OPEN AUTOMATION NETWORKS

CC-Link IE TSN
FOR MACHINE BUILDERS

Unlock the future of machine building with CC-Link IE TSN

Today's machine builders operate on a global scale with customers across the world in many different industries and markets. Whether that industry is automotive, food and beverage, semiconductors or whatever, one thing is clear. These industries all face many challenges, but a common theme through them all is digitalisation. Data has become the new fuel that drives manufacturing. For machine builders to be successful today and in the future, they need to offer systems that allow data to flow from all parts of the enterprise to everything and everyone who needs it.

For more details on the products available, please watch "**Solutions for all industries**"

That's where the CC-Link Partner Association steps in. We are an established, global organisation with a track record of getting data to where it's needed in the most innovative ways. We have done this with a range of industry leading, open technologies supported by hundreds of partner companies worldwide. This has resulted in thousands of product choices and a global installed base in the tens of millions.

Benefits of CC-Link IE TSN at a glance:

- Open, converged and deterministic industrial Ethernet architecture
- Gigabit or 100Mbit bandwidth
- Simpler network architectures/machine designs
- Greater process transparency and better management
- Better integration of OT and IT systems
- High productivity

How does CC-Link IE TSN benefit machine builders?

Digitalisation's transformative potential is widely recognised. But this "explosion" of data has created a double-edged sword. On one hand, it can provide valuable actionable insights for optimising processes. Poorly managed, it becomes a tidal wave that overwhelms systems.

Key to its management is a converged, high bandwidth network infrastructure to support digital transformation strategies. Convergence allows everything to communicate on the same network architecture, avoiding multiple networks' cost and complexity. It's the foundation of high-speed, real-time deterministic communications between disparate devices and systems, allowing competitive benefits to be increased, machine designs to be simplified, system cost and time to market reduced and maintenance made faster. For the customer, it means sharing data across the entire enterprise, regardless of source or destination. This provides the transparency required for fully optimised operations by allowing data to flow from its source to be processed for actionable insights, then fed back.

CASE STUDY | **Additive manufacturing, Japan.**

Adding value to additive manufacturing operations

Challenges:

- Simplify machine design by combining multi-axis sub-micron motion control with UV digital light processing (DLP) and other machine functions on one network
- Deliver significant productivity gains

Benefits delivered by TSN:

- OT convergence - tight integration with the system I/O, UV DLP and multi axis high precision motion control system on the same network
- Simplified system design – less wiring, reduced construction time, shorter delivery time, reduced system cost and a more competitive product
- Gigabit bandwidth contributed to component production time about 10 times faster than previous models

SHASHIN KAGAKU

CASE STUDY | **Footwear manufacturing, Taiwan.**

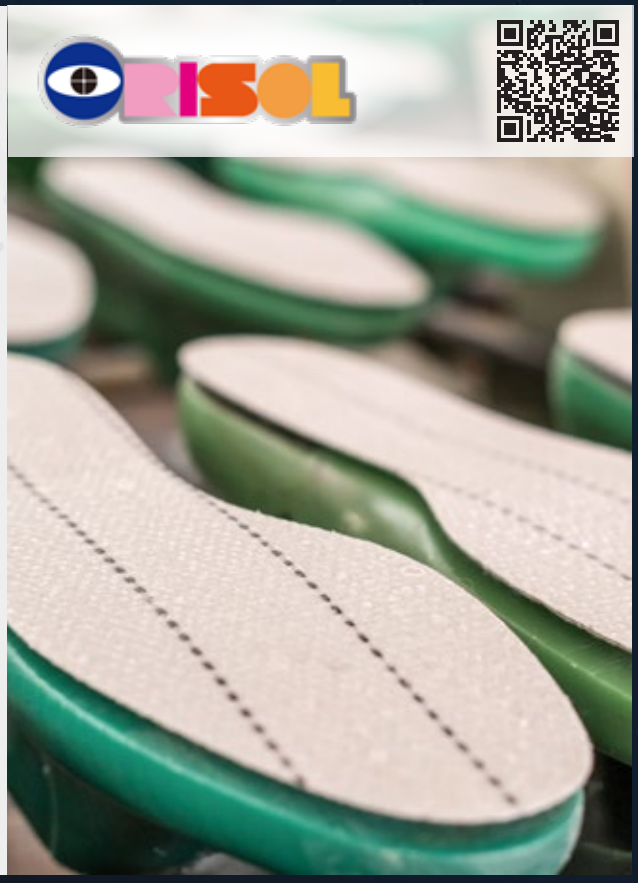
Revolutionising footwear manufacturing

Challenges:

- Simplify machine design while delivering significant productivity gains
- Precise process control for successful bonding
- Integration into a smart shoe manufacturing system focused on digitalisation

Benefits delivered by TSN:

- IT/OT convergence
- Single network architecture for machine communications between vision systems, temperature sensors, heat lamps, switches, indicators and sensors
- Delivers necessary process responsiveness independent of environmental conditions and millisecond process synchronisation between machines
- Integrates multiple machines into Orisol's proprietary production monitoring ("PDCS") and remote maintenance ("ROMPS") systems
- Gigabit bandwidth enabled 220x communication speed increase
- Led to 7x faster process execution time, overall application speed increased 12x



CASE STUDY | **Screen printing, Poland.**

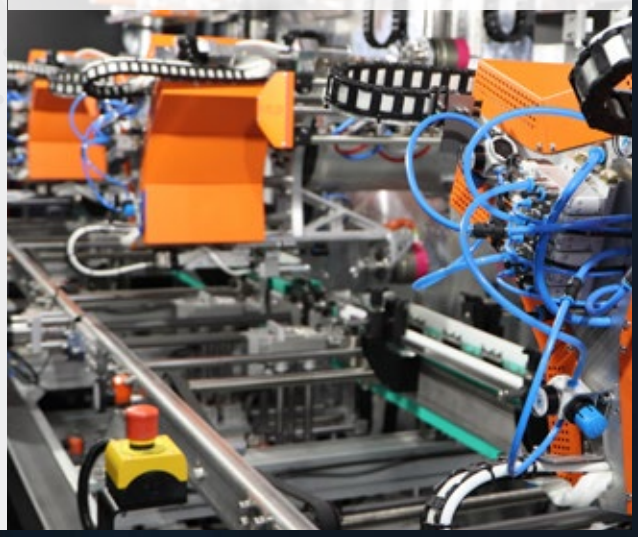
Driving innovation in industrial printing technologies

Challenges:

- Provide deterministic motion control of over 60 axes
- Deliver a convergent network architecture which will allow simplified machine design, reduced costs and shorter time to market

Benefits delivered by TSN:

- Provides fully deterministic control of all axes, with room for future scalability
- A single converged network architecture handles all machine functions, now and in the future
- High productivity - 3,000 units per hour, planning to increase to 3,600



What do we offer?

We began with what is now one of the world's most widely used fieldbus technologies, CC-Link, and then became recognised as an innovator in industrial Ethernet. Today, our offering is based on CC-Link IE TSN, the world's first and so far only open industrial Ethernet technology that combines gigabit bandwidth with Time-Sensitive Networking.

This makes CC-Link IE TSN the leading choice for machine builders looking to save cost, improve efficiency and improve connectivity between the OT and IT worlds.

Key features and benefits are:

Use TSN's converged network technology to implement simpler deterministic network architectures that combine multiple network traffic types into one.

Improve productivity with combined data streams that simplify maintenance and increase uptime.

Increase process transparency by simpler extraction of process data to gain optimisation insights.

This is why we believe that CC-Link IE TSN can be summarised as "**One Network. One Solution.**"

For less demanding applications, we also offer CC-Link IE Field Basic. This suits the needs of low cost applications where a higher degree of functionality is less important.

Our legacy technologies are still widely used globally. These include our earlier industrial Ethernet technologies, CC-Link IE Field and CC-Link IE Control. And despite being almost 25 years old, our original fieldbus CC-Link is still powering millions of devices across the world even today.

For an in-depth overview of TSN and its importance to modern machine building, please watch our video series, "**What is Time-Sensitive Networking?**"

Our organisation

The CLPA has broad industry support. This is reflected in our board members who include some of the world's leading technology companies as shown here:

President

Board of directors

3M, ANALOG DEVICES, BALLUFF, CISCO, COGNEX, IDEC, MITSUBISHI ELECTRIC Changes for the Better, molex, Orchestrating a brighter world NEC, Pro-face by Schneider Electric

Managing office
CLPA Headquarters

Conformance testing facilities
Japan
China
Korea
Germany

CLPA branches
China
Europe
America
Korea
Taiwan
ASEAN
India
Turkey
Americas
Mexico

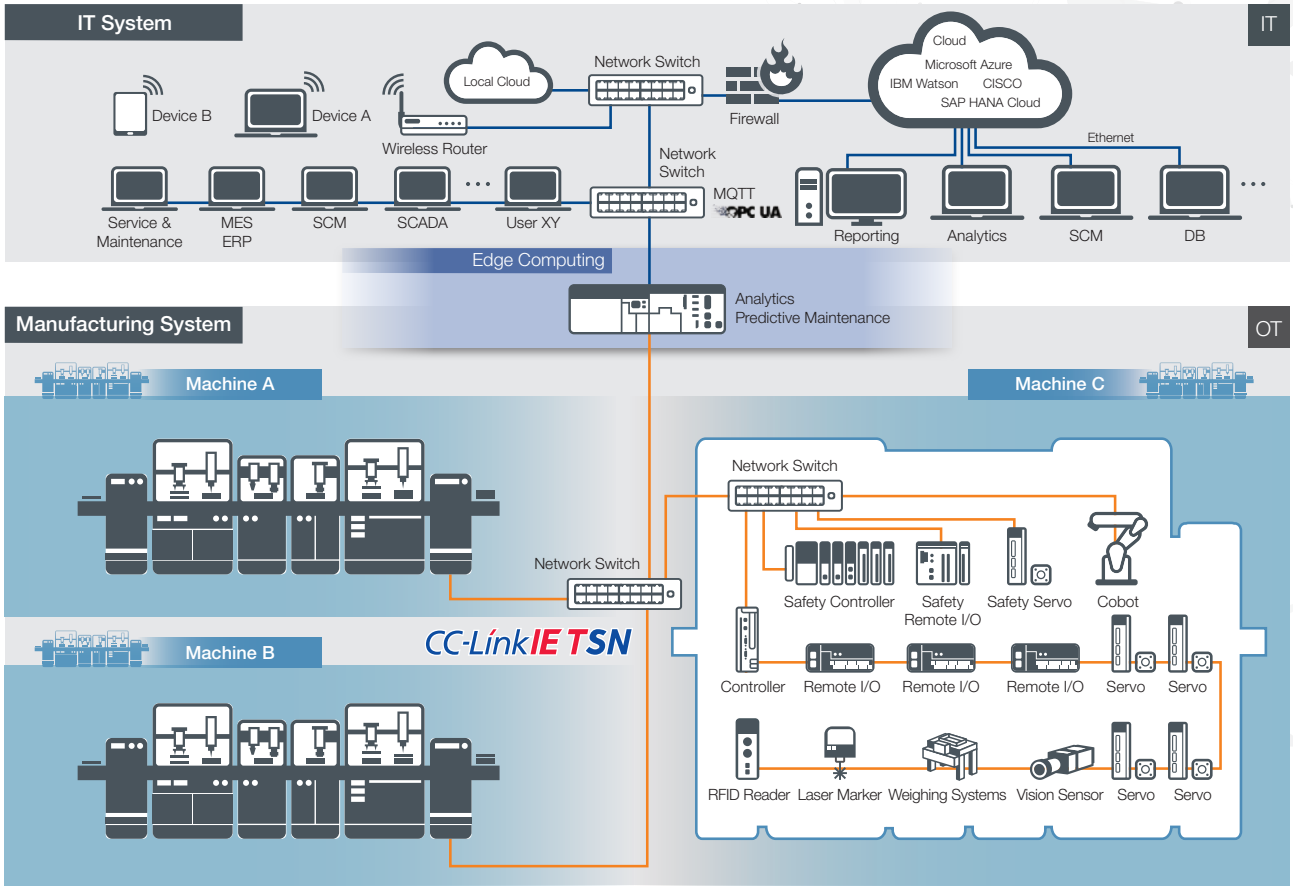
Technical task force

Marketing task force

CLPA Partners

World-wide support

CC-Link IE TSN IT/OT Architecture



Technical specifications

No.	Items	CC-Link IE TSN	CC-Link IE Field Basic
1	Baud rate	1Gbps/100Mbps	100Mbps
2	Maximum input/output size per master	4G Octet(Byte)	9K Octet(Byte)
3	Transient transmission	Supported	Supported
4	Communication method	Time sharing	Broadcast polling
5	Synchronisation method	Time synchronisation	–
6	Maximum station No. per network	64,770 stations (Master: m stations, Slave: 64,770-m stations)	65 stations (Master:1 station, Slave: 64 stations)
7	Topology	Line, Star, Ring, Line + Star, Line + Ring, Ring + Star, Mesh	Line, Star
8	Cable specification	IEEE 802.3 1000BASE-T (Category 5e or above)/100BASE-TX (Category 5 or above) compatible cable. Shielded or double shielded cable recommended.	
9	Connector specification	RJ-45 connector (1Gbps/100Mbps) ANSI/TIA/EIA-568-B compliant. 8 pin shielded connector recommended. M12 connector (1Gbps/100Mbps) IEC61076-2-109 compliant. 8 pin connector recommended. M12 connector (100Mbps) IEC61076-2-101 compliant. 4 pin connector recommended.	

CC-Link Partner Association - Europe
partners@eu.cc-link.org | eu.cc-link.org