

APPLICATION NOTE

EFFICIENT DATA ANALYSIS OF PRODUCTION PROCESSES WITH SINGLE PAIR ETHERNET

When optimizing OT processes, industrial companies rely on digitizing production as efficiently as possible. However, implementing off-the-shelf solutions is often complex and expensive. An innovative adapter solution jointly developed by Perinet and Zentinel demonstrates how this can be done simply and cost-effectively.



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THE CHALLENGE: DATA EXTRACTION AND DIGITIZATION

The manufacturing industry faces significant challenges when it comes to implementing OEE (Overall Equipment Effectiveness) solutions. One of the key challenges is data extraction from existing automation systems such as programmable logic controllers (PLCs). This challenge is exacerbated by the heterogeneity of machine control systems, as not all machines use the same control type or identical data structures. This makes data extraction not only complicated but also costly.

Another obstacle is that machine automation does not automatically translate into digitalization. Transferring machine and production data into information systems is often a complex and time-consuming process. Many companies want to digitize, but find the process laborious, time-consuming, and expensive. Furthermore, it requires intervention in existing control systems, which often involves significant risks.

To address these challenges, Zentinel, together with Perinet, offers an integrated solution that incorporates both real-time PLC data and IT system data. The two companies work closely together to develop innovative IoT solutions for the manufacturing industry.

THE SOLUTION: INTEGRATION AND EFFICIENCY IMPROVEMENT

It is important for the solution that the data is available in an open format so that customers' IT systems can be easily connected without the need for extensive redesign of the machines.

Perinet's technology focuses on data acquisition and processing. Perinet handles the hardware and capture, display, and output of machine data, while Zentinel prepares this information for specific use cases, thus anticipating use-case-specific customization for customers. Zentinel's "ZentNode" network adapters are based on Perinet's "periNODE" adapters. They are capable of converting machine sensor signals directly into data and locally calculating key metrics such as cycle times, temperatures, and alarms. These devices are robust, designed for use directly on machines, and reduce complexity by performing data processing directly at the source.

A key advantage of Perinet technology is that existing automation systems do not require modification. The periNODEs or ZentNodes are installed parallel to the existing systems and enable independent data acquisition. This minimizes the risk of disruptions and eliminates the need to intervene in the existing control systems. This enables seamless integration into existing processes.

Data is processed via Single Pair Ethernet (SPE) and an edge computer with an MQTT broker and a SQL database. This architecture allows data to be collected in real time and stored locally, while customers have the option of performing data processing either locally or in the cloud.



Zentinel's ZentNodes are available in different versions and serve different applications:

ZentNode MT For measuring water, gas, or electricity consumption. The ZentNode MT counts pulses and converts them into units such as liters, cubic meters, or kWh. The adapter outputs both instantaneous and cumulative values to an MQTT broker and can generate alarms when consumption deviates from defined limits.

ZentNode CT for counting parts, measuring speed, or production times. The CT version calculates maximum, minimum, and average values within a defined period. It also forwards the calculated values to an MQTT broker and can generate alarms or activate outputs if the values deviate from the defined limits (e.g., machine downtime or high cycle time).

ZentNode AL For monitoring analog signals such as level, pressure, or temperature. The AL variant converts and scales the signal into technical units in digital format. Alarms are generated via MQTT when the measured values exceed certain thresholds (LowLow, Low, High, HighHigh).

ZentNode IO For monitoring and remotely controlling actuators such as motors or pumps, for reading local warning signals (material shortage, machine stop, etc.), and for digitizing control panels. The adapter has two configurable 24 V DC I/O channels and publishes the status of the I/O channels with user-definable text. The output channels are activated according to the status of the subscribed MQTT topic.

ZentNode OEE is an intelligent production monitor for determining productivity, throughput, and machine availability in real time. It can monitor produced parts, rejected parts, quality, run and idle times, machine availability, and performance.

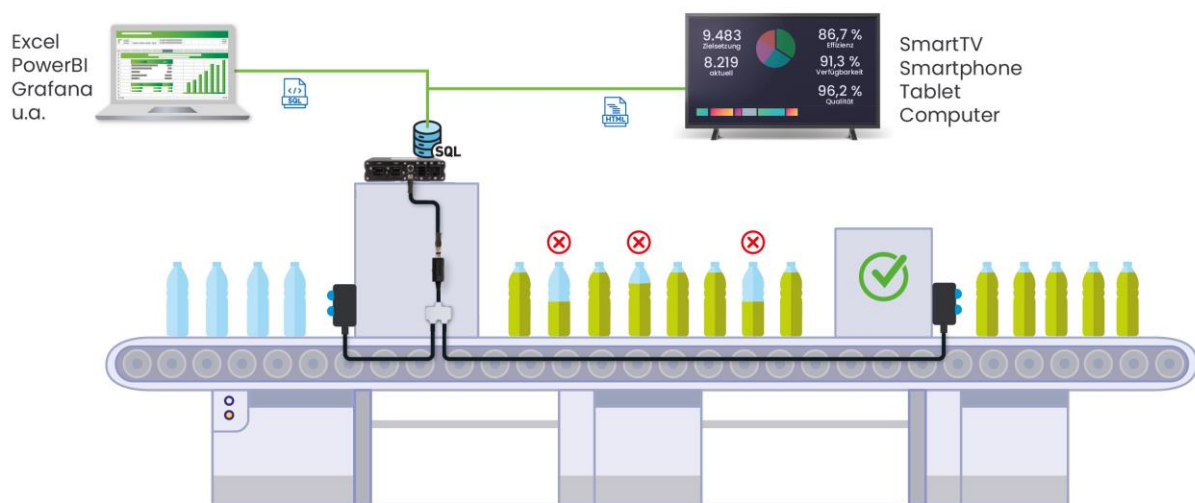
The adapters are easy to install and require only connection to an existing sensor or actuator and configuration via a browser. Wiring is done using ready-to-use system cables that provide both data transmission via SPE and the 24V power supply. With a flexible and secure architecture, the Perinet and Zentinel products are ideally prepared for future regulatory requirements, such as the Cyber Resilience Act ("CRA"). Thanks to a 24 V DC power supply, a qualified electrician is not necessarily required for installation.

THE RESULT: OPTIMIZED PRODUCTION PROCESSES AND FUTURE-PROOFNESS

With ZentNodes, companies in the manufacturing industry can easily and efficiently digitize production processes without interfering with existing systems, thus achieving better data utilization and optimizing their operations. Unlike other industry-standard OT network solutions, Perinet and Zentinel adapters do not require additional master components, simplifying installation and reducing costs.

Zentinel works with system integrators to implement its solutions in various regions and is constantly looking for new partners who can connect its products to machines and are familiar with basic technologies such as SQL databases and Ethernet TCP/IP. Interested companies can contact Zentinel via email or the website to establish partnerships.

With these solutions, companies are ideally equipped to optimize their production processes, increase efficiency, and prepare for future regulatory requirements. Customers benefit from an open, flexible, and secure solution that enables seamless integration into existing IT systems and advances the digitalization of their production processes.



Schematic representation of a filling plant equipped with additional sensors for comprehensive analysis of the relevant operating data

Source:

<https://iotusecase.com/de/loesungsbeispiele/produktionsprozesse-per-netzwerkadapter-digitalisieren/>