

Case Study

RELY-CPPS: How to solve the challenges of brown fields' digitization with one single device.

This success case shows how a single device can accomplish sensor fusion in a multi-vendor scenario, real-time high frequency processing at the edge and high-availability networking, with a full implementation of cybersecurity mechanisms, and how a company benefits from using reconfigurable hardware capable to evolve with the business and the market requirements, without additional costs.

Customer Snapshot

- MICRODECO
- Activity: high-precision bar turning (>50years)
- Production: 5 plants (3 Sp, 1 Ro, 1 Mx)
- # employees: ~200
- Market: Automotive and medical (30M\$ Turnover in 2016)

The Challenge

- New networking infrastructure
- Flexible & adaptive manufacturing
- Quality traceability
- Total Productive Maintenance (TPM)

The Solution

- RELY-CPPS platform that combines in the same device OT/IT sensor fusion capabilities, smart networking, powerful computing and cyber security.

Key benefit

- High-availability infrastructure with smart networking capacity
- Flexibility in a multi-vendor scenario
- Real-time edge computing at high frequency
- Cover demanding cybersecurity policies
- Evolving hardware

To maximize profitability, factories seek more flexibility in their layouts, more information about the process and manufactured products, and more intelligence in the processing of this data. However, as new technology is introduced into the factory sector, it necessary to respect some rules. The first and most important is that production cannot stop. New technologies must be compatible with old systems and interoperability among vendors should be facilitated.

Microdeco is a company that manufactures small metal parts for the automotive sector. The company is always looking for ways to enhance productivity and is at the forefront of using intelligent systems. In the company's pilot plant, located in Ermua, Spain, Microdeco has built a networking infrastructure around the concept of smart gateways (RELY-CPPS) that combine in the same system advanced networking, edge computing and sensing.

One of the top challenges in creating a smart factory lies in connecting the various systems. The factory includes high-speed optical links that interconnect each production group of machines, sensors and actuators (see Figure a).

Five-speed Ethernet ports implement regular Ethernet or Industrial Ethernet protocols in each cell, along with serial ports to implement widely used industrial protocols such as Modbus and Profibus. Additionally, the device includes an expansion module to connect temperature sensors, accelerometers and other digital and analogue peripherals.

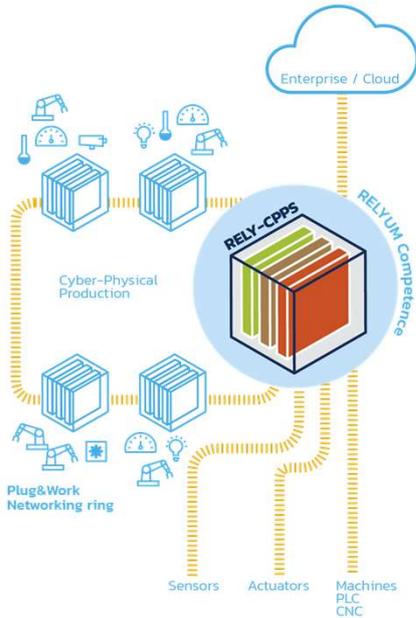


Figure a

Figure b shows how each smart gateway installed in each machine (CPPS area) is tied to the next one using a single fibre optic link. The infrastructure is completed by connecting all the devices in a single ring that implements the High-Availability Seamless Redundancy (HSR) protocol.

This non proprietary (IEC 62439-3 Clause 5) Ethernet “zero-delay recovery time” solution allows operators to disconnect any equipment from the ring without adversely affecting other nodes or equipment in the factory. This real plug-and-work operation facilitates plant layout modifications.

The cybersecurity is further enhanced by a secure boot. All the external software and bitstreams external from the device, even the bootloader and OS, are stored, AES-256 encrypted and HMAC authenticated. This feature, combined with other hardware security protections included in the device, ensures that

data throughout the cyber infrastructure comes from trusted origins.

Additionally, a SIEM agent installed in each RELY-CPPS runs (among others) the following security-related tasks: new connections, authentication attempts, SSH connections, access to analytics tool, virus/malware detection analysis, network attacks identification, protocols present in the network and ARP traffic analysis.

The data analysis can be performed remotely in the enterprise or cloud server and even locally on the smart gateway. For this last purpose, the product includes a temporal database that can predict failures or other defined behaviours in the production and act locally. Big-data analysis software provided by Juxt.io is in charge of performing the predictive analytics related to machine behaviour.

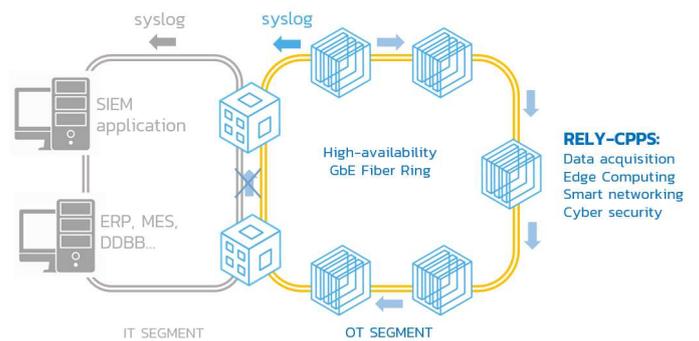


Figure b

Thanks to a solution based on open standards, Microdeco has accomplished all the targets defined at the beginning of the project. Additionally, the fact that the solution is based on a reconfigurable hardware (upgrade on the field) guarantees the evolution of the system to include future needs of the company.

“The choice of a single device to cover all our needs has allowed us to undertake the project with significant savings in terms of costs. Additionally, its flexibility helps to implement new functionalities as we move forward in digitalization”

*Jorge Sierra
- Plant Manager – MICRODECO -*

