

BFH-CSEM Energy Storage Research Centre

Infrastructure

BMS HIL Test Platform – Cell, module and pack simulation environment

BMS HIL Test Platform

The Battery Management System «Hardware-in-the-Loop» (BMS HIL) test platform provides a controlled environment to test BMS hardware functionality and software features.

The test platform has configurable cell, module and pack simulators that help in developing BMS and in validating BMS features. The BMS HIL Test System is the ideal platform for:

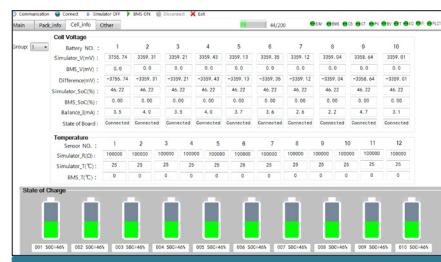
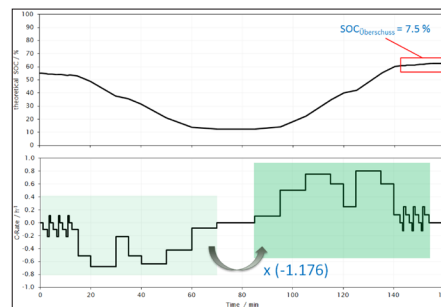
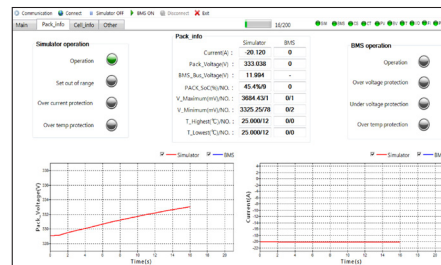
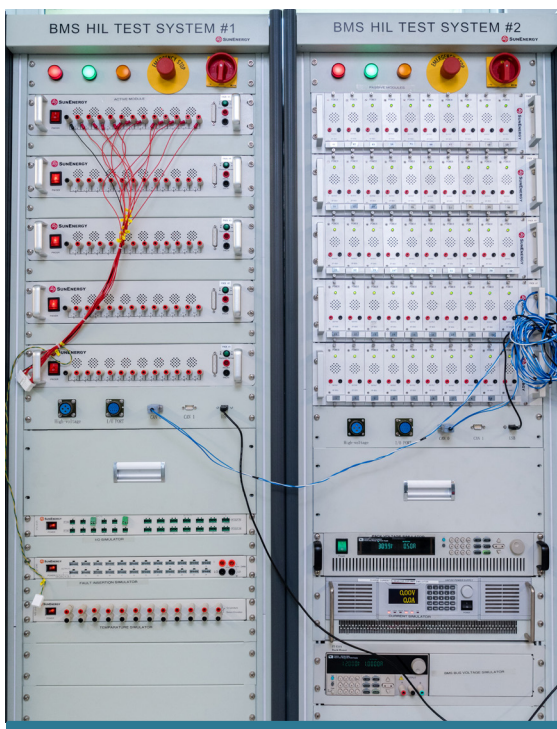
- Testing BMS system components during the development phase
- Testing complete BMS products
- Validating BMS functions
- Speeding up the development process

Our BMS Test System

- Provides a safe and time-efficient simulation of low and high voltage battery cells, modules and packs
- Simulates irregular and dangerous physical battery status
- Improves testing methodology using aggressive test cases
- Reduces costs by substituting physical batteries

Research and Development Activities

- Evaluation of BMS functions and features under standardized and application specific profiles
- Verification of sensors' accuracy and its impact on the accuracy of BMS algorithms
- Test, evaluation and validation of BMS algorithms
- Evaluation of the effectiveness of active and passive balancing by monitoring balancing currents
- Simulation of degraded cells
- Development of BMS algorithms utilizing different cell modeling approaches
- Fault insertion and safety checks for BMS hardware and software
- Validation of digital and analog I/O





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Technical Specifications

General Characteristics

- Hardware configurations for up to 500V-packs
- 100 individually controlled cell voltage simulations with acceptance of passive balancing
- 50 individually controlled cell voltage simulations with acceptance of active balancing
- 24 fault insertion channels with capabilities for open-circuit simulation
- GUI for monitoring and data logging from test bench and BMS under test

Voltage Simulation

- Each cell in the simulator is connected with voltage and current sensors (accuracy $\leq 0.01\%$ and $\leq 0.1\%$, respectively)

Current Simulation

- Current simulation up to $\pm 300A$
- Pack current accuracy $\leq 1\%$
- Balancing current measurement with highly accurate shunt-current sensors ($\leq 0.1\%$)

Temperature Simulation

- NTC-2120 temperature simulator with configurable look-up tables for temperature vs. resistance

Others

- I/O simulates up to 60V (analog) and digital signal input, output and PWM signal



BFH-CSEM Energy Storage Research Centre

The BFH-CSEM Energy Storage Research Centre unites several research groups of the Bern University of Applied Sciences (BFH) and the PV-center of the "Centre Suisse d'Electronique et de Microtechnique SA" (CSEM, Swiss Center for Electronics and Microtechnology) in Neuchâtel.



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