

Industry: Rail transport / vehicle refurbishment

Products: iQ Automation Platform (C70 Series: PLC, CNC), control terminals (GOT1000), networks (MELSECNET/H)

Up to the Challenge of Russian Railways

Russian Railways' rolling stock maintenance facility at Magnitogorsk has nearly doubled its repair throughput capacity by installing an iQ Automation Platform system. After completion of the modernisation project the works can now perform maintenance and repairs on 3,000 more rail cars per year than was possible in the past.

Russian Railways is one of the three biggest railway companies in the world, with around 1.2 million employees, 20,000 locomotives, 25,000 passenger cars and 630,000 freight cars. It carries more than 1.3 billion passengers and 1.3 billion tons of freight every year, equivalent to 80 percent of all Russia's goods traffic and 40 percent of the country's passenger traffic. Its 85,500-kilometre network is the second-largest in the world, extending across eleven time zones from the Black Sea to the Pacific. These huge distances and some of the most extreme environmental conditions in the world naturally place extreme stresses on the rolling stock.



One of Russian Railways' current objectives is to significantly boost productivity at their maintenance facilities with the help of modern manufacturing and automation technology. The first facility to be modernised was the works at Magnitogorsk, where a fully-automated bogie refurbishment line recently went into operation after just 15 months of engineering and conversion work. The model project was planned and executed by Technikon Limited from Minsk in White Russia.

Before the worn bogie components can be refurbished on the new production line they are first removed from the rail cars and measured. The measurement data are then used to determine the refurbishment operations that need to be performed. An RFID transponder tag containing all the data for the transport route and the scheduled machining operations is applied to every component. Receivers installed at every machining and transport station on the production line read the data from the tags as the components arrive. On the line the bogie components are gradually reconditioned and brought back up to their original specifications. For example, on two of the stations excess material is cut away by CNC milling machines. The transportation of the components is also fully automated, with conveyor belts

and portal systems that move an average of three bogie components through the system per hour.



The plant is controlled by a total of seven high-performance controllers, which are connected via a MELSECNET/H network with redundant architecture. Every iQ Automation Platform unit is fitted with a PLC CPU for the sequential control tasks and a CNC CPU for the numerical control operations. The C70 series, as the dual-processor CNC controller configuration developed specially for production lines is known, builds on tried and tested Mitsubishi controllers for machine tools. It is also optimised for fast communication with other automation components via the system's common backplane bus. Together with the wide range of available I/O, special function and network modules, this enables Mitsubishi Electric to deliver precisely-tailored and highly-efficient controller solutions on the basis of the iQ Automation Platform system, which also supports motion control and robot CPUs.

Two C70 CNC controllers coordinate the movements of the milling machines, the other five controllers are responsible for the handling systems, the conveyor belts and the welding robots. The entire production line is controlled centrally from a single central GOT1000 series control terminal with a 15" touchscreen display. Every machine on the line is also fitted with its own smaller GOT control terminal with a 10.4" screen. All the units are connected directly to the network, which uses interference-free fibre-optics cabling. Every controller can be programmed and monitored from any terminal, remote access via the Internet is also possible.

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The iQ Automation Platform with two powerful PLC and CNC processors connected by the common backplane bus was the only way to meet all the client's requirements for this automation solution in the shortest possible time.

**Eugene Klebanov, Head project engineer,
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