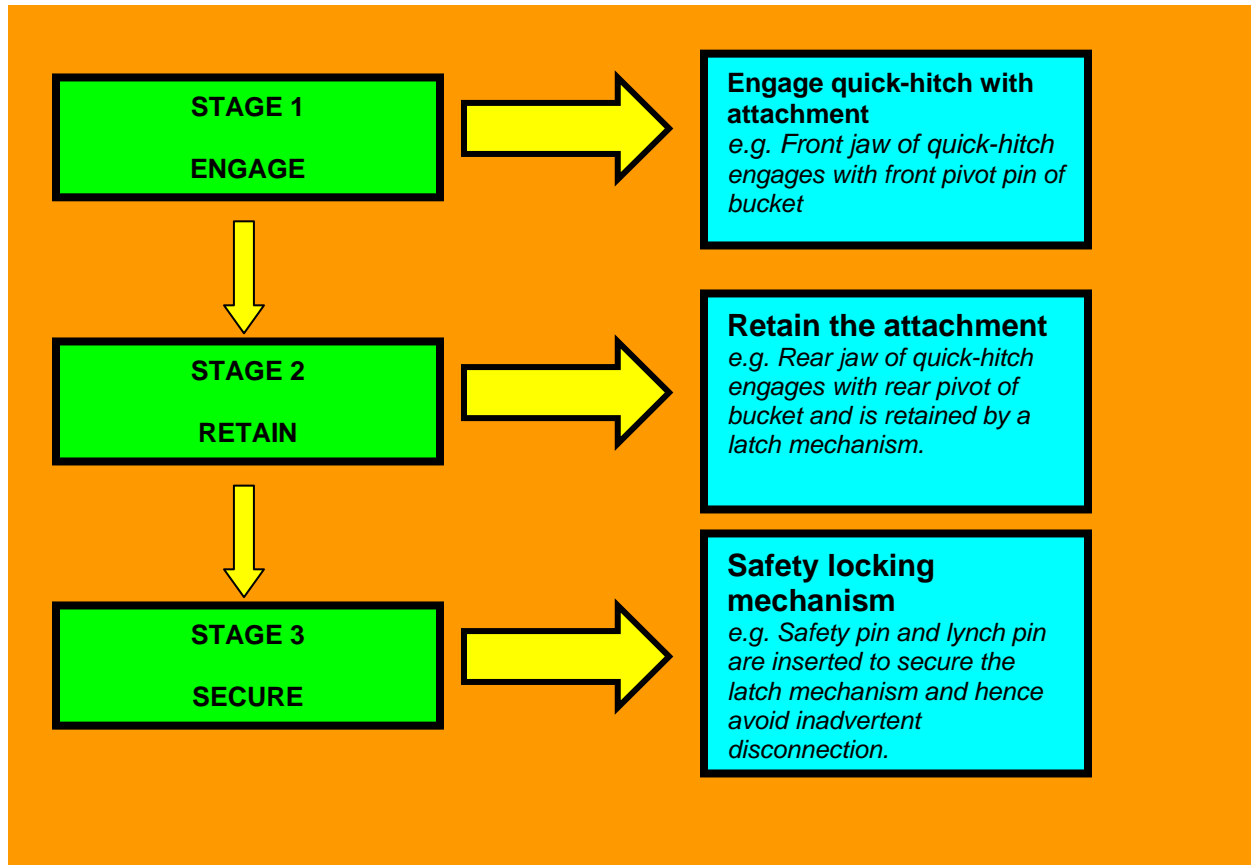
Depending on how a pin system quick-hitch is designed to mechanically operate in practice, it can be placed into one of three further classifications, which are:

- manual system;
- semi-automatic system;
- fully-automatic system.

In very broad terms, to make a connection a quick-hitch has to **engage** with an attachment and then **retain** it using some kind of a locking mechanism. A safety device, such as a safety pin, will then need to be inserted to **secure** the retaining mechanism, which will prevent it from inadvertently opening and causing the attachment to disconnect from the machine. The process of making a connection can therefore be broken down into the three stages shown in **Figure 1** below.

Figure 1

Typically There are Three Stages Involved in Attaching a Quick-hitch Device



“...in a number of accident cases investigated...involving quick-hitch devices, it was found that the safety pin had not been inserted [into the quick-hitch and that therefore the bucket became detached from the Quick-hitch striking the worker” (HSA, 2007).

Classifications of Pin System Quick-hitches

Quick-hitch System Type	Method of engagement	Locking/Security system
Manual	Manually retained e.g. by sprung latch operated with a lever.	Manually inserted safety pin.
Semi-automatic	Hydraulically operated retaining latch mechanism.	Manually inserted safety pin.
Fully-automatic	Hydraulically operated retaining latch mechanism.	Hydraulically operated safety mechanism (may incorporate hydraulic or sprung safety system).

Real Causes of Quick-hitch Accidents

Although the reasons for accidents would at first appear obvious, there are a number of root causes that underpin these reasons.

These can include:

- inadequate, or lack of, operator training on the subject;
- inadequate supervision by supervisors and site management;
- poorly trained banksmen or ground workers; and
- workers who encroach into an excavator's operational area whilst it is working.

The issue of needing to insert a safety pin as a 'final stage' in the process of connecting a quick-hitch attachment is often perceived as a 'burden' by those working on site.

A key lesson needs to be brought home to those who are operators that the pin may be a burden but when the attachment falls off strikes and kills a worker the burden can be even more significant including criminal prosecution, maximum 2 years in jail and a heavy fine.

Three key areas of Safe Quick-hitch Use

Training & Responsibility

Workers must use quick-hitch equipment properly and in full compliance with all of its necessary design and health and safety considerations. This will be encouraged by appropriate worker training and education on safe working practices, along with accessibility to necessary information such as the relevant quick-hitch manufacturer's maintenance and performance handbook.

Plant operators should be appropriately trained in all aspects of their equipment. They should not, under any circumstances, attempt to operate any equipment without valid qualification to do so, such as might be demonstrated by holding a certificate of competence recognised by the FAS CSCS or equivalent & H.S.A. Trainee plant operators can operate under supervision of a competent CSCS card holder. Trainee plant operators have a trainee card and log book to ensure records can be kept for final assessment.

The machine operator must take ultimate responsibility for the safe use of the quick-hitch equipment. This responsibility extends to changing quickhitch attachments and making sure that safety pins are fitted after each change. While in practice it may be helpful for a banksman or ground worker to help the operator with changing an attachment, final responsibility for fitting the safety pin (or other safety mechanism) should rest with the operator and nobody else. If this is not the case, then there is always the risk that one person will assume that the other has fitted a safety device, when actually, neither of them have done so.

Safe Working Practices

All-round Awareness

All-round awareness is particularly important in the safe operation of plant and equipment, especially those machines with a large swing area such as 360° excavators. The term all-round awareness mainly refers to the level of awareness that plant operators have of their immediate work surroundings, and any objects, especially persons, within those surroundings. The more aware operators are of people nearby, then the less likely they are to bring their machine into contact with them. For example, the plant operator should not swing an attachment over other workers, such as slewing a bucket of gravel over ground workers to discharge it into a trench. Neither should they let people work or otherwise get within the safe operational area for that machine.

Safe Working Load

When using a machine fitted with a quick-hitch to assist lifting operations, only designated quick-hitch lifting eyes should be used for slinging or attaching a load. Safe working load (SWL) capacities should never be exceeded and machines fitted with safe load indicators will prove invaluable in this respect. Equipment, including accessories, must be marked with the safe working load.

Attachment Selection

With some dedicated or manufacturer-specific quick-hitch equipment it may be possible to connect attachments that were not intended to be used with, or that are not suitable for, that particular dedicated quick-hitch system. For example, the use of a heavy breaker attachment might not be permitted by the quick-hitch manufacturer. Care must therefore be taken to only use compatible quick-hitches and attachments or an unsafe connection may result.

Inspection, Maintenance and Replacement

All quick-hitch equipment should be routinely inspected, and periodically thoroughly examined, as per good operator practice and in accordance with relevant legislative requirements (e.g. SHWW General Application Regulations 2007). Damaged equipment should never be used and should be instantly taken out of service prior to being replaced or repaired as appropriate. Particular attention should be paid to the proper functioning of safety alarms such as those employed on fully-automatic quick-hitch systems. Where a quick-hitch manufacturer has introduced retrofits to aid or improve safety then these should be obtained and installed. In some instances it may be preferable, especially in the case of older quick-hitch equipment, to replace the device with a more modern system if this can offer better inherent safety features.

Workplace & Environment

A safe workplace is one that encourages a good health and safety culture; a culture that embraces everyone and expects everyone to comply with it. This can begin on site with well designed induction talks that reinforce messages such as those to do with safe quick-hitch operation and the dangers associated with entering the machine's safe operational area.

Manual quick-hitch system

A manual quick-hitch system relies on the attachment, once engaged, being retained by the use of a manual mechanism, such as a screw operated latch (operated using a ratchet), or a sprung latch. A safety pin will also need to be manually inserted as a means of stopping the retaining latch from opening inadvertently. **Figure 2** shows an example of the manual quick-hitch system with pin being manually inserted.

The 'general' procedure to connect an attachment using a manual system is:

1. Remove the safety pin from the quick-hitch.
2. Position the quick-hitch over the attachment and gently manoeuvre the front fixed jaw of the quick-hitch so that it engages the front pivot pin on the attachment.
3. Use machine controls to 'roll' the quick-hitch onto the attachment so that the rear jaw of it engages with the rear pivot pin on the attachment.
4. Be sure that the latch hook has fully engaged (retained) the rear pivot pin. To achieve this, it may be necessary to apply a load on the attachment with the machine or it may be necessary to use a tommy-bar to lever the latch off so that the pivot pin can fully locate in the jaw.
5. Fit the safety locking device as per manufacturer instruction (e.g. safety pin).

Figure 2



There are a number of practical approaches to resolving the verifying of pins being in place.

1. Pin heads to be painted red, bright green or yellow to highlight pin is in position from a distance.
2. Weld chain to body of the hitch and connect pin by welding to chain. If the pin is not in place it can be easily seen moving about on the chain.

Semi-automatic quick-hitch system

With a semi-automatic quick-hitch system see in **Figure 3** the machine attachment is retained with a hydraulically operated latch, but the safety pin must still be manually fitted as additional security.

Figure 3



Head of correctly located safety pin (showing in red)

Fully-automatic quick hitch system

The fully-automatic quick hitch system not only retains the attachment with a hydraulically operated latch, but also engages a safety device as part of the hydraulic function. This safety device may take the form of a hydraulic check valve and / or a sprung mechanism to stop the retaining latch from inadvertently opening.

Figure 4 & 5



Step 1. Curl the hitch all the way in. Once pressure bucket cylinder reaches required level hydraulic ram activates and safety clasp opens 180bar or 280bar Pressure setting depending on Excavator size.

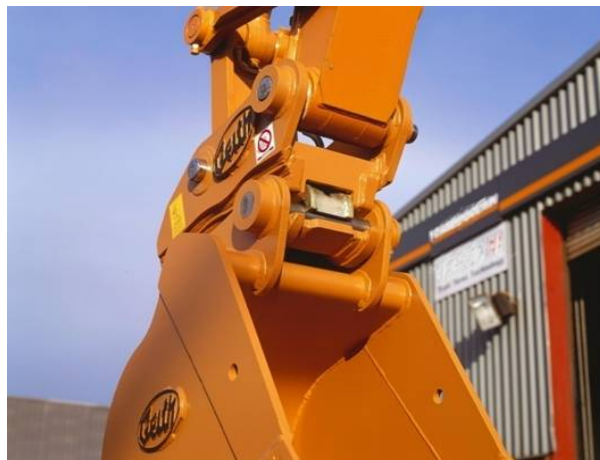


Step 2. Next position the hitch to prepare for from the pick-up of the attachment

Figure 6 & 7



Step 3. Guide the quick hitch front hooks onto the attachment link pin.

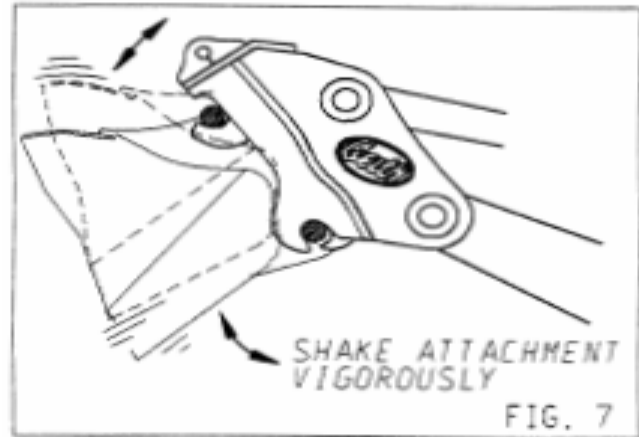


Step 4. Lower the back of the quick hitch on to the attachment dipper pin.

Figure 8 & 9



Step 5. The auto-lock will automatically close over the dipper pin first. It is clearly visible to the operator from the machine cab.

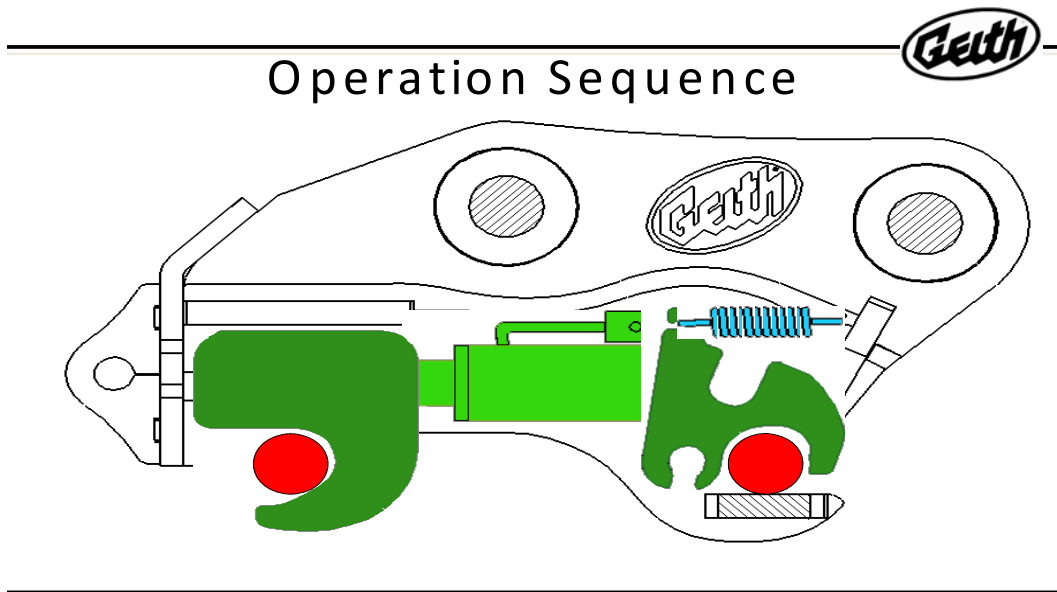


Step 6. Shake to check attachment is secure.

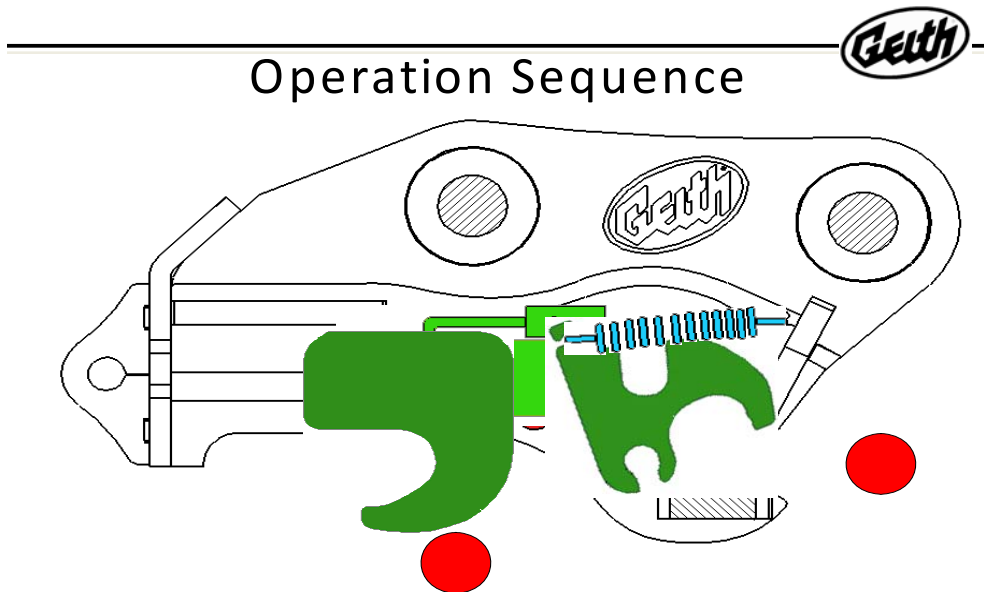
The 'general' procedure to connect an attachment using a fully-automatic quick-hitch system is:

1. If applicable, remove the safety pin from the quick-hitch.
2. Activate the switch to the 'ON' position.
3. Fully crowd the quick-hitch and pressurise the hydraulic system to open the locking mechanism.
4. Position the quick-hitch over the bucket and gently manoeuvre the front fixed jaw of the quick-hitch so that it engages the front pivot pin on the bucket.
5. Crowd the quick-hitch fully until the bucket is in position on the quickhitch and the rear jaw has engaged (retained) the rear pin.
6. Return the switch to the 'OFF' position and pressurise the hydraulic system to lock the bucket in position.
7. Fit the safety locking device as per manufacturer instruction (e.g. safety pin).

Phase 1 Fully-automatic quick hitch system.



Phase 2 Fully-automatic quick hitch systems.



Legal Note

This information is provided to assist those who work with or manage Quickhitch systems. The information contained is not intended as a legal interpretation of the legislation. Reference to the statutory Acts and Regulations should be made in attempting a legal interpretation. No responsibility for loss occasioned to any person acting, or refraining from acts, as a result of any material in this handout can be accepted by the author.

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