Innovation in traction power control with Tracklink RTU

Mitsubishi Electric's automation equipment is helping London Euston train station futureproof its traction power infrastructure as part of the High Speed Two (HS2) railway line project. A remote telemetry solution for a new substation built around a high-performance iQ-R series PLC equipped with a C Controller module has been jointly developed with system integrator Sella Controls. This will deliver next-level flexibility and interconnectivity for traction power in the station, helping to ensure smooth operations.

As part of the HS2 project, Euston station will be expanded to include 11 new 400-meter-long platforms for high-speed trains. This will double the number of seats out of the station during peak hours and improve travel links between London, the Midlands and the North. Supporting the existing and new electrification needs of this greatly expanded terminal is a top priority for the upgrade of the rail system.

At the heart of effective operations is a robust and reliable control system for traction power distribution at the substations. A core component of this structure is the PLC-based remote terminal unit (RTU), which interfaces between field equipment and the control room. It receives signals from field devices and acts upon the information provided immediately while also reporting data to SCADA systems for centralised control activities. In large infrastructure, such as Euston station, a master RTU may be used to link to remote I/O panels placed at local substations. This is essential, as the main controller is required to complete auto reconfiguration procedures in the event of a power loss to the station.

Jay Sampat, Project Manager at Sella Controls, adds: "Generally, an RTU is a single panel deployment within a substation. However, depending on the structure of the railway terminal and its substations, some I/Os can be remote, making inter-substation communications particularly challenging. This is the case for the Euston terminus, which consisted of three substations, namely Euston Concourse, Euston East and Euston West."

In order to enhance the capacity of the system, the master RTU needed to be upgraded and moved to a new substation located nearby Barnby Street. This was done to provide additional space for the new HS2 platforms. Mitsubishi Electric and its automation system integrator partner for rail projects, Sella Controls, were asked to deliver the required control system.

On the right communications track

The two companies have worked together for over ten years to deliver state-of-the-art solutions for the UK traction power market. One example of this collaboration is the Tracklink® traction power RTU, which provides a high level of interconnectivity. While Mitsubishi Electric and Sella Controls are one of two suppliers that are certified to provide RTUs equipment to the UK railway sector, only the capabilities of the Tracklink RTU were suitable for this specific application at Euston station.

To effectively control traction power in this project, the automation specialists needed to set up an RTU that could support different communication protocols and technologies. This meant that the setup would be able to meet future needs while also offering backward compatibility with any existing equipment.

To start with, the unit had to communicate with the electrical control room via Distributed Network Protocol 3 (DNP3). This is a well-established protocol in the power industry, as it supports key management tasks, such as mechanisms for remote power switching. David Bean, Solutions Group Manager for Mitsubishi Electric, explains: "To address this requirement, our control system utilises Mitsubishi Electric's iQ-R series modular PLC that incorporates a C Controller module hosting a DNP3 Level 2 communications stack in order to share data with the control room SCADA."

To achieve reliable, high-speed inter-substation data transfers, Mitsubishi Electric and Sella Controls leveraged the iQ-R PLC's conformance with CC-Link IE open gigabit industrial Ethernet technology. John Browett, General Manager at the CC-Link Partner Association Europe, comments: "CC-Link IE offers deterministic gigabit bandwidth and is therefore ideal for time-critical control applications. By minimising latency and jitter any disruption can be avoided. As the use of remote I/O is not common, this is the first RTU that can deliver inter-substation connectivity. It is exciting to see our network technology being used in such a unique project."

In addition, it was necessary for the master controller to be able to receive analogue information from field meters via serial communications. Jay Sampat comments: "In general, field communications take place over IP, which means Ethernet. Our Tracklink RTU was developed to meet this need, however, in Euston part of the infrastructure uses older generation solutions. In case such as these, the PLC can be equipped with a suitable serial module to ensure compatibility."

Powering effective control systems

Mitsubishi Electric and Sella Controls also incorporated a GOT 2000 HMI within the master RTU panel. This maximises the traction power control system's accessibility and the availability of information local to the panel. With it, operators can monitor, manage and isolate the power to the station and the electrified sections within the station. It also allows operators interact with the system remotely.

Since the completion of this upgrade project, the new telemetry solution has been helping to ensure a highly reliable traction power infrastructure at Euston station. Chris Elliott, Business Development Manager for Rail at Sella Controls, says: "We are very happy with the results of this project. We have a strong, longstanding relationship with Mitsubishi Electric and are looking forward to implementing even more cutting-edge control systems across the country soon."

David Bean concludes: "While we have supplied Tracklink RTUs to many locations, this application has been particularly exciting. In effect, we have been able to support the ambitious HS2 project and create an innovative setup for the use of remote I/O at the same time. I look forward to delivering more automated solutions to help improve and futureproof the rail network."

Image Captions

Image 1: Mitsubishi Electric's automation equipment is helping London Euston train station futureproof its traction power infrastructure as part of the High Speed Two (HS2) railway line project

[Source: Sella Controls]

Image 2: A core component of this structure is the PLC-based remote terminal unit (RTU), which interfaces between field equipment and the control room

[Source: Sella Controls]

Image 3: To ensure reliable and fast inter-substation data transfer, a proven high-bandwidth open network technology, such as CC-Link IE, was needed

[Source: Sella Controls]

Note to Editor: if you would like the text in another language please contact Kiki Anderson at DMA Europa – kiki.anderson@dmaeuropa.com.

About Mitsubishi Electric

With more than 100 years of experience in providing reliable, high-quality products, Mitsubishi Electric Corporation (TOKYO: 6503) is a recognized world leader in the manufacture, marketing and sales of electrical and electronic equipment used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology, energy, transportation and building equipment. Mitsubishi Electric enriches society with technology in the spirit of its “Changes for the Better.” The company recorded a revenue of 4,476.7 billion yen (U.S.$ 36.7 billion*) in the fiscal year ended March 31, 2022.

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The role of Industrial Automation – UK Branch is to manage sales, service and support across its network of local branches and distributors throughout the United Kingdom.

**U.S. dollar amounts are translated from yen at the rate of ¥221=U.S.$1, the approximate rate on the Tokyo Foreign Exchange Market on March 31, 2022.*

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