

## **At the core of convergence, there's (CC-Link IE) TSN**

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**In a very short time, Time-Sensitive Networking (TSN) moved from being a technology under development to a must in manufacturing and processing facilities. This success lies in the ability to drive convergence, at the core of digital manufacturing applications. The capabilities of TSN are now more evident than ever, thanks to the role played by future-oriented organisations, such as the CLPA, which has played a leading role in supporting its development and adoption in industrial applications from the outset.**

*Tom Burke, Global Strategic Advisor at CC-Link Partner Association (CLPA), looks at what the CLPA saw in TSN and the progression of this technology, now considered an enabler of digital manufacturing applications.*

TSN was developed by the IEEE 802.1 working group with the aim of advancing the capabilities of standard industrial Ethernet in order to support future-oriented, smart applications. The technology's key standards for industrial automation applications are IEEE 802.1AS for time synchronization and IEEE 802.1Qbv for traffic prioritization and scheduling.

The potential of TSN did not go unnoticed among industrial automation specialists as well as manufacturers implementing their digital transformation journeys. The CLPA immediately saw the numerous opportunities that this technology could unlock.

By driving network convergence while ensuring determinism, the first obvious benefit of TSN is its ability to simplify architectures, reducing the number of networks necessary to support data sharing and communications of different kinds. Besides enabling leaner infrastructures, TSN-supported convergence also facilitates visibility, transparency and accessibility. These characteristics can greatly improve operations, boosting responsiveness, productivity and efficiency as well as streamlining troubleshooting and maintenance. Even more, the walls that have traditionally separated information technology (IT) and operational technology (OT) can be torn down, enabling decisions based on better access to process data that enhance competitiveness.

Following its tradition of innovation, the CLPA was the first to add TSN functions to industrial Ethernet, launching CC-Link IE TSN in 2018. Early adopters immediately began to develop and implement CC-Link IE TSN-compatible development tools and industrial automation products. Following on from this, momentum built and now over 50 end users are leveraging the technology or plan to do so.

### **More than technology acceptance**

Currently, there are a variety of options available to develop products that support the technology. These have been enabling the release of devices that are helping to futureproof factories, operations and entire enterprises.

For example, the Instrumentation Technology & Economy Institute of the People's Republic of China (ITEI), which promotes best practices in manufacturing, was able to create a full-scale manufacturing system based on CC-Link IE TSN in order to demonstrate the benefits TSN can deliver. This demonstration facility features a converged network architecture, which enables the transfer of data from machining, assembly and logistics areas as well as CNC condition monitoring and tool

protection systems through a unified infrastructure. As a result, the ITEI could highlight the reduction of complexity while increasing transparency and productivity. Similarly, a leading additive manufacturing provider, Shashin Kagaku, was able to introduce machines that offer a significant increase in performance while being simpler to build. By utilizing CC-Link IE TSN, the key laser system is tightly integrated with a high precision motion control system, while reducing overall costs and time-to-market. Ultimately, the resulting machine is ten times faster than previous models without TSN functions.

Based on the same network technology, Orisol, a leading provider of automated systems for footwear production, is now offering a unique assembly unit for heat activated adhesives that bond different shoe components. More precisely, this can deliver unprecedented speed and responsiveness as well as the connectivity required for Industry 4.0 applications.

Finally, CC-Link IE TSN has been used across the lithium-ion battery industry in China to advance key aspects of production. In particular, the technology enables better integration of the highly critical motion control processes with safety and general I/O control traffic while maintaining high performance operations.

### **TSN is here and now**

Thanks to TSN and its features, the digital transformation journeys being undertaken by manufacturing facilities across a variety of sectors are being driven forward at pace, supported by a variety of industrial automation vendors. By using innovative devices and machines to deliver unprecedented capabilities, adopters of this new technology are further increasing their competitiveness while futureproofing their operations.



The CLPA, as the first organization to launch a network technology compatible with TSN, has been playing a key role in enabling vendors and users to leverage this leading innovation. Even more, the association has developed an unrivalled understanding of the technology by collaborating with a broad range of automation specialists in building and certifying CC-Link IE TSN development options and compatible products. By becoming a CLPA member and specifying CC-Link IE TSN components, companies can benefit from proven, interoperable solutions to help build the smart factories of the future.

**Image captions:**



**Image 1:** The capabilities of TSN are now more evident than ever, thanks to the role played by future-oriented organizations, such as the CLPA.

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## 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.

Anyone interested in joining the organization can apply here: <https://www.cc-link.org/en/clpa/members/index.html>

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