Li-ion batteries

Powering lithium-ion battery applications with 5-minute fast charging

DESTEN technology enables fast charging for enhanced energy storage

Pam Poulin, Market Development Manger at Thermo Fisher Scientific, and **Dr. Julian Renpenning** conducted this interview with Alasdair Pocock, Head of Business Development at DESTEN.

DESTEN introduction

DESTEN is a growing force in the battery technology industry, founded to develop and deliver powerful system technologies for mobility and stationary energy storage applications. DESTEN has disrupted traditional battery technologies through nearly a decade of research and development around lithium-ion cell and system technologies. In 2017, they developed the world's first 10C rechargeable lithium-ion battery. Their innovative battery technology includes high-power NMC and LFP cells, alongside powerful battery modules and system solutions. DESTEN is deploying its modular battery technology solutions across 2W & 3W, Marine, Passenger and Commercial Electric Vehicle applications, and stationary storage technologies including UPS, Mobile and stationary battery buffered EV charging infrastructure. In this interview, we had the privilege of speaking with Alasdair Pocock, Head of Business Development (International), about how DESTEN aims to contribute to and revolutionize the energy storage and electric mobility sector.

Can you start by sharing some detail about DESTEN and what you do in regard to lithium-ion battery research and battery applications?

With pleasure. DESTEN is a leading rechargeable battery cell and system technology research, development, and manufacturing company specializing in high-power, long-lasting and competitively priced lithium-ion technology solutions for electrified mobility and stationary applications. We are the first company to develop and deliver a 5-minute charging lithium-ion battery technology and the first to commercialize a 6C charge (fully charged in one-sixth of an hour, or 10 minutes) lithium iron phosphate (LFP) battery technology, which is expected to become the ultimate benchmark for LFP cells.

Until now, Li-ion battery technology has typically been limited by trade-offs. Our battery technology is able to achieve sub-5 minute recharge without significant trade-offs in energy density, cycle life, cost, and safety, with each of these performance aspects matching or exceeding batteries in today's applications. We are currently ramping up our lithium-ion battery technology production with partners in East Asia and are seeking to establish a North American battery production facility to meet the demand for our battery technology in the North American market.

We have recently undertaken a number of projects with our partners whereby we provide full-scope technology solutions built around our battery technologies. This is akin to moving towards a BYD model rather than acting as a pure-play battery cell producer.

What are the challenges faced by the electric mobility and energy storage industries that make high-power batteries so important?

The electric mobility and energy storage industries will require high-power batteries to overcome application-specific challenges in conjunction with engendering widespread adoption. In the electric mobility sector, achieving fast charging and discharging is critical in eliminating range and charging anxiety for electric vehicles (EVs). Our high-power NMC technologies enable ultra-fast charging for high-performance battery electric vehicles (BEV) and plug-in hybrid electric vehicle (PHEV) automotive applications. High discharge rates result in improved performance, while high charge rates provide the ability to charge batteries quickly and improve energy recuperation during braking, extending the overall range of a vehicle.

DESTEN Launches Ultra-Fast Charging Lithium Iron-Phosphate Battery, the first LFP cell capable of charging in 6 minutes.

In what type of commercial battery application do you think fast charging will be most significant?

For commercial vehicles, including fleet mobility, maintaining a strong ROI is essential. Our fast-charge LFP battery technology has significant advantages here. With lower costs compared to NMC battery chemistries, longer cycle life, and fast charging times, these solutions offer a lower total cost of ownership. At the same time, they provide improved uptime by minimizing time spent at charging depots, allowing more time to be devoted to commercial activities.

Wouldn't swapping batteries be a good and simple solution, at least for the small vehicle market?

Not necessarily. The recent trend of battery swapping has brought its own set of problems in terms of high initial capital outlays associated with rolling out battery swapping infrastructures, alongside the high costs associated with operation and maintenance. From the customer perspective, that battery swapping solution providers ensnare customers in a closed ecosystem, wherein solution providers can charge higher prices across product types. Most importantly, battery swapping engenders carelessness, as users have little concern for batteries that do not belong to them resulting in challenges relating to maintaining safety and asset longevity. With DESTEN battery technology, the future of small-format mobility will be integrated fast-charging batteries.

Beyond the benefits for electric mobility, where do you see additional potential for your battery technology?

Battery Energy Storage Systems (BESS) represent another field with strong potential. BESS markets require significant energy capacity and system footprints to meet high power demands. This is particularly true for EV charging infrastructure, where transmission constraints and the time and cost associated with such installations present key challenges to EV charging deployment. High-power applications, such as short-duration UPS systems and battery systems designed to manage power fluctuations, are where DESTEN excels. In the EV charging infrastructure market, DESTEN's technology increases power capacity without requiring major transmission infrastructure upgrades, allowing for faster on-site charger integration and the deployment of more chargers relative to available power capacity at a given location. We are actively working on projects with our partners to deliver innovative solutions for these applications.

How does DESTEN manage to develop battery technologies that address these challenges? Can you explain the R&D and production components?

Our dedicated R&D and manufacturing facility employs advanced manufacturing techniques and utilizes a diverse portfolio of cathode materials. We specialize in upgrading lithium nickel manganese cobalt oxide (NMC) and lithium iron phosphate (LFP) based battery cathode chemistries to achieve superior power and performance characteristics.

DESTEN's advantage is derived from the following key aspects:

- in-house cathode and anode active material refinement,
- nanomaterial additive formulation and incorporation,
- cell structuring techniques,

as well as differentiated manufacturing approaches, from the aforementioned material refinement and processing to electrode coating and cell formation. We draw these cell technologies into comprehensive and modular technology solutions for our partners, by leveraging our advanced understanding of our underlying cell technologies we are able to deliver system level solutions which confer enhanced value in their applications.

What are the pros and cons, or trade-offs, associated with high-power cells in the industry? How is DESTEN's portfolio and materials different?

In the industry, high-power cells often face trade-offs in terms of energy density, cycle life, and safety. DESTEN's portfolio and our material platforms allow us to mitigate these trade-offs. Our material formulations are designed to enhance the stability of the cells under high currents. These active materials are applied to specialized electrodes and combined with our proprietary electrolytes to deliver a whole-cell approach to high-power stability and longevity.

Our high-power NMC technologies deliver high energy densities of up to 280 Wh/kg while achieving C-rates of over 10C charge, 20C discharge and up to 3000 ultra-fast charge cycles. Our fast-charging LFP technology, on the other hand, offers longer life, in excess of 5000 cycles and a low acquisition cost.

Importantly, across the portfolio, DESTEN cells exhibit a strong chemical and temperature stability profile. Under ultra-fast charging conditions, temperature deltas do not exceed 15°C beyond ambient temperatures. This stability solves key issues associated with today's batteries that experience thermal events.

Can you provide examples of how DESTEN lithium-ion cells solve problems across different industries and segments? Are there any ongoing projects you can highlight?

DESTEN's battery technology finds applications in various industries. For example, we are working on a 2W project where we have integrated our ultra-fast charging LFP battery technology into a high-voltage battery pack to enable charging from a DCFC (direct current fast charger) station, which is used today for passenger car applications. We are developing a solution consisting of a high voltage battery pack and low voltage powertrain, and we will be offering this to our established partners and prospective customers. We are undertaking this effort to solve the key challenges associated with battery swapping in the 2W/3W (2Wheel/3Wheel) segment of mobility and last-mile delivery. In this segment, what we have today is typically a three-hour charge or battery swap.

Battery swapping is problematic in many ways, including high operation and maintenance (O&M) costs associated with careless use—affecting contacts and connections, corrosion, challenges around localized demand imbalances, and lack of interoperability—resulting in high switching costs that negatively impact buyers in the long run and allow suppliers to apply monopoly pricing on O&M and complementary goods. Thus, charging at EV charging stations, and a charging time of 6 minutes (20-80% SOC), will revolutionize the 2W/3W electric mobility market.

To facilitate this, we are collaborating with partners to bring our battery technology to stationary and semi-stationary storage applications, with a particular focus on EV charging. This includes our collaboration with partners on battery-buffered stationery and mobile EV charging systems. This allows for the implementation of high-power charging, which is important for the next generation of EVs.

DESTEN, with our partners, have also delivered power BESS solutions for a number of applications. One example is a solution that has been adopted for use in off-grid and on-grid mobile phone towers, where in tests with our customer we have found fuel savings of up to 63%, even without renewable energy generation solutions. We also delivered an uninterruptible power supply (UPS) for hospital and industrial power applications to a large Asian conglomerate.

Do you have an example of your fast-charging battery application specifically for the automotive industry?

In the automotive sector, our high-power NMC lithium battery cells enable ultra-fast charging, enhancing high-performance BEV and PHEV vehicles. One particularly exciting mobility project we are involved in is the development of an LMP3 (Le Mans Prototype) race car with InMotion. The nature of the partnership is to bring "electric refueling" to the race track, and together we have managed to achieve a full charge in under 4 minutes (from 10-80% SOC)—comparable to refueling at a gas station today—and with strong on-track performance (up to 600kW, or around 800HP). DESTEN has provided its high-power NMC cells for this application, and we expect the racer to be on the track in the first quarter of 2025.

Contact us for more information on our chemicals for battery applications

For more information about chemicals for battery research and development, visit **thermofisher.com/battery-chemicals**