GTIA Develops Large-Scale AGV Automatic Charging System

As automation and unmanned operations continue to expand rapidly across the manufacturing and logistics industries, Automated Guided Vehicles (AGVs) and Autonomous Mobile Robots (AMRs) have become key components in realizing smart factories and smart logistics. Alongside this trend, the importance of charging infrastructure—one of the critical factors determining operational efficiency and reliability of AGVs—is increasingly being highlighted.

Since AGVs operate on battery power, the charging method significantly impacts operational efficiency, uptime, and maintenance costs. Conventional manual charging requires human intervention and system downtime, whereas automated charging systems, when integrated with autonomous navigation technologies, enable continuous, unmanned operation.

In addition, industrial sites today demand more than simple charging functions. Integrated energy management capabilities—such as battery status monitoring, charging schedule optimization, and energy efficiency management—are becoming essential. As a result, charging systems are evolving into comprehensive solutions that combine control technology, power management, communication, and data processing.

In response to these industry demands, GTIA Co., Ltd., a company with extensive expertise in industrial automation and e-mobility, is advancing its technological capabilities through the development of an AGV automatic charging system optimized for port and logistics environments.

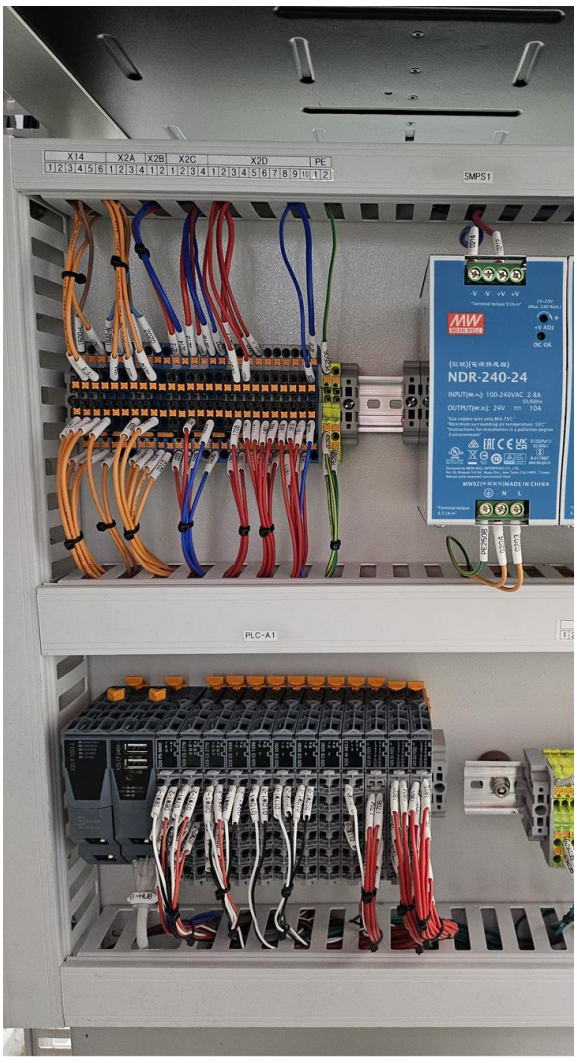
As a strategic Value Provider Partner (VPP) of B&R (an ABB company), GTIA not only supplies B&R automation products but also develops and delivers customized control solutions tailored to customer requirements. In particular, the company has successfully deployed AMR main control systems in domestic and international battery manufacturing sites and continues to expand its technological footprint in this field.

The AGV automatic charging system currently under development by GTIA is centered on an advanced control system that seamlessly integrates with various equipment. The system is designed to monitor operational status in real time and execute control commands by integrating communication networks among key components, including supervisory control systems, charging rack units, vehicle interface units, automatic charging connectors, protection relays, HVAC systems, and fire detection sensors.

To ensure high-performance and high-reliability communication, the system adopts IEC 61131-3 standard-based programming using Structured Text (ST) and C/C++, rather than relying solely on conventional PLC ladder logic. This approach enhances flexibility in communication data handling and enables efficient debugging and monitoring, making it well-suited for complex industrial

environments.

Furthermore, the B&R control platform used in the system is certified under IEC 62443-4-1, ensuring compliance with cybersecurity requirements and readiness for the growing importance of security in charging infrastructure.



One of the key technical challenges in AGV automatic charging systems is the stable control of multiple high-voltage DC charging modules connected to a single output. In such configurations, reliable control and monitoring without data loss or communication errors are critical. GTIA addresses this requirement through robust CAN-based communication control and monitoring technologies.

Additionally, communication between AGVs and chargers is implemented based on the ISO 15118 standard protocol, enabling standardized data exchange and control between vehicles and charging infrastructure. By leveraging the B&R control system and industrial communication interfaces, GTIA has successfully met these core technical requirements while ensuring seamless integration with

peripheral equipment and higher-level operational systems.

Building on its accumulated expertise in industrial automation, IIoT, and edge computing, GTIA is transforming the charging system from a hardware-centric solution into a "smart charging infrastructure." This approach is expected to play a key role in the future development of autonomous logistics systems and smart port operations.

The AGV automatic charging system project represents a convergence of automation, energy, and control technologies. It highlights GTIA's integrated engineering capabilities while strengthening its competitiveness in the rapidly growing e-mobility and smart logistics markets.