

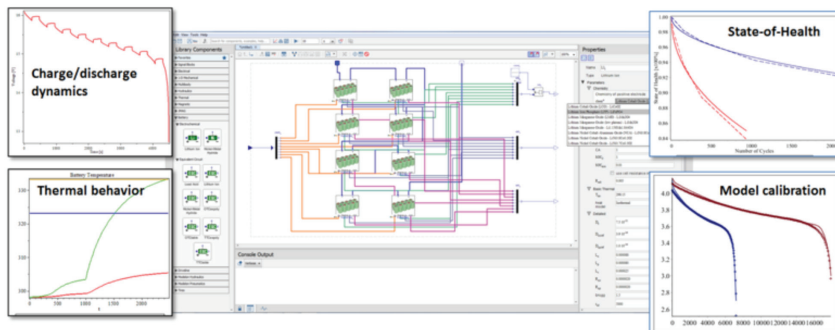
# Push Your Battery Performance Further with Model-Based BMS Testing



Maplesoft  
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Solutions

Across industries, there is a growing reliance on Battery Management Systems (BMS) to deliver the safest and best possible battery performance in all circumstances. Using a BMS is required to maintain safety, extend lifespan, and optimize performance of advanced battery packs by balancing cell voltages, regulating charge and discharge behavior, and preserving operation within required ranges of performance. The traditional approach to BMS development uses physical battery cells for testing, requiring high costs for battery packs and posing significant dangers when testing fault scenarios. To move beyond these limitations, industry leaders have moved to model-based Battery Management System (BMS) test platforms due to their virtually unlimited flexibility for BMS development. By combining MapleSim's high-fidelity battery models and the Bloomy BMS HIL Test System, it's now easier to test and develop advanced BMS firmware for the best possible battery performance in your products.

By using a BMS Hardware-in-the-Loop (HIL) test platform, the physical signal channels of a BMS can connect to high-precision battery models, giving an unparalleled amount of flexibility to optimize the BMS for any given battery configuration. In these test platforms, batteries are represented by mathematical models that can be simulated in real-time, allowing for rapid BMS development with any required battery configuration. This industry trend is allowing engineers to rapidly develop BMS firmware in a scalable, flexible environment that reduces both costs and dangers of traditional methods while giving engineers new abilities for system optimization.



Bloomy's collaboration with Maplesoft has now brought industry-leading battery models to the Bloomy BMS HIL Test System, creating new abilities for rapid, flexible BMS development. The MapleSim Battery Library brings full-fidelity, highly customizable battery models to the BMS test platform, and is optimized for the fastest simulation performance across the industry. Together, Bloomy and Maplesoft are providing engineers with the most comprehensive platform available to push their Battery Management Systems further.



## The Bloomy HIL Test System

- Provides a safe and efficient method of simulating a variety of battery cell voltages and balancing currents
- Improves quality of testing with repeatable stimuli, executed by real-time models in an open system architecture
- Reduces test duration and cost, while maximizing test coverage and throughput

## The MapleSim Battery Library

- Includes full electrochemical physics and equivalent-circuit battery models (Li-Ion, NiMH, lead-acid)
- Supports State of Health (SoH) studies through capacity fading and increased internal resistance
- Incorporates voltage profile, state of charge, thermal, capacity fading, distribution of electrode active materials, distribution of electrical potential, side reactions, and other properties



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