

Modernization of the production network at the Arntz Optibelt Group

Stable and reliable networks for secure process data acquisition

Highlights:

- Manufacturing in today's connected world requires a secure and modern automation infrastructure
- The Arntz Optibelt Group needed to modernize its production network
- Phoenix Contact supported the project with comprehensive advice and reliable network technology

"That is the beauty of working together. We learn and benefit from each other."

– Maik Hagemeyer, Arntz Optibelt

Customer profile: Arntz Optibelt Group

Arntz Optibelt GmbH manufactures high-performance drive belts and systems, just a few hundred meters from the Corvey Castle World Heritage Site. With a long tradition and a focus on quality and innovation, the company has made a name for itself in drive technology.



Figure 1: Drive belts from Arntz Optibelt keep bicycles and other vehicles moving

It smells like rubber in the halls of the 150-year-old factory complex. A walk through the central testing facilities reveals where its products are used. Bicycles with belt drives are in the aisle. A ride-on lawn mower is undergoing an endurance test in

continued →

© PHOENIX CONTACT USA, Inc.

a test station. Another room provides space for a conveyor belt. It is loud on the other side. An oversized drive belt has been tensioned between two large motors; the test machine takes up almost the entire room (Figure 1).

Challenge: Failsafe data connection to the machines

If you pay close attention as you walk through the factory buildings, you will see them everywhere: small control cabinets, mostly installed below the ceiling, that house network technology.

It was not always like this. More than ten years ago, Maik Hagemeyer and his colleagues from Equipment Development were tasked with introducing a system for machine data and process data acquisition (MDA/PDA). The idea was to make the factory more digital.

“It quickly became clear that this would not work with a traditional IT network,” says Hagemeyer. There were a host of isolated solutions and makeshift constructions. In addition, the network was unstable and, as a Class C network, was only able to integrate a limited number of devices. Consequently, a stable and reliable production network had to be established. The focus was on a failsafe data connection to the machines so that production processes could be monitored better and optimized.

Solution: Redundant connection of the individual networks

To overcome this challenge, Arntz Optibelt turned to the network specialists at Phoenix Contact. Together, a comprehensive network concept was developed for the production site in Höxter, Germany.

“In the first step, we put a lot of emphasis on availability,” reports Martin Hecker, the Phoenix Contact manager who designed the new network for Arntz Optibelt. To achieve this, the IT was connected to the OT via a high-availability switching infrastructure. Each hall is connected to a dedicated network segment. The connection is redundant to increase failsafe performance. In the production halls, the industrial Ethernet switches are connected in ring structures that are secured via conventional industry protocols. The network technology required for this also came from Phoenix Contact (Figure 2).

To ensure that it meets the requirements, the concept was initially tested in a pilot area. Following the successful test, the network was successively rolled out to other production sites in China, Romania, and Mexico, as well as to other German locations. The network design was conceived from the outset to focus on availability while simultaneously allowing for the easy future expansion of network security as part of ongoing modernization programs.

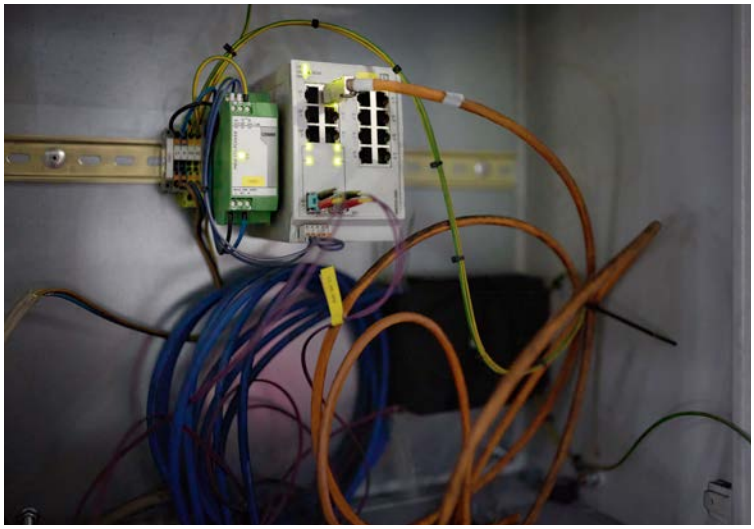


Figure 2: The managed switches from Phoenix Contact ensure a failsafe network with their redundancy mechanisms and numerous diagnostic functions.

Double protection through firewalls and micro-segmentation

This foresight benefited those involved a few years later when IT placed additional demands on the security of the production network. “In the meantime, our production network has become system-critical. If it fails, production stops,” explains Maik Hagemeyer.

Security became a critical factor. The IT department wanted to use firewalls to regulate all communication relationships between the halls themselves, and between the halls and the higher-level IT network (Figure 3). After joint consultation, the team of experts from Arntz Optibelt and Phoenix Contact came up with a good solution. A classic IT firewall routes into the subnets and monitors the communication relationships between production and IT, as well as between the subnets/VLANs.



Figure 3: Close cooperation with the IT department has enabled well-organized interfaces and responsibilities.

continued →

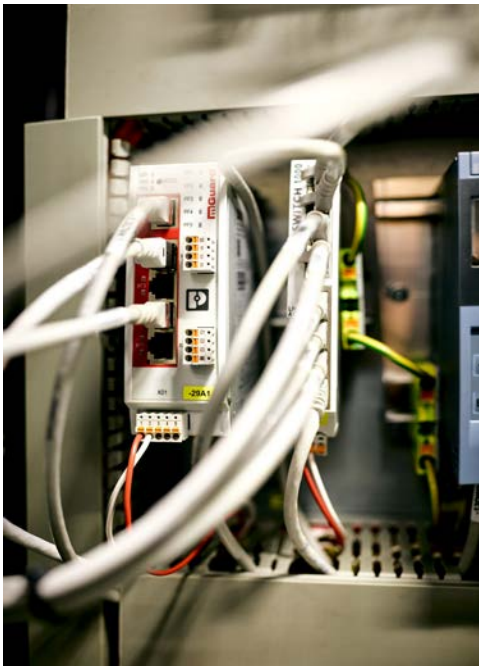


Figure 4: Security routers upstream of each machine protect the network from broadcast storms and unauthorized access.

Micro-segmentation has also been introduced. Industrial mGuard security routers further protect each individual production system. (Figure 4). This prevents broadcast storms and secures access to the Profinet systems.

This additional protection for the production network came just in time: In 2024, Arntz Optibelt was the target of a major cyberattack that also paralyzed parts of the IT system. Fortunately, the attackers were unable to access the production network due to the secure network concept.

Results: Easy configuration and monitoring

To manage the growing network effectively, Arntz Optibelt now relies on professional network management. The network management software from Phoenix Contact makes it easy to configure and monitor the devices used in the field and to generate firewall rule sets based on the communication relationships. Together with Arntz Optibelt, we have broken new ground here. The device management software was implemented as a flexible solution on a container-based platform. “That is the beauty of working together. We learn and benefit from each other,” reports Maik Hagemeyer (Figure 5).



Figure 5: All network components are configured and patched centrally via software.

All in all, the specialists from Phoenix Contact were on hand throughout the entire process. Martin Hecker says, “We created the network design and supported the rollout at the Höxter site. The employees at Arntz Optibelt have been trained by my colleagues and me and given support in the further development of the network. We also created new VLANs and helped with the identification of network structures, as well as monitoring and configuration.”

The network installation was also carried out jointly. Phoenix Contact delivered numerous plug-and-play switch boxes that have been installed throughout the production facility. The third generation of switch boxes is now in use, and Arntz Optibelt’s experience has played a key role in its development.

“The cooperation with Phoenix Contact is really fun. Our next joint project is already in the works,” reports Maik Hagemeyer. In this project, the team is developing a standardized remote maintenance concept to enable secure access to machines. A Phoenix Contact solution will be used here as well (Figure 6).



Figure 6: Achim Werdehausen, Martin Hecker, and Maik Hagemeyer (from left) are already planning their next joint project.