

Does your network have what it takes to create a Smart Factory?

Increasingly advanced automation systems from robotized manufacturing lines, AGVs, smart machines and integrated logistics are helping to create Smart Factories. These data-driven, responsive facilities can greatly enhance the competitive edge of a business. However, to realize this vision an effective means of carrying the data and control signals is required to create an autonomous, interconnected, responsive and flexible factory. Thus, the real protagonists are industrial networks.

Thomas Burke, Global Strategic Advisor at the CC-Link Partner Association (CLPA), looks at how the right industrial network can jumpstart your Smart Factory.

Connectivity is the keyword when talking about digital manufacturing. In fact, communication is the backbone of all the industrial components used to realize the Industrial Internet of Things (IIoT), as it brings together different entities on the factory floor, e.g. hardware devices, software tools and people, as well as higher enterprise level systems. It allows them to collect, communicate and analyze data. By doing so, the industrial machines and the entire enterprise become intelligent systems, able to improve plant performance, productivity and flexibility.

Within this framework, a suitable network technology can go a long way towards boosting the capabilities of a factory, as it enables direct communication between manufacturing and management systems, resulting in the ability to control and make adaptive decisions based on real-time information. This is an essential prerequisite to achieving manufacturing-on-demand for a range of increasingly user customizable products.

The foundations of a network for the future

As a large volume of devices should be seamlessly interconnected in the Factory of the Future, keeping the costs down while ensuring good connectivity is essential. Currently, the most attractive physical layer available is Ethernet. Compared to traditional fieldbus, this network technology is economical and faster. Therefore, Industrial Ethernet provides a better price/performance ratio. In addition, Industrial Ethernet offers the possibility to create different plant topologies and it is generally easier to configure and expand, factors that are crucial when defining an enterprise's automation strategy.

Not any kind of Industrial Ethernet is sufficient, though. In order to establish an IIoT-enabled manufacturing line, large amounts of data from multiple devices need to be collected and transferred in real-time. Therefore, having enough network bandwidth capacity is critical to the successful operation of these systems. More precisely, full gigabit networks are becoming the standard for industrial automation going forwards.

In addition, the networking solution should be able to address different standards, as factories tend to adopt field devices and machines from different manufacturers to satisfy their production needs. As a result, open networks are key, as they provide the only solution to accommodate products from multiple vendors.

To address this aspect, the CLPA has increased the openness of its gigabit Ethernet technology CC-Link IE by developing specifications that increase the network's interconnectivity and compatibility with other solutions. For example, an interoperability specification allows CC-Link IE and PROFINET to communicate with one another, thus allowing individual devices to be connected to either network. Also, the companion specification between the CLPA's CSP+ for Machine technology and OPC UA enables further communication options.

Looking ahead, it is safe to assume that in many cases the network of the future will be a 1 Gbps Ethernet-based solution in line with the latest advances in technology, such as Time-Sensitive Networking (TSN). As well as offering real-time, deterministic communications, it should also offer an open protocol structure to allow collaborative future development and hence futureproofing. Currently, the only industrial network to meet all these requirements is CC-Link IE TSN, developed by CLPA, the first open industrial network combining gigabit Ethernet performance with TSN functionalities.

Seamless communication across all levels of automation

An open architecture is a must for networks to accept devices from a number of manufacturers. However, this is not enough for the network of the future, which should maximize its compatibility on different fronts.

Not all installations are new and compatibility with legacy systems and devices is often required in 'real world' applications. Plus, there is always a transition period to be managed for any existing plant and machinery, which can include 100Mbit only connections. CC-Link IE TSN can support these 100Mbit devices in addition to 1Gbps equipment and is easily implemented on devices or master controllers by software alone, enabling compatibility to be added to existing products without any hardware modification. This compatibility feature broadens the practical options when implementing upgrades or new equipment.

Secondly, the ideal system should support the convergence of information technology (IT) and operational technology (OT). It is essential to ensure that the data generated on the plant floor is accessible across all higher-level systems, from the control, supervisory and enterprise levels. This requires seamless vertical network integration, which can be obtained by using a single protocol that can span across all levels of the enterprise.

This means that, in addition to having a large bandwidth, the industrial communications network needs to be able to schedule different types of data traffic in

a highly effective manner. In particular, time-critical control data should be prioritized to support determinism and reliability on the factory floor.

CC-Link IE TSN can address these requirements by utilizing highly accurate traffic scheduling and prioritization capabilities. As a result, time-critical control data can be shared in a timely manner and congestions can be minimized, if not eliminated.

In addition, CLPA's network technology establishes reliable communications between the field devices and the enterprise level by allowing easy integration with network layers such as Supervisory Control and Data Acquisition (SCADA) systems or Manufacturing Execution Systems (MES) to fully monitor, manage and report plant production processes.

A future orientated and scalable network technology

The key design principles for digital manufacturing are real-time information transfer capabilities as well as data transparency and availability across the enterprise for advanced analytics. To implement these functionalities, it is essential to select the right industrial network. This should be able to accommodate different types of traffic generated by a broad range of devices while ensuring the timely delivery of each data packet.

By combining openness, gigabit bandwidth and TSN capabilities, CC-Link IE TSN is well placed to address these needs. As a result, businesses utilizing this network technology can succeed in the creation of advanced digital manufacturing strategies that enhance their productivity and competitiveness.

- ENDS -

CLPAUS003 Smart Factory

Caption: CC-Link IE TSN can support these 100Mbit devices in addition to 1Gbps equipment and is easily implemented on devices or master controllers by software alone, enabling compatibility to be added to existing products without any hardware modification.

Keywords: Time-Sensitive Networking, Smart Factory, industrial automation, CC-Link IE TSN, TSN, CLPA, Ethernet, Industry 4.0, IIoT

About The CC-Link Partner Association (CLPA)

The CLPA is an international organisation 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 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 almost 3,800 member companies worldwide, and more than 2,000 compatible products available from over 340 manufacturers. Around 30 million devices using CLPA technology are in use worldwide.

The image(s) distributed with this press release may only be used to accompany this copy, and are subject to copyright. Please contact DMA Europa if you wish to license the image for further use.

Further Information:

Website: am.cc-link.org/en

LinkedIn: <https://www.linkedin.com/company/clpa-americas>

Twitter: https://twitter.com/CC_LinkNews

YouTube: <https://www.youtube.com/c/cclinkpartnerassociation>

Editorial contact: DMA Europa Ltd. : Anne-Marie Howe

Tel: +44 (0)1562 751436 Fax: +44 (0)1562 748315

Web: www.dmaeuropa.com

Email: anne-marie@dmaeuropa.com

Address: Europa Building, Arthur Drive, Hoo Farm Industrial Estate,
Kidderminster, Worcestershire, DY11 7RA, UK

Reader contact: CC-Link Partner Association : Thomas Burke

Tel: (847) 478-2100 Fax:

Web: am.cc-link.org/en/

Email: Tom.Burke@cclinkamerica.org

Address: 500 Corporate Woods Parkway, Vernon Hills, IL - 60061