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FACTORY AUTOMATION

Customer Reference

Revolutionising industrial printing: KELLER transforms modular systems with Mitsubishi Electric Automation

How CC-Link IE TSN network technology and advanced motion control delivered unprecedented precision, scalability, and 20% productivity increase

Key points

- **20% productivity increase:** Production speed improved from 3,000 to 3,600 units per hour
- **Unprecedented synchronisation:** Real-time control of up to 128 servo axes with absolute precision
- **Network convergence:** CC-Link IE TSN supports multiple protocols on single Gigabit Ethernet network

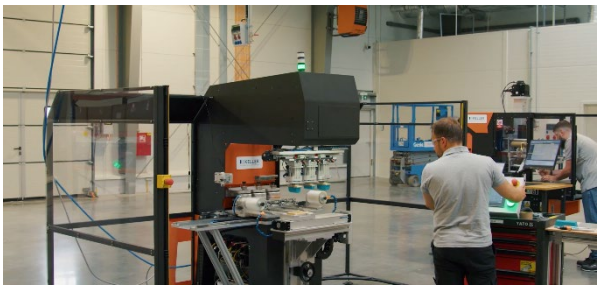
KELLER, a leading provider of industrial printing machines and consumables, delivers cutting-edge solutions across diverse industries including home appliances, automotive, cosmetics, glass manufacturing, consumer electronics, and the medical sector. Their advanced printing technologies—such as green printing, PET printing, hot stamping, and thermal transfer—offer unparalleled flexibility and high-speed production capabilities. To optimise their most ambitious project, a new modular printing system designed for maximum efficiency and flexibility, KELLER partnered with Mitsubishi Electric to integrate a powerful automation and motion control system that enhances precision, scalability, and performance whilst delivering measurable productivity gains.

The Challenge: KELLER faced several critical obstacles in developing their new modular printing system. Inflexible legacy systems were not designed for rapid reconfiguration, limiting the ability to adapt to different printing requirements and customer demands. Synchronisation complexities presented a major technical hurdle, as coordinating up to 128 servo drives for high-speed printing demanded an unprecedented level of precision that legacy control systems could not deliver. Integration challenges arose from the need to support multiple communication protocols within one unified network. Additionally, scalability and expansion needs required a design that would easily accommodate additional modules, such as vision sensors for enhanced quality control, as market demands evolved without requiring complete system overhauls.

The Solution: To ensure peak performance and maximum flexibility, KELLER integrated Mitsubishi Electric's state-of-the-art automation solutions. The implementation features MELSERVO MR-J5 servo drives providing ultra-fast and precise motion control, combined with the LD78GH5 motion control module—a high-performance controller capable of synchronising up to 128 servo axes via CC-Link IE TSN. The CC-Link IE TSN network delivers time-sensitive networking (TSN) technology that enables real-time communication across all machine components with high-bandwidth Gigabit Ethernet performance, supporting multiple protocols within a single network. The modular machine structure allows components to be swapped or expanded effortlessly, ensuring adaptability to evolving production demands and future enhancement requirements.

The Results:
The advanced automation solution has delivered

immediate and quantifiable benefits for KELLER's production capabilities. Higher throughput increased production speed from 3,000 to 3,600 units per hour, representing a 20% productivity improvement. Seamless synchronisation through real-time motion control across 128 servo axes ensures absolute precision throughout high-speed printing operations. The modular and scalable design enables system expansion with additional modules and vision sensors as needed without infrastructure overhaul. Optimised network performance through CC-Link IE TSN allows multiple protocols to run on a single converged network, simplifying system architecture. The future-ready automation platform enables KELLER to enhance machine capabilities and respond to customer demands without replacing existing infrastructure, protecting investment whilst maintaining technological leadership.



Advanced Motion Control: The heart of KELLER's modular printing system comprises Mitsubishi Electric's MELSERVO MR-J5 servo drives, representing the latest generation of servo technology with ultra-fast response and exceptional precision. These drives are orchestrated by the LD78GH5 motion control module, a high-performance controller specifically designed to synchronise up to 128 servo axes simultaneously. This unprecedented coordination capability is essential for KELLER's complex printing operations, where multiple print heads, transport mechanisms, and processing stations must operate in perfect synchronisation at high speeds. The MR-J5 drives deliver the dynamic performance required for rapid acceleration, deceleration, and positioning whilst maintaining micrometre-level accuracy throughout production cycles.

CC-Link IE TSN Technology: CC-Link IE TSN (Time-Sensitive Networking) represents a breakthrough in industrial networking, combining Gigabit Ethernet bandwidth with deterministic, real-time communication. This technology enables KELLER to run multiple communication protocols simultaneously on a single converged network, eliminating the complexity and cost of maintaining separate networks for different system functions. As Tomasz Andrzejewski, Automation Department Manager at KELLER, explains: "The implementation of time sensitive networking technology provided us with the capability to simultaneously support multiple protocols and prioritise them within a single network." The TSN capability ensures critical motion control data receives priority whilst allowing standard Ethernet traffic for diagnostics, monitoring, and future vision system integration to coexist on the same infrastructure.

Industry Leadership: The collaboration between KELLER and Mitsubishi Electric demonstrates how advanced networking, motion control, and automation can redefine efficiency in industrial printing. By implementing high-speed, modular, and reconfigurable technology, KELLER has set new industry benchmarks for flexibility, speed, and precision. John Browett, General Manager of CLPA Europe, recognises this achievement: "What KELLER has been able to do by incorporating time sensitive networking gigabit Ethernet in their machines offers them a very powerful machine solution that can easily address the demands of their customers." This technological leadership positions KELLER to serve diverse industries with customised printing solutions whilst maintaining the agility to adapt as market requirements evolve, establishing a template for next-generation industrial printing automation.

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