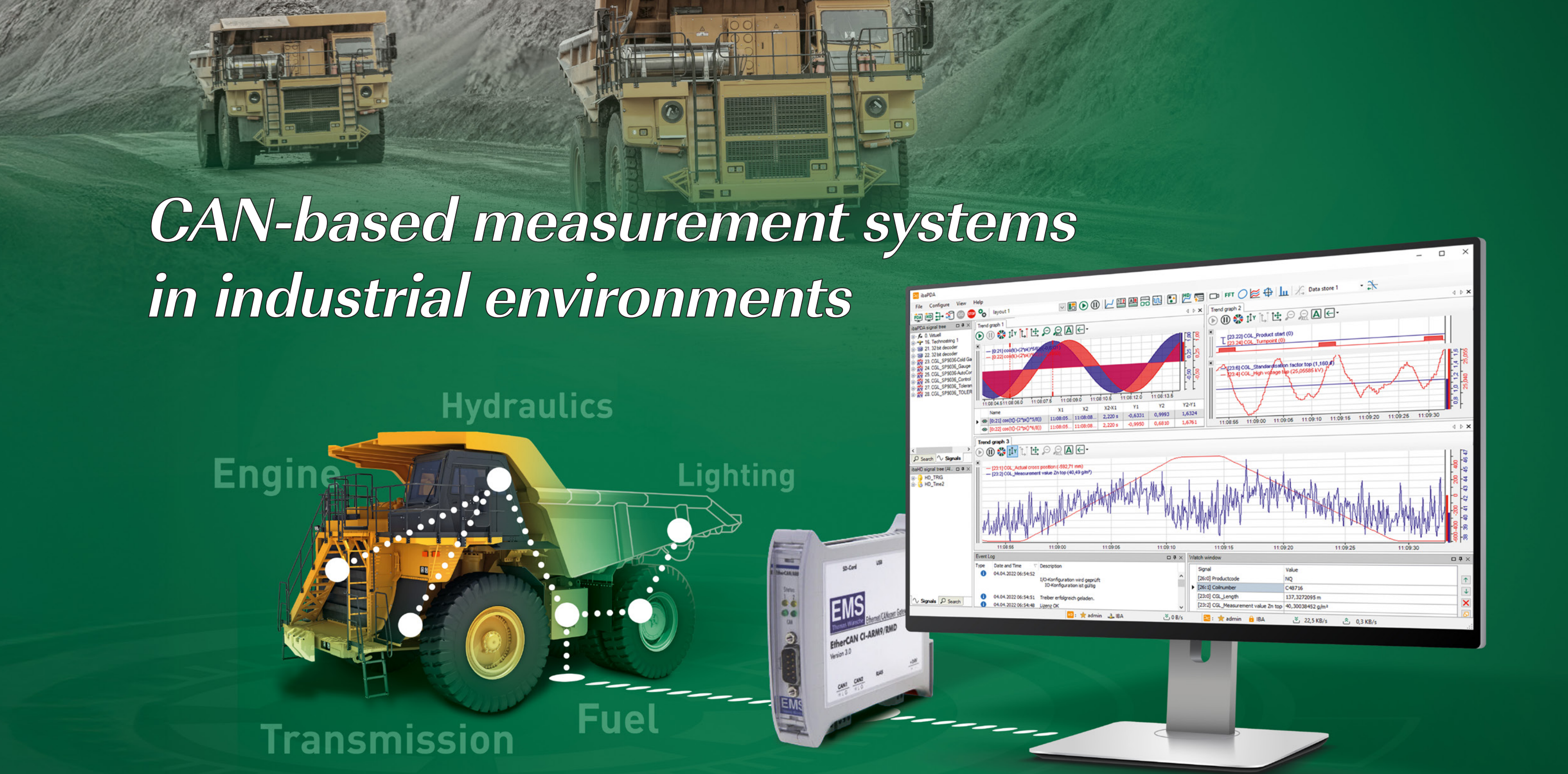
CAN-based measurement systems in industrial environments



The ibaPDA automation system from IBA (Germany) enables data acquisition and analysis from networks based on different communication technologies such as CAN(open), Profibus/-net, Ethercat, Ethernet/IP, etc. CAN networks are connected to the system via a CAN-to-Ethernet gateway.

(Source: IBA)

In many industrial and mobile applications, distributed control architectures rely on fieldbus systems that enable robust, deterministic communication between controllers, sensors, and actuators. Here, the controller area network (CAN) has been a proven communication technology. Originally developed for automotive applications, CAN-based communication is now widely used in machines, mobile equipment, and decentralized systems where robustness, determinism, and real-time capability are essential. In many industrial installations, CAN-based subsystems operate alongside PLC-controlled automation systems, drives, and higher-level monitoring solutions. While CAN is widely used for real-time communication between devices, accessing and analyzing CAN data in a broader process context remains a technical challenge.

Modern industrial diagnostics and optimization require more than basic monitoring or event-based logging. Engineers need continuous access to raw communication data, precise time synchronization with other process signals, and the ability to analyze system behavior retrospectively. CAN-based measurement systems therefore play an important role in gaining transparency across heterogeneous automation environments.

CAN-based messages as measurement signals

At its core, CAN provides a message-oriented communication mechanism that allows devices to exchange data efficiently and reliably. From a measurement perspective, CAN-based messages themselves represent valuable signals: CAN frame identifiers, payload data, timing, and transmission behavior provide insights into the state and interaction of connected devices.

In many installations, CAN communication is monitored only indirectly, for example through device diagnostics or controller status information. Such approaches often fail to capture short communication disturbances, timing irregularities, or correlations between CAN traffic and physical process behavior. A measurement-oriented approach treats CAN-based messages as time-stamped signals that can be recorded continuously and evaluated in relation to other process data.

Integrating CAN in the system

With the CAN integration introduced in ibaPDA v8.12.0, the IBA system enables direct acquisition of CAN communication via Ethernet. Using the EtherCAN CI-ARM9/RMD-IBA gateway from EMS Thomas Wünsche (Germany), CAN frames can be read from the network and transferred to ibaPDA without interfering with the active communication. This passive approach ensures that existing CAN networks remain unaffected while making all transmitted CAN data available for data acquisition, online visualization, and analysis.

Within ibaPDA, CAN-based messages are handled in the same way as other process data. The values in the messages are timestamped, visualized, recorded ▷

continuously, and synchronized with other signals acquired from PLCs, drives, sensors, and measurement hardware connected to the ibaPDA system. This unified time base is essential for understanding how CAN communication relates to machine states, control sequences, and physical process variables.

Data recording and analysis

A key advantage of CAN-based measurement with the ibaPDA system is the ability to record communication data continuously, without relying on triggers or predefined fault conditions. Many relevant events on the CAN network occur sporadically or only under specific operating conditions. By capturing all communication data, ibaPDA ensures that even brief anomalies remain available for later investigation.

The recorded data can be stored locally in measurement files and, if required, archived in the ibaHD-Server for long-term retention. This creates a comprehensive history of CAN communication and associated process data, enabling detailed root cause analysis, comparison of operating states, and long-term system evaluation.

For technical analysis, the recorded CAN data is evaluated using the ibaAnalyzer tool. CAN-based messages can be visualized alongside PLC variables, analog measurements, and digital signals in a common time domain. This makes it possible to correlate communication behavior with mechanical movements, electrical loads, or control actions.

Derived signals and expressions can be used to interpret raw CAN payload data or to calculate timing-related indicators such as message intervals or response delays. Instead of analyzing CAN traffic in isolation, engineers gain a system-level view that supports structured troubleshooting and performance assessment. The report generator integrated in ibaAnalyzer allows the creation of standardized analysis reports based on recorded data. These reports can document communication behavior, event sequences, or trends over defined periods and support transparent communication between engineering, maintenance, and commissioning teams.

Applications and benefits

CAN-based measurement systems integrated into the IBA architecture are valuable in applications where CAN-controlled subsystems interact with complex automation environments. Typical examples include mobile machinery, test benches, energy systems, and production equipment with decentralized components.

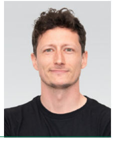
The main technical benefit lies in the consistent and synchronized acquisition of CAN data together with other process and automation data. This approach reduces diagnostic effort, shortens troubleshooting cycles, and improves system understanding. By making CAN communication traceable and analyzable in context with other data, the automation system supports more reliable operation and data-driven optimization of industrial systems.

About IBA

Located in Fürth (Bavaria, Germany), IBA is a worldwide provider of comprehensive measurement systems including hardware and software as well as data base and cloud connectivity. The IBA measurement system can be connected to almost any established automation system. Among others, it is used in the steel and metal industry, the paper and fiber industry, mechanical engineering, as well as energy generation and distribution for process analysis and optimization.

Conclusion

CAN communication remains a critical element in many industrial and mobile applications. However, its diagnostic value can only be fully exploited when communication data is captured continuously and analyzed in relation to the overall system behavior. By integrating CAN-based measurement networks into the ibaPDA system via an Ethernet-based gateway, the system provides a technically sound solution for acquiring, storing, and analyzing CAN data together with other process signals for a holistic view of the process behavior. Combined with analysis tools and long-term data storage, this approach enables deeper insight into communication behavior, faster fault identification, and improved transparency in complex automation environments – without interfering with existing CAN networks. ◀



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