

In safe hands

Careful chemistry selection in lithium batteries is key to meeting increasing expectations for longer life and safety, as well as reducing maintenance

WORDS: KARL VADASZFFY

Founded in 2007, Super B develops and produces advanced lithium batteries for a number of applications, ranging from small starter batteries to high-power solutions for ferries, tourist boats and yachts. Headquartered in Hengelo, the Netherlands, and with more than 10 years' experience in developing energy storage solutions, the company's aim is to provide among the safest, most robust and efficient batteries available in the maritime industry.

Tim Tiek, who's been CEO since 2015, says that when considering the different chemistries that comprise lithium, "there's always a trade-off between energy density, safety and cost". Super B specializes in lithium iron phosphate batteries because, claims Tiek, "They offer two key advantages over other lithium chemistries in terms of ensuring and improving battery safety: thermal and chemical stability."

Super B's cells are also built to very strict quality standards, according to the company's own and external safety specifications. In addition, the company's products feature integrated battery

management systems for every battery block, or as Tiek calls it, "additional intelligence". Each battery has its own protection electronics inside; they know their state of charge, and if something is wrong they perform their own diagnostics and cell tests and communicate with each other, shutting down in the unlikely event of battery failure.

In addition to safety, Tiek stresses the importance of robustness and lifetime in battery development. Super B's lithium batteries are among the very best in terms of longevity, with products sometimes exceeding 10 years. Tiek says that they also provide excellent performance through high energy density at a reduced weight. A single Super B battery is smaller in volume and weighs up to 80% less than conventional batteries, according to the CEO. "Even higher energy density, or a somewhat lower cost per kilowatt, are possible, but only with a safety compromise. We are not willing to take that risk for marine applications."

"Even higher energy density, or a somewhat lower cost per kilowatt, are possible, but only with a safety compromise. We are not willing to take that risk for marine applications"

Tim Tiek, CEO, Super B

Tim Tiek was appointed as CEO at Super B in January 2016 while simultaneously, founder Prins Doornekamp, took on the new role of CTO



“



Left: The new Lovers canal boat in Amsterdam runs silently and emission-free all day on a single charge equipped with Super B technology (below)

Bottom: Ferry Happiness, which was retrofitted with a hybrid electric propulsion unit to help combat the pollution problem in the Kaohsiung port in Taiwan



Route canal

In recent months the company, which sponsored the renowned Vendée Globe yacht race, started converting a tourist boat run by a company called Lovers, in Amsterdam. The vessel is 20m long and transports up to 100 tourists a time, all day, every day on 60-minute routes through Amsterdam's canals. Powered by fully electric propulsion, the vessel has been fitted with Super B's 99 SB12V160E batteries and travels at low speed, averaging 7km/h.

As the vessel is a service boat, an important request from Lovers was that any downtime be minimized. To this end, as Tiek explains, "Right now the boat charges overnight, but it will eventually be able to charge in just one hour. And with such minimal charging time required, it will be able to operate for 12-15 hours per day."

Meanwhile the company's most recently completed project, a hybrid passenger ferry serving Taiwan's popular tourist destination Cijin Island, took only three months to deliver to integrator Ship & Ocean Industries R&D Center (SOIC). It heralds Asia's first retrofitted hybrid-electric ferry, called Ferry Happiness, and transports eight million passengers a year.

To help reduce pollution levels and fuel consumption between the island and Kaohsiung, the 100 ton, 23m-long vessel is retrofitted with an electric system by electric driveline manufacturer Visedo Marine, which replaced the original 300hp diesel engine. The use of generators has also been minimized and clean propulsion

is further supported by "a relatively small battery bank of 100kWh," says Tiek.

Launching from berth every 15 minutes, the vessel's powertrain was designed to ensure pure-electric cruising for half the ferry's operation time; with fast shore charging, this pure-electric percentage can be higher. For now, it's estimated the current electric propulsion solution will save more than 25,000 liters of fuel every year.

During a successful sea trial test, with 9.1kts top speed and 5kts/h endurance, the vessel surpassed initial estimations, performing to the highest efficiency and capacity. "The ferry travels only a very short distance of 650m, so most consumption during the trial can be attributed to onboard equipment that needed electrical power, such as the heating system," Tiek says. "Now the generator remains onboard for backup."

Peace of mind

Other projects that Super B is involved in are in Scandinavia, Italy and France, and it's planning many more worldwide. "Each application is different in terms of maximum power consumption, number of cycles and temperature profiles," says Tiek. "So for each application – whether ferry, tourist boat, or yacht – we always start by creating an implementation proposal for a customer, getting inputs from them in terms of use before proposing a battery system and tailoring it to the application."

Helpfully, no maintenance is required for Super B's batteries, unlike with lead acid



solutions. "They're all closed systems," says Tiek. "The only wear is a degradation of the electrolyte and electrodes, which is predictable because we use profiling to work out how much degradation will occur after 10 years. Therefore there's no requirement to do any maintenance in between whatsoever."

Tiek predicts that in the future there'll be a substantial increase in the demand for energy storage. To cater for this, he argues that more hybrid solutions will be needed, in particular hybrid batteries. "This means you could combine all the benefits of lithium – the lifetime, reliability and safety – with something such as an ultracapacitor, or even a hydrogen solution. Over the next decade I think we'll see a best-of-both-worlds approach, where customers don't opt for just one battery type but a combination of energy solutions." +