

Redefining industrial connectivity with TSN

28 November 2023

In the dynamic landscape of Industry 4.0, a significant and transformative interconnectivity wave is sweeping the globe – Time-Sensitive Networking (TSN). The technology, supported by a large portfolio of industrial automation devices that leverage CC-Link IE TSN open industrial gigabit Ethernet with TSN functions, is being rapidly adopted and enabling remarkable productivity gains in manufacturing.

John Browett, General Manager at the CLPA Europe, looks at how CC-Link IE TSN solutions are being implemented to advance manufacturing facilities around the world.

TSN is a network technology designed to advance industrial Ethernet communications through determinism and convergence. Thanks to these capabilities, it enhances the way companies' processes operate as well as how their machines and components communicate, bringing with it a host of benefits that can drive competitiveness throughout the industrial landscape.

The solution can guarantee determinism across a network, enabling machine builders and users to set up ultra-high speed industrial automation applications, such as complex motion systems, and improve productivity. In addition, by providing a platform for convergence, TSN can help create simpler, leaner and more cost-effective networks that streamline troubleshooting. Also, it supports data-driven decision making, thanks its ability to facilitate the merger of information technology (IT) and operational technology (OT).

Driven by the competitive advantages that TSN can bring to companies in various manufacturing sectors, for example, the demand for the technology is rapidly growing. To address this, automation vendors at the forefront of the industry are beginning to offer devices that can leverage TSN, with CC-Link IE TSN open industrial Ethernet a popular choice. This network technology, which combines TSN functions and gigabit bandwidth, already boasts over a hundred compatible products that are readily available and can support advanced Industry 4.0 setups. As a result, the number of CC-Link IE TSN applications is rapidly growing.

The land of CC-Link IE TSN's rising sun

The CC-Link IE TSN adoption curve found its origin point in Asia, where forward-thinking companies across the continent quickly realised the potential of the network technology as well as its many benefits. For example, Shashin Kagaku, a Japanese producer of additive manufacturing systems, also known as 3D printers, turned to CC-Link IE TSN for its new SZ-6000 machine. The resulting solution provided the company with a significant lead over other businesses in what is already a highly competitive marketplace. More importantly, its customers can also benefit from a significant increase in productivity through a highly cost-effective unit.

In China, CC-Link IE TSN has been adopted by a leading producer of automated lithium-ion battery manufacturing lines. The company was looking for a new technology that would improve the productivity of its systems, while simplifying their designs and reducing time to market. Also, the Instrumentation Technology & Economy Institute (ITEI) of the People's Republic of China selected CC-Link IE TSN as an enabling technology within the Smart Manufacturing Comprehensive Test Platform. This is a full-scale, fully automated demonstration of a manufacturing

system that leverages key technologies to showcase best practices for future manufacturing facilities.

Another leading example of the advantages of this cutting-edge network technology was developed by Orisol, a leading provider of automated systems for footwear production. The company saw its OFA240 series upper to sole flash activator machine as an ideal candidate to benefit from TSN technology. By using CC-Link IE TSN, this updated setup could increase the speed of internal communications by a factor of 220, with execution time shortened by 7 times and application speed increased by 12 times overall. CC-Link IE TSN also enabled machines to be synchronised to an accuracy of 1 millisecond for almost instant data sharing, delivering precise communications within the machine itself, and to other devices and IT systems.

Go west

The adoption of CC-Link IE TSN in Asia, highlighted by the aforementioned examples, marked the first steps in a global shift towards a more interconnected and efficient industrial landscape. The European market is now following in the footsteps of companies in the East. Applications built on CC-Link IE TSN are helping companies enhance their connectivity, productivity and efficiency.

The latest project completed by Keller poligrafia dla przemysłu, for example, stands as a testament to the technology's fast-growing adoption in Europe. The Polish company, a leading OEM of machines that perform screen and pad printing as well as hot stamping, developed an innovative bottle printing system that leverages CC-Link IE TSN network technology to boost productivity. By incorporating TSN, the solution delivers next level productivity via deterministic motion control over a

multitude of servos. This has resulted in significant improvements in terms of speed, accuracy and precision that can greatly benefit end users.

The success of Keller's implementation demonstrates that CC-Link IE TSN is not merely an Asian phenomenon but a growing global trend. As more companies recognise the transformative potential of this technology, we can anticipate further breakthroughs and improvements in industrial processes in Europe as well as on a global level.

A global shift towards CC-Link IE TSN is underway

Today, more and more companies spanning various sectors have embraced CC-Link IE TSN. These include industry players in automotive, food and beverage, logistics, consumer electronics, semiconductor, lithium-ion batteries as well as consumer packaged goods. This broad spectrum of industries leveraging the technology underscores its ability to address Industry 4.0 challenges across the board and signals a turning point in the industrial connectivity landscape.

The continuous increase in applications that use CC-Link IE TSN for effective communications is a compelling indicator of the technology's role as enabler for the creation of the Connected Industries of tomorrow. The total number of installed devices that are compatible with the CLPA's range of open technologies, from CC-Link fieldbus to CC-Link IE open gigabit Ethernet and CC-Link IE TSN, surpasses 40 million globally and continues to climb. This therefore provides an unmistakable sign that the trend of adopting CC-Link IE TSN is not merely a passing phase but a fundamental shift that is here to stay.

Image captions:

Image 1: Keller, a leading OEM of machines that perform screen and pad printing as well as hot stamping, has developed an innovative new system that leverages CC-Link IE TSN network technology to boost productivity. (© Keller poligrafia dla przemysłu)



Image 2: Shashin Kagaku is a Japanese manufacturer of AM systems that form high precision parts using a ceramics-based process turned to CC-Link IE TSN to add value to additive manufacturing operations. (© Shashin Kagaku)



Image 3: Orisol saw its OFA240 series upper to sole flash activator machine as an ideal candidate to benefit from the principles of TSN technology. (© Orisol)

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About The CC-Link Partner Association (CLPA)

The CLPA is an international organisation founded in 2000 dedicated to the technical development and promotion of the CC-Link family of open automation networks. 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 4,200 member companies worldwide, and more than 2,800 compatible products available from over 380 manufacturers. Over 40 million devices using CLPA technology are in use worldwide.

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