BATTERIES DRIVING DEVELOPMENTS

Damon Hosmer, product manager of energy solutions at the Raymond Corporation talks to LHI about batteries and the future of lift truck power solutions.

Lithium-ion batteries provide a number of benefits for warehouse management that may better support their efficiency needs. Arguably, the lithium-ion battery's greatest strength is its ability to allow trucks to run longer without interruption. Lithium-ion batteries have a very high energy density - about triple the capacity of a similar lead-acid battery - which is a measure of how much energy a battery can hold in a given volume or battery box space. The more energy in the forklift battery box, the longer the runtime will be. Lithium-ion batteries offer the highest energy densities.

Another benefit of lithium-ion batteries is their ability to be opportunity-charged. Lithium-ion batteries charge in much shorter periods of time than traditional lead-acid batteries. For example, within a three-shift operation, a warehouse could have three lead-acid battery packs per truck — one in the truck for a shift, one in the charging room for a shift and one cooling for a shift. However, for many of these applications, a single lithium-ion battery could be used with "opportunity charging," which allows operators to take advantage of breaks, lunch hours or shift changes to recharge in the truck — with no battery removal or replacement — and maintain battery performance throughout their shift. Centralised battery rooms can be replaced with more convenient opportunity-charging stations located throughout the warehouse.

Lithium-ion batteries are maintenance-free and are considered intelligent batteries that can report a battery's status and react to all aspects of its performance, from the state of its charge to its actual state of health.

Damon Hosmer, product manager of energy solutions at the Raymond Corporation says, "It's important to take a total cost of ownership approach when making buying decisions for alternative energy solutions to ensure long-term cost savings can be considered"

He continues, "E-commerce, labour, sustainability and technology are prompting customers to look at alternative energy sources for each of their applications. The growing electrical automotive market, in particular, is driving the development of new technologies, including lithium-ion batteries.

Developments around the lithium-ion battery over the past five years have led to reduced costs and have, in turn, accelerated the conversion to lithium-ion batteries in the material handling market.

"The culmination of these developments will propel the adoption of energy solutions as part of our customers' overall business strategy. Lithium-ion batteries, in particular, will create a disruption within our marketplace, and can be leveraged as a business strategy by customers to meet the growing demands of their business."

But, how much encouragement do customers need to adopt the new power alternatives? "It's no surprise that industry challenges, such as increasing consumer demands and a reduction in labour, have left organisations looking for solutions to enhance productivity and boost operational performance to meet these demands," says Hosmer.

"This led to warehouse managers investigating the benefits of alternative energy solutions technology that may better support their needs. In fact, 31% of manufacturing and supply chain organisations say they will prioritize

investment in batteries and chargers over the next three years, according to a recent MHI Annual Industry Report.

"So, in many ways, lithium-ion battery technology has been driven by market demand. Warehouse solutions organisations like Raymond were motivated by this demand to look past traditional energy solutions to identify alternative energy solutions like the lithium-ion battery that will address these around-the-clock needs."

While warehouses — especially those in the food processing industry — are choosing to convert their fleets to electric forklifts and electric forklifts powered by lithium-ion batteries are a viable solution for increasing productivity and decreasing the costs of warehouse operations, there are still organisations which prefer more traditional technologies.

"There are operations managers who aren't yet ready for lithium-ion batteries or who prefer lead-acid alternatives," says Hosmer. "For this scenario, we recommend thin plate pure lead technology (TPPL), an additional alternative energy solution, which offers a maintenance-free lead-acid battery with no watering requirements or weekly equalisation charges. A TPPL battery can be fast charged at rates of up to 60%, without risk of damage to the battery's internal construction. Operations that don't have duty cycles to support a lithium purchase should consider this as a middle-ground solution.

"Overall, it's important for warehouse management to determine whether a lead-acid or lithium-ion battery is best for their individual operations."

"It's important to take a total cost of ownership approach when making buying decisions for alternative energy solutions."

Enersys partners with Raymond with some battery development, but is not not working with them on any lithium ion battery development at this time.

"Raymond has taken a holistic approach to battery development," says Hosmer, "and is in the process of developing a battery that will integrate energy solutions to support the entire customer experience. Raymond's commitment to providing top-notch products and exceptional customer service has empowered the company to create smart power systems to support the advanced requirements of each Raymond truck.

"This new technology provides an enhanced level of communication between a battery and a charger, as both systems are constantly interacting to ensure operations reach 100% efficiency at all points in time.

"This integrated approach allows for more streamlined processes — ultimately, helping Raymond's customers run better and manage smarter," says Hosmer.

Lithium-ion batteries can also play a role in the increasing use of telematics. "Telematics enhances the use of lithium-ion batteries," says Hosmer. "Battery manufacturers have been actively studying power consumption to understand battery requirements for decades through power studies enabled by telematics."

Hosmer explains, "During a power study, an e-meter is plugged into the truck and logs current, voltage, cumulative charge and discharge amp-hours and watt hours, temperature and cellular service quality on all of the warehouse's electric trucks. The meter tracks the battery's performance throughout shifts, which helps warehouse management realise how much energy the battery is consuming. With this information, you can understand the true power consumption within applications.

"Battery usage of one truck may be completely different than another. A cold storage operation requires greater energy usage. Based on these differences, the third-party provider can offer customised recommendations on the most cost-effective solution to address these specific energy needs, truck-by-truck."

Hosmer says that a power study is an effective first step toward identifying the best solutions for your operations. Additionally, it creates an ongoing dialogue with the battery provider who can create informed product recommendations.

Lithium-ion also plays a huge role in AGV offerings and will continue to evolve at a rapid pace. "AGVs provide Raymond the opportunity to create a purpose-built power solution based on each specific customer application," says Hosmer. "Through an advanced state of charge modelling and application-specific simulations, Raymond's applications engineering group can tailor a customisable solution that supports future growth, providing a scalable power solution for each automated facility.

"Raymond also is developing an automated charging product to support AGV applications. The goal is to provide a maintenance-free set up using a combination of lithium-ion and TPPL battery products supported by an automated and potentially wireless charging infrastructure. Lithium-ion batteries enable automated forklifts to be charged in short cycles aligned with production cycles, eliminating the need for a separate charging station. Opportunity charging reduces downtime for lithium-ion battery-powered AGVs, as the batteries do not need to be replaced, and enhances ergonomics in the workplace."

Will so much emphasis on green technologies will lithium-ion stand the test of time? – Hosmer believes it is in the mix.

"Future electric truck power will embrace a number of different power solutions," he says. "Hydrogen fuel cells will play a role in conjunction with lithium-ion and other technologies. Hydrogen fuel cells have significant sustainability benefits, such as increasing efficiency and reducing pollution.

The high voltage architecture (80, 96, 144v) we have traditionally seen in the automotive industry will begin to migrate to the lift truck business. We hope this will help lower the initial cost of many power solution options, similar to the way we have seen costs rapidly decline within the EV [electric vehicle] market."