



# SAFETY ON SITE

## ABSTRACT

Each day construction workers are exposed to dangers at the workplace; this is especially so since they work with heavy equipment and machinery that may potentially result in injuries or even death. More than one in five fatal accidents in 2014 within the European Union took place within the construction sector and a high percentage of incidents involved a man on the ground.

Both personnel and employers have a role to play when it comes to maintaining safety on construction sites. Personnel need to adhere to safety standards and rules at the site. Employers must make sure their companies meet the minimum requirements of Occupational Health and Safety, Risk Assessments and that the Hierarchy of Control is applied.

In this article, incidents on the construction site; competence and training for operators and drivers; and the various safety methods that companies should have in place for a safe working environment will be discussed.

## INTRODUCTION

One of the most hazardous and accident-prone working environments is the construction site. If one were to look at work site incident figures within the European Union, more than one in five fatal accidents in 2014 took place within the construction sector. An extremely high percentage of these incidents involved a man on the ground.

Construction site workers are injured, and sometimes fatally, every year as a result of heavy construction equipment accidents. This includes incidents from falling tools from equipment, contact with excavators, backhoes, and other moving construction vehicles.

Construction site dangers faced by personnel every day are not always avoidable but may be prevented by steps taken by both the company and employees themselves. Construction workers need to know how to identify the potential dangers present at their workplace and learn to adhere to all applicable safety guidelines set by the

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Above: A high number of incidents on the construction site is caused by the interaction between man and machinery. Safety guidelines, training and a general awareness of safety at work can prevent accidents.

company. Companies can significantly reduce the potential of an incident if they identify potential dangers, implement steps to prevent incidents and provide their personnel with sufficient safety training. Furthermore, they need to establish their company's safety standards making sure it meets the minimum requirements of Occupational Health and Safety, Risk Assessments and that the Hierarchy of Control is being applied.

## INCIDENTS WITH MAN ON THE GROUND

About two decades ago, the work of banksmen was almost non-existent. Though their presence was important for directing the operation of a crane or larger vehicle for safe operations, there were issues from the very beginning. The banksmen did not understand the capabilities of the machine and the operator as they lacked the technical knowledge while machine operators disregarded the banksmen for the same reason. This led to larger safety problems.

Training was then introduced to banksmen and hand signals were formalised to overcome this initial issue, but the acceptance of banksmen by the heavy equipment and machine operators still had a long way to go.

One of the main hazards in relation to the use of banksmen on a construction site is the



Figure 1: A banksman directing a moving vehicle on the construction site.

visibility (Figure 1). The principle of “I see you you see me” has been a long struggle to be established by men on the ground working with machines. This is something in the construction industry that has yet to evolve if we are to persist in this manner, i.e. the use of banksmen on construction sites.

Whilst companies understand the dangers that banksmen pose to the construction sites, the enforcement and the basic desire for banksmen by clients and project management consultants worldwide on the construction sites is, has been and continues to be overwhelming. This is something that needs to be discussed within the dredging industry and a broader awareness needs to be established and adopted by all.

Over the last few years within the dredging industry, several incidents have occurred due to the interface between man and heavy equipment and machinery. A majority of the incidents involved banksmen.

Some examples of incidents that have occurred were related to dozers reversing on reclamation sites. In one case the banksman

was standing in the blind spot of the dozer operator. When the dozer started to reverse, the operator did not see the banksman. The latter managed to step away in time to prevent being hit by the dozer only because he heard the machine approaching (reversing alarm).

Another incident occurred when a superintendent failed to establish eye contact with an excavator operator when approaching the machine. The superintendent was able to get out of the way of the excavator when it suddenly started moving. The excavator operator did not see the superintendent as he either did not expect him at the location or the superintendent was situated in the blind spot of the operator.

Consequently, if banksmen were to be removed, it will eliminate the lack of visibility and other hazards related to man on the ground. To achieve this, it is important to understand that attention needs to be paid to the implementation of safe work practices and procedures and the design of construction sites.

## TRAINING AND COMPETENCE ASSURANCE

### Training

In many countries in the world, such as the UK and Australia, a person is only allowed to operate heavy equipment if he or she has successfully passed a test. In the UK there is the Construction Plant Competence Scheme (CPCS). It is a registration card scheme acknowledged by the industry for those involved in plant operations by recognising skills, knowledge, understanding, competence and qualifications.

In some parts of the world there are no legal requirements for operating heavy equipment or guidance documents. It is therefore up to the company to ensure that the operators have suitable and sufficient skills, knowledge, understanding and competence to operate heavy equipment safely. Thus, several companies have developed in-house assessment schemes and training to ensure that their operators have a minimum level of training to operate heavy equipment.

There is a need within the dredging industry to align training requirements that can be recognised by all in a global working environment. This would improve current and future performance of operators if a set of standards were established.

### Competence assurance

One of the most important ways to improve safety and prevent incidents is by ensuring that the operators understand the high-tech equipment they are operating. They need to be fully-trained and competent before they even put their hands on the controls.

The competence of operators should be assessed on their experience, (recognised) training, knowledge and ability. Operator competence assessments are very important and should be conducted by experienced operational staff or operators with a proven track record.

The competence of operators can be verified through the following steps.

- Licenses and training certificates should be checked for availability and validity.
- At a minimum, operators should have



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regular eyesight tests every two years.

- In countries where there are no requirements for eyesight tests, the operator should be asked to read a number plate of a vehicle from a distance of approximately 20.5m.
- The operator's practical experience can be verified by using assessment or evaluation forms.

Other safety measurement controls can be utilised to prevent incidents. Every operator and driver employed directly or indirectly to drive a vehicle or operate heavy equipment should only be allowed to do so if they meet the following requirements:

- are aware of their own responsibilities and avoid taking risks and short cuts;
- have received and confirmed they understand any specific rules issued to them;
- have undergone a site induction and are given relevant information and instruction on the hazards and control measures associated with site traffic management;
- are aware of the company's alcohol and

drugs policy;

- are aware of the working hours and rest breaks.

### MAINTAINING SAFETY PROCEDURES

As a preventive measure to reduce the number of incidents related to man and heavy machinery, most companies have developed safe work practices and procedures. By creating safety policies and procedures regarding heavy equipment and effectively communicating them with employees, companies can considerably reduce the potential of incidents.

An aspect of safety that companies should look into is working hours. Long operating hours is a contributory factor for incidents on site. Local rules and legislation regarding health surveillance requirements for operators will vary depending on the country where the works are taking place. Companies should ensure that local laws regarding working hours and rest breaks are respected. During these rest breaks workers can recover from fatigue and prepare for continued productive work.

Local law may prescribe the length of a working day which includes a period or periods for rest breaks. Organisations should set a criteria for rest hours where there is no specific local law in place.

- Drivers / operators should not drive for more than eight hours each day. This does not

include rest periods.

- Drivers / operators must have at least one day off work each week.
- Drivers / operators should be given at least one rest break in the morning and one in the afternoon in addition to a longer break for lunch.
- Resting areas should have seating and should be out of direct sunlight.

### Staying vigilant

Staying and remaining vigilant on the job is a key message that companies should communicate to their drivers / operators and banksmen. One of the largest causes of accidents on construction sites is due to personnel moving too quickly both on the ground and with heavy machinery. Avoiding an injury or accident is as easy as taking one's time, and making sure to be safe and smart around the machines one is working with. Rushing on the job can lead to accidents, so employees need to try not to let the stress of their deadlines affect their performance and commitment to safety. This should be monitored by the supervisors.

On the job, there are dozens of distractions at any given moment which can lead to mishaps. Personnel should remain focused on the task at hand and pay attention to what they are doing and others around them. This would prevent them from making unnecessary mistakes that can be detrimental.



Figure 2: Clear signage (must be lighted in the dark) should be utilised to indicate pedestrian walkway to prevent any incidents with moving vehicles.

Safety supervisors play a big role in maintaining a safe working environment for all personnel. Supervisors need to check the traffic situation constantly on a proactive basis. A 'if you see it, you own it' system should be used, which means they should initiate actions when they observe that lay out-, vehicle- or people-related issues may cause any potential health or safety problem. Supervisors can check the Traffic Management Plan and ensure safeguards from risk assessment are implemented.

### Separation of pedestrians and machinery

Separation of pedestrians and machinery is key on a construction site. Incidents can be prevented by proper design of construction sites and more specifically traffic management. This can be achieved in various ways:

- provide separate entry and exits routes to the construction site for pedestrians and machinery;
- barriers can be put in place between the roads and the walkways;
- in the event that pedestrians have to cross a road, ensure that signage is clear and sufficient lighting is in place in hours of darkness (Figure 2).

Other measures should be to set up in the construction site in such a way that delivery vehicles do not have to drive on the site for long distances but that goods can be delivered at the entrance. This prevents the need for these vehicles to be driven on site for long distances.

### Reversing vehicles safely

There is a considerable amount of incidents related to the reversing of vehicles; this accounts for nearly a quarter of deaths on the construction site. Other incidents do not result in injury but can cause costly damage to vehicles, equipment and premises. If one were to take a closer look at past incidents, the majority of these could have been avoided by taking simple precautions. It includes removing the need for reversing altogether by setting up one-way systems. For instance, by utilising drive-through loading and unloading positions. Where

reversing is unavoidable, routes should be organised to minimise the need for reversing. This should preferably eliminate the need for a banksman. People who do not need to be in reversing areas should be kept well clear.

Since the reversing area is a high-risk spot where incidents are most likely to happen, it must be designed with care. The following points should be taken into consideration.

- Reversing areas should be clearly marked and made visible to operators and anyone else in the area.
- Increase visibility for operators and pedestrians, e.g. by installing fixed mirrors in smaller areas, keeping vehicle mirrors clean and in good condition, installing reverse cameras on vehicles / heavy equipment.
- Make reversing spots on breakwater or bunds with a barrier.
- Physical stops should be constructed in case there is a steep edge or excavation.
- Place lateral white lines on the ground to help the operator position the vehicle accurately.

An example of a time when a reversal of a vehicle is hazardous is during work on break water and bund construction. Break water and bund construction activities require an in-depth risk assessment and good implementation of the Hierarchy of Controls. The reversal of a dump truck during these activities can be dangerous as it is not possible to see the people behind the truck or how far the edge is. There are several ways for companies to minimise their risks.

A safe method is to construct a wide bund to unload the dumped material on the bund instead of dumping it straight into the water (substitution). After unloading the material, the material can be pushed into the water with a shovel. This prevents the need for the truck to unload by driving until the edge of the bund in reverse. Another method to prevent dumpers from reversing into the water or slope is by utilising a wheel stop; this can be a piece of heavy pipe, timber, concrete or a heap of sand. Another (less preferable) option to prevent the truck from reversing too far towards the edge is with a pole with a reflective cone on top. The banksman can place the pole at a safe distance from the edge (>3m) so the operator knows how far he can reverse the vehicle. This way the banksman is always in front of the vehicle and can be seen by the operator. Furthermore, companies can ensure that reversing areas (turning circles) are installed on long breakwaters to minimise the reversing distance.

Banksmen or traffic counters should only be utilised when absolutely necessary and only under strict conditions:

- the banksman should be standing on an elevated protected area;
- hard barriers should be in place around elevated protected areas;
- no personnel should work alone;
- banksmen must be visible (high visibility clothing, lights);
- adequate means of communication (VHF radio) must be provided; and
- adequate means of weather protection must be in place (sun, rain, wind, cold, etc...)

## CONCLUSIONS

Full separation of man and machine will be the future on construction sites. The time of banksmen on construction sites appears to be over. If there are no more banksmen on the ground it will eliminate the hazard of them not being seen by the operators. To achieve this, it is important to understand that attention needs to be paid to the design of construction sites and

implementation of safe work practices and procedures.

Construction sites can be hazardous places and accidents can happen at any time. If a person were to stay safe, pay attention and understand their equipment and the work at hand, their job will remain hazard-free and rewarding.