

Energy Storage Manufacturing—High Power, High Energy Density Lithium Ion (Li-Ion) Batteries

PROBLEM / OBJECTIVE

Lithium Ion batteries offer higher power, longer mission times and lighter weight than existing battery technology, but manufacturing costs were high and power density inadequate for Army applications.

The goal of this ManTech program was to increase the production rate and yield of battery cells and to reduce production costs while improving overall battery performance, safety and reliability. Technology improvements included new electrolyte and electrode materials that enhanced high temperature stability, a new built in circuit breaker technology to reduce the risk of overcharging and venting, and development of prismatic lithium ion cells optimized for an integrated cooling system.



Improved TOW ITAS



Battery Module

ACCOMPLISHMENTS

Process Improvement:

Improvements of the VL30P cell to the VL34P cell manufacturing lines were demonstrated with the following improved performance & cost metrics:

- 14% improvement in energy density
- 11% improvement in weight
- 75% improvement in power density
- 50% cost reduction at cell level

Automated production process with

- 63% reduction in cell labor hours
- 50% reduction in factory flow

Implementation and Technology Transfer:

This technology was implemented on numerous weapons systems and demonstration programs for military hybrid electric vehicles and high pulse power applications. Specific implementations benefitting from Army ManTech process improvements include: TOW missile Improved Target Acquisition System (ITAS); Active Denial System; Joint Lightweight Tactical Vehicle (JLTV) demonstrator; Navy SEAL Delivery Vehicle (SDV); Housekeeping Power Supply (HKPS); F-35 Joint Strike Fighter (JSF); NASA LEO Satellites; and DARPA Falcon hypersonic aircraft.

BENEFITS AND WARFIGHTER PAYOFF

This program established an automated Li-Ion battery manufacturing process within the United States and increased power density for multiple systems.

- Expansion of silent watch and silent mobility capabilities
- Additional boost power for dash mobility and acceleration with a positive impact on survivability
- Warfighter benefits included TOW improved target acquisition system (ITAS) extended mission times and better maintainability than previous silver zinc batteries
- Over 3000 ITAS batteries were procured
- This project had an ROI of 5.6 with a cost benefit of \$121.5M

FUNDING

Army ManTech: \$23.6M

TIME LINE / MILESTONE

Start Date: July 2004
End Date: April 2011

PARTICIPANTS

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