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reaching out.

# Spotting the trend

In this two-part safety feature we take a look at the main causes of fatalities in the access and lifting industries and the current guidance and equipment on the market designed to reduce the number of incidents. This first instalment focuses on the access industry and begins with IPAF's accident database reports - now in their third year - to identify the trends that are beginning to emerge as these statistics gather more contributors.

Although IPAF's accident reporting database is still very much in its infancy, a collective overview of its data to date has revealed a number of recurring causes of fatal incidents. Including IPAF's recently released 2014 half-year results, there have been a total of 106 reported fatalities since the project's launch at the start of 2012.

The main causes include 31 cases of machines overturning, 30 falls from the platform, 17 cases of electrocution, 16 of entrapment, five given as resulting from mechanical/technical issues, five from impact with an aerial work platform and two cases of death from falling objects.

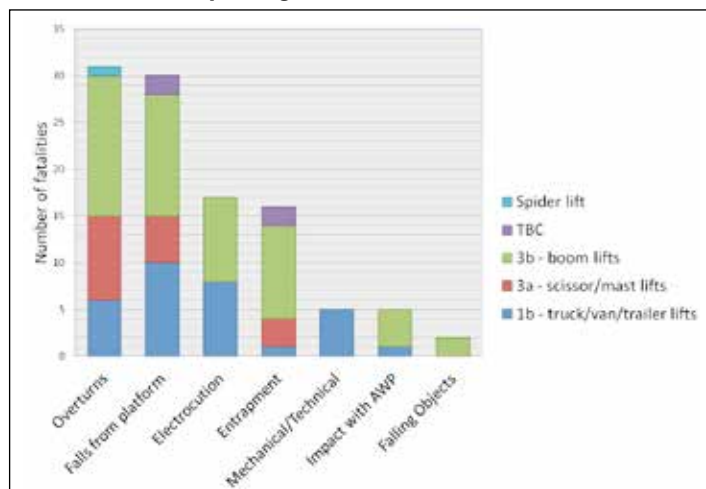
Incidents involving boom lifts accounted for more than half of the total (51 percent) while vehicle and trailer mounted lifts represented 29 percent and scissor lifts a further 16 percent. In four percent of incidents

the machine type is unknown, while there was one incident involving a spider lift.

## Overturns

Topping the charts as the cause of 31 fatalities is overturning with 48 percent occurring with boom lifts, 29 percent scissors, 19 percent on truck, van or trailer lifts and one with a spider lift. It is well recorded that a good number of overturning incidents occur as a result of poor ground conditions and the failure to appreciate the pressures that an aerial lift can exert while in use. It's worth noting that a typical 60ft boom can generate a pressure in excess of 90kg per square inch and that individual wheel loadings can more than double depending on the position and angle of the boom. As a result of this ignorance a machine's outrigger jacks or wheels often sink into or break through the surface of the ground causing an overturn. Another significant cause

## IPAF's accident reporting statistics to date



IPAF's demonstration at Conexpo 2011 revealed just how much pressures can vary between the wheels of a platform.

of overturning with booms and scissor lifts is when operating on slopes beyond what the machine can cope with. This is particularly true with boom lifts which until now have generally not been fitted with cut-outs on slope sensors. One of the most common causes is when a machine's retracted but elevated boom is driven on a slope and tips over backwards, landing on its counterweight and catapulting the occupants out of the basket - assuming they are not wearing a harness and lanyard of course. Other causes of overturning relate to include incorrect set up of the outriggers, technical malfunction or more often while loading and unloading.

## Available guidance

For a number of years now various companies and associations have issued guidance on ground conditions and outriggers in a bid to reduce the number of incidents. The latest to emerge is 'Ground Conditions Good Practice Guide', which has been developed by the UK Strategic Forum for Construction. For more information on the guide, which will be issued later this month, take a look at the feature on page 35.

IPAF's 'Spread the load!' campaign

also provides guidance on ground conditions and highlights the importance of carrying out a proper jobsite risk assessment prior to using any aerial device to determine if there are ground areas with uncompacted fill, below ground voids, underground services and any areas where ground stability could be compromised. Most operator manuals also stress the importance of 'walking the course' to check that there are no soft areas, obstacles, kerbs or manholes in the area that might be driven over while at height. Any such areas should be clearly cordoned off prior to work starting.

## Calculating ground bearing pressures

IPAF's interactive Ready Reckoner tool can also be used to provide guidance to operators when setting up work platforms which require outriggers. Depending on the weight of the vehicle the Ready Reckoner will show the minimum size of outrigger mat to use for differing ground types. It is increasingly recognised that outriggers mats/spreader plates should always be used under the outrigger feet, irrespective of the ground conditions, in order to reduce ground bearing pressures and build in an addition margin of safety.



IPAF's handy Ready Reckoner.

IPAF technical and safety executive Chris Wraith, said: "A significant problem is that manufacturers currently use a variety of different units for measuring relative bearing pressures. The IPAF conversion tool makes it clear and simple for operators looking for ready guidance. The campaign message is straightforward - always do a risk assessment and check ground conditions. Know the weight of your machine and be aware of its maximum point loadings and ground load-bearing capacities."

Another convenient and practical tool on the market which can determine the pressure ground can safely take is Bronto's handheld ground tester the 'Loadman'. Although not exactly cheap, the portable falling weight deflectometer measures the ground density/strength and provides a specific

bearing pressure that the surface can support which can be then used to select the right size of mat or spreader plate. To help reduce ground pressures there are now a very wide range of mats in timber, aluminium, steel and a variety of composite materials in

a wide range of sizes and shapes, including several innovative modular systems. For wheeled or tracked machines there are an increasing number of proprietary trackway systems, timbers and bespoke spreader plates all readily available for hire or purchase, so there really is no excuse to take an unnecessary risk which could add to the fatal accident statistics.

**Falls from height**

With 30 recorded fatalities since 2012, falls from aerial work platforms are the second most common cause of death. Of these 43 percent occurred with boom lifts, 33 percent using truck, van or trailer lifts and 17 percent from scissors.

Excluding scissor lifts for a moment, what jumps out of this statistic is that in more than 75 percent of the recorded fatal incidents the use of a full body harness and a short restraint lanyard could have prevented the fatality – it is that simple! Although there is some debate over which lanyard and harness is most suitable (often down to personal preference), ultimately using any system is better than not using one at all. All too often the accident reports on [www.vertical.net](http://www.vertical.net) involving fatal falls from the platform highlight the fact that a harness was not used. As there is no risk of a catapult effect in a scissor it is likely that fatalities from falls can be attributed to climbing on the rails and overreaching. This is often the result of using the wrong machine for the job - in other words a lack of planning.



**Electrocution**

The electrocution of operatives while working from an aerial work platform is the third highest cause of fatalities with 17 cases. It is worth noting that all but one of them occurred in the USA where high voltage overhead power lines are far more prevalent in urban areas than in Europe. In spite of the statistics, incidents involving live overhead power lines are not as uncommon in



Europe as you might think occurring most often among those working on trees or telephone cables that are in close proximity to power lines, although they tend to carry lower power levels than in North America. At Conexpo earlier this year, IPAF highlighted its recommendation that operators should maintain a distance of 15 metres plus the length of a fully extended boom from electrical pylons and nine metres plus the length of a fully extended boom from lines on wooden poles. It is possible to work closer to power lines but only after seeking advice from the power supplier and implementing additional safety precautions.

Through proper planning, risk assessment and management of the work at height, electrocutions can be prevented. The use of machines with insulated platforms/buckets and earthing equipment can help reduce the risks when working on trees or communication lines. Devices such as conductor height measurers and overhead voltage detectors/proximity warning alarms (see Innovations page) can also alert operators to any unexpected dangers. In the past these devices were said to be unreliable, and while this is no longer the case, their costs might act as a deterrent. However, if more companies specified these devices when there is a risk of getting too close to power lines the cost of the devices would plummet.

**Entrapment**

To date there has been a total of 16 fatal incidents of entrapment recorded - interestingly only one of which occurred in the UK. 63 percent of all entrapment fatalities involved boom lifts, 19 percent scissor lifts and six percent on truck, van or trailer mounts. A good deal has already been said and done about secondary guarding systems in the UK in recent years and

recently the HSE has addressed this in great depth with guides, advice and recommendations.

Entrapment occurs by inadvertently driving, telescoping, elevating or slewing into an overhead obstruction, which can then pin the operator to the controls preventing him from reversing the control function resulting in a crushing fatality. Incidents can also occur from unexpected boom movements. For example, driving a 26 metre lift with the extended boom elevated at 45 degrees over a 100mm rise in the ground causes the platform to rise more than a metre in just over a second.

The following is a selection of secondary guarding systems currently on the market:

**Blue Sky SkySiren (Genie OPA)**

**Pros:** When the horizontal pressure switch is triggered the boom lift's functions stop and an audible and visual alarm is activated.

**Cons:** Manufacturer's approval might be needed and it does not provide adequate safety from sudden contact from above.

**Availability:** Retrofit to most boom lifts.

**ACTIV'Shield Bar**



**(Haulotte)**

**Pros:** Alerts operators of potential entrapment while its 'Safety Gap' protects the operator from full entrapment. Once triggered visual



and audible alarm sounds and only reverse/lowering movements are permitted.

**Cons:** Does not provide adequate safety from sudden contact from above.

**Availability:** Optional, also retrofitable to Haulotte machines dating back to 2008 (older units on a case by case basis).

**Sanctuary Zone**



**Pros:** A solid steel frame mounted on either end of the platform prevents overhead crushing injuries from occurring, approved by most manufacturers.

**Cons:** Slightly reduces platform capacity and increases the height of the basket which could be an issue in tight areas.

**Availability:** Retrofit only

**OPS (Genie)**

**Pros:** The tubular steel structure prevents overhead crushing injuries. It can also be used in conjunction with its OPA system.

**Cons:** Slightly reduces platform capacity and increases the height of the basket.

**Availability:** Designed to be bolted to platforms and can be retrofitted in under an hour.



**SiOPs (Niftylift)**

**Pros:** Functions stop when the operator is forced onto the controls and requires its dead-man foot pedal to reset the device, allowing the operator to reposition the platform. Has no effect on the platform size - completely built in.

**Cons:** Does not provide protection from sudden contact from above.

**Availability:** Standard for HR models over 15 metres.



**SkyGuard (JLG)**

**Pros:** Fitted above the control panel, when triggered it stops all functions and automatically reverses the last function used. In extreme cases the sensor bar breaks away to provide additional space.

**Cons:** Limited protection from sudden contact from above.

**Availability:** Optional for most diesel/gas powered JLG boom lifts manufactured after 2004.



**Skyjack SG-M**

**Pros:** A lightweight protective steel structure prevents overhead crushing injuries.



**Cons:** Platform capacity is slightly reduced and increases the height of the basket.

**Availability:** Optional (retrofit possible) on all booms.

**Skyjack SG-E**



**Pros:** When the horizontal sensor bar is triggered it stops all functions and initiates a siren and flashing beacon.

**Cons:** It does not provide adequate safety from sudden contact from above.

**Availability:** Optional (can be retrofitted to all post 2006 booms).

IPAF, along with most industry experts, agree that no single solution can prevent overhead

crushing incidents from occurring and that each system offers different benefits depending on the specific risk assessment. Ultimately, prevention requires good operator training and awareness, proper planning of work at height and good aerial lift management on site.

**Mechanical impact**

Five fatalities were each put down to both mechanical/technical problems and impacts with aerial work platforms. While there is very little that can be done with mechanical/technical fatalities, which are generally very rare, there are countless systems on the market which can prevent people coming into contact with machines. These include both visual and audible systems to alert pedestrians, radar, camera and 360 degree detection systems to alert operators, and even systems that can differentiate between obstacles and pedestrians. Once again though there is no real substitute for training and awareness of the operator and proper planning of the work and good site management.

**Falling objects**

**Last to feature - with two recorded fatalities - is falling objects which can be prevented with enough care, attention and planning. In a recent example of this UK window sealant company CD Sealants carried out work on an apartment block on a busy street in Nottingham.**



*Sufficient traffic management was provided to protect pedestrians of any falling objects*

The company not only closed a lane of the road to create a walkway diverting pedestrians away from the platform, but it also made use of Big Astor's Genius pedestrian tunnels and wrapped its platform basket in scaffold webbing. A spotter was also employed below to ensure that pedestrians kept out of harm's way.

**Worth a mention**

The loading and unloading of aerial work platforms by delivery drivers represents around a third of the incidents recorded (not necessarily fatal) and include most categories of incidents listed. Many companies are not focusing enough of their efforts on this aspect of their business.

**To conclude**

Virtually all of the incidents that have been reported to IPAF's accident database are preventable and are highlighted in most operator training programmes. Incidents occur when operators or site managers fail to follow good practice, when they cut corners, when they fail to plan or when they ignore their training etc... Operators should be aware that it is the same type of incidents that keep reoccurring and to be extra vigilant.



*One third of all the incidents recorded by rental companies involved delivery drivers*



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