

# Case History – New Battery Pack Design Provides “Smart” Solution for Handheld Device

## Background

Fueled by the need for power and portability, the demand for high-power portable energy systems is ever increasing. The evolution of portable electronic devices in lighter weight, smaller packages, and designs that are more ergonomic is driving the need for new battery pack system technology, specifications and creative designs.

At the same time, driven by performance demands of critical applications, these electronic devices must provide a safe, long, trouble free operation. This requires effective design solutions, design planning and an understanding of interconnection between the battery power source and the device circuitry.

## Problem

The current battery pack design, though low cost, was not very reliable. A “generic” battery was not designed nor tested for the specific application. There were problems with the circuitry including an under designed capacity and insufficient protection circuitry. The battery pack’s circuitry did not provide the necessary resolution; neither was real time reporting of current, voltage, and temperature adequate. Significant accuracy was only achievable if the battery was new and operated at room temperature.

Lastly, the battery pack did not have all of the proper safety testing and certifications completed. The design team needed these problems addressed quickly. As a result, a fast solution to the design problems was required, including getting the proper UL, CE, and DOT certifications.



## Solution

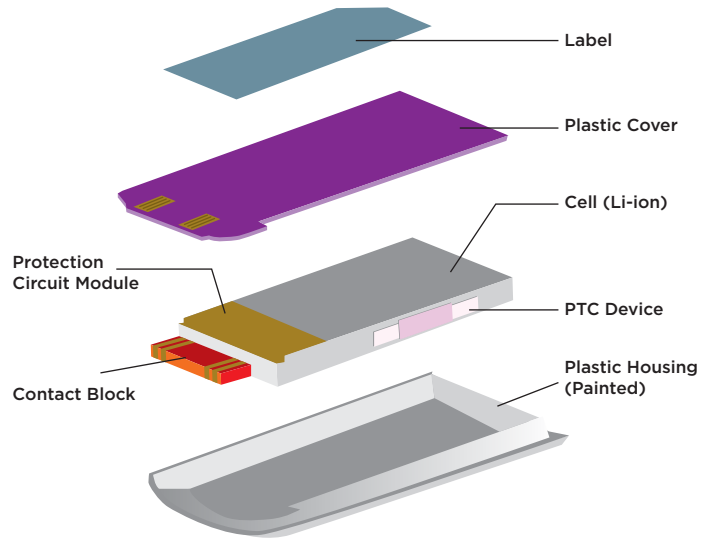
There are a number of important factors to consider when designing and specifying a battery pack. Not only are these issues critical to functionality, but also imperative in assuring safe operation, and maximizing performance, durability and reliability. These considerations include:

- ✓ Application
- ✓ Cell electrochemistry selection
- ✓ Electrical rating
- ✓ Operational parameters and management
- ✓ Mechanical profile and connection needs
- ✓ Agency approval requirements

Tyco Electronics recommended and developed a “smart” battery pack solution. This “smart” solution included the proper Voltage and Amperage requirements. A “smart” battery includes a microchip that allows it to communicate with the charger and with the device. This “smart” battery also was designed to include battery fuel-gauge technology.

A Lithium Ion cell was chosen as the solution for the space requirements. One benefit of Lithium batteries is the amount of power capacity that can be put into a small space. A Protection Circuit Module was designed to protect the battery from over charging and to ensure safe and consistent operation.

After the design was completed and approved, a series of tests were set up for UL approval. Because Tyco Electronics Battery Systems has a certified UL test lab on site, this testing was completed in half the time it would take if an outside lab were utilized.



## Result / Outcome

Today’s advanced portable electronic devices have created many challenges for not only battery system designers, but also for the designers of the products where battery packs are used. The optimum design has to consider many factors related to power, form, fit, function and safety.

Because of this complexity, Lithium Ion battery formulations have been the product of choice. By recognizing the needs and requirements of design, problems can be minimized while battery cost-performance can be maximized.

Lithium Ion battery packs provide power to an array of applications, all with a common theme: a safe, reliable power source is mission critical to the task the device was designed to perform. Gone are the days when a battery simply provided power. Modern “smart” battery pack applications can include circuit protection, safety components, fuel gauge, and battery management.

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