

Solution: PCAN-USB

Country: Hong Kong

Industry: Construction machinery



Mobile PCAN-USB interface: Real-time hydraulic monitoring for crawler excavators

An international construction machinery manufacturer from Asia set itself the goal of increasing the operational reliability and maintainability of its large 35-ton class excavators. These machines, which are used in mines, on large construction sites, and in civil engineering projects around the world, feature complex hydraulic systems. These systems control the precise movements of the boom, arm, and bucket. To reduce maintenance and downtime and thus increase excavator availability, a suitable solution was sought that would monitor the hydraulic systems in real time and systematically evaluate machine data. This article demonstrates how the use of the mobile CAN interface PCAN-USB enabled simple and reliable monitoring during ongoing operations without expensive installations and long integration processes.

EXPENSIVE DOWNTIME: CONDITION MONITORING ONLY POSSIBLE WITH GREAT EFFORT

The powerful crawler excavators in this weight class operate in extremely harsh environments. Dust, vibration, and extreme temperature fluctuations place a strain on both the mechanical components and the electronics. The hydraulics form the heart of the machine, providing the immense power for all working movements. They consist of powerful pumps, precisely controlled valves, and cylinders operating under high pressure. Until now, operators and service personnel had only limited access to transparently monitor the actual operating status of these system components. Problems often only arose when a component was already worn or damaged. Diagnostics also required proprietary systems that could

only be integrated into the existing IT infrastructure with considerable effort. Every unplanned machine downtime resulted in significant costs, as a single excavator can generate several thousand euros in added value per hour.

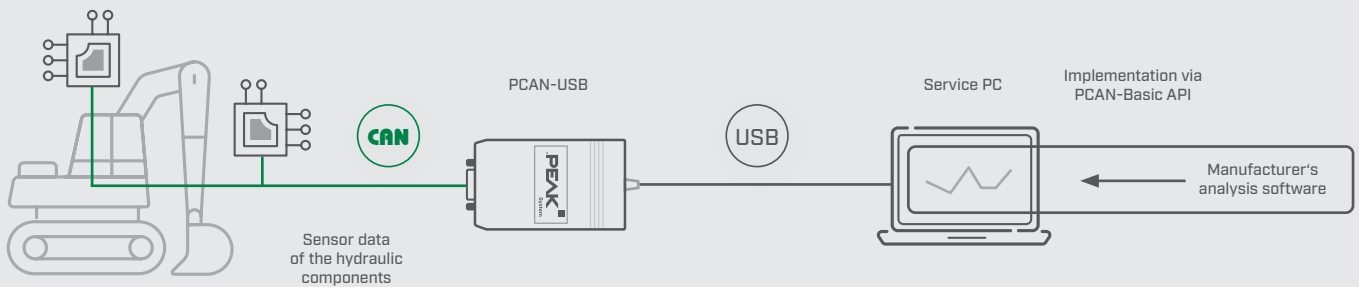
SECURELY CONNECT EXCAVATORS AND ANALYSIS SOFTWARE ON-SITE: THE PCAN-USB CAN INTERFACE

The solution for the Asian company's engineers was the implementation of the PCAN-USB CAN interface from PEAK-System. This product enables a standardized connection between the machine's internal CAN bus and an industrial laptop, which is used either directly in the driver's cab or in the maintenance container.

CUSTOMER BENEFITS

- ✓ Reduced downtime through early, real-time detection of hydraulic problems
- ✓ Higher machine availability through more precise scheduling of maintenance intervals
- ✓ Rapid integration without expensive installations or complex IT adaptations
- ✓ Reliable field use thanks to robust, mobile design and wide temperature tolerance

System structure: Sensor data is read via PCAN-USB and transferred to the manufacturer's analysis software



The excavator is equipped with a CAN bus network, via which all sensor data, such as hydraulic pressure, pump speed, or oil temperature, is cyclically transmitted. The PCAN-USB is connected via a service port, thus establishing a reliable bridge between the machine and the diagnostic computer. At the software level, the diagnostic solution developed specifically by the manufacturer accesses the raw data via the PCAN-Basic API, processes it, and presents it in a user-friendly interface. This provides the technician with immediate insight into all relevant parameters of the hydraulic system, such as the pressure in the boom and bucket cylinders, the oil temperature in the main circuit, or the speed of the hydraulic pumps as a function of the engine load. In addition, the software compares target and actual values to detect deviations at an early stage and plan maintenance measures in advance.

ROBUST, MOBILE, AND REAL-TIME CAPABLE: THE PCAN-USB

The decision to use the PCAN-USB proved to be a particularly well-thought-out technical solution, as this interface combines numerous features precisely tailored to the requirements of real-time hydraulic monitoring on a tracked excavator. Its compact plastic housing makes it suitable for mobile use, and the opto-isolated version offers galvanic isolation of up to 500 volts, reliably absorbing voltage spikes and ground loops. It supports full-speed USB and is compatible with USB 1.1 to 3.0, allowing it to be used on a wide variety of computers. The integrated high-speed CAN channel according to ISO 11898-2 covers bit rates from 5 kbit/s to 1 Mbps and supports both standard and extended CAN frames, enabling the integration of a wide variety of sensors and control units.

The time stamp resolution of 42 μ s was crucial for precise diagnostics, making it possible to detect even rapid pressure peaks in the hydraulic lines. Proven components such as the SJA1000 CAN controller and the PCA82C251 transceiver ensure stable communication. Jumpers can also be used to activate termination and a 5-volt power supply, which is particularly advantageous in service and test environments. Finally, the extended operating temperature range of -40 °C to +85 °C ensures safe operation even under the harshest conditions on the construction site. In addition, there is broad software and API support. The PCAN-Basic API enabled the construction machinery expert to easily integrate the solution into its existing diagnostic landscape and make it usable for both mobile applications in the field and end-of-line testing in production.

CONCLUSION

With the implementation of the PCAN-USB CAN interface, the construction machinery manufacturer has significantly improved the diagnostic capabilities of its 35-ton crawler excavators. Hydraulic parameters are transparent and available in real time at all times, allowing malfunctions to be detected much earlier. Unplanned downtimes have been significantly reduced, while maintenance intervals can now be planned more precisely. The solution therefore contributes significantly to increased machine availability and reduced operating costs for customers.

FURTHER INFORMATION AT
www.peak-system.com