

Turbocharging vehicle production with advanced network technologies

The automotive industry has continually pioneered new manufacturing and assembly processes, driving the adoption of key innovative technologies on the factory floor. To enhance their competitiveness, companies need smart and flexible production systems that can decrease cycle times while increasing quality. Industrial communication technologies play a key role in the successful implementation of complete solutions for data/information integration.

Thomas Burke, Global Strategic Advisor at CLPA, discusses what to look for to identify ideal network solutions for the automotive industry.

The automotive sector is often an early adopter of innovative technologies and as a result it is one of the most automated manufacturing industries in the world. It is the main driver and largest segment of the industrial robotics industry, accounting for 30% of the over 2.4 million robot installations worldwide.¹

The use of advanced automated systems allows businesses in the sector to maintain low cycle times that support high-volume, fast turnaround production with improved quality. For example, thanks to technology, it takes 13 to 35 hours to turn raw materials into a car that comprises tens of thousands of parts. Key applications that car makers currently automate include welding, injection molding, painting and surface coating, glue dispensing, assembly and inspection.

Similarly, automotive manufacturers can support large-scale mixed model production programs in their assembly. As a result, businesses can effectively use a single production line to deliver different vehicle models with a high degree of customization.

Smarter, better, faster

As new, promising digital technologies emerge and develop, they are often adopted by automotive manufacturers to optimize various aspects of their production. Currently, one of the most common ambitions among manufacturers is the creation of flexible systems that can autonomously run entire production processes, self-optimize their performance across a broader network and adapt to varying conditions in real or near-real time.

Even in following this trend, the automotive sector is ahead of the curve, with 30% of factories in the industry that have already been made smart and further 44% expected

¹ International Federation of Robotics (2019) Executive Summary World Robotics 2019 Industrial Robots. Available at: <https://ifr.org/downloads/press2018/Executive%20Summary%20WR%202019%20Industrial%20Robot%20s.pdf> [Accessed: 12 August 2020]

within the next five years². This results in over 70% vehicle manufacturers currently involved in this initiative².

At the heart of smart factory applications are large volumes of data, which are generated, shared and analyzed in order to offer a unique insight into machines, processes and facilities as well as supporting automated closed-loop feedback control. Therefore, the implementation of a highly advanced networking technology to connect multiple parties and share information is paramount to set up intelligent, interconnected plants. When advancing automated systems, businesses require a high-performance, secure and reliable networking technology in order to get the necessary data for smart application from factory floor devices, which are otherwise disconnected.

The key needs of smart factories

The automation specialist needs to select and use automation devices that leverage a state-of-the-art industrial communication technology that can support the real functionalities of data-driven applications. Key elements that automation specialists should include in their products are interconnectivity and the use of a network solution that features sufficient and well-utilized bandwidth as well as the ability to support the convergence of information technology (IT) and operational technology (OT).

The first aspect enables automation products to communicate and interact with other devices within an enterprise, e.g. supporting effective field-level communications. Optimal level and allocation of network bandwidth, on the other hand, allow automation devices within a network to effectively handle the ever-increasing traffic of data generated by smart machines while minimizing the risk of packet delays and collisions during transfer.

When brought to the next level, this capability supports the seamless integration of systems across different levels of the automation pyramid. For example, businesses in the automotive sector can benefit from more accurate and efficient scheduling, production planning and material allocation.

Network technologies for maximum performance

CC-Link IE TSN is one of the network solutions that allow manufacturers of automation products to address these needs. This is an open industrial Ethernet technology that combines 1 gigabit/second bandwidth and Time-Sensitive Networking (TSN). By selecting it for their products, device makers can leverage a widely adopted technology with the highest bandwidth currently available as well as traffic scheduling features to support IT/OT convergence. To further support the effective transmission of large

² Capgemini Research Institute (2020) How automotive organisations can maximise the smart factory potential. Available at: <https://www.capgemini.com/gb-en/wp-content/uploads/sites/3/2020/02/Report-%E2%80%93-Auto-Smart-Factories-1.pdf> [Accessed: 14 August 2020]

volumes of data, CC-Link IE TSN uses token passing methods for data transmission control.

Automotive plants that use CC-Link IE TSN compatible automation devices can therefore fully realize smart, interconnected factories, reaching the next level in productivity and performance. In particular, businesses will be able to further reduce their cycle times and production costs, increase flexibility to deliver vehicles with a high degree of customization and quality.

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CLPAUS027 Automotive Industry Feature

Image Caption: The automotive sector is often an early adopter of innovative technologies and as a result it is one of the most automated manufacturing industries in the world.

Keywords: automotive, CC-Link IE TSN, manufacturing, Time-Sensitive Networking (TSN)



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.

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