access INTERNATIONAL

GREEN ENERGY SUPPLEMENT

August 2022

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A KHL Group publication

A journey into low emission access

The future of diesel

Rental focus

Weighing up batteries

The charging dilemma

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The sustainability progression

Alongside climate change-related issues, which often dominate our news channels, the move to lower emissions and ultimately zero emissions is no longer just a desire, it has become a clear focus for companies and countries across the world.

However, while most people in our industry recognise that widescale electrification of equipment is an inevitability, the key question remains; 'how do we get there?'.

Considerations remain around the cost of green equipment, how to charge it easily and effectively on worksites and how quickly to invest in it.

Many rental companies are left with a dilemma that if they don't invest in electric now or in the near future, and continue with diesel, it may be difficult to sell on that equipment in the future.

As an interim solution, for the short- or even the medium-term, hybrid equipment is being offered as a practical option - electric operation is used wherever possible but it is backed by a combustion engine when required.

This equipment can come in the form of true hybrids, which offer independent operation in both electric or diesel mode, or a 'piggy-back' combustion engine that is just used for charging the battery if it runs low.

While some would argue that a direct move two 100% electric is the way forward, others would suggest hybrid has a place in the short-term in mature access markets as it could be sold on as used equipment to markets with slower developing emission regulations.

The debate over lithium-ion batteries has largely been won by the view that in practical terms they are the more efficient option for rough terrain equipment. Although, increasingly evolved lead acid solutions will remain dominant in the slab scissor environment for quite some time.

Nevertheless, there is also growing questions over the long-term sustainability of lithium batteries and there is a significant school of thought that says new battery options will dominate in the future.

These questions are just some of those being asked across our industry as rental companies and OEMs forge their way forward towards a zero-emission environment.

This supplement provides an extensive overview of how our industry is taking these steps.

Euan Youdale
Editor

> "While most people in our industry recognise that widescale electrification of currently diesel-fuelled equipment is an inevitability, the key question remains; 'how do we get there?'"

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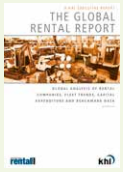

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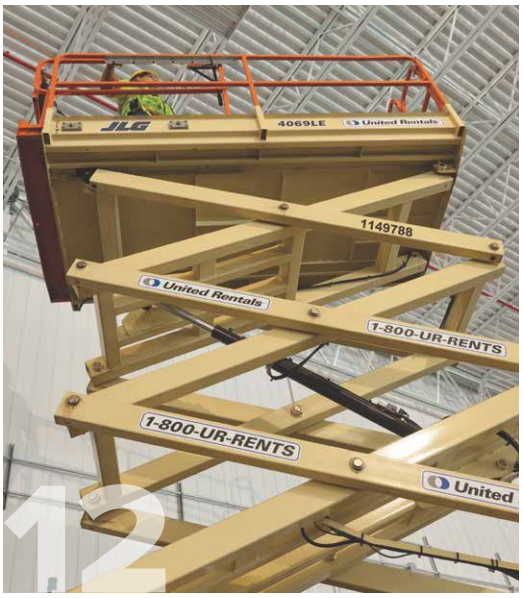

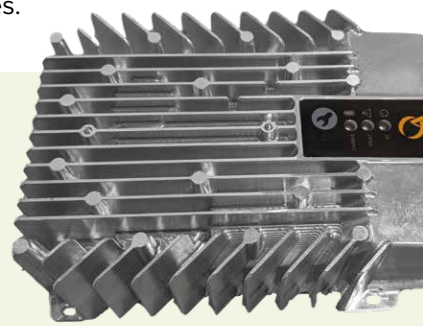

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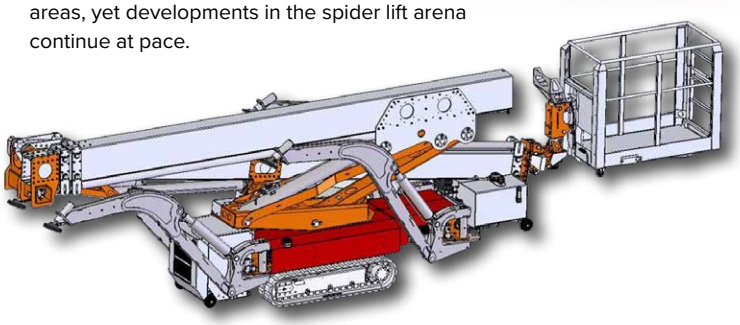

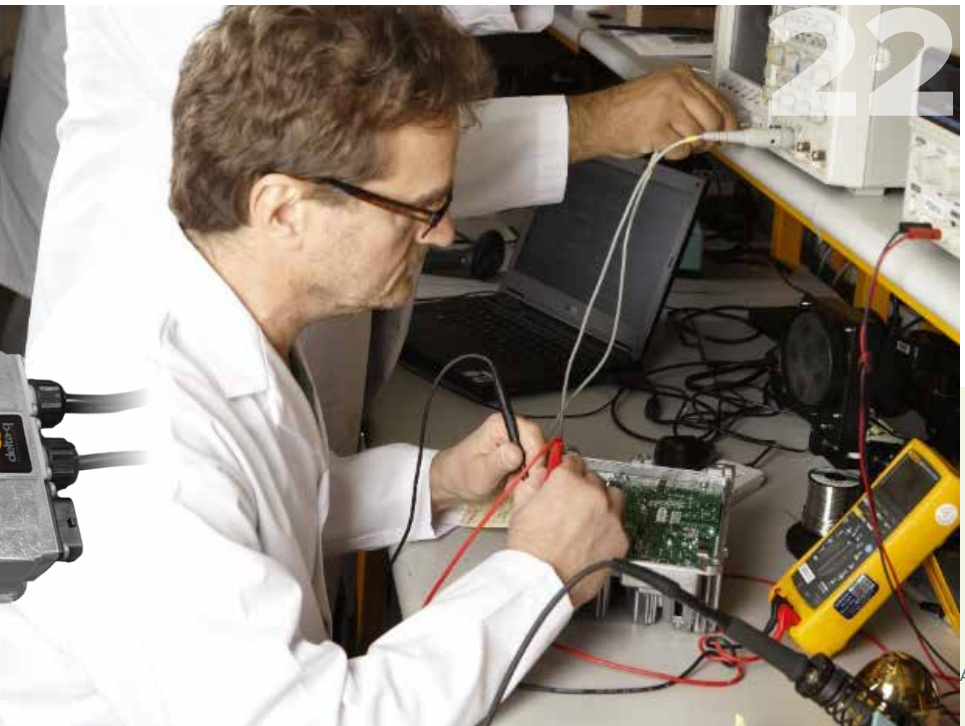

FURTHER READING

VERTICAL MASTS & TELEHANDLERS
Find out how low emission products are developing in the July/August issue of **AI**.

ROUGH TERRAIN SCISSOR LIFTS
Read about the latest in electric RT Scissors in the September 2022 issue of **AI** - soon to be published.

TRUCK MOUNTS
Insights into the electrification of truck mounts in the forthcoming November/December 2022 issue of **AI**.

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FACTS OF

‘Realistically, is diesel-powered access equipment here to stay?’ This was the question posed to the industry. Find out how it responded.

United Rentals is one of the major drivers of sustainability in US rental sector.

“Our current view is that diesel-powered access equipment isn’t going away in the short-to-medium term.”

MICHAEL DURAND, senior vice president of sales and operations, United Rentals.

THE MATTER

The pace in adoption of electric-powered equipment is accelerating as jobsite regulations become more stringent and the equipment offers better and more efficient performance, alongside their cost, which continues to come down.

Europe has been the global leader in the move to electric and hybrid, but demand in China has recently overtaken. In most cases, increased adoption follows government regulations. Additionally, it is the result of the economics around investing in this equipment making more sense.

As Rafael Bazzarella, product manager at Skyjack confirms, the strongest demand is found where change is forced through new emission standards, as in Europe and China, or where there is growing demand for versatile equipment, that can be used on a jobsite from start to finish, like in North America.

While the transition to electrification is underway, there must remain a place for the traditional combustion engine. But, how long will that transition take, and, as *AI* asked a number of companies in the access industry, "Realistically, is diesel engine-powered access equipment here to stay?"

Michael Durand, senior vice president of sales and operations at US rental giant United Rentals, makes a blunt assessment. "Our current view is that diesel-powered access equipment isn't going away in the short-to-medium term. We do expect that the future regulatory environment, along with advances in technologies, will push the industry toward zero-emission access equipment in the long run. But that's unlikely to happen in the next decade."

Adding to that point, Zach Gilmor, product manager at Genie, explains that electrification continues to be one of the major trends in the industry, and believes it's possible that someday diesel engines will be a thing of the past. However, he adds, "That might take a while because the technology needs to continue advancing to the point where it can >

United Rentals has added the zero-emission PowrBanks its fleet. The portable energy storage system from Powr2 Energy Solutions uses high-density lithium batteries and integrates with diesel generators, significantly reducing generator emissions, noise and fuel waste.

deliver real-world jobsite performance on all types and sizes of equipment, and it needs to be cost-effective to own."

In addition, Gilmor says that jobsites need to have the necessary charging infrastructure to support an all-electric fleet before diesel–powered equipment can become a thing of the past.

"We're at the point where electrification of access equipment makes sense for smaller machines and jobsites that can support their charging needs. In some categories, you already see products jumping straight to electric, particularly when they can maintain

"We're at the point where electrification of access equipment makes sense for smaller machines and jobsites that can support their charging needs. In some categories, you already see products jumping straight to electric."

ZACH GILMOR, product manager, Genie.

Genie's AC drive system.

TRUCKS AND TRACKS

For the producers of spider lifts the hybrid and bi-energy journey started years ago and is at the heart of many of this product type's designs.

Davide Fracca, sales and marketing director at Hinowa, echoes the thoughts of previous companies.

"The trend, without any doubt, goes towards electrification but for some applications or construction sites diesel engine will remain the preferred option. Missing charging capabilities are for sure is one of the main issues during the decision process of new access equipment acquisition."

And at spider lift and truck mounted manufacturer, CTE the views are similar, although vary between self propelled and vehicle mounted units. Roberto Berritta, CTE technical product and innovation manager, says, "It is really hard to think that diesel will disappear quickly. The automotive industry is not yet ready to the big change of full electric on a large scale. The engine of truck mounted aerial platforms is obviously related to the developments of the automotive industry.

Multitel Pagliero's MT 204 Hybrid.

"For tracked mounted MEWP or self propelled platforms the situation is profoundly different, the change of the engines is really fast, even if it remains to be managed how to transport these means to the job sites."

Looking at the differences between the tried and tested bi-energy models and electric units, Berritta, explains that while full electric spiders are already fully available, the trend and availability on the market will depend on the available battery technology. "We would expect that in five years, at least 50% of our track mounted production will be fully electric or full hybrid."

To speed up that shift, Berritta says cities need to be redesigned with more electric vehicles, including rental vehicles, taxis and public transport, along with the required charging capabilities. And on construction sites that means, "Better organisation of working hours, when possible, to carry out work at evening or night with zero noise."

HERE TO STAY

Roberto Carboni, senior director of international sales at Multitel Pagliero, says the company has started to offer part of its telescopic boom range as a hybrid version but he adds that the truck mounted platform market is waiting on the truck OEMs to produce a suitable chassis option, which can start to replace the classic combustion and PTO versions.

So far in Europe, Multitel sees a general rise in interest in hybrid and electric options, more than other countries in the continent, with strong incentive policies and strict restrictions being the main reasons.

Carboni adds, "We have started already from a sustainable production process by using green energy and recycled material where possible."

Hinowa all electric direct drive TC22N.

"Missing charging capabilities are for sure is one of the main issues during the decision process of new access equipment acquisition."

DAVIDE FRACCA, sales and marketing director, Hinowa.

or exceed the performance of internal combustion engines."

Currently, about 70% of Genie's product line is electrified or hybrid. When Genie introduced its first FE hybrid boom, it represented a move from the more niche, bi-energy hybrid technology of the past to a product that offered practical benefits for jobsites. Since then the FE offering has expanded. (See the Boom lifts feature for the manufacturer's latest hybrid launch, along with a new 100% electric offering).

"For some other types and sizes of equipment, and for some jobsites, hybrid power is an important middle step until electrification of larger equipment can be effectively achieved because it offers both performance and versatility, serving as a perfect replacement for IC engines in some scenarios. It makes sense that hybrid will come to dominate in some categories, and for jobsites where full-electric is not yet feasible," says Gilmor.

The JLG ERT 2669 rough terrain scissor

COMPLEX EQUATION

Faced with weighing up the future of diesel, Barrie Lindsay, JLG's Europe director of engineering, agrees that it depends on the timeframe. "You've got very good diesel engines in the market now in terms of emissions. But then they have added expense and complexity to the machines.

"If you look at construction, the amount of power required exceeds what's practical to use batteries at the moment. And that's driving obviously further development in cleaner engine technology using either hydrogen or something similar.

>

"Certainly, charging capabilities are one of the main infrastructure that will bring the electric market and usage, even for the truck mounted products. Also, lower cost and longer lasting batteries will facilitate the trend."

> "It is really hard to think that diesel will disappear quickly. The automotive industry is not yet ready to the big change of full electric on a large scale.
>
> **ROBERTO BERRITTA, technical product and innovation manager, CTE.**

At fellow vehicle mount manufacturer FE Group the thoughts run along a similar vein, although there is a significant difference in the mainly utility-based application that its products inhabit.

According to the company's export managers Alexandre Vandorpe and Jurgen Pulinx, regulations are strongly encouraging the adoption of electric vehicles. In addition, municipalities are introducing increasing restrictions on access to city centres.

"These elements indicate that within a few years the percentage of ecological platforms sold will be higher than those using fossil fuels.

"We cannot predict with precision if diesel equipment will remain but what is certain is that green models will sell more and more.

On the heavy-duty side, 90% of the pods sold are diesel/hybrid or gas/hybrid.

France Elevateur's 172 Gaz.

Apart from charging capabilities, "The development of green products with greater autonomy would allow us to offer even more efficient products."

"Many customers have mileage requirements that are currently holding them back from switching to green models.

"The development of recharging stations at construction sites would go some way to overcoming this obstacle," add Vandorpe and Pulinx.

Based in France, FE Group says the country is seeing one of the largest penetrations of mobile electric equipment in Europe. "We are receiving strong requests for environmentally friendly equipment. This is due in particular to the various restrictions introduced by the municipalities for access to their city centres."

In addition, the Scandinavian countries, Germany and Northern Europe in general are advanced in terms of hybrid and ecological vehicles. "European programs are flourishing and allow member states to benefit from subsidies for their green projects, the latest example being Romania. Like any disruptive technology, electric mobility had to face scepticism at first. But this time is over."

The Traccess 230 E spider lift from CTE.

> "The development of green products with greater autonomy would allow us to offer even more efficient products."
>
> **ALEXANDRE VANDORPE and JURGEN PULINX, export managers, FE Group.**

"So, to imagine that in 10 or 15 years, we'll still be running the same diesel engines is hard to imagine. Whether an internal combustion engine is eliminated completely is still a difficult question for construction in general.

"But I do think that for the large proportion of MEWPs, we will find an alternative for fuel to the diesel engine and progressively work up the product range over the next few years, and being innovative with using lighter weight materials, to try and make it work."

Corey Connolly, senior product manager at Skyjack believes the survival of the diesel-powered combustion engine is assured in the foreseeable future, unless there are major new regulations which force it out of the industry.

Connolly comments, "It is definitely here for the short term due to the limited infrastructure to support electric equipment on a typical construction jobsite. For the long term, demand for diesel equipment will continue as engine manufacturers reduce diesel emission output and the costs associated with the engine are kept low.

Although Connolly concedes that should governments make aggressive changes to emission regulations, the diesel engine could become obsolete, he adds, "In certain regions if there are no requirements, incentives or cost advantage to shift away from diesel engines the demand will likely persist, unless manufactures collectively no longer offer the product."

> "In certain regions if there are no requirements, incentives or cost advantage to shift away from diesel engines the demand will likely persist [for diesel].
>
> **COREY CONNOLLY, senior product manager, Skyjack.**

Nevertheless, in five years' time Connolly believes 25% to 50% of the rough terrain equipment produced by Skyjack will be hybrid or electric, with hybrid MEWPs beings a realistic bridge to electrification. "This

Skyjack SJ16E vertical mast lift

MAST CLIMBING

Mast climbing specialist Alimak Group offers a range of hoists and platforms across it international markets. The company's executive vice president for its Construction Division, David Batson, says, from his perspective, "Diesel-powered equipment is not the future of our industry.

"HVO will probably be used as a transition fuel since it has lower CO_2 emissions than diesel. However, HVO is not beneficial from a land use, and biodiversity perspective.

"Eventually all access equipment is likely to be fully electrified. The pace of electrification will probably be determined by battery technology development, both with regards to energy density and cost."

> "The pace of electrification will probably be determined by battery technology development, both with regards to energy density and cost."
>
> **DAVID BATSON, vice president, Construction Division, Alimak.**

The company provides products which mostly use electricity from the grid. "Electric mast climbers have the same needs as other segments of the aerial platform sector, including plentiful charging points.

"This is a must, as long as batteries are not large enough to last for a full day of operation. And, as long as battery energy density is not high enough, availability of rapid charging is a must for all work vehicles which usually can't afford to wait or stand still and charge for extended periods of time."

Batson adds that while much focus is on the effect that carbon has on our climate, there are other topics which should be taken seriously. This includes Biosphere integrity, caused by mono cropping, biodiversity, due to limited natural land, nitrogen and phosphorus cycles, strongly linked to industrial farming practices. "These areas can be critical, especially when one examines the role biofuels like HVO should have in our industry and society at large."

Alimak's Scando 650 construction hoist.

One of LGMG's new generation of scissor lifts.

will be driven by a combination of product development, as well as continued demand for diesel engines. Likely though, the demand for dual fuel engines, particularly in North America, could be reduced by shifting toward hybrid machines."

Beyond charging infrastructure and charging capacities, Connolly says there needs to be other improvements. "Costs have been trending downwards for a number of years but there is still some apprehension the machines will cost significantly more, and users will not know how to operate or charge the equipment properly."

HERE TO STAY

Yuling Wang, director of overseas application engineering at China-based manufacturer LGMG, believes the combustion engine will be in existence for a long time to come. "For example, in some countries where the land is sparsely populated, at the beginning of the construction of a project, the site is not well equipped with electrical equipment to meet the charging requirements."

However, there will be a considerable difference in adoptions in other countries. Wang says that for the Chinese market, by the next half decade, around 80% of the rough terrain aerial platforms produced by LGMG are likely to be hybrid or electric. "China's increasing demands on environmental protection are stimulating the market demand for electric equipment.

"The second reason is that Chinese construction sites are becoming relatively well equipped with electric units at the beginning of a construction project, providing convenient conditions for those electric products."

Outside China, on average about 30% to 40% of total exported MEWPs will be hybrid or electric in five years' time, with hybrid products becoming less of that ratio over time due to their higher cost. "In addition, foreign construction sites are not fully equipped with equipment to meet charging requirements," adds Wang. "Therefore, the promotion of electric equipment is difficult, and accounts for a relatively small share in the export market."

The reason for this stark difference, says Wang, is three-fold. "Firstly, there is relatively strong demand in China; secondly, electric infrastructure at construction sites is becoming more complete."

Thirdly, says Wang, China has its government-led 3060 carbon zero target to meet.

The company intends to meet the lack of charging capacity on construction sites in two ways. Firstly, in terms of charging, by developing range extenders, using onboard generators to charge the batteries, and provide the longer operation of electric equipment.

Wang adds, "In terms of battery change, we will provide rapid battery replacement for our products to shorten downtime. To adapt to the power needs of different working conditions, we will increase our research and development efforts in the areas of power supply circuit integration, battery versatility, and ease of replacement." AI

> "China's increasing demands on environmental protection are stimulating the market demand for electric equipment.
>
> **YULING WANG, director of overseas application engineering, LGMG.**

POWER IN THE USA

"In North America there will continue to be a steady movement towards hybrid or electric, but it feels like 10 years will be required to exceed 75%. There are too many harsh weather locations and too many demanding applications that will still not be able to be performed by hybrid or electric power," comments Gary Crook, vice president of engineering at US-based MEC Aerial Platforms.

In five years' time, Crook says the rough terrain access equipment that MEC produces will be greater than 50% of its production, but it will not exceed 75%.

Even as required charging infrastructure is developed, diesel will remain an important power element. "There will still be many applications where the use of an engine-powered choice will be requested or necessary."

MEC's Leak Containment-System

As Crook adds, the adoption of electric-powered equipment will be down to mindset. "There are obviously all the practical boxes to check but the area that needs to be developed as much as all of these is that of an open mind to the possibility that an electric-powered machine can indeed perform the jobs that, until now, have been performed by engine-powered machines.

"Often the perception of the electric product having lesser performance causes its rejection ahead of an actual witness of its capabilities. All the logistical questions may be answered but perception is important to the success of green energy beyond anything other than electric slab machines."

And as a passing note, Crook adds, "I know that 'green energy' gets the bling label but there are other completely meaningful developments that work towards the same goal.

"The use of a smaller diesel engine to do the same task through careful study of efficiency in a hydraulic circuit can lead to using an engine that uses one third less fuel than competitor's products yet be a fully productive solution. It is something that can be done now and, not that it is a substitute for the ultimate green product, but it is a smart choice while developing the machines of five or 10 years into the future."

> "The area that needs to be developed as much as all of these is that of an open mind to the possibility that an electric-powered machine."
>
> **GARY CROOK, vice president of engineering, MEC Aerial Platforms.**

United Rentals in a warehouse fit out worksite.

_AI_ spoke with rental companies from North America, Europe and China to find out how their sustainability and green equipment policies differ and concur.

The rental sector is embracing sustainability initiatives and increasing the number of electric and hybrid equipment in its fleets accordingly. However, while being a long-term goal for rental companies, the shift to non-diesel equipment depends on a combination of factors including total cost of ownership (TCO), availability of charging and the requirements and regulations of governments or worksites, not to mention educating the marketplace.

It is commonly noted that Europe is seeing a faster transition to full electric rough terrain MEWPs than North America. China, the fastest growing access market in the world, is also seeing a swift move to electric power. However, the obstacles remain plentiful.

RENTAL REGENE

NORTH AMERICA

A company with an overarching view of the North American market is United Rentals. As Michael Durand, senior vice president of sales and operations at the world's largest rental company explains, there are no US government incentives specifically for electric access equipment. However, the proposed Build Back Better federal legislation includes incentives for mobile machinery and commercial equipment that would apply to electric access.

"That legislation is stalled in the Senate and may not be enacted, but the incentives could be included in a budget bill in the fall," Durand comments.

One of the most significant hurdles to electrifying jobsites in North America is end-user education, says Durand. "Customers need to be properly trained and familiar with charging procedures. They also need to understand how to preserve battery life. Education is critical for the productivity of the customer and the rental company."

"Additionally, the charging infrastructure – fixed charging points, deliverable power banks, etc., will become imperative at jobsites, yards and offices as more and more electric equipment is rented. It's possible that rental companies can upsell power as a customer service."

CHANGING PACE

United Rentals has more than 143,500 aerial platforms in its fleet – the largest in the world, with almost all of them in North America. About 70% of the MEWP fleet is electric-powered, with 21% of the company's rough terrain scissor lifts being electric and 16% for boom lifts.

TJ Mahoney, vice president of supply chains at United Rentals, expects the fleet to reflect an increasing percentage of fully electric units over time. "The pace of that change depends on a number of factors, including how our end-markets adapt to the logistics of battery charging, the cost of the fleet and the ongoing introduction of new technologies by the OEMs."

As Mahoney goes on to explain, it is not an ideal environment to get a reading on R&D plans for electric equipment from the OEMs. "Many of them have global supply chain challenges that have backlogged existing orders >

RATION

and will delay bringing new models to market. That said, we're seeing customer demand for electric fleet and we expect that to grow in the short- and long-term. We're prepared to educate our customers on the pros and cons of various power technologies to help them make informed decisions."

On the subject of batteries, Mahoney, believes lithium is the most technically advanced solution for now. The batteries weigh less, recharge faster and have a longer run time than nickel-cadmium. "But they're not without challenges — lithium batteries are costly, in limited supply, and there are issues with end-of-life disposal. It leaves the door open for manufacturers to explore other battery technologies."

Asked if these options would extend to hybrid-powered rough terrain equipment, rather than just focusing on pure electric, Mahoney Durand comments, "We offer hybrid options now, as well as straight electric options. Eventually, our expectation is that low- and zero-emission equipment will be a combination of technologies and not just either/or.

"So far, we're not seeing demand for hybrids in North America at the same high level as in Europe, where they're extremely popular. One trend we do see is that contractors tend to request hybrid rental fleet in the early stages of a construction project when power is lacking at the jobsite.

"As access equipment gets greener, the higher horsepower units could be the most natural fit for hybrid power. There used to be a perception that hybrid rough terrain booms wouldn't perform well in environments where more tractive effort was needed. The opposite is actually true – hybrid units typically outperform diesel due to the 4x4 electric drive motors. "

SUSTAINABLE REPORTS

United Rentals has a number of key sustainability initiatives detailed in its Corporate Sustainability Report; one example being reducing the greenhouse gas emissions intensity of the business by 35% by 2030, from 2018. Its earned the company rating upgrades from leading ESG agencies in 2021.

Apart from soliciting feedback from customers and helping them reduce emissions in their business activities, the company also has a varied internal.

"We look at the entire rental cycle to see where we can reduce emissions and generally be more eco-friendly in the way we operate. For example, we're analysing our sales, service and delivery vehicles to explore low- and zero-emission options. We also have a team looking at our procurement activities to identify where targeted renewable energy plans can have the most impact."

United's employees also have a virtual resource group called Planet United where the team can share information about our environmental initiatives.

Expanding on the challenges, Durand says in the near-term, there may be supply issue based on the initial high demand for alternative power equipment, given the delays in getting parts and materials to the manufacturing plants. "And there will be differences in rental rates; education will help overcome this."

United Rentals supplies multiple units for a bridge construction.

Steel erection job for United Rentals.

EUROPE

The mature European access markets have been long associated with advances in technology and safety, partly due to the EN 280 regulations, which where until recently, with the US ANSI standards, a step beyond most in the world. While overall sustainability

Riwal has made major strides in its green energy programmes.

programmes in the US are often just as bold as those found in Europe, the move to electric equipment has been markedly more quick.

Riwal has around 20,000 access units in its fleet, with some 70% of the fleet in Europe being electric. That percentage is lower in the middle East and India, where the company also has operations, because the market is not, on the whole, ready to use electric machines.

"As the availability of electric machines will increase so will our share of electric machines. The limiting factor will probably be the availability of proper connection on site."

Nevertheless, Riwal has ambitious goals and aims for 90% of its fleet to be electric or an alternative form of green power by 2030. In addition, the company is installing solar panels and water regeneration facilities at its depots.

"The challenge for the industry," says the company, "Will be to develop a machine that can run for a full week without charging, against reasonable cost. This would result in the autonomy of the AWP or the possibility to charge/change the machine over the weekend.

"In addition, OEM electrification would make it possible to use technology to check the status of the machine and reduce the number of hands touching a machine during maintenance. Given the shortage of technicians, this will be an important element in the future.

INDUSTRY ADVANTAGES

Looking at power generation, right now there is even split between lead acid/AGM and lithium batteries says Riwal, which demonstrates the considerable increase of latter in access equipment in recent years. "There are several advantages of Lithium, such as batteries that are maintenance-free and have a higher power density than AGM/Lead Acid batteries. The obvious downside is the cost of the battery."

Is there a future for hydrogen-powered access equipment? The answer is 'no' for some equipment but potentially 'yes' for others. "We don't see Hydrogen as a source for most AWPs because of the loss of energy when storing this energy. Batteries should contain sufficient power as the energy consumption of smaller AWPs is not that big.

On the other hand, "For the larger ultrabooms and the telehandlers, hydrogen-powered equipment might be the solution, because batteries at the moment cannot supply sufficient power to achieve an autonomous range."

Hybrid will be in demand in the short term, but in the end, the company believes it will transition to fully electric or hydrogen-powered. The cost to purchase and maintain both batteries and an engine will probably not be sustainable going forward.

STEADY GROWTH

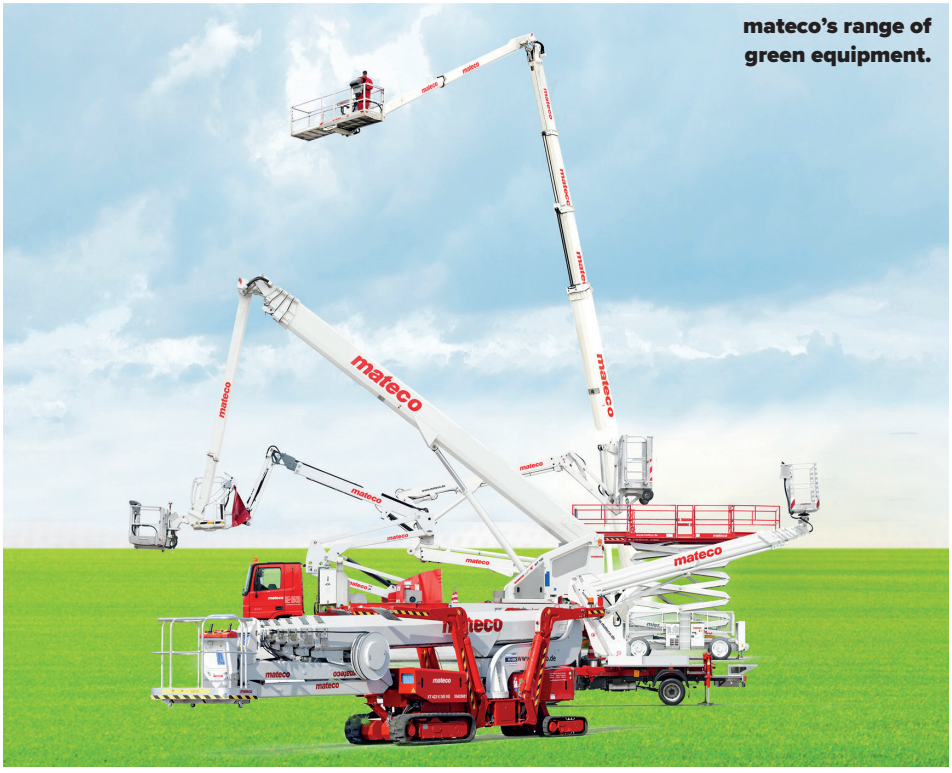
Fellow European access rental giant mateco's 30,000 aerial platform fleet comprises 70% electric equipment so far, with 35% of its rough terrain fleet being electric powered.

The percentage will grow steadily, depending on what comes available on the market, but the company is fully focused on strong investment in green energy, says the company's COO Andries Schouten, and not just when it comes to MEWPs, but transportation and its facilities.

However, the drive towards green energy is not consistent across all of Europe. "For sure we see in North and Western European countries much higher use of electric machines, mainly driven by legislation.

And Schouten adds, "In these countries there are certainly better conditions on jobsites for charging multiple electric machines."

Weighing up the virtues of lithium for rough terrain MEWPs, Schouten is assured of its benefits. "It is the best >



mateco's range of green equipment.

solution for the use of electric machines where longer lifetime is needed and quick charge is requested, and where low cost maintenance is a strong plus. However, he adds, "Lithium batteries seem to be only the right solution for light weight machines. But heavier machines, or machines with a lot of movement – telehandlers or earthmoving machines – are probably better off with hydrogen-powered engines. So, there will certainly be a future for hydrogen powered access."

Despite the advantages of lithium, the lack of comprehensive high voltage charging limits its usefulness of lithium, explains Schouten.

On the other hand, Schouten believes hybrid as an alternative option is only a transitional solution. "Where full electric is an option, we believe that most rental companies will go straight to electric."

AUSTRALIA ENERGY

Australian rental company Coates has launched the Coates Greener Choices range of products, following the launch of its sustainability strategy last year.

The range includes greener lighting solutions, including solar powered, hybrid and portable LED options.

Also included are electric and hybrid boom and scissor lifts and electric, lithium-ion battery-powered forklifts and warehousing equipment, as well as Stage V low diesel particulate emission engine forklifts and telehandlers.

Battery powered hand tools are also part of the Greener Choices range.

The company has also introduced the use of Blended Biodiesel, up to B7, for all Coates diesel engine-powered plant and equipment.

Murray Vitlich, CEO of Coates, said, "Coates Greener Choices range offers customers tangible opportunities to reduce emissions, improve efficiencies and commit to best practice environmental sustainability standards."

The company recognised that "the criteria for inclusion in this range will continue to evolve as the industry advances and new technologies emerge," he added.

CHINA

China's rental sector is growing like no other. The current number of platforms in the country nears 400,000 and forecasters believe the figure could reach 750,000 in the next three years, or so, with a large percentage of those destined to be electric rough terrain units.

Shanghai Horizon Equipment & Engineering is the country's largest access rental company, with more than 97,000 units in its fleet.

As of December 2021, some 99% of Horizon's scissors were electric and 15% of its rough terrain boom lifts are electric-powered.

Over the next five years, the penetration of electric RT booms in the country will be strong and rise to 50% or higher of those products in use, forecasts the company. "As far as we know, annual shipment-wise, the rate has already reached 50% for some of the manufacturers."

This is partly due to electric-powered booms becoming commercially viable and even advantageous. To put that it into percentages, says the company rough terrain booms are 6%-7% more expensive than upfront costs, but at least 20-30% lower in operation cost as of 2022.

LITHIUM TREND

In China, where batteries are used, 90% of fleets are using lead acid, but the company is starting to invest in lithium battery products, and the company believes the lithium battery will be the trend for rough terrain MEWPs, for two major reasons:

"The charging performance of lithium is better than lead acid in high power mode, and lithium has a longer lifetime – eight years versus three years for lead acid, so the overall cost could be more advantageous."

Hybrids however don't seem to be part of the equation in China. "At present, we don't see much demand for hybrid. Going straight to electric is very likely to be the industrial approach here in China."

While the Chinese access equipment sector has some way to go before it matures, major rental companies such as Horizon are adopting the latest technologies to manage their vast fleets, including green transportation.

The company is achieving this through accurate order dispatching through digital technology, planning the best routes, and reducing waste through effective transportation capacity.

On the product side of the equation, the company is making efforts to improve power capacity of the battery, but also optimising the precision of output control. It has worked to optimise the BMS system, especially the battery discharge management capability which has a strong impact on battery lifetime.

CHARGING ISSUE

And, the same challenges are being found in China as in North America and Europe. One of those is the familiar issue of charging. More than 90% of Chinese construction sites are equipped with mid-range power charging capabilities, which equates to about 10 hours to fully charge the average MEWP battery system.

Reducing the cost of 100% electric equipment is also a considerable challenge. "Cost down is still required by the ramping up of electric boom production capacity. Meanwhile it will take another two to three years for users to understand its operational cost."

For more information about challenges and opportunities in the Chinese market, see the Asia focus supplement, set to publish in the fourth quarter of this year. **AI**

Shanghai Horizon Equipment & Engineering's base in Guangzhou.

ELECTRIC CHARGE: WHICH BATTERIES WILL POWER THE ACCESS INDUSTRY IN FUTURE?

Advances in battery technology and the need to cut carbon emissions are driving an arms race to develop and acquire innovative electricity storage solutions in the access industry. Lucy Barnard **finds out how.**

Competition to produce increasingly powerful low-maintenance electric equipment is forcing OEMs around the world into an arms race to develop and acquire innovative electricity storage solutions.

According to McKinsey, the global market for battery cells is set to grow on average by more than 20% per year until 2030, reaching at least US$360bn globally.

Moreover, it says that there is a realistic scenario that the market could accelerate and hit $410bn by 2030 as governments around the world work to eliminate vehicle emissions by promoting the use of electric cars and to help power the world's electric grids, because renewable sources, such as solar and wind energy, still cannot provide energy 24 hours a day.

Powered access manufacturers, which have already been making battery powered scissor lifts and boom lifts for decades, have been pushing the boundaries of portable power storage.

NEW PARTNERSHIPS

Last year Oshkosh, the parent company of access platform manufacturer JLG agreed to invest $25m buying shares in Houston-based battery manufacturer Microvast and entered into a joint development agreement to facilitate future battery collaboration and innovation.

And since 2014, French aerial work platform manufacturer Haulotte's >

A Sinoboom scissor lift fitted with Discover batteries.

Briggs & Stratton lithium ion batteries.
PHOTO: BRIGGS & STRATTON

innovation department has been working with CEA Tech, part of the French Alternative Energies and Atomic Energy Commission, dedicated to technological research, looking to develop innovative power supply and electrical distribution systems.

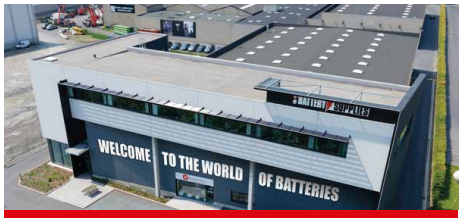
For the access industry, the switch to emissions-free equipment comes as a simpler proposition than for other areas of the construction sector because many of the smaller pieces of equipment such as slab scissor lifts are already powered by batteries while developments in battery technology increase the possibility of switching from diesel to electric for larger machines.

Nonetheless, the pressure to innovate is intense, driven both by the need to cut carbon emissions and by fast paced advances in battery technology in other areas.

MINIMUM MAINTENANCE

For access equipment manufacturers, who sell many of their new products to rental companies, the need to provide batteries which can work well in tough site conditions and with minimum maintenance is paramount.

"The access industry presents battery manufacturers huge challenges in terms of charging technology," says Micha Denys, export sales manager for Belgium-based Battery Supplies which supplies both lithium ion and lead acid batteries from various manufacturers across Europe. "Chargers on access equipment often don't have enough output to fully charge the batteries within eight hours. Equipment is often used through rental services and the end users do not always receive enough knowledge of battery maintenance in terms of charging time, charging conditions and watering services. Batteries are often partially charged which has a negative effect on the battery bank's performance and may lead to an early fall-out."



Battery Supplies depot in the Netherlands offers a complete range.

Much recent development has so far focused on lithium batteries as a future power source in the access industry.

"We are finding that our lithium battery sales improve every quarter as we receive more and more requests from OEMs," says Denys. "Over the last two years, we have started to sell lithium batteries to a number of European manufacturers of access equipment. These are mainly custom-made battery packs that have been developed together with the engineers of the equipment manufacturers."

LITHIUM SALES 'IMPROVE EVERY QUARTER'

Stuart James, joint managing director at the UK arm of European battery distributor DC Battery Technologies says his firm will be specifically targeting the access industry for new Li products this year. "At the moment we supply very few Li batteries to the global access industry," he says. "But we expect this to change. We will be launching new products aimed specifically at this sector at Vertikal Days."

The most widely used form of lithium batteries are lithium-ion rechargeable batteries. Usually consisting of cathodes of either lithium manganese oxide or lithium cobalt dioxide and anodes of graphite, it is this sort of batteries which are already widely used in laptops and smartphones, and which are also the key energy source behind electric vehicles.

"This is a new segment for us," says Dave Schulenberg, director of product management electrification and li-ion batteries at US-based engine manufacturer Briggs & Stratton. "Traditionally access has used lead acid due to cost and weight. But lithium is gaining ground as the potential benefits to the rental companies are truly tangible."

Schulenberg says that Briggs & Stratton produces Nickel Manganese Cobalt Oxide (NMC) batteries from 3.8 to 10kWh which can be stacked in parallel up to 100kWh. The

BATTERIES FOR THE FUTURE

A few other forms of cutting-edge battery technology in development:

- **NEW GENERATION LITHIUM-ION BATTERIES:** With actual materials and cell designs, li-ion technology is expected to reach an energy limit in the next coming years. However, scientists have been busy discovering new families of disruptive active materials to unlock present limits. These innovative compounds can store more lithium in positive and negative electrodes and will allow for the first time to combine energy and power. In addition, with these new compounds, the scarcity and criticality of raw materials are also taken into account. A number of battery manufacturers claimed last year to have produced a cobalt-free Li-ion battery. Chinese battery-cell manufacturer SVOLT unveiled a nickel manganese (NMX) battery pack which it said was in series production in Jiantan, China and could be made at its planned plant in Saarland, Germany by the end of 2023.
- **LITHIUM SULPHUR (LI-S):** In li-ion batteries, the lithium ions are stored in active materials acting as stable host structures during charge and discharge. In lithium-sulphur batteries, there are no host structures. While discharging, the lithium anode is consumed and sulphur transformed into a variety of chemical compounds; during charging, the reverse process takes place.
- **SOLID STATE:** A form of battery which replaces the liquid electrolyte by a solid compound which nevertheless allows lithium ions to migrate within it. This makes the technology far safer at both a cell and battery level and

means that batteries can contain higher voltage, higher capacity materials, meaning higher energy density and lighter batteries. Startup companies including Factorial Energy,

company is currently focussing on selling these to OEMs and rental companies specialising in the powered access industry.

FULL PRODUCTION

And powered access manufacturers have been incorporating li-ion batteries in their machines. For example, in 2018, JCB Access introduced five electric scissor lifts offering working heights between 6.6m and 10.1m powered by li-ion batteries. Last year JLG launched its DaVinci AE1932, a 5.8m electric scissor lift powered by a single li-ion battery. In July 2021, Snorkel announced it had started full production on five li-ion battery powered compact rough terrain scissor lift models.

Manufacturers agree that li-ion batteries have a higher energy density than the lead-acid batteries which have commonly powered most light-use self-propelled access equipment for the past fifty years and are a feature of most petrol cars. This means that they can provide more power and their lifespan is longer.

For Schulenberg, the advantages of li-ion batteries are obvious. They require much less maintenance than their lead-acid equivalents. They can be partially charged and re-charged without damaging the cells and they can work at sub-freezing temperatures.

BATTERY MANAGEMENT SYSTEMS – THE BRAINS OF THE BATTERY

Moreover, unlike lead-acid batteries, they usually come with an electronic battery management system (BMS) which manages the battery so that the lithium cells within the pack do not over-charge or over-discharge to maintain safety and extend the life of the battery.

"The BMS is for all intents and purposes the brains of the battery," Schulenberg says. "It allows for battery usage monitoring, accommodates safety systems, it also allows for data gathering and extraction so that the equipment owner has greater knowledge about how the equipment is used. For any rental fleet, data is important, and our lithium-ion battery system allows for a standardised platform for extracting data, simplifying and streamlining decision making for fleet managers. Lead acid batteries typically do not incorporate a BMS."

However, manufacturers agree that li-ion batteries come with a number of drawbacks too.

Li-ion batteries use organic liquid electrolytes which are volatile and flammable when operating at high temperatures. This means that the batteries can catch fire if they have been improperly manufactured or damaged, or that the software which operates the battery is not stored properly.

In 2021, car giant General Motors recalled the entire fleet of around 141,000 of its most popular electric car, the Chevrolet Bolt after the company identified defects that could lead to battery materials to make contact with each other and combust spontaneously. The same year Hyundai had to replace the batteries in around 90,000 of its Kona EVs after alleged issues with faulty cells and Ford said it would replace battery packs fitted to the Kuga PHEV after it issued an official recall for the model.

LI-ION BATTERY FIRE RISKS

Nonetheless, manufacturers say that combustion risks for li-ion batteries are manageable.

"Our lithium-Ion batteries are designed with added layers of safety," says Schulenberg. "The BMS controls the charge and discharge rates to ensure compliance at all times. The use of cylindrical cells together with wire bonding technology enables the battery to self-isolate individual cells if there is any damage or failure. This prevents any mass failing of the battery reducing the risk of thermal events."

The high cost of li-ion batteries too, when compared with their lead-acid alternative, is also seen as a drawback.

"As with all new technologies, it takes time to be adopted," Schulenberg says. "Look at the EV market; while it is gaining momentum, it is still not the majority despite all the promoted benefits. Lithium-Ion batteries are also more expensive than lead acid – so upfront costs will be higher, but over the life of the >

An AGM battery from US Battery.

PHOTO: ADOBE STOCK

Solid Power and QuantumScape are already working on the technology. However, the timetable for mass production keeps slipping and it is not clear how soon these batteries will become commercially available.

- **ZINC AIR:** A potential alternative to lithium. Zinc air batteries using oxygen from the air as their anode and a cathode of zinc have been used for many years in devices such as hearing aids, film cameras and railway signal devices. Due to the global abundance of zinc, these batteries are much cheaper to produce than lithium-ion ones and they can store more energy (theoretically five times more than lithium-ion batteries). However, their widespread use has been hindered by the fact that recharging them has proved difficult. In 2017, scientists from Sidney University published potential ways to overcome this problem but mass production still seems a long way off.
- **SODIUM:** Batteries which use sodium as their primary element rather than lithium have been used since the 1970s and some saltwater batteries are commercially available today. They do not contain costly lithium, nickel or cobalt and are more easily recycled than batteries which use toxic or flammable materials. However, challenges in manufacturing costs mean that these form of batteries are not advancing as quickly as some alternatives and they have a low energy density.
- **CARBON:** With demand for the raw materials needed for batteries skyrocketing, Robial, a company founded in 2018 by academics from the University of the West of England, has been using funding provided by the Bill and Melinda Gates Foundation to use microbial fuel cells that feed off organic carbon found in urine and wastewater to provide electricity. The cells are designed to provide affordable, renewable and carbon neutral energy for poor or remote areas but, if they ever go into commercial production, also have wider implications.

equipment the TCO, data extraction benefits and the longer operating life will offset the upfront costs."

One of the key reasons for the high price of these new batteries is the expense and difficulty in obtaining the rare metals from which they are made.

Getting hold of the cobalt needed to make up NMC batteries can be both expensive and potentially damaging to both the environment and human rights. Around two thirds of the world's cobalt supplies come from mines in the Democratic Republic of Congo where human rights groups have for years been raising the alarm about dangerous working conditions, environmental abuses, corruption, and the use of child labour.

When asked where it sources the cobalt for its batteries, Briggs & Stratton says that it "sources cells from tier one suppliers." However, as the complex supply chains surrounding cobalt mining come under further scrutiny, many NMC battery manufacturers and users are coming under pressure to go further.

In 2020, electric car giant Tesla signed a deal with Swiss mining company Glencore to only buy cobalt from the DRC which it could ensure is "conflict free" and does not benefit armed groups in the country. The company added that it was looking to reduce the amount of cobalt needed in its battery cells. General Motors too has announced plans to use less cobalt in the battery systems of its electric vehicles.

Mining for nickel too, another key component of NMC batteries, has been linked with environmental and health damage, especially in parts of remote Indonesia where many of the world's nickel reserves are found. And, although lithium itself is not scarce, the process of extracting it from its ore usually requires large amounts of energy which again can be damaging to the environment.

As manufacturers continue to search for improved power sources, many suppliers are recommending lithium iron phosphate (LFP or LiFePO4) cells – a slightly different type of lithium battery gaining recognition in the manufacturing industries due to its cost-effective materials and stability with high temperatures.

LFP CELLS ARE EASIER TO MANUFACTURE

LFP cells, which use lithium iron phosphate as the cathode material and a graphite carbon electrode with a metallic backing as the anode, contain neither nickel nor cobalt, making them easier to manufacture. Proponents argue that, if widely adopted by EV manufacturers, the chemistry could prevent a materials input crunch which has been feared if nickel-cobalt chemistries prevail.

The technology is already widely used in Chinese electric vehicles and has been adopted by a number of global access manufacturers. In 2018 Manitou launched the MHT-790E, an electric telehandler powered by a LFP battery and in 2019 Genie announced it was offering lithium iron phosphate batteries on its slab scissor range.

"I would definitely recommend LFP batteries in access equipment," says Denys. "LFP is a much safer technology than NMC (Lithium Nickel Manganese Cobalt Oxide). For the access industry, a huge benefit of LFP technology is that they are fully maintenance-free. The batteries are fully resistant to intermediate or opportunity charging, and the charging time is much faster compared to lead batteries.

Derek Pettingale, director for product and program management lithium at Canada-headquartered battery manufacturer Discover, says he recommends LFP for access equipment too.

"For the access industry, LFP lithium batteries enable the highest level of productivity from semi-traction battery powered machines and utility electric vehicles and, unlike lead-acid batteries, can be continuously operated in a partial state of charge (PSOC) without degrading performance," he says. "Unlike lead-acid batteries, LFP batteries deliver a dramatic reduction in total cost of ownership and a predictable return on investment."

JLG's DaVinci scissor lift.

TCO CONSIDERATIONS

Total cost of ownership (TCO) is a phrase often used by lithium battery manufacturers and suppliers as they attempt to encourage buyers to upgrade. Pettingale estimates that the upfront costs of the LFP cells his firm supplies to the access industry stands at around double those of their lead acid equivalent. However, he says that the total cost of ownership for users is much lower because the average lifespan is much longer. In fact they have a greater number of cycle charges than li-ion batteries (roughly 2,500 compared with around 1,500 for most li-ion cells if properly charged and discharged). "Lithium costs will come down over time as it becomes more common in the access industry, and we anticipate an increase in demand in the near future," he says.

DC's James agrees. "Lead acid batteries tend to cost around a third of the price of LFP cells. However, the industry is realising

PHOTO: REUTERS

Workers at a lithium-ion factory in Huzhou, China.

that LFP cells only need 50% of the capacity of lead acid, so the overall cost is much less," he says.

High up-front costs and a lack of awareness of the new technology are also putting off potential end user customers, says Denys. "LFP battery technology is a relatively young technology in the access industry," he says. "Compared with other market segments such as marine, AGVs (autonomous guided vehicles), cleaning equipment and material handling, the sales solutions in the aftermarket – where a lithium battery is offered as a replacement for a lead acid battery bank is relatively low."

Moreover, critics point out that the fact that LFP batteries contain cheaper materials than NMC batteries, makes them even harder to recycle at the end of their lives. Currently, if battery packs are recycled, they tend to be either dissolved in acid or burnt at high temperatures so that the expensive cobalt and nickel can be extracted and re-sold. For recycling companies, there is currently little value in recycling LFP packs down to their constituent metals through a costly process when manufacturers can buy those same metals more cheaply and easily from mines.

And, despite the push towards lithium, battery manufacturers are continuing to invest in developing lead acid cells which they point out are cheaper than lithium cells and easier to recycle.

LEAD-ACID STILL HAS POTENTIAL

Last year Discover Battery launched a new range of dry cell absorbent glass mat (AGM) lead acid batteries designed specifically for the powered access industry which it says offers 15% more capacity than standard AGM maintenance free batteries and is suitable for all types of scissor and boom lift platforms regardless of size. The company last year agreed a deal with Chinese powered access manufacturer Sinoboom to provide its batteries as standard on all of Sinoboom's electric and hybrid powered work platforms in Europe, North America and Australia as well as Asia which it already supplied.

US Battery too last year updated its deep cycle lead acid AGM line to include thick positive alloy grids to resist corrosion, high density positive active material and advanced glass mat separators which it says will maintain battery cell structure during deep cycling, limit acid stratification and inhibit internal shocks.

"The technology of lead-acid battery packs still has a very interesting potential for development," says Mikael Cugnet, battery expert at CEA Tech which has been working with Haulotte to assess and develop its future power supply offering. "When integrated to high-performance electrical architectures, it offers many advantages and still has a bright future, especially given that nearly 98% of lead-acid batteries are recycled across the world, because the components can easily be recovered and reused and have a strong residual value." AI

AGM Batteries from Trojan being used in a scissor lift.

GROWING WITH LITHIUM

Noble Zhang, C&D Trojan's general manager for Asia Pacific, shares his view of electrification and battery technology in the access sector

Trojan Battery launched its first lithium-ion product late last year and has recently updated its lead acid line that combined will cover the requirements of today and tomorrow's MEWP industry.

Known worldwide as a major supplier of batteries for the access industry Trojan Battery Company was acquired by C&D Technologies in 2019 and has since then combined its knowhow to create what it considers to be products that meet the requirements of the modern access sector.

The two brands now share a corporate leadership team, which oversees both entities across their operations, engineering, sales and marketing.

Having established itself in North America, Trojan's major focus is now in Asia Pacific, and especially China.

"Trojan at the moment is quite US-based and most sales are in North America - China is another emerging market for our brand," says Noble Zhang, general manager, Asia Pacific at C&D Trojan (Shanghai) Energy Technologies Co.

See the full interview at www.accessinternational.media

Noble Zhang, C&D Trojan's general manager for Asia Pacific.

DRIVING CHARGING STRATEGIES

The steady increase of charging worksites is top of mind in the global construction industry. As infrastructure expands into undeveloped and sometimes challenging to access areas, the need for charging worksites races to keep pace, writes Rod Dayrit, **director of business development at charging specialist Delta-Q Technologies.**

Historically, questions about increasing equipment power were simple to answer - gas or diesel. And fossil fuels satisfied the demands of a machinery-driven world. However, from our 21st-century lens, the ubiquity of fossil fuels is no longer a given.

Scientific data points to the overuse of fossil fuels and their subsequent greenhouse gas emissions as the root cause of global warming. Industries have begun implementing alternative power solutions to decrease reliance on fossil fuels and increase sustainable practices; however, progress varies by sector. The construction industry faces the daunting undertaking of an alternative power shift both in equipment and the surrounding infrastructure to support projects. As traditional fossil fuels fail to satisfy the call for sustainability, electrification adoption is one solution many industry leaders are turning to.

If electrification is a ready solution, what entices companies to make this switch, and what challenges is this more sustainable power source facing?

BENEFITS OF ELECTRIFICATION

Mirroring the data on fossil fuels' impact on the climate, the health impacts from heavy exposure to these gases can be severe. Electric power alternatives improve working conditions by eliminating exhaust that workers might breathe in on the job. One study found that "workers exposed to diesel exhaust are 40% more likely to develop lung cancer." That is just one of many alarming statistics related to diesel and gas exposure. Battery-powered equipment is a safer option, especially for indoor construction sites.

Indoor construction projects are hazardous for fuel-based operations because fume outputs require constant monitoring. This includes installing and maintaining ventilation systems that comply with the governing regulatory body. The costs of labour and consumables (filters) to maintain these systems can add up very quickly. These indoor guidelines are also applicable in sites close to residential neighborhoods. Switching to electric-powered machinery eliminates hazardous fumes from the equation entirely, along with the associated costs to operate indoors and near or in residential spaces.

A massive development in the electric space is the advancement of lithium batteries and their ability to power larger pieces of construction equipment. This was previously a roadblock for operators as the battery-operated equivalent to a traditional power source would not have the same duty cycle – typically an eight-hour shift. Once the technology and development caught up, the cost to switch to lithium was also no longer a barrier. Today, energy capacity, efficiency, safety benefits, and lower operating costs are well worth the upfront acquisition costs compared to diesel-operated machinery.

CHALLENGES TO ELECTRIFICATION IN THE FIELD

One of the more recognisable differences between electric and fuel power is the former's need to charge. Refilling a gas tank produces

THE AUTHOR

ROD DAYRIT is the director of business development for Americas and Asia at Delta-Q Technologies, a Zapi Group company. Dayrit joined Delta-Q in 2018 and has more than 20 years of experience with design and development in the electrical field. He has spearheaded the creation and launch of the company's compatibility programme Charged by Delta-Q. Prior to joining Delta-Q, Dayrit held senior roles at Samsung SDI, Foxlink and Motorola.

an immediate result – the machinery can resume operation with no downtime. Electric-powered equipment requires more strategic planning to minimize or eliminate operator downtime in the field. This planning can be viewed as a barrier to moving to an electric-based model.

Thankfully, there are a few best practices companies can employ to achieve smooth operations on the field with little downtime for operators. For companies new to electrification, establishing these procedures can be overwhelming. This is when original equipment manufacturers (OEMs) should rely heavily on their charging partner to design a charging system that meets the needs of the applicable machinery and environment. One key consideration is the environment, as a rural charging site's conditions can drastically differ from an urban setting.

CHARGING COMBINATIONS

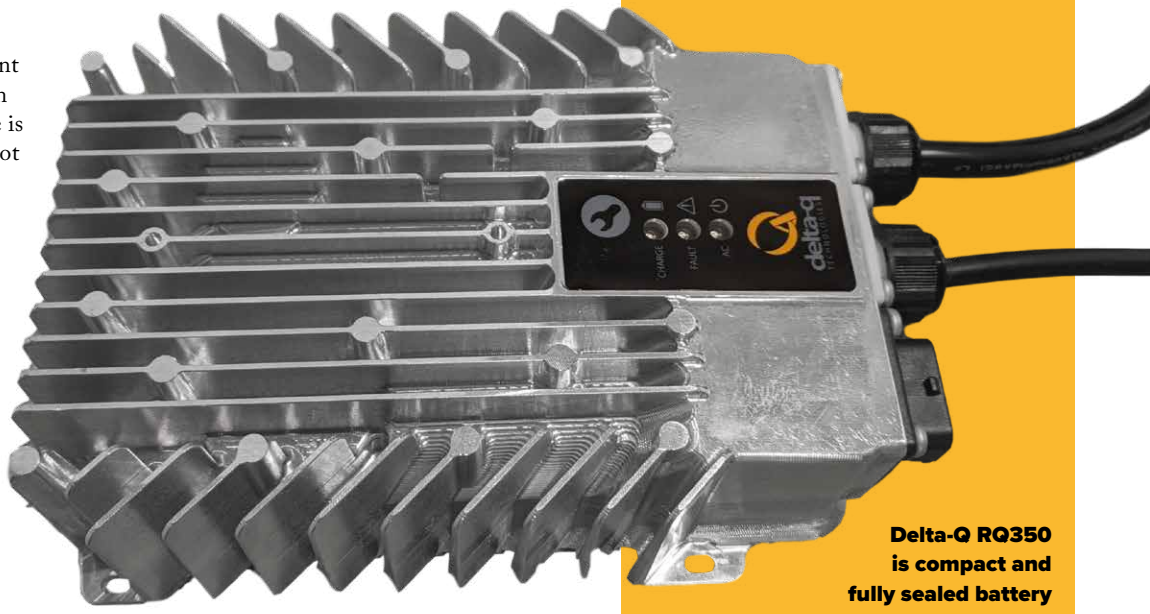
Site managers can implement a combination of on-board and off-board chargers in various field scenarios. The on-board chargers selected should be designed with the size and recharge requirements of the machinery and setting in mind. A battery charging supplier should be able to capture the usage conditions of the equipment, such as efficient overnight charging and opportunity charging, to help extend duty cycles. Off-board charging stations, equipped with high-power battery chargers, can provide substantial energy to high-capacity lithium battery packs when the equipment is not in operation.

For machinery at the higher end of the usage scale, hybrid charging or battery swapping can be used to meet the equipment requirements. As the name implies, a hybrid charging system pulls elements from on-board and off-board charging into a combined solution. In a hybrid scenario, equipment used for extended periods can pull from an on-board charger in the field during idle time or operator breaks. A battery swapping system >

Delta-Q's "Charged by Delta-Q" programme provides global OEMs access to a network of existing and compatible battery and charging solutions.

may be the best solution for equipment in the heaviest duty cycle scenarios on sites where an off-board charging site is not practical and the machinery cannot sustain a full day's operation on a single charge.

The common thread among overcoming the challenges above is the ability of electrification to produce adaptable solutions. This is not the case with traditional gas and diesel-powered operations that are constrained to two factors: on or off. Electric power allows for flexibility and appropriate nuances for the environment, operator, and individual pieces of equipment.



Delta-Q RQ350 is compact and fully sealed battery charger, IP66 rated to protect it from intrusion of dirt, water, and chemical fluids.

GOOD CHARGERS AND CHARGING PARTNERS

Moving from a fossil-fuel-centric operation to an electric one can entail a good deal of education and depends on a company's prior experience with electrification. One of the fundamental pieces of electric power knowledge is an understanding of what makes a good charger. There are a few design characteristics to look for:

- Sealed and robust design
- Shock absorption appropriate for heavy environments (up to 100G is a good benchmark)
- Vibration testing up to 5G
- Ability to charge both lead-acid and lithium-ion battery chemistries
- Software integration options

While the above features are great indicators of a reliable product, there are other traits to consider for a charging partner. And as electrification adoption continues to trend upwards, the pool of charging companies and other components naturally widens. OEMs have an extensive vendor pool to wade through. When selecting the right charging partner, OEMs should ensure the supplier has the same strategic mindset as them. The question OEMs should ask is not about who can make a good charger today but:

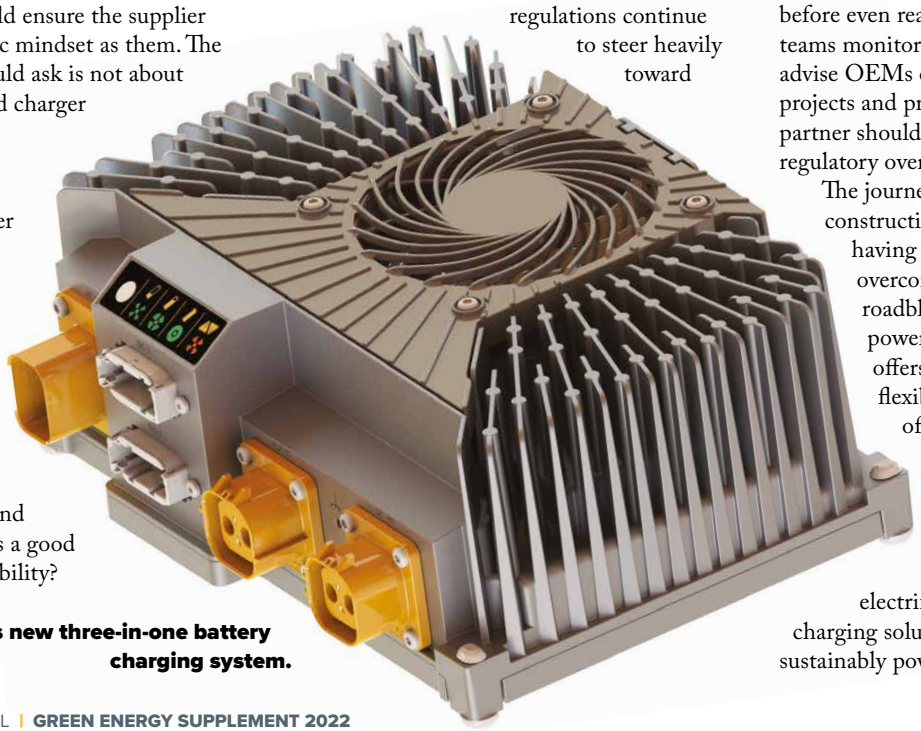
- Is the charger supplier looking at what a good charger means today and five, ten, or even twenty years down the line?
- Does the charger supplier work well with other component suppliers, such as batteries, motors, and controllers, and has a good reputation for reliability?
- Can the charger supplier answer any questions and help provide insights into each electric drive component's capability to build an electric solution with better flexibility?

That forward-thinking mindset aligns with the global conversation on how the construction industry can align with environmental goals.

REGULATORY COMPLIANCE AND SUSTAINABILITY

There is mounting pressure on the industry to reduce greenhouse gas emissions. Companies are grappling with meeting the charging demands of ever-increasing worksites through a sustainable lens.

Countries and cities, down to individual communities, are turning to greener alternatives at every level of daily life. This shift impacts regulatory bodies at the highest levels of world governments. Regulatory compliance existed pre-electrification, but with global attention to climate concerns, regulations continue to steer heavily toward sustainability. Green alternatives of the past were often choices adopted by a smaller minority. Today, there is a shift to stricter guidelines and subsequent penalties for non-compliance.



Delta-Q's new three-in-one battery charging system.

High-polluting industries, like construction, face severe consequences for failing to tow the environmental line. If OEMs fail on regulatory compliance, they can incur hefty fines and even the ability to manufacture, advertise or export their products into certain countries. Regulatory policies can feel like moving targets as policymakers race to keep current with relevant scientific data.

Seek out a charging company with a dedicated regulatory team. A talented engineering team can design exceptional chargers, but if the company is weak on a country's regulatory mandates, then components may be prohibited from use before even reaching a charging site. These teams monitor regulatory developments and advise OEMs on relevant impacts on current projects and products. A strategic charging partner should be able to provide this regulatory oversight.

The journey to electrification in the construction sector is complex, but having the right partners can help overcome technical and regulatory roadblocks related to shifting power requirements. Electrification offers site managers and operators flexibility while reducing total cost of ownership, improving safety conditions and mitigating adverse environmental impacts. Furthermore, as countries continue to build greenfield infrastructure, site electrification and associated mobile charging solutions support the ability to sustainably power these projects. AI

THE WORLD OF SLAB SCISSORS

An analysis of how slab scissors are evolving to meet environmental and worksite requirements.

The access industry is intrinsically linked to electric operation and in traditional rental fleets battery-powered slab scissors outweigh larger rough terrain units by some distance.

However, this very fact is a subject of huge development in the industry, when it comes to what type of battery and an increasing move into full electric drive.

Again, electric drive has been with us for some time, but there is a discernible shift wherever possible to zero hydraulics, to avoid issues such as oil leakage, oil changes, stuck valve cores and temperature inefficiencies.

Christian Dube, product manager at Genie, says compact scissor lifts is an area where we are seeing a strong push towards electrification. "That's because the technology has reached the point where it can deliver better jobsite performance, reduced maintenance, and a lower total cost of ownership."

The next step will be to continue evolving this technology, including areas like lithium batteries. "But," says Dube, "Just like the first steps toward electrification, it has to be the right technology at the right time and purposefully designed for the equipment it is meant to power."

Returning to the subject of drive options and batteries, Stefan Weber, export manager at Airo, says, "Given the business nature of compact scissor lifts, being considered a commodity, the high-cost impact of electric drive or a lithium battery packs on one side, the long amortization and the risky business on a rough construction site, on the other, voids immediately all obvious advantages of using a lithium-ion battery pack."

Matthew Elvin, CEO of Snorkel and Xtreme manufacturing, says direct electric drive offers many benefits to users of compact scissor lifts, such as increased efficiency delivering longer duty cycles and reducing the risk of hydraulic oil leaks when working in sensitive areas."

Elvin adds that through the use of direct electric drive, compact scissor lifts are now being used in industrial and clean room environments, such as in the medical and food sectors.

"However," as Elvin goes on to explain, "Direct electric drive is more expensive than a hydraulic drive system which is limiting widespread adoption by manufacturers, as the compact scissor lift is highly competitive."

As Pianigiani Paolo, business development director at Imer, says, "The new micro scissor lift models are occupying a market segment that until now saw the use of heavier and more bulky machines or pusharound systems. The search for technologically advanced solutions has certainly made it possible to optimise costs."

E-DRIVING

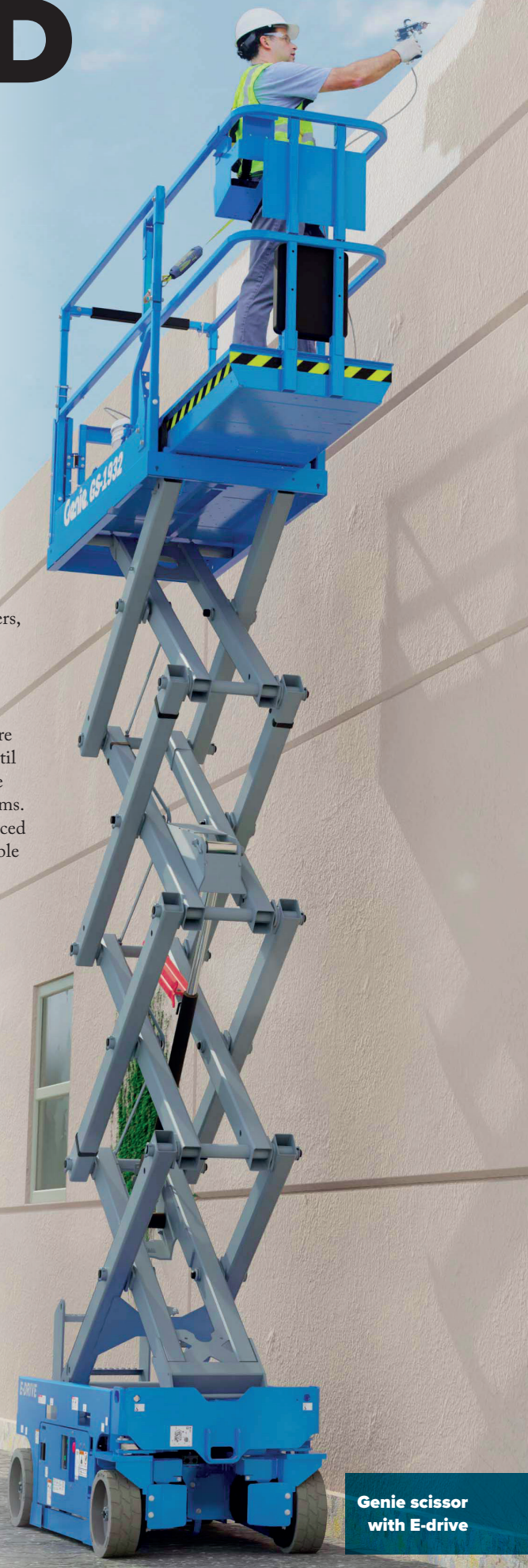
However, these products have been moving to the next level of late. Genie's new E-Drive scissor lift motors are brushless and fully sealed against moisture and water for maintenance-free longevity.

Further reducing service downtime, the GS E-drive scissors have 70% fewer hydraulic hoses and fittings, drastically reducing the potential for hydraulic leaks.

Based on industry-standard HIRD cycle testing, E-Drive scissor lifts have shown a 30% increase in runtime per charge, with up to a 20% reduction in lifetime battery costs.

With high-gauge steel guards and increased ground clearance, the E-drive scissors' 25% gradeability, combined with two times the tyre tread depth as previous models, also have the torque and traction for climbing dovetail ramps, even if one wheel slips.

A 14° breakover angle enables >



Genie scissor with E-drive

the scissors to crest the top of the ramp without bottoming out, eliminating the need to winch machines onto trailers or raise dovetails after partial loading.

Dingli has launched what is describes as a fully oil-free and electric scissor series.

The new direct electric drive Dingli series of six scissor lifts and vertical mast lifts uses electric actuators for lifting, lowering and steering, instead of traditional hydraulic oil cylinders. Accordingly, the new series' lower energy consumption amounts to an energy saving of 30%, says the manufacturer.

The has no hydraulic oil and offers working heights of 5m – 16m and maximum loads of 230kg – 450kg.

The new drive system also enables temperature, load and variable torque control for added safety.

There is also built-in position sensors and real-time data monitoring of the working cycle.

The units are equipped with a maintenance-free permanent magnet synchronous motor (PMSM) and AGM battery, which greatly reduces maintenance costs, says the manufacturer.

Dingli adds that the full stroke proportional control eliminates jitters caused by self-gravity lowering, while the complete system provides considerable noise reduction and environmental protection.

Dingli's Oil Free series incorparate scissors and mast lifts

INTEGRATED COMPONENTS

JLG's latest compact models are the 5.8m working height ES1330L and 6.5m ES1530L, which both offer direct electric drives and integrated components, that boast reduced hydraulic hoses and fittings, again for reduced operating costs.

For example, these ES series models have only six hoses, a significant reduction over hydraulic drive machines, which reduces the chance of leaks. Both have a platform capacity of 227kg and width of 0.76m.

JLG's micro scissors are powered by maintenance-free AGM batteries, with no lithium option available at the moment.

On the electric drive discussion, Negri explains they are gaining favour. "For example, fully electrified models offer an eco-friendly solution thanks to having no hydraulics or oil – these lifts are leak-free and operate quietly, making them a preferred piece of equipment for work in environmentally sensitive areas, as well as in hospitals, schools, libraries and office buildings where noise restrictions exist."

Their compact footprints also feature, what JLG says is a unique zero turning radius for work in tight spaces. For JLG that also means a lightweight machine that provides operators with ample space for tools and materials.

The ES1330 from JLG

As previously mentioned, there has also been a significant move into offering lithium batteries as options. While this won't yet suit most customers there is an increasing call for this solution in slab scissors, notably in China.

Sinoboom's has introduced the1932SE scissor lift - a compact model with 5.8m platform height and 230kg load capacity. It has a narrow width of 0.8m and total machine height of under 2m with rails folded, making access through doorways and elevators easy.

Alongside these, other Sinoboom models for the European and UK market will include the 1330SE and 1932ME compact scissor lifts.

LGMG has launched a new generation of scissor lifts in June, designed for a global audience and with lithium options.

The seven new 5.8m to 14m working height slab scissors meets European CE and US ANSI standards and are rated for indoor and outdoor use.

Commonality of components is a key difference between LGMG's new range and the previous generation. The models incorporate long wearing parts, while major

LGMG's new generation scissor lift series.


Airo's X59E

electric and hydraulic components are all interchangeable, including joysticks, motors, the controller and charger.

Optional on Airo's compact lifts are traction batteries, and there is increasing demand for maintenance free AGM batteries from its customers in countries with high labour costs.

The Airo micro line incorporates three models of 7m, 8m and 9m working height – the XS7E, XS8E and XS9E. A unique feature of the range is that its maximum capacity is available across the extension deck.

Returning to the subject of drive options and batteries, Weber says, "Given the business nature of compact scissor lifts, being considered a commodity, the high cost impact of electric drive or a lithium battery packs on one side, the long amortization and the risky business on a rough construction site, on the other, voids immediately all obvious advantages of using a lithium-ion battery pack."

ACCESS EQUIPMENT FOR INDOOR AND OUTDOOR APPLICATIONS

Mathew Elvin, CEO of Snorkel and Xtreme manufacturing, says, "Direct electric drive offers many benefits to users of compact scissor lifts, such as increased efficiency delivering longer duty cycles and reducing the risk of hydraulic oil leaks when working in sensitive areas."

These requirements are seeing a shift to more pusharound products in the sector. Shown as a prototype at ConExpo in 2020, the pusharound Snorkel S3210P is designed for in and outdoor slab applications or indoor areas which have a wind loading, such as the early phases of a construction build where windows or doors may not yet be installed.

Measuring 0.81m wide, it is effectively an outdoor rated version of the manufacturer's S3010P pusharound mini scissor lift, with a wind speed rating of 12.5m/s, a lifting capacity of 240kg, and weighing just 470kg.

It can be easily pushed when stowed between work areas and carried in an elevator.

Returning to powered products, Snorkel is now researching the new 4m platform height scissor lift segment, with the intention of adding this to its line of electric scissor lifts.

Elvin adds that through the use of direct electric drive, compact scissor lifts are now being used in industrial and clean room environments, such as in the medical and food sectors.

"However," as Elvin goes on to explain, "Direct electric drive is more expensive than a hydraulic drive system which is limiting widespread adoption by manufacturers, as the compact scissor lift is highly competitive."

Lithium-ion batteries are also an alternative >

The Snorkel S3215L

power option to lead acid batteries to power compact scissor lifts. But will they be more widely used in smaller scissor lifts?

Elvin believes its is a possibility to extend duty cycles, eliminate battery maintenance, and more closely match the charging habits that we are familiar with, such as on mobile phones.

"While battery cost may reduce widespread adoption currently, it could be a welcome solution in certain sectors, such as retail,

Imer's Easy UP 5 Picking

industrial, clean room, and hospitality environments."

Imer will launch compact electric drive units this year. The two new scissors will be released by July this year; those being the IM 4080 and IM 4980.

Their main features will be a 6m and 7m working height, respectively, a capacity of 230kg, a platform extension of 0.6m, electric steering and weight of less than 800kg.

They will complement Imer's most recent micros in its Easy Up series, offering low weight and very compact dimensions, with a height of 5.2m. Three models are available; pusharound, self propelled and picking, with tray.

Noteworthy among the company's soon to be launched products is, indeed, the electric steering system, which Paolo Pianigiani, commercial director of Imer's Access Division, says complies with the green demands of today's industry.

MICRO SOLUTIONS

Sinoboom has gone down the lithium route with its latest products, those being the 0607SE and the upgraded version of 0407SE.

The 0407SE now features an increased maximum platform height of 4.5m and has been changed to front-wheel drive. The 0607SE on the other hand is more lightweight in comparison to its sister 0608SE.

With these new products Sinoboom says it

LEAK CONTAINMENT

Protecting the environment is also about respecting your immediate workplace surroundings. One way to do that is through hydraulic oil leak containment.

"An increasing number of jobsites, such as data-centres and environmentally sensitive areas, require a hydraulic oil containment system," said Christian Dube, Genie product manager. "Spill Guard is an economical solution that fulfils these requirements and mitigates the risk of costly clean-ups on finished floors."

Genie's Lift Tools Spill Guard hydraulic oil containment system has now been rolled out globally as a factory-fit option.

Available on Genie E-Drive scissor lifts from 14ft (4.3m) to 40ft (12m), the system works with standard, square pads that do not require time-consuming cutting or fitting.

A one-time factory installation of the easy-access, swing-out and bolt-in trays, which do not use or rely on magnets to stay secured, delivers a durable, economical solution, says the manufacturer, that will not vibrate during transport and protects against hydraulic leaks on the jobsite, which can be costly or cause environmental issues when they occur.

Genie's Lift Tools Spill Guard.

MEC

MEC Aerial Work Platforms has been granted patents for its Leak Containment System (LCS).

Using a system of trays integrated within the machine, MEC's Leak Containment System is designed for its slab scissor lifts and vertical mast lifts.

The three awarded patents incover the US, Europe and Canada. According to MEC, unlike previous attempts at resolving the longstanding problem of oil leakage capture, the leak retention mechanism of LCS does not interfere with other basic functionalities of the device, including deployment of the machine's pothole protection system, front wheel operations, access to the emergency stop and ground controls, and operation of the static strap.

In addition, the integrated trays are protected from weather elements, jobsite debris and forklift damage.

The MEC-Leak-Containment-System.

HY-BRID LIFTS

Hy-Brid Lifts has introduced its trademarked LeakGuard integrated system for surface protection, providing 110% hydraulic fluid containment.

LeakGuard is an option for users versus diapers. The technology allows equipment owners to access more jobs with strict environmental and spillage regulations that require a leak prevention system. The system is made up of one single tray and disposable pads. It will be available on the company's Pro Series of lifts.

Terry Dolan, Hy-Brid Lifts' president and CEO, says, "The integrated system features an intuitive, single-tray design, making things even easier for operators. LeakGuard will open doors to more opportunities by allowing contractors to get on highly regulated jobsites they may not have previously had access to."

Hy-Brid lift's LeakGuard.

can now supply Chinese customers with a full series of machines featuring lithium batteries, and the overseas markets will follow next.

According to Sinoboom these items are also uniquely equipped with permanent magnet motors, commonly found in the automotive industry, for example Tesla model 3 cars, which are more energy efficient than excitation motors by about 20%, and so help to provide longer run-times.

As Peter Peng, Sinoboom's product manager explains, the products adhere to the trends in the category of being lightweight, narrow and with easy manoeuvrability.

"In a competitive micro and compact market, we have been developing features to meet specific customer requirements. Narrow machine width and lightweight are key factors to help optimise transportation logistics and lower transportation costs – a major consideration in the equipment rental industry.

Peng adds, "Reduced maintenance requirements also help rental customers to turn equipment round between hires more efficiently – which helps to make these a more cost-effective solution for working at height.

Sinoboom scissor lifts come with several features as standard, such as the bumper strips which help protect decals during transportation and daily use, and all equipment is treated with an electrophoretic primer which protects against corrosion.

Dingli is also taking the direct electric drive route with its Mini Scissor Series micro range. The company just added a new model to make three in the series. While the products come as standard with lead acid batteries, lithium is offered as an option.

The new 6.5m working height, lightweight battery-powered JCPT0707DCM can fit into a standard elevator. The micro lift has dimensions of 1.43m x 0.76m, and a maximum load of 230kg.

Dingli's DC electric drive Mini Scissor series now covers three models, the 5.6m JCPT0607DCM – the new JCPT0707DCM, with the third unit being the 7.6m working height JCPT0708DCM.

With the guard rails folded down, the overall heights are 1.62m, 1.68m and 1.65m, respectively, while weighing in at 920kg, 1150kg, and 1300kg.

Dingli points out that with a lower purchase price, the rental price for mini scissors remains almost the same as that of standard scissors, therefore making the rate of return higher.

Sinoboom's 0607SE

PRODUCTIVITY APPROACH

Skyjack's latest addition in this area is the SJ3014 micro scissor lift launched last year for the European market come with sealed maintenance free batteries and DC electric direct drive, the focus is on productivity.

And, with a focus on light weight at 820kg and low ground pressure, it is designed to tackle maintenance tasks in commercial and industrial applications.

Rafael Bazzarella, product manager at Skyjack, says, "With these attributes these micro scissors can start to replace some traditional means of working at height by getting to locations that current machines are not used. If it is just as easy, and safer, to access the location with a micro scissor instead of a ladder then the micro scissor will be used." **AI**

The SJ3014 micro scissor from Skyjack.

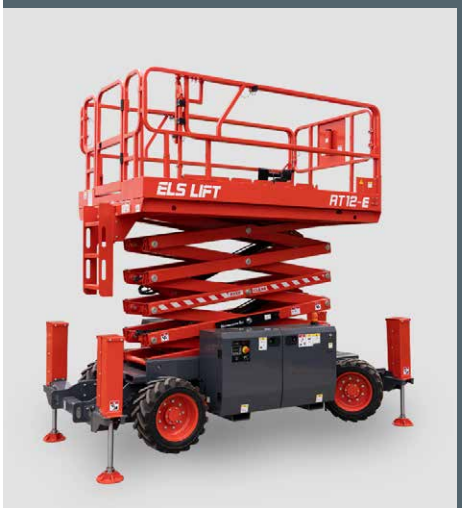
ROUGH TERRAINS

Find out about all the latest rough terrain scissors lifts in the Scissor lifts article appearing in the September issue of AI.

OEMs are moving quickly into electric options on their latest scissor lifts. For example, ELS Lift has started what it describes as a green transformation across all its product categories.

It continues the Turkey-based manufacturer's initiative that started with the e-series scissor lift series, launched in 2020 with the EL12-e and introduced to users in the last quarter of 2021.

This will be followed with the launch into mass production in 2023 of the company's first rough terrain all-electric model, the RT12-E. Apart from the direct electric drive, the company has made improvements to reduce hydraulics to prevent leakage problems by 80% - 90%. The hydraulic elements left on the machine are now for steering and wheels. It features maintenance-free batteries, less battery consumption while moving and ease of maintenance.



ELS said the latest trends in technology, combined with the climate crisis led the company's R&D department to introduce the new model. "These measures and emission criteria implemented by governments have become a priority in the design of all of ELS Lift's ongoing studies."

The new electric RT scissor was also developed following intense demands for zero emission equipment from the market, said ELS.

ELS Lift's RT12-E will be production ready in 2023

Contractors on major construction sites, particularly in urban areas, are increasing their demands for low or zero emission equipment wherever possible. This is alongside major rental companies like Loxam introducing policies to invest in electric-powered access equipment wherever there is a choice to do so.

As such, the access manufacturers have been turning their attention to this area for some time and are expending their ranges in that direction. An important part of the thought process being that electric or hybrid equipment should not be produced for the sake of it; it must to fit into the marketplace.

Barrie Lyndsay, director of engineering – Europe, at JLG, explains that the company is continuing to work on relevant upgrades and entirely new products. "As you know, new products take slightly longer to develop, but our strategy on the core products is really to do it right."

JLG's most recent electric boom launch is the EC quick charge, lithium battery-powered series, which is now being rolled out globally. Earlier this year JLG announced the units in the series, the EC450AJ and EC520AJ, have just been introduced to Latin America. The models offer 15m and 18m working heights, respectively,and unlimited platform capacity of 250kg.

With a 48V battery and 12V DC auxiliary power, the platforms are on par with diesel machines in terms of performance, offering 2WD and a travel speed of 4.5 km/h.

This unit is a good example of where the company felt electrification made sense, says Lindsay. "It's an efficient machine. It's not too heavy and the current technology works well.

"So that's where we're focusing our efforts – generally still very much committed to a strategy of electrification, as well as making sure we understand that we need to serve all our markets."

Lyndsay adds, "Not all our markets are as advanced in electrification as others. So, we are still making sure that we have a good core product line as well."

MARKET FEEDBACK

While no major announcements from JLG regarding electric booms are likely this year, updates to the current EC boom range are under development, Lyndsay explains, "It's a little bit early, but it's based on customer feedback. We continue to look at adding more capacity on the batteries for example, and flexibility in the design."

Another reality is that there are different requirements across the world, which means JLG may consider a more transitional products moving forward. And, for example, Europe tends to be seen as more advanced than North America, especially in the northernmost countries, when it comes to embracing electric RT MEWPs.

The world wants to move to all electric equipment but a number of factors stand in its way, namely the concern over the real market demand for this equipment, compared to cost and TCO, as well as the lack of widespread charging infrastructure, among others.

BRINGING ON THE BOOMS

The new hybrid telescopic S-60 FE boom from Genie.

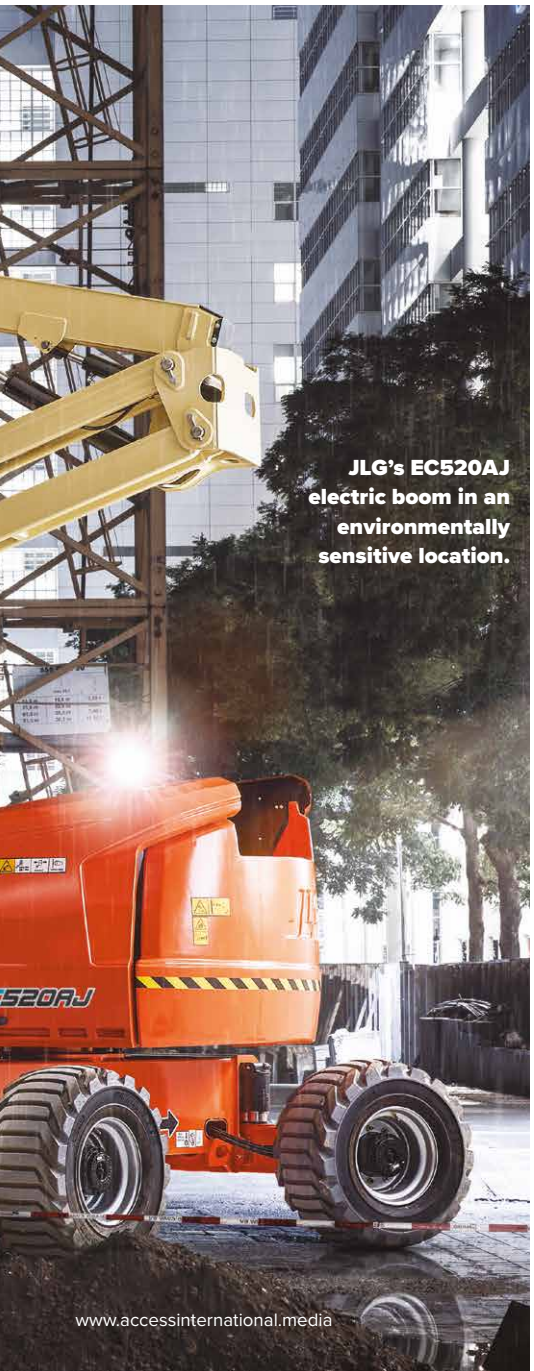
"Not every market wants a full electric machine, for example, but some wants flexibility.

"So, I wouldn't say we're going strictly hybrid, but we're maybe offering some additional power options there as well."

Looking forward Lindsay adds, "I think there are examples in the industry where the customers want the flexibility. So, we want to try and offer customers the flexibility to have alternative power sources, but not necessarily burden the machine with dual power sources all the time."

When asked if future hybrid products could fall along the line of an onboard combustion-powered generator Lindsay comments, "So, the installations we're working on are not as complex as a fully integrated hybrid machine, which I think is not the way forward in the future, but you know, more flexibility with the power requirements on the machine."

Nevertheless, the manufacturer does already offer a hybrid, the 12.33m H340AJ, which offers diesel-like performance, with four independent AC electric-drive motors and a diesel-powered generator providing exceptional diesel-like terrain ability, says the company.



JLG's EC520AJ electric boom in an environmentally sensitive location.

So, what is the reaction to the full electric JLG EC booms now working in the market? Lyndsay says some of the larger customers and distributors have taken a reasonable number and have been using them onsite.

"I think we're now at the point where with some of the feedback we've had and some of the changes we'll make, we hope to continue to grow sales of that product over the next couple of years. Really. We're also seeing some success in Latin America as well, which is interesting."

MAIN MARKETS

The main market for the EC boom is in Europe, where there is a real potential for growth, Lindsay believes. So much so that 30% – 40% of the market that the EC boom covers, could in the medium term be made up of this type of equipment.

"As I've said before, there's some adoption barriers to that at the moment – one being charging on site."

At the manufacturers' New Perspective customer and distributor events that the company has recently introduced to replace >

Snorkel has expanded its fleet of electric units to nine in total; among them is the A46JRTE boom lift.

the its presence at Bauma and other trade shows, JLG been trying to educate the market as to what's currently available and what will likely need to be available in the future to drive further adoption.

As customers ask for more capacity and the electrification of larger machines, and the price of batteries inevitably goes down, there will be the ability to put more power in machines, and then, says Lindsay, the next adoption hurdle, is the charging technology.

"I think everybody would say the same thing; until we've got an infrastructure available to charge multiple products, quickly, I think there will be some limits on the adoption. But you could say the same about the automotive industry and look at what's happening; there's more and more electric cars, and nowadays you see charging points on lampposts, for example. There are a lot of innovative people out there and I'm sure we'll find a way." (See Charging in Question box).

HYBRID FOCUS

As we have seen through Genie's rough terrain boom product launches of the last few years, the company has focused on hybrid lifts, with its FE models.

However, the company is also now offering pure electric rough terrain boom lift equipment through its recent launch of a model in the 60ft (18m) category, alongside its launch of the market's first telescopic hybrid boom in the 18m category, at the same time earlier this year.

With a 20.6m (67ft, 2in) working height, the new S-60 DC and S-60 FE boom lifts follow increasing demand on large jobsites for clean, quiet, versatile equipment that can work indoors and outdoors, and on rough terrain.

The FE booms are notable for their ability to be used as a 100% electric RT machine for a full day on a single battery charge.

The S-60 DC model offers a low weight of 7,983kg and quiet operation for end users.

The FE version weighs 8,051kg, slightly more than the DC version, meaning they are both suitable for applications where floor loading must be managed.

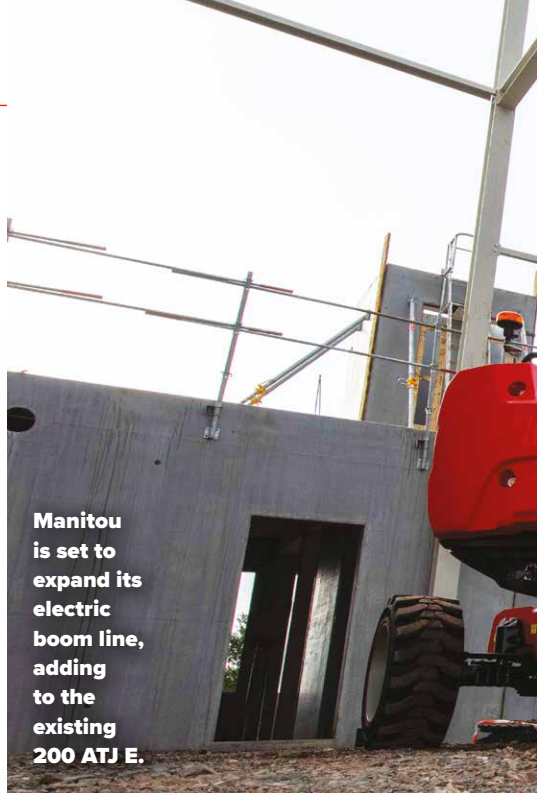
The FE boom intelligent control system keeps the batteries charged using regenerative braking and automatic engine start and stop.

A DPF-free Stage V engine eliminates the need for after-treatment or low-sulphur fuel.

The JLG EC450AJ.

Features of both the S-60 DC and FE also include a maximum outreach of 12.3m and unrestricted platform capacity of 300kg on a 1.83m jib, delivering a 130-degree working range.

Both offer high-efficiency AC drive motors on all four wheels, providing similar torque as hydraulic drive motors, while using 30%-40% less energy, while there is a 6.44km/h (4mph) drive speed and 45% gradeability.



Manitou is set to expand its electric boom line, adding to the existing 200 ATJ E.

PURE ELECTRIC

Snorkel has heavily invested itself in the 100% electric route. It unveiled its first Lithium-

The XCMG XGS28E telescopic boom lift.

NIFTY UNITS

Niftylift has introduced two new low weight all-electric boom lifts this year, the HeightRider 15E (HR15E) and HeightRider 17E (HR17E).

The new HR15E and HR17E can lift two people and their tools to working heights of 15.7m and 17.2m, respectively, or a working outreach of 9.4m.

With both machines weighing less than 5 tonnes, they combine weight and space-saving design with a minimum turning circle to enhance manoeuvrability and reduce transportation costs.

Their 180° rotating cage and fly boom, coupled with fully proportional multi-function controls deliver precision when positioning the cage.

The installed batteries will last four times as long as standard battery-powered machines due to an efficient battery power system with an all-electric drive.

With their non-marking tyres as standard, the pair is designed to work inside or out.

The models both incorporate Niftylift's ToughCage and SiOPS protection, eliminating sustained involuntary operation by instantly stopping machine movement if the operator is pushed onto the control console.

SDC RATING

The HR15E and HR17E booms utilise an advanced battery power system designed with an efficient all-electric drive that allows the batteries to work for significantly longer. Niftylift measures machine operation in Standard Duty Cycles (SDC Rating), with the units achieving an SDC Rating of 66 - at an ambient temperature of 25°C.

powered rough terrain boom lift in September last year.

The new A46JRTE boom lift joins eight other lithium-powered Snorkel models which have been introduced since late 2019. These include the SL26RTE and SL30RTE Speed Levels, five rough terrain scissor lifts, as well as the SR5719E/SR626E compact rough terrain telehandler.

The range's A46JRTE boom lift is the ideal market entry point says Matt Elvin, CEO of Snorkel. "The compact and mid-size aerial lift and telehandler segment is a sweet spot for electrification."

The unit uses the same lithium-ion battery pack as the other MEWPs in the range, without compromising on four-wheel drive capabilities of the diesel equivalent.

It comes as standard with three 5.75 kW (111Ah) automotive-quality lithium-ion battery packs, which satisfies heavy-use and are equipped with the latest battery management systems (BMS), and for typical use, a single charge can last for more than one week.

The battery packs have been tested in climatic chambers between -77°F (-25°C) and +140°F (+60°C), making them suitable for use in most environments.

Featuring a powerful AC electric motor, it benefits from higher torque and delivers 62% less jobsite noise and with no engine fan.

Scott McCall, business development manager & net zero specialist at Snorkel, says around a third of the manufacturer's orders are for lithium battery-powered machines.

One of the major issues, says McCall, is the rising cost of diesel. "Looking at the fuel crisis that's happening at the moment...the cost is going to be pretty prohibitive in the future."

McCall also points out that the starting difference in price between a traditional diesel unit and its electric counterpart is not that great overall.

"A lot of people keep machines over seven years in the fleet, the returns [on electric equipment] are quite staggering because you're putting that fuel spend into your pocket rather than into a fuel company's pocket."

Adding to that point, McCall says sustainability has become a major driving factor for rental companies, as well as contractors. "If you're buying diesel machines today, how long are they going be in your fleet before somebody will say, I don't want them.

"And that's what people are starting to think."

MOVING FAST

McCall has carried out a great deal of research into the subject with sustainability teams at major contractors. "What I've noticed in the last year is this is moving very fast…they have >

The new Niftylift HR15E and HR17E.

According to Niftylift, the industry standard SDC Rating for a typical working day is 16, which means they can potentially offer over four days of operation on a single charge.

HAULOTTE HYDROGEN PARTNERSHIP

Haulotte has announced a collaboration with Bouygues Energies & Services to focus on using hydrogen energy to fuel its lifting equipment.

Under the initiative between the two companies, engineering and services specialist Bouygues will test a Haulotte MEWP equipped with a hydrogen fuel cell system under real conditions on several of its construction sites over one year.

Bouygues will also study the hydrogen supply ecosystem for the entire construction sites on which the MEWP will be operating.

Bouygues Energies & Services, a subsidiary of Bouygues Construction, is a key player in energy and digital transition across a range of industries and buildings.

Haulotte said, "This partnership between the two groups aims to confirm the technical feasibility of using hydrogen technology in the construction sector to provide a low-carbon, zero-emission solution in response to climate, environmental and public health issues."

In addition, Haulotte is exploring solutions for the complete decarbonization of its future aerial platform equipment.

Caroline Mazzoleni, head of Smart Energy Division, Bouygues Energies & Services; and Patrice Metairie, COO, Haulotte Group.

all the ideas and know what they'd like to do."

Whereas in the past there has been hesitancy, "Now," adds McCall, "Sites are really buying into [electric], and they're a lot closer aligned with what the sustainability teams want and are starting to promise to their clients."

While charging on site is no doubt a consideration, McCall believes there are short-term solutions "Charging infrastructure on site is a massive growth market. [Rental companies] are really pushing hybrid solar and generators that have got a battery bank in them that stores energy.

"All those will power one of our machines or more than one of our machines. So, it's not just about having the local electricity supplier, there are other alternatives."

Manitou Group is equally committed to an electric future. The company has said it will launch seven additions to its Oxygen series at bauma, in Munich during October this year.

The new products are part of the French manufacturer's promotional campaign to demonstrate the commitment to electric equipment and low emissions across the business. "The group intends to reinforce its commitment to its energy transition and affirm its ambitions as a responsible leader," it said.

As part of the campaign the company has announced a new slogan, Reduce your emissions, raise your standards.

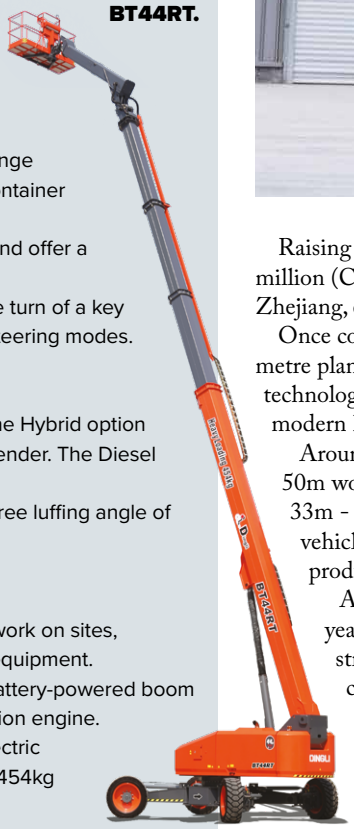
The current series includes the 20m working height ATJ 200 e Oxygen, launched at bauma in 2019, and remains the company's first electric all terrain aerial platform. It features a maximum capacity of 230kg and provides the same performance as a diesel-powered version.

Now that offering is set to expand. Arnaud Boyer, VP of marketing and product development, said, "We are hoping to accelerate the development of our electric ranges with numerous launches throughout 2022 and beyond."

Dingli's BT30SHRT is part of the manufacturer's Range Extended Series.

LARGE ELECTRICS

The 44m working height Dingli BT44RT.



Dingli launched nine new electric and hybrid models from 36m - 44m working height in August this year.

The new High Metre modular boom series, developed by Dingli's Germany-based R&D centre, through its part-ownership arrangement with spider specialist Teupen, is produced in the China manufacturing facility.

The addition of the High Metre series now means Dingli's complete boom range covers maximum working heights of 16m to 44m, with all models suitable for container transport.

The newly-launched models are available in electric, hybrid or diesel drive, and offer a maximum 454kg capacity in the basket.

Further advantages of the series include its parallel axle system, that with the turn of a key sees the axles extended while the machine is in situ, without driving and four steering modes.

POWER OPTIONS

Electric versions of all models come with a 358V200Ah lithium battery pack. The Hybrid option is equipped with a high-capacity lithium battery pack and a universal range extender. The Diesel model features a German Deutz engine as standard.

Designed with a high level of modularity, other features include the 240-degree luffing angle of the jib, which can be hooked back for container transport.

RANGE EXTENDER

Dingli has also recently introduced a new hybrid boom lift series designed for work on sites, particularly in Europe, where there is no power supply to charge pure electric equipment.

The new Range Extended Series is an advanced version of Dingli's lithium battery-powered boom lift offering which comes with a 'mobile charger', in the form of a small combustion engine.

The series is based on the same specifications as the company's existing electric boom range, with maximum working heights of 22m to 34m, maximum load of 454kg and a 80V (420Ah) lithium battery pack.

Raising the stakes through its new US$348 million (CNY2.2 billion) production facility in Zhejiang, eastern China, is Dingli.

Once completed, the new 240,000 square metre plant will be equipped with the technology required for manufacturing modern high-reach access platforms.

Around 4,000 units, including 36m - 50m working height electric boom lifts, 33m - 36m electric scissor lifts and vehicle mounted insulated booms, will be produced at the facility each year.

As the company says, over the past year it has continued to broaden its strategy of electrification with its complete boom range now available as a lithium-battery powered option.

The plant occupies a 61-acre site and forms Phase 5 of the company's "Future Factory"

Sinoboom's TB32EJN Plus.

LGMG's T20JE telescopic boom.

expansion project, which aims to take advantage of China's rapidly expanding access rental sector.

HIGH CAPACITY

LGMG has also been raising the electric bar with its range of high-capacity electric telescopic booms, which are already used in China and have now been introduced to the international market.

Wang Yuling, head of LGMG's overseas application engineering department, commented, "With the increasingly strict environmental requirements and the improved environmental protection awareness, the market demand for electric machines is increasing.

"For our customers, low carbon and energy-saving electric equipment means more rental opportunities and lower operating costs."

The launch of the four new telescopic models in overseas markets is designed to fill the gap in LGMG's electric telescopic boom product line in overseas markets, making it more complete.

With working heights of 21.8m to 29.8m, the new electric booms provide outreaches of 16.6m, 17m, 22.3m and 22.5m, respectively.

They come with a 300 (unrestricted)/450kg (restricted) dual capacity and are equipped with a 2.44m triple-entry gate as standard and four-wheel drive with three steering modes: four-wheel steer, front-wheel steer, crab steer, and one-touch wheel alignment. A floating oscillating axle is also a feature of the units, which have a maximum tilt angle of 5° tilt and 45% gradeability.

Across its range LGMG offers booms lifts with platform heights from 14m to 38m and a maximum load capacity of 450kg, including the A14JE-Li, AR20JE–Li, and other articulating boom lifts. These new models will be introduced to the market shortly.

INTERNATIONAL PLANS

XCMG is also now actively introducing boom lifts into the international market. The equipment is based on the Chinese manufacturer's long established crane boom technology. At the UK show Vertikal Days in May, XCMG announced two electric lifts, the telescopic XGS22E and XGS28E.

On show was the XGS28E, which features a 28.2m working height, with a limited 300kg basket capacity and an unlimited capacity of 400kg. The platform has a width of 2.4m to provide space for materials and tools.

It is powered by a Kubota Euro stage V and incorporates CAN and programmable controller technology for more automated operations. Secondary guarding and the emergency lowering system provides are both standard safety features.

At Vertikal Days, Sinoboom's European subsidiary Sinoboom BV was presenting its decision to only introduce electric boom lifts to the European market, rather than a mix of electric and diesel, demonstrating its confidence in the strong current and near-future demand for these products.

The company has also been expanding its electric boom offering. An example is the new TB32EJN, which the company says is the world's tallest electric telescopic boom without extendable chassis.

It tops out the TB series with working heights of 20m to 28m. The narrow chassis is only 2.49m wide, making the boom easy to navigate jobsites and transport, while also offering a permanent oscillating axle.

The model also features tie-rod steering, which is easier to use and more economical than 4-wheel steering control, says the company, contributing to greater reliability.

Its hydraulic levelling, rather than electrical levelling, provides easier maintenance for service technicians, while commonality of parts with the existing Sinoboom TB26 and TB28J Plus models, contributes to TB32EJN uptime and overall good return-on-investment.

The large format screen allows easy viewing, operation, calibration and troubleshooting.

NEW AWARENESS

Zoomlion Access introduced its first all-electric telescopic boom lifts in early November last year.

"As the awareness around carbon neutrality rises, we believe the needs for electric booms will grow significantly on construction sites, especially in North America and Europe, both indoors and out," says Jason Liu, global sales and marketing director of Zoomlion Access Overseas.

The two new models are the ZT22JE and ZT26JE and are powered by lithium batteries.

The lifts offer working heights from 24.4m to 28.7m, with horizontal outreach of 17.9m for the ZT22JE, and 22.1m for the ZT26JE.

Common features include 300kg unrestricted platform capacity, 24° gradeability, 360°continuous swing and 4-wheel drive.

Yi Zhong, manager of R&D at Zoomlion Access, said, "We initially integrated the lithium power into the Zoomlion scissors range in 2019, which is ahead of the industry trend. Now we are expanding the advanced technologies of lithium batteries into our telescopic boom lifts."

Equipped with an 80-volt lithium battery that can be fully charged within seven hours.

Operators can also remotely manage the lifts by using Zoomlion Z-Asset, the manufacturer's telematics system. **AI**

The Zoomlion ZT26JE for the international market.

Spider lifts are adapting, as their work environments become even more sensitive.

LIGHT ON THE ENVIRONME

Another segment of the access sector with a long history of bi-energy and hybrid units is spider lifts.

This equipment is sent to work in sensitive environmental areas, both inside and outside, as they are used to maintain anything from retail centres to hospitals and airports. The traditional plug-in power options are often combined with a combustion engine, allowing them to be moved from one work position to another.

As with other product types, there has also been an increased focus on battery options as a step to complete electrification. However, as we have heard elsewhere the jump to a 100% electric industry remains a few steps away.

As Manuela Vender, sales director at Easy Lift explains, it may be impossible to avoid combustion engines in the medium-term, "In fact, all platforms that have a combustion engine are still more efficient and give better performance than battery-operated platforms.

Vender adds, "The combustion engine is more powerful than lithium battery and there is no need to charge it with an external device, whereas a lithium battery needs to be charged every four to five hours. Furthermore, if you work outdoors and you need to charge the battery, you may need another device."

A compromise is the hybrid. Easy Lift's HY hybrid units mean a combustion engine can be used outdoors and the battery indoors. HY hybrids are available on the manufacturer's medium-sized models, the R190HY, R210HY and RA24HY, as well as all large telescopic units - R260HY, R300HY, R360HY, R420HY and double telescopic units RA26HY and the RA31HY.

An interesting point put forward by Vender is that the trend for 'green energy' spiders started in Asian and Middle Eastern markets for use inside airports, banks and shopping malls, and that has now grown quickly throughout Europe, particularly in Northern Europe, in the rental sector. "Sustainability has become one of the main corporate social responsibilities and core values for all companies. Customers too pay great attention to sustainability and prefer to purchase green machines," explains Vender.

The company works with its engineers to design and manufacture sustainable machines, collaborating with suppliers too, in particular for batteries. Easy Lift has selected lithium over lead acid thanks to the energy, performance and low weight compared to lead-acid batteries, which have longer recharge times, low energy efficiency and shorter life.

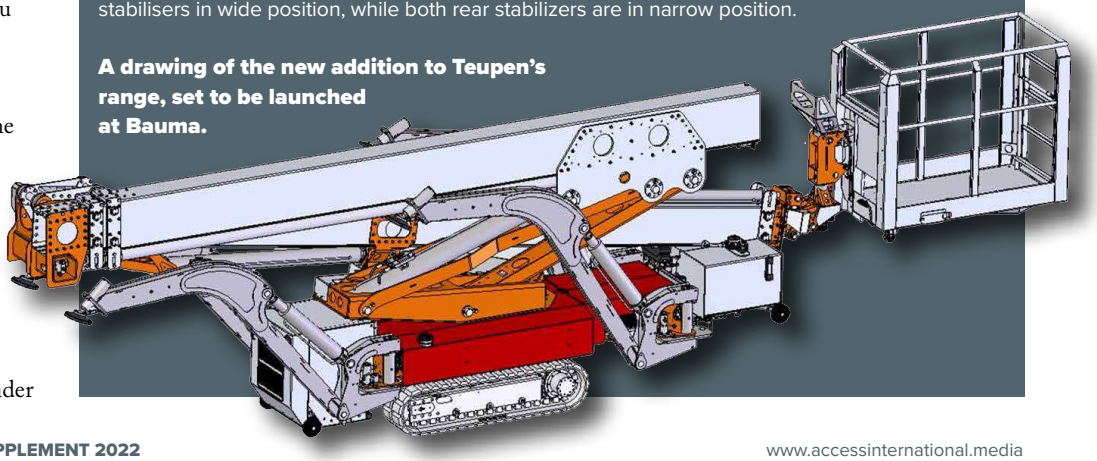
EXPANDING LITHIUM OPTIONS

Teupen is expanding the lithium battery option to its lifts. At Bauma, this October, the company will launch two telescopic lifts, the 24m working height LEO24GT and 27m working height LEO27GT.

Both will be high performance machines, with a lithium battery drive option. Partly making this possible is the models' light weight of below 3,000kg, meaning it can be transported on a trailer at under 3.5 tonnes using a standard B-category driving licence in Europe. In addition the models have a more efficient hydraulic system. Transport width is around 89cm.

Both machines will have lateral outreach of approximately 12.2m with 250kg basket load, and are equipped with a basket load sensor and radio remote control. The basket is also more compact at 900mm x 800mm. They also offer hydraulically height and width adjustable tracks.

Besides the standard stabiliser set up positions (wide/wide, wide/narrow, narrow/narrow), there is now an additional setup position called the church position – with both front stabilisers in wide position, while both rear stabilizers are in narrow position.



A drawing of the new addition to Teupen's range, set to be launched at Bauma.

The R420HY from Easy Lift can perform in extreme conditions

ENT

Easy Lift's hybrid RY20HY

However, Vender shares a widely held view of what needs to happen before lithium power can spread widely. "All the access sector is moving towards the eco-friendly philosophy, but there are still many issues to be discussed in terms of green energies' durability, quality and costs compared to diesel and petrol power resources.

"To implement these new technologies, working areas, both indoor and outdoor, should be equipped with battery charging devices. Now, the whole access sector is becoming more sustainable and we do think that all worksites will soon have the right devices to recharge batteries to let platforms work properly and efficiently."

ELECTRIC TRACKS

Hinowa has been making some of the largest leaps in the spider sector towards zero-emission products. The TC22 telescopic spider follows on from the launch of its smaller sibling, the TeleCrawler TC13.

The undercarriage has electric traction motors which means the unit is completely electric-driven, without the use of any hydraulic oil.

As Davide Fracca, vice president and sales director at Hinowa, says they are the first spiders to offer full electric tracks.

The technology provides a permanent magnet drive motor guaranteeing a high performance, compared to traditional electric motors. All aerial movements are powered by a lithium-ion battery pack.

Fracca comments, "This system is significantly more efficient compared to the hydraulic one which allows use of a lithium-ion battery pack, and powerful and efficient electric traction motors ensuring the same

performance levels as a hydraulic traction platform."

With the focus on electrification, the company plans to add more telescopic tracked models and alongside, develop the automatic telescopic boom extension control, i.e, the scissor effect.

In five years' time, the percentage of hybrid or electric access equipment manufactured by the company is likely to be about 50% of total production, Fracca forecasts.

In support of that, the company recently added new bi-energy units to its existing line-up of combustion and lithium-ion-powered models.

The bi-energy powered range features both combustion engine and electric motor, which since 2018 has only been on the larger size lifts, such as the Lightlift 26.14 PIIIS and the Lightlift 33.17 PIIIS.

In 2021 this technology was introduced to the Lightlift 20.10 PIIIS MK3. Fracca adds, "Because of its smaller dimensions, this was quite a challenge and a careful technical project needed to be undertaken."

The 20.10 PIIIS MK3's lithium-ion battery pack provides more capacity and in addition it is fitted with an IPM (Interior Permanent Magnet) electric motor which guarantees an increased overall efficiency.

Nevertheless, spiders share a common problem, says Fracca, "Charging capabilities are for sure one of the main issues during the decision process of buying access equipment."

CLEAR FUTURE

CTE also believes that in five years' time, at least 50% of its tracked platform production will be fully electric or full hybrid.

Hinowa's direct electric drive TC22N.

The smaller sibling, the Hinowa TC13N

CTE's fully electric models are the Traccess 160E, Traccess 170 E and Traccess 230 E. The latest model in the range, the 270 is a triple energy unit and is equipped with a battery pack, paired with an AC low voltage electric pump with smart power management that can also be powered by AC outlet power, for indoor pollution free and silent jobs.

Roberto Berritta, technical product and innovation manager at CTE, says that while full electric spiders are clearly already available, their wide availability on the market will depend on a combination of battery technology and their cost, alongside environmental restriction based on the political decisions from country-to-country.

There are other factors too that must be in place before the 100% electric market can truly grow. Berritta says, "Our cities need to be changed and redesigned. More electric vehicles, such as rental vehicles, taxis and public transportation are required, along with more charging capabilities at large companies with many employees and at public organisations. For example, there needs to be a better organisation of working hours on road construction, where possible, to carry out work at night with zero noise."

On the product side, CTE is developing its Traccess hybrid and electric spider range.

In addition to the these major technological developments, Berritta points out it is also important to remember the other key areas of MEWP design. "It is vital that we continue to emphasise the importance of safety issues

HYDRAULIC RESTRICTIONS

The drive to optimise hydraulics is evident, as manufacturers update their products to reduce the effects of leakages and improve environmental impact, even on equipment that is not 100% electric. CMC has updated its F-Series of spider platforms, incorporating a new remote control system and hydraulic improvements.

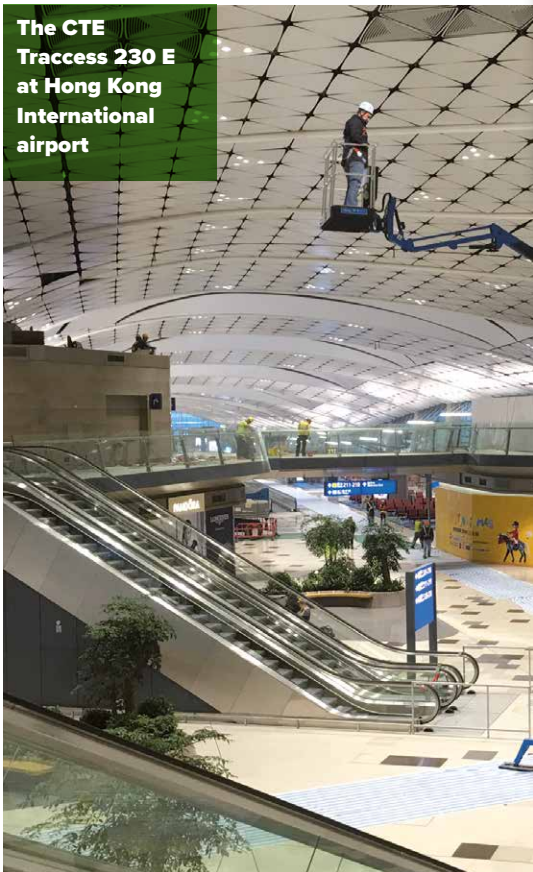
With working heights ranging from 13m to 18m, the F-Series spiders include a new electro-hydraulic distributor, which incorporates automatic stabilisation and enables double speed functionality for improved efficiency.

Unlike the manufacturer's previous F-Series machines, which were presented at Bauma in 2019, the updated F-Series is also now available with new Kubota engine and hybrid options.

A remote control system has also been added as standard. This can be further upgraded to offer users wireless radio control, via an after-market kit that includes a transmitter, two replaceable rechargeable batteries and a charging station.

Also helping to reduce downtime is the new pressurised fuel tank. It includes a closed hydraulic circuit that ensures no air or debris gets sucked into the tank, increasing cleanliness.

Part of CMC's newly updated F-Series of spider lifts.



The CTE Traccess 230 E at Hong Kong International airport

NEW COLOURS

Palazzani has three different power options available for its spider lifts.

Palazzani Industrie has changed its colour scheme depending on the power supply of its spider lifts, in a move that the company believes will make the power options of each product instantly recognisable.

According to the Italy-based company, providing each power option with its own colour has a "great impact" on the final product and it can be "the extra detail to make a spider lift recognisable and unique."

Palazzani said, "For decades we have been offering electric and hybrid spider lifts that have evolved over the years, in order to be more sustainable and attentive to the changing needs of all markets."

The company currently has three power options available on the market: bi-energy (diesel and AC), eco (AC and lithium battery) and hybrid (diesel, AC and lithium battery).

Bi-energy, the standard power option offered by Palazzani will now be associated with the standard red and white colours.

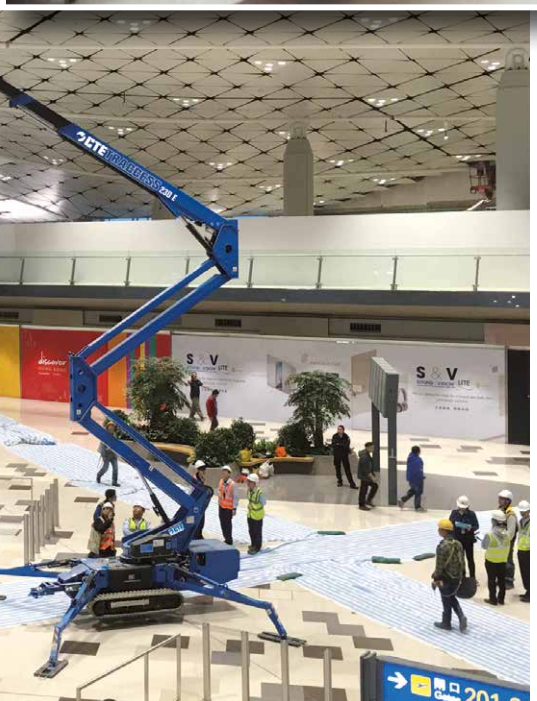
The green eco option will now be associated with green and white colours while hybrid, which was updated last year to improve efficiency will be represented by blue and white.

Among those it will help to differentiate is the SMX250, which has a maximum working height of 25.2m, a boom made of aluminium, a dual drive with combustion engine and electric motor.

At its maximum horizontal outreach of 11.6 metres, the platform's capacity is 80kg, rising to 250kg at 7.9m outreach.

The compact size and a weight is 2,600kg making it possible to carry the spider on a trailer and access confined places.

The compact design of the Traccess 230 E.



and provide safe and reliable work tools on site."

The advancement of electronics is also complementing the growth of electric equipment. For example CTE's latest management system.

"Our S3 EVO provides safety by avoiding manoeuvring errors of our platforms."

DUAL HISTORY

Falcon Lifts has always offered hybrid machines with dual power, batteries and combustion engine. "But some markets and customers show an increased interest in pure electric and lithium power," says Brian Falck-Schmidt, Falcon sales director, "Especially lifts that are intended for use in cities with no-emission restrictions".

As well as zero emissions, Schmidt sees opportunities in more lightweight and versatile units for both indoor and outdoor operation, along with increasing basket loads to a minimum of 250kg.

On the compact angle, Falcon Lifts introduced a line of what it describes as "smaller" lifts in January. The models range from 13m - 27m, mounted on tracks, with articulated Z-booms.

ELECTRIC WHEELS

Falcon was called upon to provide its 420S model for the construction and ongoing maintenance of the majestic Axel Springer office building in the heart of Berlin, Germany.

The 420S was delivered for the completion of the building and used for final finishing and cleaning before the handover to the end-user.

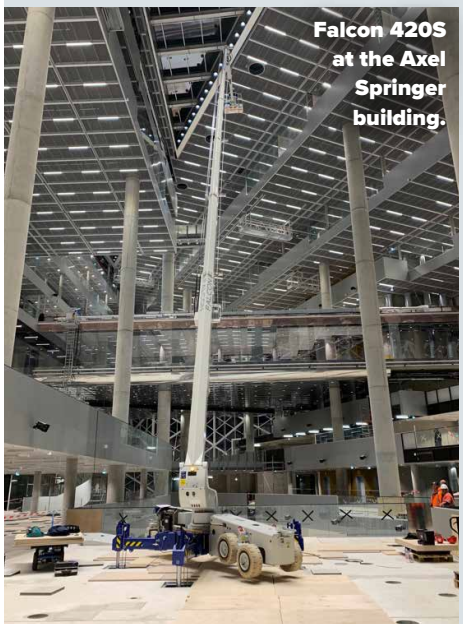
The wheel-mounted 100% electric model has a combined DC battery and AC 400 V hook up and has specially designed outriggers that can be fixed to the floor, for set up in restricted load areas, where enhanced reach is required.

Accommodating more than 3,000 people, the 80,000 square metre building is based on a design by renowned Netherlands architect Remment Lucas Koolhaas.

Built by German construction company Züblin AG, the new building consists of eleven floors above ground, two basement floors and an accessible landscaped roof area. A central component of the design is a 40m high atrium lined with terraces.

The main challenges for the Falcon lift are the restricted floor loads and thereby travel path restrictions, along with restricted areas for setting up the equipment, and difficult to access positions that required a high working height and long side reach.

As Falcon Lifts explains, there is a growing need for spider lifts in buildings with complicated architecture that require them to be supplied with customised features for complex maintenance work.



Falcon 420S at the Axel Springer building.

The range offers dual power, available with a lithium power pack as an option, and is compact enough to pass through single doors, and light weight enough to travel on sensitive floors. Equipped with a remote access system, via GSM, online service support can from the Falcon service team. **AI**

STREET

Vehicle mounted equipment for the utility sector, often used in applications like street lighting and other maintenance work, has long been required to take heed of sensitive environmental requirements. In this special report, utility lift manufacturer Versalift considers the direction of travel.

The European arm of aerial access platform manufacturer Versalift has recently launched a range of greener solutions designed to meet tightening inner-city pollution regulations.

Versalift has long focused on the trend toward more sustainable, and less polluting alternatives to the diesel fumes and invasive noise of conventional vehicle mounted access platforms.

Today, Versalift has a portfolio of 100% electric vehicle mounted access platforms alongside hybrid solutions.

However, for the short to medium-term future of aerial access, it's the hybrid solutions that make the most sense for professional operators. And with good reason.

Regulatory authorities around the world are increasingly stipulating less noise and pollution. In some major European cities, vehicle requirements are becoming increasingly stringent - with a particular focus on reducing CO_2 emissions and noise levels.

Versalift International's French subsidiary director, Laurent Cuyolla, welcomes such regulations. "There's enough noise and pollution in our cities already," he says. "Access platform vehicles may be far less plentiful than most traffic, and they're typically not the noisiest equipment on the decibel scale, but they do stick out in the landscape - so they're part of the overall problem."

Along with Andy Bray, who leads Versalift's UK subsidiary, Cuyolla as been a prominent voice within the company. "While health-protective laws, and attention to city design and planning can minimise noise, they're not enough on their own," he states. "As a leading vehicle mounted access platform manufacturer, we have a strong supporting

SETTINGS

role to play too."

At first glance, the obvious solution would be to develop a 100% electric platform mounted on a fully electric vehicle.

The company developed a 100% electric vehicle mounted platform. "It stirred up a lot of attention, but as we were well aware, there are some practical realities that, for most customers, mean that a fully electric fleet of such vehicles isn't the right choice just yet," says Bray.

ELECTRIC ISSUES

As things are today, prospective purchasers have three basic options: invest in a fully electric vehicle and platform, choose a hybrid platform mounted on a hybrid-driven vehicle, or opt for a hybrid platform on a conventionally fuelled vehicle. "For now, the most workable, most affordable option for complying with the new regulations is the latter," says Cuyolla. It's a recommendation that reflects the current state of electric vehicle technology. On the one hand, the few fully electric vans on today's market, such as those produced by industry frontrunner Renault, aren't able to cope with heavier platform designs.

That's because both payload and driving range must be reduced to an extent that significantly reduces their feasibility for most operators. "A fully electric setup might be okay for short stops in a city centre setting," says Bray, "but once you have to get out on the highway, you're quickly going to run into some limitations." On the other hand, there's the >

Versalift has launched its new hybrid e-Tech system, engineered to allow lifting jobs to be carried out using 100% electric power. Installed with lithium-ion batteries, the 12v e-Tech system delivers 20 work cycles from a full charge. The battery recharges while the vehicle is being driven, using its combustion engine.

price. Today's electric vans and other suitable professional grade vehicles cost around twice that of their conventionally fuelled cousins. For cost efficiency focused public service bodies and private providers alike, that's a significant barrier likely to see the worthwhile reduction within the next five or so years.

Therefore, Versalift's recommended solution for most contexts is a hybrid system where a diesel vehicle is equipped with an electric motor and rechargeable battery pack to drive the platform. When using a vehicle of this type, the platform can be operated with both the diesel engine and the electric motor.

While it's not entirely environmentally friendly, such a system presents a strong alternative to an access platform operated exclusively by the vehicle's diesel engine. "A hybrid platform is a good solution if you are not ready to go all-in on electric," says Cuyolla. "And almost all of our platforms can be offered in a hybrid form, providing there is a sufficient vehicle payload, since the extra weight of the battery pack must be taken into account."

Versalift's strategy is to start applying electric platform technology to a conventional vehicle to learn how things work best – how the battery lasts, or the optimal temperature range. It's a carefully thought-through, phased approach from a company that understands what it takes to introduce innovative new concepts to work settings.

Versalift now offers different hybrid systems for vans, pickups, and trucks, in both 12 and 48 volt configurations, and with either Lithium-ion or VRLA GEL batteries. In addition, a hybrid system can be retrofitted to a current Versalift product via a relatively straightforward upgrade.

OPERATOR UPSIDES

"We're not just doing this for city residents or visitors, but also the equipment operators and other service or construction colleagues in their surroundings," says Bray. And there are plenty of aspects to improve work conditions for service workers.

For example, the electric motor noticeably reduces noise and reduces the CO_2 emissions produced by a diesel engine during a working day. That's because it is switched off during operation, enabling work to be carried out completely silent and with a minimum of fumes.

Additionally, with the battery packs used in earlier electric platform models, the platform operator was constantly left wondering whether they were going to run out of power while suspended in the air. Not a great thing when you're working alone.

But vehicles equipped, for example, with a 20C lithium battery pack, are very quick to recharge - just 15 minutes of driving is enough to go from 80% to 100% charged. And the new models feature a Bluetooth connection, so operators can easily check charge levels from a phone or tablet. From an engineering point of view, having a battery

Klubb Group K32 on Renault Master.

FRENCH CONNECTION

FE Group and Klubb Group are two utility-related aerial platform manufacturers based in France. The pair provide their insights into road-going vehicle development.

Julien Bourrellis, CEO at Klubb, comments, "At the heart of our production activity at Klubb and in the country where our its head office is located, even if sales of all-electric and environmentally friendly platforms have increased significantly, diesel engines are not yet set to disappear."

However, hybrid is a key option. Bourrellis continues, "Today, 25% of our aerial work platform production is already hybrid. Indeed, even if the vehicle itself still runs on old energy sources - petrol/diesel, our green pack option, which operates the platform, is 100% electric. This is a very interesting alternative for all companies concerned about the environment."

With such practical options Bourrellis is not convinced that the number of 100% electric aerial platforms will increase in the near future. "Unfortunately the production of this type of vehicle is not going as quickly as expected."

Over a decade, Klubb's commitment to green equipment has evolved and today, for example, 90% of the company's suppliers are based in Europe, and 70% of them in France.

The first 'Green' model launched by Klubb in partnership with the SNEF Group, which specialises in electrical engineering, dates from 2012. This 15m working height platform on a Modec carrier produced by Electruckcity was the first to enter the electric utility market and has since been joined by many other models in the Klubb Group's green range.

Today the company offers the 100% electric KL21B on the Peugeot e-Expert, which is compact and designed to work in tight areas while maintaining adequate storage capacity and payload to transport tools and equipment. It is also easy to position on the road.

With its 11.4m working height and 6.4m offset, the unit can perform 32 aerial work cycles and 230km WLTP on the road.

The KL32, on the other hand, which is the company's bestseller, on the Renault Master ZE, was improved in 2021 with the release of the KL32 Light version. This allows a gain of 140kg of payload compared to the previous version. Now the 100% electric version is being released and is available in van and truck versions.

OPERATOR UPSIDES

In 2000 FE group, which incorporates France Elévateur, launched its ecological label, which includes the eco-pack, allowing working at height in electric mode with the chassis' engine switched off.

pack that isn't linked to the vehicle's engine separates the two systems nicely.

And from reliability, maintenance, and warranty perspectives, since there is no need to make additions or adjustments to the engine, it's far simpler and cleaner for all involved. "All in all, hybrid is a really workable solution," says Bray, "which is why a lot of the vehicle mounted platforms we're selling right now are of this exact type."

SIGNALLING SUSTAINABILITY

For rental companies, municipalities, and other equipment purchasers, choosing the new hybrid platform sends an important signal directly aligned to the sustainability ambitions that have become an essential part of any organisation's outward-facing image.

Versalift's sustainability and social focus ambitions extend beyond being a first-mover in new, greener alternatives. Rather than focusing purely on selling new units, Versalift is offering an option to retrofit existing vehicle mounted platforms to enable them to make a difference, "we deliberately chose to do this to make the most difference we can in society, rather than simply going after the most profitable choice every time," says Cuyolla.

POSITIVE ENERGY

In 2022, Paris will stop most forms of traffic moving through a large zone covering the city's core, to cut pollution and noise and free up more space for trees, cycle lanes, and pedestrian areas. This latest initiative is part of a European-wide trend, with flagship cities such as Madrid, Oslo, Brussels, and Berlin already well down the track.

According to Bray, the UK is in a similar situation. In fact, in October 2021, London moved to expand its ultra-low emissions radius outward from the city centre – a significant footprint expansion that raises entry costs for access operators operating in the area, adding further fuel to the fire for greener equipment options. Over the next few years, Birmingham and other major cities will follow London's lead. To meet these challenges, Cuyolla sees a long road of necessary innovation ahead, "as part of the Paris initiative, diesel vehicles are entirely banned from 2024 and petrol joins the unwanted list from 2030.

So everyone will need to operate 100% electric or natural gas vehicles – and there are currently very few professional vehicles suited to access tasks that live up to these requirements."

Along with the rising cost of fuel, this will see an increase in the number of electric vehicles used in workforces.

"We are very proud to be part of the shift towards greener energy and solutions because it is a transition we believe in," says Bray, "we have a saying that we deliver positive energy in more ways than one, and I think we're living up to that". **AI**

The all-electric 091 Fcce from France Elévateur.

This concept has become a standard option and a dozen models in France Elévateur's range meet emission reduction criteria and can be mounted on electric, hybrid or gas carriers.

The company says it was a forerunner in the green market with its all-electric 091 Fcce model, exhibited at COP 21 in 2015 in Paris.

The FE Group also incorporates Movex, the Spanish manufacturer it acquired last year. It will launch the ATL15, mounted on the gas-powered Piaggio Gas this year to join the company's existing ATL12, mounted on the Alkè electric vehicle.

France Elévateur's hybrid CNG gas-powered model, with an eco-pack currently has the greatest autonomy in the range, while respecting CO_2 emission rules in urban environments.

Noise pollution is further reduced when the platform is used in electric mode.

The company said, "We are receiving more and more requests for environmentally friendly aerial platforms and carriers. Fighting global warming and reducing greenhouse gas emissions has become a major concern."

In addition, municipalities are also introducing more and more restrictions on access to city centres, says the company.

In this way, the company is working to offer more efficient equipment in terms of increased cycle autonomy and weight savings by offering more efficient and lighter batteries.

France Elévateur is also looking to reduce the weight of its booms, as well as working on the 'nacelle of the future', by using new materials and stopping the use of hydraulics.

"The development of green products with greater autonomy would allow us to offer even more efficient products. Many customers have mileage requirements that are currently holding them back from switching to green models."

The expansion of charging stations at construction sites would go some way to overcoming this obstacle, says the company.

The FE group is expanding its environmental offering outside of its product development. In partnership with SEVIA, the company recycles its hydraulic oil by recovering used oil on its sites and reuses it. Under the procedure the oil is filtered and reconditioned for applications that require oil purity.

The company has also replaced all neon lights with LED lights Inside and outside its buildings in line with the EU standard.

"France is one of the countries where the penetration of electricity in mobility is one of the highest. We are receiving strong requests for environmentally friendly pods. This is due in particular to the various restrictions introduced by the municipalities for access to their city centers."

In addition, the Scandinavian countries, Germany and Northern Europe, in general, are advanced in terms of hybrid and ecological vehicles, adds the company.

"European institutions are pursuing proactive policies and implementing legislation that contributes to the reduction of the carbon footprint."

Movex's inner city ATL12