



CASE STUDY

Multi-channel logging with the PCAN-Router Pro FD

Solution: PCAN-Router Pro FD

Country: Germany

Industry: Automotive supplier



Data logging for commercial vehicle ECUs: End-of-Line Testing with PCAN-Router Pro FD

A leading European commercial vehicle manufacturer uses highly automated end-of-line test benches to perform final testing and calibration of electronic control units prior to delivery. Several CAN and CAN FD buses run in parallel in the test environments, connecting, among other things, engine control, exhaust aftertreatment, transmission control, and driver assistance systems. To ensure the long-term quality of the vehicles – in this case, 40-ton semi-trailer tractors for long-distance haulage – all communication must be seamlessly documented throughout the test process. However, the previously used infrastructure based on PC-based logging solutions proved to be prone to failure and maintenance-intensive. In its search for a flexible and cost-effective solution that could be easily integrated into the existing test architecture, the international company discovered the PCAN-Router Pro FD from PEAK. This application report details the technical setup, the environmental conditions, and explains why the manufacturer is so convinced of the PEAK solution.

HIGH DATA LOAD, BUFFER OVERFLOWS & DATA LOSS: PC-BASED LOGGERS CAUSE ERRORS

The central challenge of end-of-line testing lies in the non-invasive monitoring of the bus system. Especially during full-load phases, extremely high data rates occur on the CAN FD lines, which can reach up to 8 Mbit per second in the commercial vehicle segment. During such

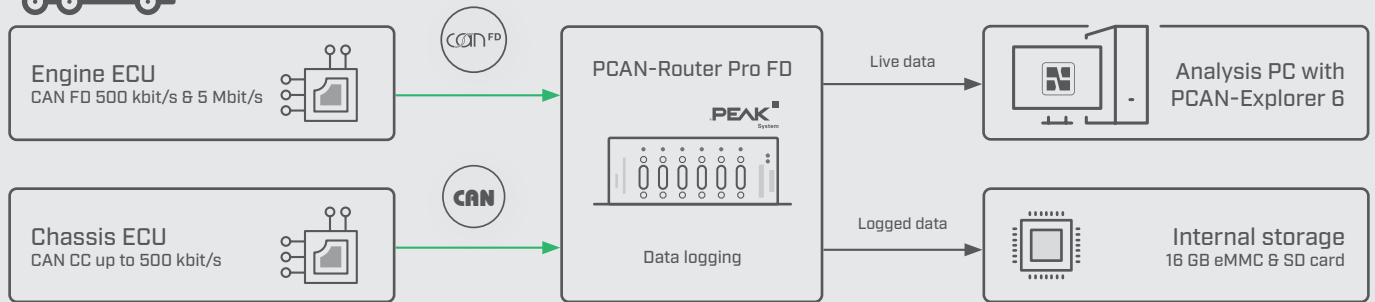
tests, the control units exchange hundreds of cyclic and event-based messages per second, including engine torque data, rail pressure and lambda values, transmission shift strategies, and sensor data from driver assistance systems. The PC-based loggers previously used repeatedly encountered problems during this phase. Buffer overflows led to data loss and non-deterministic time stamping, which complicated synchronization between the engine and transmission bus. Furthermore, operation required trained personnel, which impaired test throughput and resulted in high personnel costs. A single lost CAN frame or shifted time base could make root cause analysis of a malfunction impossible, which is unacceptable in the EoL process.

CUSTOMER BENEFITS

- ✓ A self-contained logger prevents data loss and failures during continuous operation.
- ✓ Automatic triggering significantly reduces personnel costs and training requirements.
- ✓ Microsecond timestamps enable precise synchronization and error correlation.
- ✓ Robust hardware runs reliably 24/7 and reduces test bench interruptions.



End-of-line test scenario for the engine and chassis control units, logged via the PCAN-Router Pro FD via CAN FD and CAN CC.



AUTONOMOUS LOGGING AS A GUARANTOR OF STABILITY

The decision was made to use the PCAN-Router Pro FD as a standalone data logger. The device, with six CAN FD channels, was connected in parallel to the engine CAN FD bus with a data rate of 500 kbit per second in the arbitration phase and up to 5 Mbit per second in the data phase, as well as to the classic chassis CAN with 500 kbit per second. Additional channels were reserved for future expansions such as the ADAS bus or the diagnostic bus. The router was configured to record all frames, including error frames and bus load information. Data is stored directly on the internal 16 GB eMMC memory, which can be expanded with SD cards, thus providing sufficient capacity even for continuous runs lasting several days. Each data set receives a timestamp in the microsecond range, generated by the integrated real-time clock with battery backup.

The operation was designed so that the logger starts automatically with a CAN signal as a trigger from the test bench control system and also stops automatically after the test. After the test, the test personnel simply needs to remove the SD card or read the data via USB. The log files are then imported into the central analysis backend, which is based on a combination of PCAN Explorer scripts and proprietary Python tools. There, targeted filtering takes place according to relevant IDs, such as torque and lambda values from the engine control system, gear shifts and clutch pressures from the transmission control system, brake pressure and ABS data from the chassis bus, and diagnostic frames for OBD codes or flash communication.

PCAN-ROUTER PRO FD: PRECISE TIME STAMP & TRIGGER FUNCTION

The use of the PCAN-Router Pro FD offered decisive advantages. Unlike PC-based solutions, the router operates completely autonomously and does not require an additional computer during recording. This significantly increased stability in 24/7 operation. Its multi-channel capability allows up to six CAN and CAN-FD networks to be recorded in parallel, with each interface individually configurable with regard to bit rate and protocol variant. This allowed the manufacturer to monitor the engine and chassis bus simultaneously with different parameters without losing synchronization.

The precise time stamping in the microsecond range proved particularly valuable, enabling exact correlation of even very short events such as misfiring or transients during gearshifts. Furthermore, the integrated trigger function allowed for full automation of the recordings, significantly reducing operator effort. The real-time clock with battery backup ensured that the time base was retained even after a power failure. Finally, the freely programmable firmware based on the C/C++ SDK enabled the implementation of customized filter routines, eliminating irrelevant data during recording. This reduced the amount of data required for post-processing and significantly accelerated analysis.

The use of the PCAN-Router Pro FD as a data logger provided the commercial vehicle manufacturer with a time, process, and cost advantage in the end-of-line testing process. The solution enables seamless and highly precise recording of all relevant bus communications without placing a strain on the test bench itself. At the same time, operational effort was reduced, as the loggers run stably in continuous operation thanks to automated triggering and robust hardware integration, requiring less personnel intervention. Overall, the PCAN-Router Pro FD makes a decisive contribution to improving test quality and increasing vehicle delivery reliability.

FURTHER INFORMATION IS AVAILABLE AT
www.peak-system.com