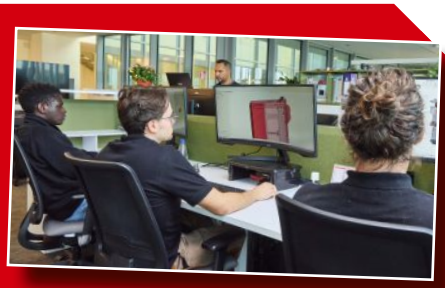
Flash Battery develops integrated high-voltage battery system



Over its 14-year history, Flash Battery has been involved in challenging projects, none more so than developing a range of custom high-voltage lithium batteries designed for GPUs. Produced for a leading GSE manufacturer, Flash Battery engineered the lithium batteries as an industrial high-voltage battery system fully integrated into the machine's electrical architecture.

Airports are hives of activity with many processing thousands of passengers and tonnes of cargo a day, requiring reliable equipment. European emission regulations are driving a transition away from ICE towards alternative power solutions, primarily electric power. GSE is being electrified to reduce emissions and noise, increase operational reliability, reduce total cost of ownership and improve fleet energy flexibility.

Flash Battery's project to upgrade an integrated high-voltage battery system for electric GPUs started in 2019 with a GSE manufacturer. The intention was to deliver an advanced technological upgrade for a high-voltage solution, improving integration within the GPU's electrical design and raising standards of safety, reliability and operational continuity.

The previous configuration of the electric GPU used a modular solution made up of small battery units with basic electric controls. The GPU manufacturer had to manage highly complex assembly, numerous modules connected in series and parallel, external non-integrated auxiliary components, long assembly times and overall poor quality. The system was complex and not reliable, so Flash Battery developed an integrated high-voltage battery system to simplify the architecture, reduce the number of components and improve overall efficiency.

It quickly became clear that this was a complex engineering project, which required the R&D team at Flash Battery to collaborate closely with the customer's technical team. The project required concentrating high levels of energy in a reduced space while ensuring full compliance with the main international standards for industrial high-voltage batteries, including requirements for transport and electrical and electromagnetic safety.

The most important elements of the project included the integration of safety systems, the implementation of advanced management logics required by the customer, the ability to use batteries in parallel to achieve high energy storage capacity, the industrialisation of high-voltage batteries, passing safety, mechanical, EMC and sector-specific tests and to provide after-sales design.

A range of high-voltage lithium batteries dedicated to eGPUs were developed to meet different operational demands with two energy capacities of 50 and 125kWh. Both configurations use lithium iron phosphate (LFP) chemistry for maximum safety, stability and service life of more than 4,000 cycles.

Creating two battery capacities makes it possible to store large amounts of energy using only a few batteries in parallel, reducing the number of components, simplifying the design and lowering the cost of the overall solution.