Finding the unique solutions to

Move Your Motive Power Fleet Forward

Look at any trade publication, blog, or social media post over the last year or more, and the hot topic related to forklift power is clear – the ongoing "perceived" battle of the ages between lead and lithium battery technologies. With electric powered trucks currently at 64% of the overall truck market in North America (Industrial Truck Association (ITA – www.indtrk.org)), it is an important issue. The best technology solution depends on the application. ***So what are the facts to finding the power you need?***

TOP FACTS

When considering a battery power solution, whether as a replacement for your existing fleet or batteries for your new fleet, the most important questions to ask is "What are my power needs, maintenance desires, and infrastructure capabilities"? Based on those unique needs, and along with some additional facts addressed below, you will be able to determine your best power solution.

Individual Power Need:

The key is matching the right technology and charging practice to your unique situation. It is important to work with a battery manufacturing partner to assist you with a power study to determine your needs. In some cases the solution could be a single technology, in other cases, the answer could be a mixture of both lead and lithium batteries. Choosing a partner who is familiar with

and can provide both technologies is important to offer an unbiased solution. Performance is critical to the success of your operation. A key way to figure out your power requirement is by determining the daily Equivalent Battery Unit (EBU) needed. An EBU is defined as a battery's maximum allowable daily discharge based on its overall capacity.

There are applications that require 1 EBU, and there are applications that require more. The following is a recommended guideline to optimize usage without the need for multiple batteries and change outs:

- ***1 EBU daily – Best suited for*** **CONVENTIONAL CHARGED LEAD BATTERY**
- ***1 - 1.25 EBU daily – Best suited for*** **OPPORTUNITY CHARGED LEAD BATTERY**
- ***1.25 – 1.6 EBU daily – Best suited for*** **FAST CHARGED LEAD BATTERY**
- ***≥ 1.6 EBU daily – Best fit for*** **LITHIUM-ION BATTERY**

Understand Change, Question Absolutes:

The material handling industry has been around for centuries, and has gone through some major changes. What has been good for one application might not be right for others, especially over time. Be aware that both lead and lithium can offer efficiencies and cost savings dependent upon the need. When considering which technology to use, realize every application is unique and be sure to consider all factors before making your decision. One of the best tools to determine the financial benefit of the power solution is a formal Return on Investment (R.O.I.) analysis.

Some major R.O.I. factors to consider include Power:

1. Charging & Battery Rooms–

- While common in conventional lead charging applications, these rooms are growing less common in larger warehouses and 3PL facilities as they look to maximize their floor space for profitability. Removing the battery changing and charging room can be accomplished with lead technology through Fast or Opportunity charging or by using maintenance-free design (no watering) options such as the ***Deka Dominator®***. In addition to lead, this can also be accomplished with lithium technology. With both these methods, the batteries can be charged at

Match the right battery technology and charging practice to your unique situation.

higher rates on demand throughout the facility, eliminating the cost of the battery room. The key here is determining the number of EBU's per truck and matching the right battery strategy to eliminate changing.

2. Cost/Life/Maintenance–

• Almost all lithium batteries have a higher acquisition cost than lead per battery (so the number of batteries needed per truck is an important factor in total cost). In addition to battery cost, a customer must weigh the cost of ongoing maintenance (watering, PM's,). Lead batteries offer technologies that require watering and also offer maintenance-free designs that do not. Lithium technology does not require watering. Lastly, the life of the battery is critical to determine your daily cost. Depending on your application, there are two independent ways to measure battery life, either cycle-life or AH throughput. Regardless of the technology, product life is historically dependent upon the duty cycle of the product. NOTE: This is where it becomes critical as a significant part of your ROI to properly balance your total acquisition cost, maintenance expense, and the expected life from your batteries.

3. Technology–

• Batteries made from lead technology have been around for well over a century and are the predominant form of stored electrical energy in the world today. It is a known product with an experienced and well versed user base. While lithium is a newer technology, the advances made over the past few decades have been significant. While there are many lithium technologies and chemistries in the marketplace (LFP, NMC, LMO, and NCA), Lithium-iron phosphate (LFP) technology is the perfect blend of power and safety for motive power applications.

PAY ATTENTION TO THE DETAILS:

In addition to your needs detailed above, be aware of what each technology offers in terms of features and benefits specific to different operating situations and how this affects your total investment in both material and personnel requirements. For example, Deka flat plate flooded lead batteries have multiple types of designs, each with their own benefits. Opportunity and Fast Charge product like the, ***Deka D-Series®*** or the ***Deka PowrMate®***, allow users to charge on demand, during breaks and lunches, enabling charging stations to be setup throughout a facility. Should a user be interested in maintenance-free designs (eliminating the need for watering), there are various Gel battery models available such as the ***Deka Dominator®***.

A note of caution: Another maintenance-free designed lead technology called Absorbed Glass Mat (AGM), successfully used in both the automotive and reserve power markets, is also promoted by some as a motive power solution. Some companies even promote enhanced AGM batteries with thin, pure lead plates. However, based on extensive laboratory and field testing, the results show that due to the heavy duty motive power cycle, neither of these technologies are well suited for motive power applications. The predominant weakness of AGM batteries was found to be dryout, and internal shorting resulting in an accelerated decline of performance and life within these heavy duty deep cycle applications. When comparing lithium batteries, find established lithium battery manufacturers,

like the ***Deka ReadyPower®***, that adhere to the highest quality standards and materials paired with cutting-edge technology to ensure optimal battery performance, life, and safety.

Key Lithium Attributes:

- **UL Certification–** The product should be UL listed like the ***Deka ReadyPower®***. To be UL listed, the product must pass a multitude of tests including nail penetration and drop simulations to name a few.
- **Battery Management System–** This critical component should be a well-designed, rugged Battery Management System (BMS), which helps monitor the cells for performance and safety. The BMS device should also be UL listed.
- **Maintenance–** As lithium batteries have higher voltage, it is critical to work with a lithium partner who can assist you on all the safety and training protocols should service be required. There is product specific training that is critical prior before anyone should be working on any lithium product.
- **Product Communication–** Look for products that offer seamless electronic communications between the battery, truck, and charger.

GREEN IS GOOD - RECYCLING/SUSTAINABILITY

Lead: In terms of recyclability, lead batteries are the most recycled consumer product in the world with a recycling rate of 99% (BCI Study). The recycling and sustainability of lead batteries is a massive success story as virtually 100% of a lead battery's components are recyclable. Not only is it recyclable, but also sustainable, meaning that when it is picked up and recycled, the lead and components can be repurposed and turned into a new lead battery. In addition, there is a financial incentive for recycling since a monetary credit is received by the customer when turned into a new lead battery.

Lithium: There have been many numbers discussed to the recyclability of lithium with varying rates. While there have been inroads specific to recycling lithium batteries, it is still a process in development. The current recycling process is tailored towards recycling individual components, such as steel and copper that are very valuable. However, there is not yet a viable and cost positive solution where spent lithium batteries are turned into new batteries like they are with lead.

THE POWER YOU NEED

Finding the power you need is all about knowing the individual application and being educated to the facts, both financial and otherwise to make the right decision. There are benefits and challenges for each technology. Everyone likes options, but to choose the right options you need information. As the cost to power most lift truck fleets reaches into the tens and hundreds of thousands of dollars, information is key to help avoid costly mistakes. A view of the full picture is critical. It is also critical to find a manufacturing partner that can offer you an unbiased look at the available motive power choices. Choose a manufacturer that offers both lead and lithium technologies, has the capability to provide service and support anywhere, and can match all of it to your specific fleet's needs.

Knowing the facts and aligning your needs will provide you with the best ROI and the right power solution to help ensure the success of your operation for many years to come. ◆

