BEST START

Partner Company Profile

ASCENTEK

Globally, the demand for reliable, sustainable, and high-performance energy storage solutions is growing. Traditional battery technologies, such as lead-acid and lithium-ion, face significant challenges, including poor temperature performance, safety risks, and environmental concxerns. These limitations particularly impact the military, where high performance, compactness, and proven dependability are essential to operations. Ascentek, Inc., a Minnesota-based innovator, is addressing these challenges head-on with its groundbreaking high-power sodium-ion cells, offering a safer, more efficient, and environmentally friendly energy alternative.

Advancing sodium-ion battery technology for military application

Ascentek's sodium-ion batteries are designed to excel in extreme temperatures, provide long-term storage stability, and eliminate safety risks associated with thermal management. These innovations are inspired by direct feedback from vehicle manufacturers, who highlighted the inadequacies of lead-acid and lithium-ion batteries in real-world applications.

Sodium-ion batteries offer significant advantages over traditional options: they maintain 90% capacity at -40°C , compared to a 30% reduction in lithium and lead-acid batteries; they are roughly one-third the weight, easing logistical burdens; they exhibit a minimal 1% self-discharge rate, unlike lead-acid's 10%; and their entire supply chain, from minerals to components, is sourced domestically in the USA.

Lead-acid batteries, while widely used, suffer from high self-discharge rates, poor cycle stability, and dismal performance in cold weather. Lithium-ion batteries, though efficient in moderate conditions, struggle in extreme temperatures and pose significant safety hazards due to their flammability. Ascentek's sodium-ion technology bridges these gaps, offering a robust solution that performs reliably from -40°C to 100°C, with minimal self-discharge and no risk of explosion, even when damaged.

For the warfighter, these advantages translate into enhanced safety, operational reliability, and logistical efficiency. Sodium-ion batteries are three times lighter than lead-acid alternatives, reducing the burden on personnel and equipment. Their superior temperature tolerance ensures consistent power in arctic cold or desert heat, while their domestic supply chain strengthens energy security and reduces dependence on foreign materials.

Design and performance

Ascentek's sodium-ion batteries stand out for their innovative design and unparalleled performance. Unlike lithium-ion batteries, which degrade outside their optimal temperature range (15°C to 35°C), Ascentek's technology operates across a broader temperature spectrum. This resilience is critical for military and industrial applications where conditions are unpredictable.

Safety is another cornerstone of Ascentek's technology. The batteries can be fully discharged to 0V without damage, a feature that simplifies storage and transport. Most notably, they exhibit no risk of thermal runaway, even at temperatures exceeding 500°C, eliminating a major hazard associated with lithium-ion batteries.

From an environmental perspective, sodium-ion batteries are a game-changer. Sodium is abundant and widely available, unlike lithium, which is geographically concentrated and often sourced through environmentally damaging processes. Additionally, sodium-ion batteries contain no toxic heavy metals like lead or cobalt, making them easier to recycle and far less harmful to the environment. Their extended cycle life—thousands of charges compared to lead-acid's few hundred—further reduces waste and replacement costs.

In addition to military applications, Ascentek's technology also is poised to transform other industries. Current prototypes are being developed for off-road power sports, including snowmobiles, ATVs, and UTVs, as well as on-road applications like motorcycles. Additionally, Ascentek plans to develop larger high-power battery systems for construction and industrial equipment.

The team behind the technology

Based in Golden Valley, Minnesota, the Ascentek team brings decades of experience in serving global manufacturing and technology leaders, ensuring that Ascentek's innovations are both cutting-edge and commercially viable. Ascentek partners with global OEM, manufacturing, and technology leaders to provide private-label fluid manufacturing, battery production, regional bulk fluid distribution, vehicle wash equipment and services, hard parts assembly, onsite plant maintenance, chemical management programs, environmental services, drop-shipping, and software solutions.

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About BEST START

BEST START provides the crucial support businesses need to bring their visionary technologies to life. Whether refining smart grid technologies, enhancing green energy applications, or creating efficient solutions for power generation, BEST START partners with Minnesota companies to move technology forward. BEST START is a collaboration of three organizations—DEVCOM Army Research Laboratory, the University of St. Thomas in Minnesota, and ETC, a nonprofit defense solutions provider.