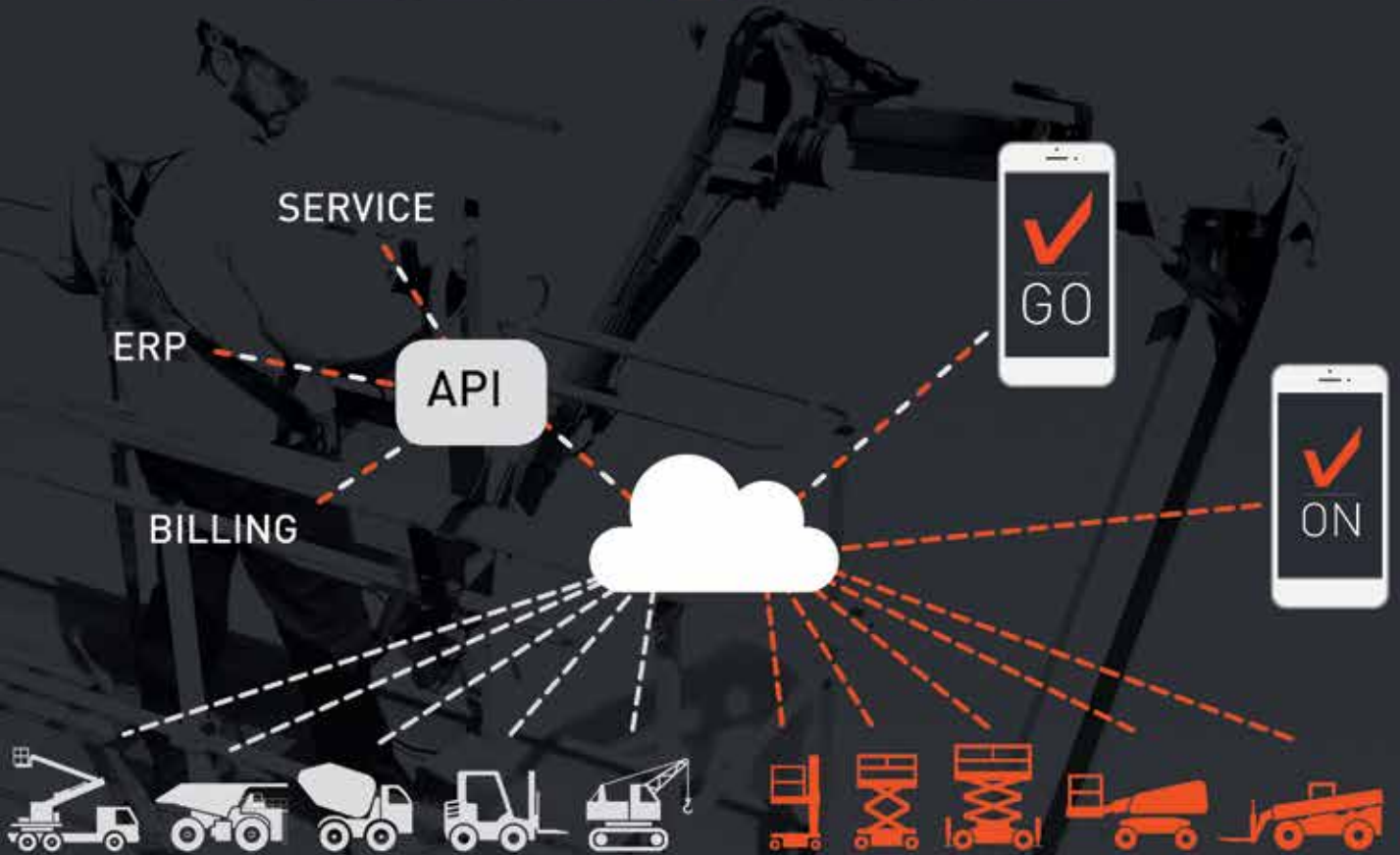


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# Change is in the air

Over the next 20 years, as many as two billion more people will live in cities, resulting in a total of five billion urban dwellers worldwide. Major cities are already facing up to the challenges of air pollution and rising health issues resulting from airborne vehicle emissions. An increasing number of countries have announced future bans on internal combustion vehicles, while a growing number of cities are introducing ultra-low emission zones. This is already causing equipment buyers to consider switching to electric or hybrid powered machines, and why so many aerial lift manufacturers are starting to look at alternative power sources to diesel for their larger models.

Over the past few months several manufacturers have launched hybrid and lithium powered boom lifts as a result of the increased customer interest. The market for hybrids has been pioneered by UK manufacturer Niftylift which recently launched its third generation hybrid boom lifts and now offers two and four wheel drive models up to 86ft.

Niftylift has also launched its first telescopic/straight boom - the 65ft HR22 S - following customer demand for true hybrid versions of this type of boom lift. And it launched the HR21 E, a new all-battery electric version of the updated 62ft HR21 - its first with direct electric drive - which offers 13 metres of outreach, 250kg platform capacity, 150 degree articulating

jib, 30 percent gradeability and an overall weight of 6,640kg.

Demand for hybrid booms is particularly strong in Germany where Niftylift is now market leader in some sectors, initially due to the growing appetite of German rental companies - and more importantly their customers - for clean, quiet platforms, no matter what their size. Buyers have also now bought into some of the company's other features, such as low weight and built-in secondary guarding.

## Niche no more

For many years the major manufacturers took no notice of the hybrid or all-electric concept for Rough Terrain lifts, given that it was very niche and certainly not something that the big American

producers saw in their home market which has traditionally tended to drive the development of new concepts or products.

Even European-based manufacturers such as Haulotte and Manitou seemed unpersuaded that this type of product would ever be anything more than a small niche market. Although it must be said that JLG did some significant and critical development work in this area, launching



The Nifty HR21E's compact electric motor and pump replaces the usual hybrid power pack



Haulotte's new 60ft HA20 LE is the first unit in its Pulseo Generation and part of a radical new 'Blue' strategy



JLG launched the 60ft E600J all-electric boom lift with on-board recharging generator as long ago as 2000

the 60ft E600J all electric boom lift with on-board recharging generator as long ago as 2000. Its problem was that it was ahead of its time and therefore never sold particularly well. And in order to improve battery life it was built as light as possible and was quite different from the company's regular 60ft articulated Rough Terrain boom lifts.

The company also tested a fuel cell powered boom lift in 1999 which never made it into production. Other companies have also offered a variety of bi-energy models over the years, which were intended to offer hybrid like characteristics, but never offered sufficient battery

life to perform as a true electric powered platform. In the late 1990s UpRight, looking to produce a simple alternative to Genie and Niftylift's Bi-Energy boom lifts, added a small Kubota marine diesel with generator to its all electric AB46E, with enough generator power to top up the battery pack faster than the machine was capable of drawing down. As with the JLG E600J, it worked up to a point, but powering the traditional hydraulic wheel drive system with an electric motor was not the best combination.

In contrast Niftylift's Bi-Energy models had dual electric and diesel systems, so were true diesel



In the late 1990s UpRight added a small diesel engine with generator to its all-electric AB46E

powered units when ploughing through tough ground conditions, while the battery electric power train was slower and no match for the gradeability of the diesel power train. The lack of 'grunt' on the electric Niftylift booms, was the initial reason it created the Bi Energy option in the first place. So in a way it was this failing which led to Niftylift's development of the first hybrid boom lifts.

Genie also had a very credible Bi-Energy power pack option, a popular option on its market leading Z-45 boom lifts in Europe, but it sold few if any in North America. The main breakthrough in battery electric Rough Terrain lift development arguably came from JLG when it launched its 34ft 340AJ articulated boom in 2014 which featured four AC electric wheel motors, the first major aerial lift manufacturer to risk placing electric motors in an area where they are subject to abuse and contamination from mud and water.

The company had trialled direct electric drive in the late 1980s with DC wheel motors within the rear axle of its 30ft 300A. Genie took this a step further in 2007 when it added direct electric AC drive to the rear axle of the industrial Z-40/23N boom lift. But a four wheel drive, four wheel steer Rough Terrain direct electric drive boom lift had to wait for the right components to come along and then be proven able to handle the abuse of the rental market and tough construction sites.

Genie added to the development process with the launch of the 60ft Z-60/37 DC in early 2016, together with the FE 'hybrid' version with onboard diesel recharging generator. While sales of the Z60/37FE have been steady they have been a little slower than might have been expected, but the concept is certainly gathering momentum and owners are placing repeat orders.

Haulotte has now added to this trend with the launch of its new 60ft HA20 LE and LE Pro at Intermat.

This is the first unit in its Pulseo Generation and part of a radical new 'Blue' strategy which involves the company ceasing production of diesel boom lifts over the coming years as it converts its entire product line to emission free power sources.

#### Haulotte Pulseo range

Haulotte made a great deal of the launch of the first in a new range of Pulseo machines - part of an overall corporate strategy dubbed 'Blue Orientation'. The main element of which is to end all diesel powered production within 10 years and hopefully in half that time, but practicalities will have some impact on the actual timing. The company is starting with full traction lead acid battery packs, before switching to AGM and then lithium ion battery packs and finally - if all goes according to plan - fuel cells.

The new machine incorporates most of the structural elements from the current HA 20 RTJ but has reinforced riser weldments and boom to handle the optional dual platform capacities, with 250kg unrestricted for a working height of almost 21 metres and outreach of 11.9 metres. Or 10 metres outreach and 18 metres working height with the 350kg maximum capacity. Up and over reach is 8.5 metres.

Dual capacity is selected in the platform and monitored by the platform overload system. The counterweight is also slightly smaller, compensated by the two chassis-mounted full traction 72 volt/435Ah lead acid battery packs with centralised water top up system. The lift can be plugged into any 230 volt - ideally 16 amp - socket or recharged from the 18Kw Kubota diesel with generator - something the company refers to as a 'Range Extender'. All power from the generator goes into the batteries, but the company claims that even with totally flat battery packs the machine will operate within a minute or two of starting



The Haulotte HA20 LE can be plugged into any 230 volt - ideally 16 amp - socket or recharged from the 18kW 'range extender' Kubota diesel with generator

the engine. It also claims that the machine can work a full shift on a single battery charge. A chassis mounted battery charge indicator is said to be more accurate than those typically found on aerial lifts. A second indicator is provided on the platform controls.

Four wheel-mounted AC electric motors provide 45 percent gradeability while a separate electric motor powers the hydraulics. The riser descent has also been changed from power down to gravity descent. Four wheel steer and an oscillating axle are standard equipment on both the LE and LE Pro. Haulotte's latest technical features such as Activ'Lighting systems, Activ'Shield Bar 2.0, Activ'Screen and universal telematics plug are all standard equipment.

#### JLG hybrid boom

JLG is set to launch the production version of its new 80ft articulated 4x4 hybrid boom lift at Vertikal Days this month. The H800AJ goes head to head with the Nifty HR28 4x4 Hybrid which has been a runaway success in several European markets.

Compared to the Nifty HR28 the



The HA20 LE has dual platform capacities and a maximum outreach of 11.9 metres



JLG is set to launch the production version of its new 80ft H800AJ articulated 4x4 hybrid boom lift at Vertikal Days this month



Genie added to the development process with the launch 60ft Z-60/37 FE 'hybrid' version with onboard diesel recharging generator

#### How the JLG H800AJ compares with the Nifty HR28 4x4

	JLG H800AJ	Nifty HR28 4x4
Working height	26.38 metres	28 metres
Outreach	16.45 metres	19 metres
Platform capacity	230kg	280kg
Gradeability	45%	40%
Overall weight	16.11 tonnes	14.65 tonnes
Power source	Parallel hybrid - 84V DC with AGM batteries and Kubota Tier IV diesel engine	35kW Hybrid power using Kubota diesel engine
Machine length	11.13 metres	9.28 metres
Machine width	2.49 metres	2.49 metres
Machine height	3.0 metres	2.7 metres
Jib articulation	130 degrees	150 degrees
Drive	4 x 4	4 x 4

new JLG H800AJ is physically larger with 1.6 metres less working height and 2.55 metres less working outreach at 16.45 metres. Up and over height of the JLG is however better at 9.78 metres and gradeability is superior but platform capacity is 50kg less and at 16.1 tonnes it weighs almost 1.5 tonnes more. One of the reasons for this is that it is based on the regular diesel 800AJ, in fact after the electric motor it is basically identical, but the big battery pack replaces some of the counterweight. The unit combines an 84 volt electric system with AGM maintenance free batteries and Kubota Tier 4 final

diesel replacing the Deutz motor. Power on both machines - described as a parallel Hybrid system - is provided in a very similar way. Both use a small Kubota diesel coupled to a large electric motor which when reversed and driven by the engine becomes a generator that tops up the battery pack. In diesel mode the engine powers the pumps and the 'generator'. When extra power is required for steep inclines or heavy mud etc the electric motor kicks in and adds the additional required horsepower.

Both platforms can also run as a pure battery-electric machine with minimal noise and zero emissions.



JCB showed the prototype 50ft diesel AJ50 D at Conexpo and Vertikal Days 2017



**C&a**

**boom lifts**

Niftylift's HR28 4x4 Hybrid has been a big success in several European markets

As with the standard machine it is equipped from four wheel hydraulic drive, an oscillating axle with a four wheel steer option.

#### Lithium battery platforms

New energy and power developments are moving on apace. In recent months Niftylift has launched a lithium powered boom - the HR 12 LE L - while JCB has introduced lithium batteries on its scissor lifts. Both of these are the result of a request from Netherlands based start-up rental company Hoogwerkt which is planning an all lithium fleet which can be collected on a two axle equipment trailer. The Nifty HR12 LE L is also available as the HR12 LE (Light Electric) which Niftylift expects will make up the majority of machines sold as it uses

the much cheaper AGM batteries which it says can still last up to four days on one charge. (See Niftylift moves into lithium power, page 24).

JCB announced its move into booms early last year and showed the prototype 50ft diesel AJ50 D at Conexpo and Vertikal Days 2017, however no other models in the range have been seen and as far as we understand production units have yet to ship. Another interesting boom seen at Conexpo was JLG's 460SJ on a self-levelling chassis - but no further information has been released on when production models will be available.

Lithium power on aerial lifts is clearly becoming more mainstream and pioneer Hinowa will celebrate 10 years of lithium battery power in

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Manitou's third generation 52ft 180 ATJ uses a smaller Kubota diesel engine with LSU pump to extract more performance.

October. It says that it has delivered 1,000 lithium lifts so far and has not had to replace a single full battery pack. It took five years to fully eliminate initial teething problems, changing out several component suppliers before finally perfecting its lithium battery pack which is currently in its second generation.

### Third generation Manitou booms

Manitou has launched a third generation 46ft/52ft - 160 and 180 ATJ articulated boom lifts, matching a smaller Kubota diesel engine to the company's well proven Load Sensing hydraulic system with LSU pump which manages to extract more performance from the smaller engine. Gradeability increases from 36 to 45 percent, new lifting and tie down lugs make it easier to lift the

machine without putting pressure on the new modified covers or the need to use a spreader beam. Other features include smoother controls, wider wheels and tyres and the Stop & Go automatic engine stop/start system gives a claimed eight percent reduction in the 'total cost of ownership'.

### Hi-spec MEC

MEC's latest boom is the high specification 45ft 45-AJ Rough Terrain articulated boom lift. The Kubota diesel powered machine is very Genie 45 and offers 360 degree continuous slew, solid rough terrain tyres, a triple entry platform with swing gate and oscillating front axle. Outreach is 7.6 metres, with an up and over height of 7.5 metres. Maximum platform capacity is 227kg. The unit is built for MEC by Dingli in China to its detailed design changes in order to deliver a cost

effective product with all the MEC 'bells and whistles' resulting in 'full-featured, rugged, simple and reliable boom lifts'.



MEC's latest boom is the high specification 45ft 45-AJ Rough Terrain articulated boom lift

# Let's get together

**The current ANSI standards are being completely updated, to the point where new machines complying with the updated US standard will be much closer to the models that meet current European, ISO and Australian standards, which have largely been harmonised. We look at the main changes from the old ANSI standards and how machines are changing and what effects this might have on North American-built platforms shipped to overseas markets.**

**Historically European and North American aerial work platforms have differed in several key areas because they comply with different standards - the American National Standards Institute - ANSI and the European Standard EN280.**

Units sold in the USA currently comply with ANSI A92.5 and A92.6, which deal with manufacturers' stability, testing and safety requirements. The Canadian Standards Authority (CSA) standards are also quite

similar for obvious reasons. ANSI certified platforms are also used in many Central and South American countries.

Aerial lifts sold into Europe have had to adhere to the Machinery Directive since the single market came into force in 1992 with the CE mark designating compliance. In 2002 the first EN 280 standard was published, which guided compliance with relevant machinery directives. More recently the International Organisation for Standardisation (ISO) standard ISO16268 was



*Occupants in the platform must have the knowledge on how to work safely including how to use fall protection, the location of the harness anchor points and how to complete emergency procedures in line with manufacturer's warnings and safety information*

drafted, it largely followed the latest version of EN280 and guided the update of the Australian standards. With the ANSI standards well beyond their sell by date, it made sense that they be redrafted along the lines of the ISO standard, helping move towards a single global safety standard.

The changes to ANSI are quite significant and will have an impact on the way some North American contractors work. It has also created some real challenges for manufacturers as well as dealers and rental companies as these new machines begin to ship. The changes might also carry some product liability issues in the USA, such as in the case of a fatality that might have been avoided if a safety device required under the new standard or previously used in Europe was fitted to the machine involved?

The new ANSI standards - A92.20 - will bring North American platforms closer to the European machines by eliminating most of the current variations. Standards for safe use (A92.22) and training (A92.24) bring them even closer. Work on the new standards is being carried out by the Aerial Platforms Committee ASC A92 - approved by ANSI - and made up of a wide range of individuals and groups from the access industry. The core changes include platform overload cut outs, indoor/outdoor ratings, stability calculations, entrance gates, guardrail heights and operation when off level. While these are welcomed by most end users, those who typically overload platforms or operate on excessive slopes will obviously be irritated when a new machine cuts out and stops them from abusing the machine and putting themselves at risk.



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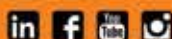
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The new ANSI standards - A92.20 - will bring North American platforms closer to the European machines by eliminating most of the current variations

Under the new standards the platforms will be classed differently - those that move vertically but stay inside the tipping lines (scissors for example) and those where the platform extends beyond the chassis (e.g. booms). Both can be divided into three further categories - those only driven in the stowed position, those driven elevated but controlled from the chassis and those driven elevated and controlled from the platform.

Occupants in the platform must have the knowledge on how to work safely, including how to use fall protection and the location of the harness anchor points, how their actions could affect stability, how to safely use accessories, how to stick to the safety plan and avoid site specific hazards and how to complete emergency procedures in line with manufacturer's warnings and safety information.

#### Load sensing

The addition of active load sensing is probably the most obvious change. Current standards place the onus on the operator not to overload the lift. However, complying with A92.20 means aerial work platforms must be equipped with a load sensing device that disables the lift functions and activates an audio visual alarm when overloaded. Those that have overloaded machines in the past will have to re-plan their work or use a different machine. While load sensing adds some complexity to the platforms, the technology has been in use in Europe for more than 20 years and is now well proven. Scissor lifts will use a combination of scissor stack angle sensors, pressure transducers on the lift cylinders and/or load sensing pins, while booms will use load cells to measure platform load. In order to overcome obvious objections from users, manufacturers are busy adding higher or dual platform capacities



to their machines - in some cases requiring structural changes to the lift structure - which benefit users worldwide. Additionally, the fact that all machines will now have overload devices, allows manufacturers to build this into the machine, reducing cost and improving reliability.

#### Wind forces

One of the main differences between the current ANSI and EN/ISO standards is the manner in which the effect of wind loading is applied to stability tests and calculations. Under the new A92.20 standard scissor and mast-type vertical lifts will be impacted considerably, with narrower slab electric units affected more than the wider, heavier Rough Terrain units. For example, a current ANSI scissor lift may have a two person capacity with a 12.5 metres a second wind rating. Under A92.20 it may be reduced to two people and zero wind - 'indoor use' - with one person capacity possible for 'outdoor use'. Narrow outdoor rated scissor lifts are also likely to weigh more which affects loading and transport, as well as floor loadings and the ability to ride elevators etc.



One of the main differences is the effect of wind loading when applied to stability tests and calculations. Here is an example of an A92.20 decal.

Manufacturers may opt to simply switch the rating on current indoor/outdoor machines to indoor use only. Rental companies need to consider this when purchasing in order to match their customer's requirements.

When it comes to boom lifts most self-propelled booms over 40ft are less likely to be affected by the new wind rating requirements, but narrow aisle boom lifts may require more weight or a change in rating? Certainly, expect more



There may well be a further move towards solid perforated side wall cushion tyres

stringent restrictions on the size of material loaded into the platform and supported by attachments such as glazing kits and pipe racks etc.

#### Tyres

Changes in the way stability and overturning moments are calculated will in most cases result in a switch to foam filled or solid tyres, a trend that has been gathering pace in North America for some time. Once again this has been a requirement in Europe for many years. What is likely is a further move towards solid perforated side wall cushion tyres.

#### Platform entry and guardrail heights

Currently many North American platforms, especially small scissor lifts, have a guardrail height of around a metre. Going forward they will have to be 1.1 metres, the same as in Europe. This could mean that some units will no longer pass through a standard door without folding the guardrails down. The chain gate entrance will also go - no 'flexible' devices are permitted under the new standard - gates with toe boards or drop bars with fixed toeboard will replace them.



The chain gate entrance will also have to go - replaced by gates with toe boards or drop bars with fixed toe boards

#### Tilt sensing requirements

Going forward platforms will need to cut out before they reach an unsafe slope angle - most boom lifts are currently fitted with tilt alarms that simply make an obnoxious noise when a machine moves onto a slope of two or five degrees and more. With most machines rated for working on firm level ground and tested to five degrees in the most unstable position, manufacturers will need to decide on a cut-out angle that will not destroy the



A tilt sensor will be needed to stop platforms reaching unsafe slope angles

practicality of the machine. The option exists - particularly on boom lifts - for manufacturers to combine the overload sensor and boom position indicator to effectively have a load chart that allows working on slopes where overturning is unlikely, such as with shorter booms, lower boom angles, lighter or some cases heavier loads. Some manufacturers are considering a slope selection switch that allows user to dial in, something like ...Level ground up to two degrees, or Up to five or even 10 degrees, with the system then limiting the machine's working envelope to match, cutting out when the selected slope is exceeded, thus adding to a machines capability rather than detracting from it.

#### Machine manuals

Operator manuals must include a list of the machine's functions, features, operating characteristics, limitations and devices needed for machine familiarisation. Each machine must have a space to mark the date of the last annual inspection.

#### Summary

When ANSI A92.20 is finally published manufacturers have 12 months to meet the new standards. The new standard will not be retrospective This means that buyers can choose to stock up on platforms that comply with the existing standards, while others restrict their purchases to machines that comply with the new standard. Some manufacturers have already been redesigned their models to comply. Larger international contractors are likely to stipulate all machines on their sites must comply with the latest standards, while smaller companies may seek out the older, 'less restrictive' models for as long as they can.

The net result is that manufacturers will be able to move closer to a 'world' machine allowing owners to sell their used machines anywhere without major modifications. It will also allow a new approach to some system designs, integrating them into the base machine rather than a 'bolt-on' for certain markets. This tends to lead to better designs with a lower cost. All in all, a positive change for the longer term.

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# Niftylift moves into lithium power



As the saying goes 'there is many a true word spoken in jest'. The joint 'Star Trek' April Fool news story on Vertical.net jokingly said: "We (Niftylift) decided to boldly go where no one has gone before... The technology will put us light years ahead of competitors who still cling-on to old technology."

The story of course builds on the new Nifty HR12 LE (Light Electric) and HR12 LEL (Light Electric Lithium) which has a lithium ion or AGM battery pack. Unfortunately Di-Lithium crystal technology is still currently unavailable, but the HR12 LEL has 'crossed the final frontier' of battery design using lithium power in a standard production self-propelled boom lift for the first time.

The new Nifty HR12 LEL has caused something of a stir, firstly because it can be powered solely by lithium ion batteries and secondly it weighs almost a tonne lighter than its previous models the HR12 4x4 and the 'narrow' HR12N which are also considered to be at the lighter end of the boom lift spectrum.

The 33ft HR12 is the elder statesman of the boom lift world, dating back almost 30 years but is still as popular as ever even though

it is largely unchanged - at least visually. In the late 1980's Niftylift launched its first self-propelled boom lift - the 26ft Height Rider 10 - but its limited outreach quickly prompted the development of a telescopic version, the Height Rider 12. It also pioneered the bi-energy concept, mainly due to the poor battery life and gradeability of the all electric model. However the concept struck a chord with many rental companies, in that one machine could be used both indoors and outdoors, helping boost utilisation. It has remained popular over the intervening years - in spite of only the most modest of design changes and several attempts from other manufacturers to make it obsolete with alternative product

offerings - thanks to its light weight, narrow overall width, simple design and first class reliability.

Mostly sold with Bi-Energy - Battery/Diesel power - the only criticism in the early years was its mediocre performance on rough terrain. However in 2006 Niftylift rectified this with the introduction of the 4x4 model which carried over all of the proven componentry from the standard HR12, but featured a new chassis with four hydraulic drive motors, greater ground clearance and a larger two cylinder Kubota 452 engine. The lift still retained its Bi-Energy battery power pack allowing it to work inside or in quiet locations as well as on site. The standard tyres were lugged tractor tread, although a non-marking white



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**How the new Nifty HR12 LE L compares with other HR12 models**

	Niftylift Nifty HR12 LE L	Niftylift Nifty HR12 4x4	Niftylift Nifty HR12N	Niftylift Nifty H12
Working height	12.1m	12.2m	12.2m	12.2m
Outreach	6.4m	6.1m	6.1m	6.1m
O/A Width	1.79m	1.6m	1.5m	1.8m
O/A Length	3.97m	4.1m	4.1m	4.1m
O/A Height	1.98m	1.95m	1.9m	1.9m
Gradeability	25%	30%	25%	25%
O/A Weight	2,540kg	3,470kg	3,435kg	2,630kg
Platform Cap	200kg	200kg	200kg	200kg
Power options	Lithium ion or AGM battery	Diesel or Bi-energy or Bi-energy	Battery, Petrol, Diesel or Bi-energy	Battery, Petrol, Diesel
Travel speed	6kph	3.7kph	3.4kph	3.4kph
Turning radius	3.63m	3.4m	4.2m	3.15m
Cage size	1.2 x 0.85m	1.1 x 0.65m	1.1 x 0.65m	1.1 x 0.65m

version was also available. The overall weight was still a handy 3.3 tonnes and while the unit has greater ground clearance stowed height was still under two metres.

Until very recently Niftylift still produced the HR10 which had a 10 metre working height, 4.5 metre outreach and 1.5 metre overall width, the same as the narrow version of the HR12N - which has 12.2 metres working height and 6.1 metres of outreach but was heavier at 3,435kg. The standard HR12 has a 1.8 metre overall width but weighs just 2,630kg compared to the HR12 4x4 at 1.62 metres wide and weighing 3,470kg.

On first glance at the table above, the latest lithium powered HR12 LEL appears to have a very similar specification, however this is not the case.

Working height is 100mm lower at 12.1 metres however outreach has increased by 300mm. The width is now 1.79 metres, almost as wide as

the original HR12 but it is also slightly shorter and slightly higher. Travel speed on lithium power is much quicker at six kilometres an hour.

The HR12 LEL's new covers, new controls and a compact version of the Nifty Tough-Cage - which is still bigger than previous models - brings its total weight with lithium ion batteries to just 2,540kg. It can also be ordered with AGM batteries which increases its weight by about 100kg. The low weight allows it to be towed on a standard two axle equipment trailer, a concept that appears to be growing in popularity again, especially in the Netherlands, Germany and even London in the UK, where demand for same day delivery or collection is increasingly popular.

Niftylift has almost travelled back in time with the new HR12 LEL with a very similar weight and width to the original, but the new technology has breathed new life into the HR12 which hopefully means it will be a big hit with the 'next generation' of users.



A 2006 HR12 4x4

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