

CANoe Safety-Related Lifecycle Validation of Battery Systems

Case Study ZSW Laboratory for Battery Technology (eLaB)



The Customer

The ZSW Laboratory for Battery Technology (eLaB) in Ulm, Germany is an independent development and testing center for batteries. It is internationally recognized for its testing of cells, modules and complete battery systems including battery management. The laboratory's researchers have over 25 years of experience with batteries and super-capacitors. Customers come from industry and research organizations worldwide.

The Challenge

Safety-related lifecycle validation of battery systems with increasing numbers of variants

Endurance tests, which typically take months to complete, represent the foundation for reliable operation of a Battery Management System (BMS) and for long battery life. The tests contain real and synthetic performance profiles, such as emergency shutoff and charge cycles. The challenges are to strive for full automation in test flow and to handle the large numbers of test variants and large volumes of data. The CAN communication data alone amounts to terabytes.

The Solution

Combining an active power controller and CANoe to create a high-performance endurance test bench for batteries

All power and communication interfaces of the System Under Test (SUT) are implemented in the battery test bench, which consists of the Battery Management System (BMS) and the battery (see figure). An active power controller can act as either a DC source or sink. Flow control in PC1 executes power profiles fully automatically. The CANoe test tool on the separate PC2 models CAN and LIN networks in a remaining bus simulation. The two systems communicate directly via the already existing vehicle bus. Visualization is provided on CANoe panels for continuous monitoring of the test progress. CAN-driven, CANoe subdivides the measurement results into binary log files of reasonable size and manages them. They can be traced back to their associated endurance test at any time.

The Advantages

Endurance logging, data management and visualization for continual access to everything "at a glance"

- > Endurance tests of the battery and the BMS are very realistic
- > Non-stop operation of the test bench of over half a year ensures smooth test flow
- > Transparency achieved by clear traceability of log files to driving cycles and power profiles – both during operation and offline
- > Many different logging strategies based on user-definable trigger conditions
- > Graphic visualization makes key battery parameters immediately and continually accessible at a glance
- > Targeted offline analysis is enabled by versatile and convenient search functions

