

Occupational Health and Safety in Construction Industry (Continued)

Mobile access equipment

Where it is not possible to avoid work at height or work from an existing structure, mobile access equipment, including mobile elevating work platforms (MEWPs) and mast climbing work platforms (MCWPs), can be used to prevent falls.

Mobile elevating work platforms (MEWPs)

MEWPs can provide excellent safe access to high-level work that can be easily moved from one location to another.

The three basic types of MEWP are:

- scissor lift (which gives a vertical lift only);
- telescopic boom (which gives vertical lift and outreach);
- articulating and telescopic boom (which are usually vehicle mounted and used for specialist activities such as bridge repair).

Before a MEWP is used you must assess the risks of people falling from or being thrown from the carrier, or the MEWP overturning, and take precautions to eliminate or control those risks.

Before work starts make sure that:

- the work is properly planned;
- the operator is fully trained and is familiar with the performance and controls of the specific type of MEWP they are going to use;
- there is a current report of thorough examination for the equipment;
- the machine is fitted with an emergency stop at ground level which can be deployed if the carrier becomes trapped against a fixed structure;
- the work platform is provided with guard rails and toe boards or other suitable barriers;
- it is used on firm and level ground, which may have to be prepared in advance and any temporary covers are strong enough to withstand the applied pressure;
- the daily inspection has been completed;
- any outriggers are extended and chocked as necessary before raising the platform;

- areas of the site where people may be struck by the platform or falling materials have been barriered off;
- other vehicles, such as delivery vehicles and dumpers etc, are segregated from the work area;
- equipment is protected from adverse weather. High winds can tilt platforms and make them unstable. Establish a maximum safe wind speed for operation. Storms and snow falls can also damage platforms, so they should be inspected before use after severe weather; and
- Everyone knows what to do if the machine fails with the platform in the raised position.



A mobile elevating work platform

When using MEWPs:

- do not operate MEWPs close to overhead cables or other dangerous machinery;
- do not allow people to climb out of the carrier to reach their work position;
- do not allow a knuckle, or elbow, of the arm to protrude into a traffic route when working near vehicles;
- do not move the equipment with the platform in the raised position unless the equipment is designed to allow this to be done safely (check the manufacturer's instructions).

At the end of each day check that:

- the platform is cleared of tools and equipment;
- all power has been switched off and the keys have been removed from the machine;
- the equipment is secured where it will not be accessible to vandals or trespassers; and

- machine log has no record of any faults, malfunctions, repairs or maintenance requirements.

Some MEWPs are described as suitable for 'rough terrain'. This usually means that they are safe to use on some uneven or undulating ground, but check their limitations in the manufacturer's handbook before taking them onto unprepared or sloping ground.

If there is still a residual risk of impact or people falling after you have assessed the risks and put control measures in place, then the use of fall protection equipment should be considered, eg:

- when working next to or in a live highway (eg street lighting work) where there is a risk of a vehicle hitting the MEWP;
- when traveling with the carrier in a raised position where it may strike fixed objects in its path (eg branches, steel work);
- when traveling with the carrier in a raised position over uneven ground;
- during steel erection where the carrier has to move in and around the steelwork.

In practice, wearing a harness with a short work-restraint lanyard provides the most suitable form of personal fall protection as it stops the wearer from getting into a position where they could fall from the carrier in the first place (unless it is a MEWP overturn). In this system, the harness does not normally have shock- absorbing capability and must be fixed to a suitable anchor point inside the basket.

MEWPs are versatile machines that can be used throughout the life of a project. When undertaking refurbishment work or when you have reached the fit- out stage of a project, you may consider using a MEWP to provide safe access to height. MEWPs that can fit through a normal-width doorway and can be moved from floor to floor using the lift installed in a building are available for indoor use. Always check the safe working load of the lift against the weight of the MEWP (including people and equipment) before transporting it in this way.

Mast climbing work platform (MCWPs)

This equipment is often used when carrying out repairs to (or refurbishment of) high-rise buildings. MCWPs are designed to provide access to working positions – they are not designed to act as material hoists.

Only specialists should erect, alter or dismantle mast platforms. It is particularly important that the correct sequence is followed. Serious accidents have occurred when ties have been removed or outriggers have not been properly extended during alterations.

A great advantage of using MCWPs is that those using them can be protected from adverse weather as many types can be provided with screens and a roof to the platform. However, enclosures to platforms can increase wind loads so the supplier must always be consulted before fixing them. High winds can make platforms unstable so consult the supplier to establish a maximum safe wind speed for operation. Storms and snowfalls can also damage platforms, so they should be inspected before use after severe weather.

When MCWPs are used, make sure:

- a handover certificate is provided by the installer. The certificate should cover how to deal with emergencies, operate, check and maintain the equipment, and should state its safe working load;
- there is a current report of thorough examination for the equipment;
- masts are rigidly connected to the structures against which they are operating and outriggers are used when necessary;
- working platforms are provided with suitable guard rails and toe boards;
- the controls only operate from the working platform; and
- area below the platform is barriered off to prevent people from being struck by the platform or by objects that may fall from the platform.

At the end of each day check that:

- the platform is cleared of tools and equipment;
- all power has been switched off and, where appropriate, power cables have been secured and made dead; and
- machine log has no record of any faults, malfunctions, repairs or maintenance requirements.

Suspended access equipment

Where it is not possible to use mobile access equipment, suspended access equipment can be used. This enables the worker place themselves in the position required to carry out the work and includes suspended access cradles and boatswain's chairs.

Suspended access cradles

Accidents happen during installation, use and dismantling of temporary cradles. Most accidents happen because of:

- unsafe access to and from the cradle;
- insufficient or poorly secured counterweights and holding-down systems;
- failure of the cradle platform or components such as drop-nose pins and bolts;
- failure of winches, climbing devices, safety gear and ropes, usually as a result of poor maintenance; and
- failure to follow the manufacturer's instructions on erection and dismantling.

Equipment should be selected, installed, thoroughly examined and tested to ensure that it is suitable for its intended purpose. Cradles should only be used by suitably trained and competent workers.

When using cradles check that:

- the cradle has adequate guard rails and toe boards and material cannot fall from or through the cradle's base;
- the equipment is capable of fitting closely to the building and where buffers or rollers are fitted, they will run against suitable features on the building;
- the building is capable of carrying the loads placed upon it, particularly under the counterweights and under the fulcrum (or pivot point) of the outrigger. The advice of a structural engineer may be needed;
- jib spacing matches the cradle length and, when the cradle can move, adequate stops are provided to prevent the cradle running off the end of the track;
- jib length and counterweights are specified to give a factor of safety against overturning of no less than three;
- a secondary safety rope fitted with a fall arrest device is provided and used;
- adequate operating instructions and technical support are available. If the equipment is hired, the supplier should be able to advise;
- the cradle is not overloaded and loads are placed on the platform as uniformly as possible;
- there is safe access into the cradle. Access at ground level is safest. If access is from the roof, the cradle should be secured to prevent it swinging away from the building. Access must be possible without the need to climb up or down the suspension ropes. If access is from the roof, or other raised platform, suitable means to prevent falls from roof edges will be required (eg guard rails and toe boards); and
- there is a plan for rescuing the operator if there is a cradle fault while at a high level.

Even where these precautions have been taken, accidents are still possible. For example, if the motor on a powered cradle fails, it can make the cradle tip, or people may overbalance and fall while reaching out of the cradle. Safety harnesses can save lives in these circumstances. Harnesses should be attached to specially designed anchorage points which have been installed in the cradle by the manufacturer. The harness lanyards should be kept as short as possible, while allowing operators to reach their place of work.

It is important that a thorough visual pre-use check for obvious faults is carried out before each use. In addition, a weekly inspection should be carried out by a competent person and a record made of that inspection. Before taking a temporary scaffold access platform into use, the following should be checked daily:

- the platform should be structurally sound – lift it off the ground, say 1 m, and inspect for excessive deflections;
- while it is off the ground, carry out a tactile inspection of critical connectors;
- make sure that it runs freely up and down – try it out; and

- check that lines of communication work properly.

At the end of each day, check that:

- the platform is cleared of tools and equipment;
- all power has been switched off and, where appropriate, power cables secured and made dead;
- the equipment is secured where it will not be accessible to vandals or trespassers;
- the shift report has no entries reporting any malfunction etc.

Boatswain's chairs

Boatswain's (or bosun's) chairs should only be used for light, short-duration work. They should only be used where the provision of a working platform or other mobile access equipment is not practicable. In general, use a chair that consists of a seat with a back, a central suspension point and a carrying point for tools.

Whether a chair or seat is used, the user should be attached to the suspension system by a harness and lanyard to protect against falls. Always ensure that the rope grab is compatible with the rope type, rope diameter and/or energy- absorbing lanyard in use.

A person in a boatswain's chair is suspended high above the ground and would be hard to reach if they required assistance. The risk assessment should include your arrangements in case of an emergency.

Safety nets and soft landing systems

Safety nets and soft landing systems (eg fire-retarded polystyrene-filled bags, air bags etc) can be used as leading edge protection to mitigate the consequences and distance should a fall occur. They are not a substitute for the use of fall prevention measures but can be used in conjunction with them if the risk of a fall cannot be eliminated.

Nets are a complex energy-absorbing system, which should only be installed by trained and competent people. Before gaining access to height you must decide whether nets can be installed at ground level. It is often feasible to incorporate this into the steelwork design, and only if this is not possible should another means of gaining access to height be considered.

The way in which a safety net system is installed is critical and therefore this should only be undertaken by trained and competent people. Nets should be positioned as close as possible to the working level to minimize the height of a fall.

Safety net systems should be inspected by a competent person after installation and a handover certificate prepared to confirm their safety. They should then be inspected on a weekly basis to ensure they are still fixed correctly and will arrest a fall. When a person falls into a net, the material deforms as it absorbs the load and it is therefore essential to provide adequate clearance below the net to allow deformation to occur without the person striking the ground or another object. The net installer should be consulted when the net has been used to arrest a fall.

It is essential that your risk assessment covers your procedures for rescuing someone from a rigged net and for treating first aid while in the net, eg if someone strikes their head on structural steelwork during a fall.

Several different types of soft landing system are available as an effective alternative to nets. These systems can also be used in traditional house building and the contracting sector to reduce the risk of injury should a fall occur during the installation of floors or during roof work.

One system uses polystyrene-filled bags that are clipped together to completely fill the area beneath which work is being carried out. The depth of the bags both cushions and reduces the distance of a fall, which is effective in reducing injuries.

An alternative system uses air bags, and may be considered the most appropriate in the circumstances. Such systems require an air compressor, which maintains the pressure in the air bags so that they will absorb the energy of someone falling onto them without bouncing.

The installation and inspection of any soft landing system is critical and must only be undertaken by trained and competent people working to manufacturer's instructions.

Rope access techniques

This technique can be used for inspection and other similar activities but not for general construction work. It should only be used where an access technique from higher up the hierarchy cannot be used. Check that:

- the equipment is erected and used under the supervision of a competent person and then a pre-use check is carried out;
- anyone using the technique has been trained and is competent;
- safe descent does not depend upon a single suspension point. The working
- line and safety line should be attached to two separate suspension points;
- all the equipment is checked carefully before each use and maintained to a high standard;
- any tools which are needed for the work are attached to the operator with a suitable lanyard, eg a rope or chain, so that they cannot be dropped; and
- where a risk of dropped tools or falling materials remains, the area beneath the work should be fenced off or protected by fans, covered walkways or similar.

Safety harnesses

If work at height cannot be avoided, putting measures in place to prevent falls should always be the first consideration. If falls cannot be prevented by using work equipment that protects all those at risk (independent scaffolds, tower scaffolds and MEWPs), consider using work equipment that mitigates the consequences if an individual falls.

Fall-protection equipment can prevent people falling when it is used as a work- restraint system.

When used in this way, the lanyard is kept as short as possible while allowing operators to reach their place of work. This prevents them from getting into a fall position, as they are physically unable to get close enough to the open edge. Using a harness in this way is acceptable for light short- duration work and for inspection and maintenance purposes. In some cases a permanent or temporary horizontal lifeline could allow safe working. A harness can also be used as a work restraint when working from MEWPs or cradles.

There may be occasional circumstances where people still have to approach an open edge from which they would be liable to fall and having worked through the hierarchy of control, it is not practicable for any safer system to be provided. A harness should only be used to arrest a fall as a last resort. One of the problems with using fall arrest equipment is that it only protects a person if they wear the harness properly and connect the lanyard to a secure anchor point. Harness systems should not be used unless a suitably positioned and fully secure anchorage is specified. The use of any such system requires a high degree of training, competence and supervision.

Inertia reels are self-retracting fall-arrest devices. They are designed such that a steel cable or material webbing line pays out and is retracted automatically as the user moves around. Should a fall occur, a braking mechanism stops the line paying out and locks it to arrest the fall, similar to the operation of a car seat belt. They should only be used with an overhead anchor within a 30-degree cone under the anchor. If anchored in any other way, eg at foot level, the user's instructions or the manufacturer/supplier should be consulted to determine whether this is safe. Additional forces are generated with foot-level anchorages, as a person will fall further. The unit may not be capable of coping with such additional forces. Foot- level anchorage may cause the line to go over a sharp edge in the event of a fall; this could also cause the system to fail.

Harnesses and lanyards are made of man-made fibres and as such are prone to degradation by sunlight, chemicals, abrasive particles etc. It is important to carry out tactile pre-use checks daily, in good light, before taking harnesses and lanyards into use. If there is the slightest doubt about a harness or lanyard, do not use it. Faults can be noticed by discolouration, little tears and nicks, grittiness to touch etc. After use, harnesses and lanyards must be allowed to dry before being stored in a clean area.

Make sure everyone who uses a harness knows how to check, wear and adjust it before use and how to connect themselves to the structure or anchor point as appropriate.

A suitably qualified person must supervise the installation of equipment to which harnesses will be fixed, eg a suitable anchor.

Always minimize the free-fall distance. Keep your anchor point as high as possible to reduce the fall distance and ensure that there is an adequate clearance to allow the system to deploy and arrest the fall.

Anyone who needs to attach themselves should be able to do so from a safe position. They need to be able to attach themselves before they move into a position where they are relying on the protection provided by the harness.

A person may be injured by the impact loading on the body or by the 'pendulum effect'. This is when the faller swings like a pendulum striking the structure, the ground, or other obstacles. To reduce the risk of injury, a fall arrest system should always contain energy absorption.

Using designed temporary horizontal lifelines or inertia reels can provide extra free movement. Any attachment point must be capable of withstanding the impact load in the event of a fall and have an appropriate factor of safety – expert advice may be needed.

Consider how to recover anyone who does fall. It is not appropriate to rely on the emergency services as they might not arrive in time or might not have the necessary equipment to carry out a rescue.

A twin-tailed lanyard may be necessary in some cases where the wearer needs to move about. It is important that anyone who uses this system knows that when one of the lanyard legs is connected to the anchor point, the second leg is not attached to the user's harness as this could limit the extension of the energy absorber in the event of a fall.

Harnesses should be subject to a detailed inspection, which for arduous use should be carried out at least every three months.

To be continued in next issue.

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