CASE STUDY

Secure validation of battery charging systems using PCAN-Explorer 6

Solution: CAN software PCAN-Explorer 6

Country: Italy

Industry: Industrial charging technologies

Automated testing of battery chargers using CAN software

Industrial battery charging systems must be extensively tested before practical use because they control the entire charging process, for example, in electric vehicles or industrial battery systems. It is essential to ensure that batteries are charged reliably, efficiently, and without overloading. Possible errors in charging or communication behavior could lead not only to power losses, but also to overheating, failures, or, in the worst case, dangerous fires. A leading international manufacturer of electric vehicles and chargers for industrial battery systems faced the challenge of testing its products faster, more precisely, and in larger quantities. In this application report, the company provides insights into its fully automated test solution and shows why the CAN communication software PCAN-Explorer 6 is the most convincing solution for the company.

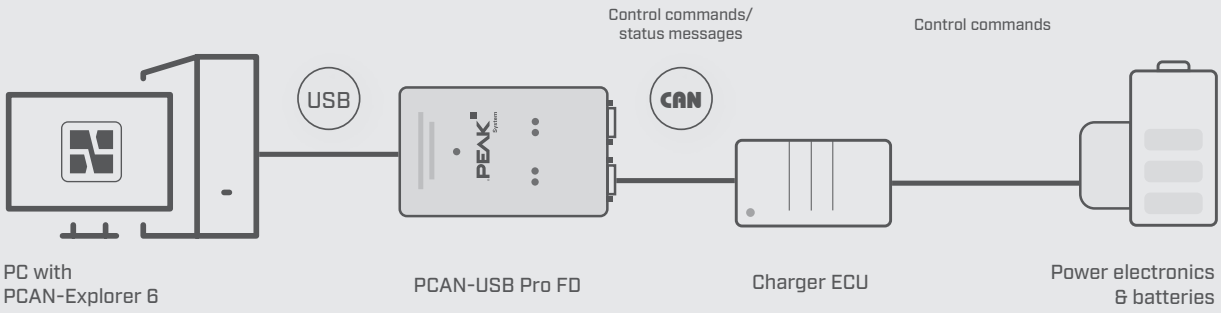
ERROR-PRONE AND SLOW: MANUAL TESTING

Modern chargers are no longer simple power sources; they feature an integrated control unit (ECU) that regulates the power electronics and communicates with external systems via the CAN bus. This ECU receives control commands, monitors the charging process, and returns status information such as current, voltage, temperature, and error messages. Until now, these parameters were checked manually: messages were sent individually over the CAN bus, and the ECU responses had to be logged separately. This process was error-prone, significantly slowed down processes, and was hardly suitable for testing multiple chargers simultaneously. In addition, test requirements changed frequently—sometimes different message sequences had to be tested, and cycle times sometimes had to be adjusted. Particularly critical was the lack of an option to map the communication between the PC-based test system and the charger ECUs in an automated, synchronized, and reproducible manner.

CUSTOMER BENEFITS

- Faster and more precise testing through complete automation
- High flexibility thanks to macros and VBScript customization
- Reproducible results thanks to trace and playback functions
- Reliable quality assurance with stable, standardized processes

System structure: Communication during automated charger testing



FLEXIBILITY OF HARDWARE AND SOFTWARE

The Italian-headquartered company decided to equip the test environment with the Windows-based communication software PCAN-Explorer 6 and connect the charger ECUs to the test PC via the PCAN-USB interface. In the test setup, the PC running PCAN-Explorer communicates with the charger's control unit via the PCAN-USB adapter. The ECU interprets the incoming messages, controls the power electronics, and sends back status messages, which are then recorded and displayed by PCAN-Explorer. The software handles the cyclical control of the messages: Two different messages are automatically sent to the charger ECU, while the feedback is recorded synchronously. Changes to the cycle time or message content can be easily adjusted using macros, enabling flexible and automated test operations.

MACROS & VBSCRIPT: EASILY CREATE A CUSTOMIZED TEST SOLUTION

PCAN-Explorer 6 offered decisive advantages in this application. Particularly helpful was the ability to operate multiple CAN buses in parallel and to clearly analyze the data using symbolic representations (via symbol files). The integrated trace and playback function allowed data traffic to be recorded and repeated as needed, ensuring reproducible tests at any time.

Another key feature was automation via macros and VBScript. This allowed cyclic message sequences to be flexibly controlled without the need to develop dedicated test software. In addition, PCAN-Explorer's project management provided a clear structure, while optional add-ins such as the Plotter or Instruments Panel supported visual data analysis. This resulted in a solution that was both stable for continuous operation and easily adaptable to changing test requirements. With PCAN-Explorer 6, the manufacturer was able to fundamentally improve its quality assurance. The communication between the PC-based test system and the charger ECUs could be automated, synchronized, and reproducibly documented. Tests that were previously laborious and error-prone to be performed manually are now performed in parallel, efficiently, and in a standardized manner. This provides manufacturers with a tool that responds flexibly to new testing requirements and sustainably supports the validation of their chargers.

```
// PCAN-Explorer Macro File
// First edited: 6/25/2024  8:48:00 AM
FormatVersion=6.0

Send 1 100h 1 AAh

Wait 20
Send 1 100h 1 ABh

Repeat
```

Standard macros in PCAN-Explorer 6

FURTHER INFORMATION AT
www.peak-system.com