

Lokistix

temperature-resistant box with a modular inlay, embedded electronics module and cloud-based monitoring and analytics to protect cylindrical, prismatic and pouch cells of all sizes and chemistries during transport and storage

the challenge

With our safe and intelligent packaging solution for lithium-ion batteries (LiB), we combat the dangerous effects of thermal events during transportation and storage. LiBs are classified as dangerous goods because they carry the risk of emitting toxic gases, catching fire or even exploding after an internal short circuit. In logistics, this failure can be caused by manufacturing defects, thermal or mechanical abuse or combinations thereof. Once a battery cell experiences such a thermal event, commonly known as a thermal runaway (TR), it is very likely to infect neighbouring cells, triggering a chain reaction. This in turn is known as thermal propagation (TP). The thermal energy released during this reaction is highly dependent on the chemistry, capacity and form factor of the battery, as well as the type of fault causing the TR. Accidents in the past have resulted in warehouses catching fire, ships sinking, trucks breaking up and, unfortunately, loss of life. Our innovative packaging solution combats both TR and TP of LiB cells during transportation and storage. On the one hand, we reduce the risk of TR to reduce the likelihood of an accident in the first place. On the other hand, we prevent TP, minimizing the impact of a thermal event.

the innovation

The Lokistix LiB cell packaging solution consists of a temperature-resistant box with a modular inlay, an embedded electronics module, and cloud-based monitoring and analytics software integrated into the Internet of Things. Its purpose is to protect cylindrical, prismatic and pouch cells of all sizes and chemistries during transport and storage.



It comes in standard sizes of $\frac{1}{4}$, $\frac{1}{2}$ or an entire Euro pallet ensuring compatibility with existing infrastructure. The box improves cleanliness, as it is sealed off from the environment shielding dirt and particles. The inlay provides passive-preventive cooling through an innovative material that can absorb and dissipate heat in the event of an impending TR significantly reducing the chances of a thermal event. If the malfunction is too severe, and we are unable to stop TR, we have a pressure relief valve that allows the hot vent gases to quickly escape from the box without heating the neighbouring cells, preventing TP. These features significantly increase safety and can lower insurance premiums due to the reduction in incidents.



Our electronics module monitors GPS, temperatures, acceleration, and humidity of the cells, which enables an early warning system for thermal events and increases transparency throughout the supply chain. In addition, cells damaged during transportation can be sorted out immediately upon receipt without having to carry out an incoming goods inspection. This reduces cycle time and the risk of faulty cells in the assembly line. The data can be accessed through our cloud-based dashboard or existing 3rd party systems.

how it was implemented

Our box can be acquired as a product by LiB cell manufacturers, freight forwarders and carriers, original equipment manufacturers (OEMs) or anyone requiring a transportation or storage solution for LiB. As reusable packaging solution, the boxes will circulate between sender and receiver or be used as storage containers in warehouses. The collected data will be made available through our cloud-based dashboard or integrated in existing software such as Enterprise Resource Planning (ERP), Transportation Management Systems (TMS), or Supply Chain Visibility Platforms (SCV). In addition, truck drivers, train drivers, ship captains and airplane pilots as well as the fire department are to be warned immediately via their smartphones if a thermal event occurs. The fast first response is one of the most important factors when it comes to impacts of TR and TP events, which justifies the additional effort. Monitoring, analytics, and alerting software will be a license-based service. Our future

activities will be related to packaging solutions for transport and storage of entire battery modules, packs, and vehicles

result

We are still in the product development and implementation phase of the project and expect to have a prototype by Q1 of 2025 as well as a minimum viable product by Q4 of 2025. This includes testing and verification as well as certification for dangerous goods.

conclusion

We live in a world where the production of LiB plays and will continue to play an important role in decarbonisation. Demand as well as the requirements to power- and energy-density will increase, which consequently leads to more incidents with bigger impact. Regulating bodies such as the national fire protection agency in the United States are working on stricter regulations in regard to safety along the entire battery supply chain. All these trends and developments point towards a huge market to be addressed by the Lokistix battery packaging solution. We are eager to contribute to a safer, more transparent as well as more efficient future of transportation in an uprising industry. Please feel free to reach out at any time to learn more about our solution. We are happy to introduce you to the details of our innovative approach.



LINK: <https://www.lokistix.com/>

