Stepping into the future

TSN revolutionises footwear manufacturing

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Delivering cutting-edge solutions is the goal of any customer-driven, ambitious company. When Orisol, a leading provider of automated systems for footwear production, wanted to futureproof its offering to drive its customers' and its own competitiveness, CC-Link IE TSN offered the ideal technology. The resulting innovation delivers unprecedented speed and responsiveness as well as the connectivity required for smart manufacturing operations.

Orisol is a world-leading provider of smart, automated machines and systems for footwear manufacturing. The company is committed to delivering solutions that maximise interoperability, compatibility and scalability to support the digital transformation of its customers and advance their competitiveness.

In line with this aim, Orisol participates in key collaborations, such as Mitsubishi Electric's smart manufacturing initiative, the e-F@ctory Alliance. In addition, it focuses on the development of future-oriented systems that can support the different stages of shoemaking.

After learning about the potential of Time-Sensitive Networking (TSN), the footwear equipment specialist was keen to apply this technology to its solutions in order to help drive forward the digitalisation of its customers. In effect, TSN can provide the backbone for smart, data-driven operations by supporting the convergence of

multiple types of traffic onto a single network. While doing this, TSN also ensures determinism by prioritising the transfer of time-critical messages, such as control data.

Innovation – body and soles

Orisol saw its OFA240 series upper to sole flash activator machine as an ideal candidate to benefit from the principles of TSN technology. This system, which is a key element of footwear assembly lines, uses heat activation to effectively and homogeneously cure adhesives that are applied to bond different shoe components together.

Successful bonding requires accurate and precise control of the heat applied onto the product. In effect, the challenge in this process is the heat energy distribution that is spread out on the surfaces. It requires the machine to have precise internal communications to regulate the heating energy being released. Also, it needs to offer monitoring functions for the user to know if intervention is needed.

In terms of network requirements, optimum operations for the OFA240 demand suitable controller to device (C2D) communications, so that a single network architecture could be used for all the operational technology (OT) elements of the machine to self-adjust in real-time. These components include vision systems, temperature sensors, heat lamps, switches, indicators and alarms.

Moreover, since Orisol is focused on the digitalisation of operations to create a smart facility, a network architecture that could also enable controller to controller (C2C) communications, in addition to integration with higher level information technology (IT) systems, was required. This would allow machines to operate in parallel to share information and effectively collaborate to optimise product quality, efficiency and

productivity. TSN provided a single solution to address all these requirements, ultimately supporting convergence of the OT and IT domains. It also offered the possibility for multiple machines to be integrated into Orisol's proprietary production monitoring and remote maintenance systems, such as its Production Data Collection System (PDCS) and Remote Operation Maintenance Platform (ROMP).

To leverage the power of TSN and meet Orisol's requirements, CC-Link IE TSN was selected as the system's network technology. This is the first open industrial Ethernet to provide TSN functions, therefore ensuring convergence and determinism. In addition, it offers gigabit bandwidth to maximise the volume of data traffic that can be sent simultaneously. Furthermore, it is supported by leading global automation vendors with a range of compatible products.

A foot in the door

Thanks to an established portfolio of CC-Link IE TSN compatible industrial automation devices from Mitsubishi Electric and Moxa, Orisol could leverage a comprehensive application solution to meet all their requirements.

The benefits delivered by this solution were significant. The network's gigabit bandwidth led to internal communications speed increasing 220 times. This meant that execution time was shortened by 7 times and application time by12 times. CC-Link IE TSN also enabled machines to be synchronised to an accuracy of 1 millisecond. This delivered almost instant data sharing, delivering precise communications within the machine itself, to other devices and to IT systems, such as Orisol's PDCS and ROMPS. These provide remote monitoring and control, allowing operators to have a real-time overview of the process as well as promptly intervene, if anomalies are discovered. The end result was a system that fully addresses the demands of Industry 4.0 by using TSN technology.

John Browett, General Manager at CLPA Europe, concludes: “Orisol’s OFA240 series flash activator machine is an excellent example of how TSN has been applied in a real-world application to deliver significant machine performance improvements. We are extremely proud to see CC-Link IE TSN being used to enable significant productivity increases and therefore deliver an enhanced competitive advantage to Orisol and their customers. We look forward to seeing many more companies apply CC-Link IE TSN the near future to realise similar benefits for their own machines and customers.”

Image captions:

Image 1: When Orisol, a leading provider of automated systems for footwear production, wanted to futureproof its offering, CC-Link IE TSN offered the ideal technology. (© istock/Nordroden)

Image 2: Orisol saw its OFA240 series upper to sole flash activator machine as an ideal candidate to benefit from the principles of TSN technology. (© Orisol)

About The CC-Link Partner Association (CLPA)

The CLPA is an international organization founded in 2000, now celebrating its 20th Anniversary. Over the last 20 years, the CLPA has been dedicated to the technical development and promotion of the CC-Link open industrial network family. The CLPA's key technology is CC-Link IE TSN, the world's first open industrial Ethernet to combine gigabit bandwidth with Time-Sensitive Networking (TSN), making it the leading solution for Industry 4.0 applications. Currently the CLPA has over 4,100 corporate members worldwide, and more than 2,000 compatible products available from over 370 manufacturers. Around 38 million devices using CLPA technology are in use worldwide.

Further Information:

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