

# T<sub>2</sub> Technology



## *Classic Trojan. Intelligently Refined.*

*Every once in a while a classic design inspires new ideas. Introducing T<sub>2</sub> Technology – Trojan's next generation of deep cycle advancement. Inspired by the rugged durability, outstanding performance and long life that you've come to expect from our batteries, Trojan's T<sub>2</sub> Technology is battery technology intelligently refined to deliver even greater performance.*

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*Trojan's T<sub>2</sub> Technology – Experience why no other battery performs like a Trojan.*

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# Battery management reduces costs

In recent years an increasing number of powered access rental companies have tuned into the significant cost savings that can be generated by paying attention to the lead acid batteries that power more than 60 percent of all self-propelled aerial work platforms.

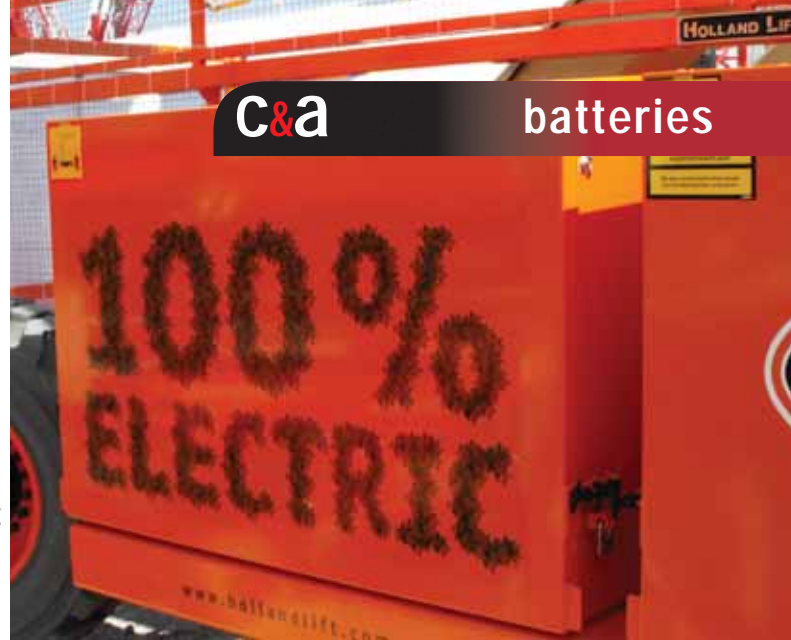
The past year or two has seen rental rates fall while energy/electricity costs have increased and environmental issues have come to the fore. These factors make good battery management more important than ever.

Any effort to reduce battery costs is fortuitously being helped by the emergence of a number of new products and technology which can add to the gains available from good battery maintenance.

## Start out right

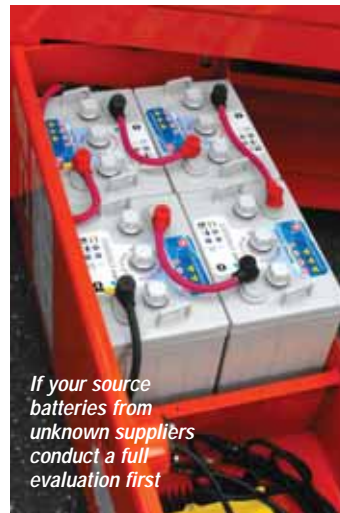
The key starting point is to make sure you buy or specify the right battery for the job at the outset. When buying new, this decision tends to be made for you by the lift or crane manufacturer. Thankfully few, if any, cut corners with the batteries they fit. The three most commonly used batteries - Trojan, US Batteries and Crown - all have solid reputations. However if you

are tempted to buy a new lift from one of the Chinese manufacturers beginning to make inroads into western markets, you may want to check its batteries. At the risk of being accused of a sweeping generalisation, there are a large number of cheap (in every sense of the word) deep-cycle lead acid batteries produced in China which should be avoided at all costs. China produces many excellent lithium ion and NiCad batteries and possibly good lead acid starter batteries? However deep-cycle batteries, while using the same technology, are totally different and rely on experience, good design and high build quality. If you do find a deal on batteries from the region that seems just too good to pass up, check them out on one or two machines first and ideally over a two year period. The true cost of a cheap battery can be prohibitive.



C&a

batteries



*If your source batteries from unknown suppliers conduct a full evaluation first*

When selecting a battery consider the application that the machine will be used for. The manufacturer should have already selected the best size and type of battery for general purpose applications. In most cases this will be a standard well-built flooded battery. While such batteries from the top producers are first class, they do need regular maintenance to keep them at their peak and they can pose risks in some sensitive applications. If you know they will never be checked or there is a chance of spillage or emissions are a concern, then maintenance-free batteries may be the way to go - although there are trade-offs (See *choose the right battery*).

## Look after them

Flooded batteries need regular maintenance, largely consisting of checking and topping up of the electrolyte and cleaning, not to mention regular and sensible

charging. While most of us appreciate this and if faced with the question in an exam would answer it correctly, in real life where time is in short supply, it is often neglected. Ask 20 rental companies if they inspect and top up their batteries regularly and if they are honest at least 50 percent will say that they don't, due to pressure of work or cost. The fact is that this can be a major cost saving rather than an expense. A poorly maintained battery will start to lose its ability to maintain a charge and is likely to fail while out on hire. At that point an engineer is obliged to make a 'house call' possibly resulting in swapping the machine out for another, involving an unscheduled delivery and collection as well as the cost of replacing the batteries. This alone will cost far more than the cost of regular maintenance but the cost of upsetting the customer and damaging your reputation can be far greater again.

*Specify auto top up for full traction batteries.*



*Most manufacturers provide good quality batteries as original equipment*

LED lights on the front of the charger show charge stage for each battery

### Some aids

There is good news for those who find it hard to spend up front to avoid future cost. Given that regular attention to electrolyte level is the most important factor, battery manufacturers are taking steps to address this issue. Crown, for example has introduced a new 'water-saver' cover and vents along with something that it calls 'Pro-Eye' which allows the visual checking of electrolyte levels. On the full traction fork truck-type batteries used on some booms and big scissor lifts it is worth specifying automatic top-up systems, the pay-back is relatively short. This is particularly true for machines such as mast booms where checking the electrolyte can be difficult.

Crown offers its Pro-Eye quick and clean electrolyte check point.



### Snake Oil

A simpler and low cost solution is Thermoil battery de-mister. The product has been on the market since 1992, initially in the RV-camper market then electric boats and golf carts. Over the past few years it has slowly moved into the aerial lift

market. The curious thing is why a product which offers so much has not become standard equipment.

Thermoil is one of those products that appear to be too good to be true. The number of users is growing steadily and everyone we spoke to that has tried it, appears to be a convert. In the USA some major companies such as NES and Genie-refurb are now not only using it but prepared to recommend it. An increasing



The GantiCharger handles each battery individually.

number of European companies have also become converts with one or two major general rental companies now trialling it.

The additive is poured into the battery where it forms an oil film on top of the electrolyte. This helps retain the hydrogen and oxygen gases produced during the charging process within the battery, increasing their re-combination, in a similar way to what happens in sealed batteries. The oil also helps reduce and even eliminate the internal corrosion that can shorten the life of a good battery. Finally it also cuts the dangerous gas emissions and sulphuric acid misting associated with flooded battery recharging, while helping keep batteries clean and their storage box clean.

If you believe the claims of regular users the product might be even better than the manufacturer says. The fact is that cutting the need for regular top-ups, eliminating premature battery failure and, if users are to be believed, doubling the battery life all add up to some substantial savings.



Thermoil sits on top of the electrolyte to prevent gassing and corrosion.

### Saving power consumption

With the cost of electricity climbing and many are looking to reduce their carbon footprint, any products or ideas that can help reduce power consumption are naturally of

interest. One simple tip is to put battery charger sockets on timers to allow charging during off-peak tariffs or to use a more efficient battery charger. (See 'Lowering the cost of battery ownership')

### A better charger?

Another new product that suits the battery packs used on most smaller aerial lifts – the four, six volt deep cycle units – is a new dual voltage/dual frequency charger from Norwegian-based GantiCharger. Conventional battery chargers push power across all four batteries in an unmetered and non-controlled manner which can result in batteries that are fully charged continuing to receive input long after they are fully charged, until their weaker neighbours have caught up.

This process means that extra power is consumed, extra heat is generated within the battery, while the additional gassing causes higher water consumption, emissions and corrosion. The GantiCharger features a separate feed for each battery, allowing it to deliver an individual measured input based on the batteries exact charge requirements. When an individual battery is fully recharged the GantiCharger simply stops its power supply. In this way significant power savings can be achieved while battery life is extended. The product is relatively new and we don't yet know its cost compared to a regular charger. Assuming that any premium is modest and that the charger is at least as reliable as other chargers, this could be a winning concept.

# Choose the right battery and look after it

We asked a number of manufacturers for their input, which as you might hope was very similar. Here is a summary of the tips provided.

While lithium-ion battery technology has made great strides in recent years, long cycle life, deep cycle flooded and sealed-valve regulated (VRLA) batteries are still the choice for aerial lift applications. Deep cycle batteries are optimised for the deep discharge and recharge cycle demands from aerial lifts and other heavy equipment.

Deep cycle batteries typically fall into two primary groups: regular or flooded (Flooded Lead-Acid) batteries and VRLA ones such as AGM (Absorbed Glass Mat) and gel. Flooded batteries provide the best cycling performance of all the deep cycle battery technologies and are generally the best option where lowest life-cycle cost is the key objective. However, to achieve their maximum potential life, FLA batteries require regular care and maintenance which includes:

- Watering depending on frequency of usage and temperature
- Inspection of terminal connections to ensure they are clean and no signs of damage
- Cleaning of the battery case, terminals and connections with a soft cloth or brush using a solution of baking soda and water
- Charging of batteries immediately after each use
- Equalising the batteries by overcharging after the normal charge cycle to keep cells balanced
- Storage of the batteries after they are fully charged in a cool, dry location that is protected from the elements



less sensitive to high operating temperatures. Both AGM and gel batteries are of course costlier than flooded batteries.

There are as many different battery manufacturers as there are battery technologies and choosing from the product offerings of different manufacturers is a matter of identifying the needs that are most important. Selection criteria often includes the quality of the battery, product availability, ability to provide FLA and VRLA battery technologies, a dedicated technical support team, wide distribution network and brand reputation.

So, when selecting a deep cycle battery, be sure to take into consideration all of the elements that will affect the battery's performance, estimated life cycle and maintenance requirements. Flooded batteries may have a lower initial cost when compared to VRLA batteries, however if regular maintenance cannot be guaranteed your best choice is to invest in AGM or gel technology. Over time, the life-cycle cost of a VRLA battery might actually be less than the life-cycle cost of a flooded battery that has suffered premature failure as a result of not being maintained properly.

*If maintenance, fumes or spills are a major issue gel may be the way to go.*

For applications that require maintenance-free batteries, AGM or gel battery technology may be the best option. While a maintenance-free battery provides more convenience, that convenience comes at a price. Sealed VRLA batteries are going to be more expensive and will generally have a lower cycle life when compared to flooded batteries. As with flooded

batteries, when choosing a sealed VRLA battery it is important to consider only deep-cycle AGM or gel technology. AGM batteries have a higher discharge current capacity and are ideal for applications where the batteries are not cycling on a daily basis and can be maintained at nearly a full state of charge for a longer time. Gel batteries provide better cycling performance and are



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# Lowering the cost of battery ownership

The use of full traction fork-truck type batteries is becoming more widespread in the access business, particularly on larger aerial lifts and mini cranes. John Lawton, a director at EnerSys Motive Power Europe, explains how to get the most from this type of battery and lower the cost of ownership.

Batteries are an expensive necessity. If you are going to lower the costs of your operations and ensure that down-time is minimised it pays to understand how to purchase and use your power sources to your best advantage. There are three types of lead-acid battery technologies generally used in material handling equipment: standard design flooded cells, low maintenance flooded cells and maintenance free gel or AGM cells. The latter are best suited to low-duty applications with a lower depth of discharge. Inevitably when buying decisions are made the visible expense is for the battery and charger. What are not always understood are the operating and maintenance costs for the life of the product which should be factored in to give a true life-time cost.

For instance flooded batteries require regular topping-up with deionised water. This is likely to be on a weekly basis for standard designs and less frequently for low maintenance batteries. The cost of water and the labour required to carry out the process should be added into the purchase decision calculation. Water topping-up is of course not needed for maintenance-free batteries which are also designed for opportunity charging. The other operating cost is electricity for recharging your batteries and the amount depends upon the battery technology and the charging system used. Your electricity tariff and the time of charging may also come into the equation. Specifiers and buyers of batteries need to consider all these factors in order to arrive at the true life-time costs.



*Organising rapid changes can save £££s in larger operations*



*Full traction battery packs are being used more widely on aerial lifts.*



For those operating intensively on two or three shifts a day, on the job battery changing is going to be essential. Minimising the time taken to change a battery will bring significant dividends. The traditional method of changing battery pack typically takes around ten minutes. But with the correct equipment this can be reduced to as little as three minutes. The impact of such a reduction in change time can be considerable. In a 24/7 operation, with 50 trucks undergoing two battery changes each per day, the savings can add up to 4,200 hours a year. Additionally by using change equipment which maximises floor space it is also possible to reduce the charging area by up to 60 percent.

For operations that are less intense, 'fast charging' can be considered. This eliminates the need to change battery packs because batteries can be charged when the machine is not in operation - during coffee breaks, at lunch times, between shifts or even during a shift when it is standing idle. It may be possible to re-model operations to allow sufficient recharge time. Fast charging is however only suitable for flooded batteries with airmix. Efficient battery charging brings

significant benefits and means less electricity consumption. There are two things which impact the amount of electricity needed to recharge a battery - the charger's efficiency and the charging factor. Conventional 50Hz charging technology uses large transformers which reduce the efficiency in converting AC input to DC output. Such chargers are typically only 80 percent efficient - older models can be considerably less. The charging factor is usually 1.20 which means 20 percent overcharge to mix the electrolyte and return the battery to a fully charged condition. High frequency chargers are at least 90 percent efficient and have charging factors of 1.08 to 1.15 depending on the battery technology. Such efficiency can produce a reduction of at least 15 percent in electricity consumption thereby not only reducing the carbon footprint but bringing significant financial savings.

For large operations additional savings can be achieved using a software system to manage battery use and charging. By scheduling charging to avoid costly spikes in electricity demand and ensure the correct rotation of batteries, less electricity is required. When all aspects of battery fleet management are operating at optimum efficiency, life-time battery costs can be substantially reduced.

## WORLDWIDE DISTRIBUTOR OPPORTUNITIES



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