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# Turn on to batteries

The past year was somewhat surprising in terms of the battery developments in the aerial work platform market. Around 70 percent of all self-propelled aerial lifts are powered by batteries - the vast majority being slab electric scissor lifts - that use a fairly standard and traditional lead acid battery pack made up of four six volt 225 Amp/Hour batteries. In order to work at peak efficiency they need to be kept well charged and be regularly maintained. Ignore this last point and their life can easily be reduced to little more than a year, while looking after them properly can easily extend this to five years or more. With rental rates remaining weak and margins thin, this can be the difference between turning a profit or a loss.

When a battery pack fails on the job, the cost can easily escalate to more significant levels, given the cost of a call out to check the problem, a second visit to replace the batteries - or the machine - lost revenues, and possibly worst of all, the loss of a good customer. It is therefore an area that is increasingly receiving more and more attention.

However with good service engineers hard to find and increasingly expensive, more lift owners and rental companies are looking into battery choice up front. This is the area that has changed most in recent years. In the past the most you might do was ensure that a good quality semi traction battery pack was installed.

All major manufacturers install such batteries on their new machines and have done so for many years. But there was a time - at least in

Europe - when this was not so when it came to replacement time, usually due to abuse or lack of maintenance. Inferior or under specified batteries were all too often fitted, due to the lack of availability or the cost of an original replacement. Almost without exception the best lead acid batteries for this application come from the USA and brands such as Trojan, US Batteries and Crown etc.. In the past 15 years or so these batteries have become readily available in Europe at a competitive price and so these days most owners replace their battery packs with such products.

In the same time-frame battery powered lifts have become significantly more efficient thanks to motor controls and direct wheel drive etc largely solving the battery life problems of old - or at least reducing their occurrence - making battery life between re-charging a non issue. However most fleet

*The best lead acid batteries come from the USA and brands such as Trojan, US Batteries and Crown.*



C&A

batteries



*A classic battery pack on a Skyjack scissor lift*



*The low profile Stealth Watering System from TVH fills all battery cells to the same level at the same time and claims to take one tenth the time of doing it manually.*

owners are still spending a good deal more on battery replacement and maintenance than is necessary.

A sign of change in this area came at the start of last year when an increasing number of rental companies began seriously considering alternatives to traditional lead acid batteries. This may have been spurred on by the

increasing use of lithium ion battery packs on spider lifts, which have chalked up a good track record, since Hinowa pioneered them in 2009. The first ones have been in service for almost 10 years now, and in most cases substantially outperformed the original claims in terms of battery life, both between charges and in the number of years



*Battery powered lifts have become significantly more efficient thanks to direct wheel drive such as on the Genie Z-60/37DC*



Lithium ion batteries are now an available option on Genie GS slab scissors



A Nifty HR21E

they would last before needing to be replaced. Hinowa says that apart from some early failures during the warranty period, they have yet to replace a single battery pack.

The reason that they have not until now spread to other platforms is price and until recently the lack of a standard off the shelf product that could simply replace the six volt lead acid unit. Products are now coming on the market but are double or triple the cost of a wet lead acid battery, but it can be argued that you can use fewer of them. JCB for example uses two, 12 volt lithium ion batteries in place of the traditional four, six volt lead acid battery pack. The company added them as an option on its slab scissor lifts after landing a large order from the Dutch rental start up Hoogwerkt. Given that the JCB scissors use traditional hydraulic wheel drive motors, battery life between charges is unlikely to be



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any better than the standard pack. However they are maintenance free, have a long operational life and are cleaner. All of which can yield significant manpower savings, possibly allowing a reduction in service engineer headcount? It also means that end user customers do not need to concern themselves with checking batteries, or where they recharge - as unlike traditional wet batteries they do not emit hydrogen - an increasing concern on

Trojan Battery recently revealed its first lithium batteries Trillium - Trojan Intelligent Lithium - which replaces lead batteries using the same charging equipment.



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A Lead Crystal battery with Ecobat's Rapid Charger.

### Lead Crystal batteries

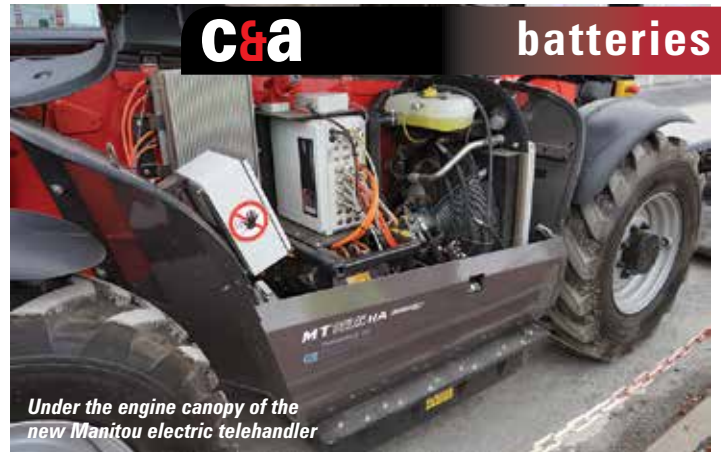
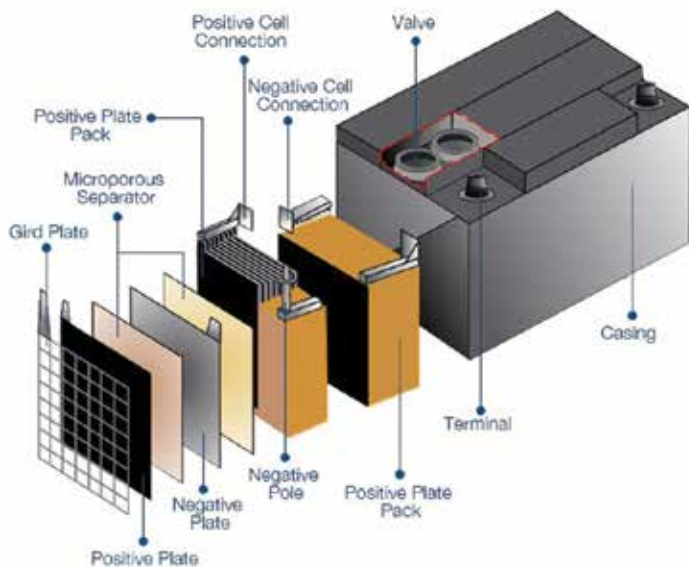
Another alternative is emerging - Lead Crystal - which is said to deliver a similar performance to lithium ion, partly due to the fact that they can be discharged to almost zero without stressing the battery, they recharge in half the time of lead acid, do not 'leak' charge when stored, do not suffer from 'memory' and are said to last up to 18 years - all for a lower price. They are also 99 percent recyclable through traditional channels and classified as non-hazardous goods for transport.

The technology uses pure lead, high purity calcium selenium plates and a safe silicon dioxide (SiO<sub>2</sub>) electrolyte solution that solidifies into a white crystalline powder when charged/discharged. It also contains less acid, no cadmium and no antimony.

Battery distributor Ecobat launched a Lead Crystal range of batteries last year, strategic director Derek Anderson said: "Contrary to common belief, matching the correct charger to the battery is as important as identifying the most appropriate battery for the application. This is particularly the case with a highly engineered

safety conscious sites and projects. Given the costs of lithium ion another maintenance free alternative is gaining ground, the AGM or Absorbed Glass Mat battery. They were originally used as a less expensive, maintenance free alternative to Gel batteries, for applications in food preparation areas and clean rooms etc. The downside was that for a given physical size they were not as good as the lead acid equivalent, often only achieving 90 percent of the run time. Back when scissor lift battery life was a pressing issue, this was significant - pay more and get less performance! However in the years since everything has changed, AGM batteries now offer more storage capacity than lead acid, they have the maintenance free benefits of lithium ion and offer a real alternative to both. When combined with machines featuring direct electric drive they offer enough life to manage two shifts of intense use. All this at a lower cost than lithium, without the concerns some companies have of lithium overheating or their recycling challenges.

The make-up of a Lead Crystal battery



Under the engine canopy of the new Manitou electric telehandler

product such as Lead Crystal, which is designed to provide a realistic real-world alternative to lithium and other lead-based products."

### More powerful packs for booms

The benefit of battery packs with a greater power to weight ratio is that larger battery powered boom lifts are becoming practical alternatives to diesel. Battery powered booms up to 86ft are now finding favour, with JLG offering an all-electric version of its 800 series of telescopic boom, although it currently uses a very large traditional battery pack. Most 86ft Niftylift HR28s have been sold as hybrids with a complete battery pack and a small diesel.

When it comes to the 60ft class the choice is wider still, with Genie having unveiled its all electric Z-60/37DC and hybrid FE version in 2017. Both units use four electric wheel drive motors which can outperform the diesel Rough Terrain Z-60s in the rough. At Bauma they will extend the concept, most likely to the popular 45ft Z-45/25 and 51ft Z51/30 articulated boom lifts. Haulotte unveiled its new HA20 LE Pro Pulseo last April, and went further, stating that it will cease manufacturing internal combustion units over the next few years as part of its Blue Orientation strategy - essentially Haulotte's environmental policy with plans for the entire company to become carbon neutral and as environmentally friendly as possible within its time frame.

At Bauma we are likely to see

other companies introducing electric boom lifts, JLG has already said that it will unveil lithium ion battery powered versions of its 34ft 340AJ, 45ft 450AJ and 52ft 520AJ articulated boom lifts, using the same structural elements as its Diesel RT models, but with and electric motor to power the hydraulics and two electric wheel motors for travel. Expect Manitou to follow suit, possibly at Bauma. But even more interesting is its new electric telehandler using a large lithium ion battery pack. A hybrid version with the addition of a small, emission friendly diesel is also to be launched. The development is part of a cooperation programme with Deutz which is focusing much of its R&D efforts on hybrid and all-electric drive trains. During a recent visit to the Manitou plant in France, the new battery powered telehandler was performing test laps of the endurance track, which includes a rough terrain section and gravel shovelling work station. The speeds were clearly as good as a regular diesel model, but without the noise and emissions. The loudest noise during full speed travel is the 4x4 transmission, normally drowned out by the engine noise.

