

SIGNALLING SYSTEM CASE STUDY



WEST METRO SIGNALLING SYSTEM
PROJECT 2015-2017

MIPRO

MIPRO'S INTERLOCKING AND ATS SYSTEMS CONTROL THE TRAFFIC IN WEST METRO

Mipro has delivered the interlocking and ATS systems and the passenger information system for the new West Metro line, the western metro extension of the existing Helsinki metro.

For the new rail line of 14 kilometres, Mipro delivered a centralised system solution based on the existing infrastructure. Mipro adapted its solution to the requirements set by the existing track equipment locations, cable tunnels, power supply, data communication and equipment rooms to enable safe and efficient construction of the solution one station at a time.

Mipro's system project for the new metro line commenced at the end of March 2015, and the interlocking system was accepted and taken over successfully in August 2017.

A TOTAL SOLUTION SUITABLE FOR THE WEST METRO ENVIRONMENT WITHIN A TIGHT SCHEDULE.



Mipro delivered nine SIL4-level interlocking systems for the control of West Metro. The architecture of the interlocking system is based on a centralised solution in which all internal hardware, control units, interfaces and the fail-safe system hardware are installed in one centralised device facility as per station. Each West Metro station therefore has its own interlocking system. The internal equipment and control hardware of the station-specific interlocking system are

located in cabinets that follow the same design principles to facilitate their maintainability and to uphold modularity.

Mipro's interlocking system has a modular flexible structure which allows the most suitable solution - centralised, distributed or mixed - for each environment. In the case of West Metro, the centralised solution enabled safe and efficient construction one station at a time.

PROJECT MANAGEMENT AND CO-OPERATION

Mipro had total responsibility for delivery of the interlocking and ATS systems for the West Metro line. Consequently, the large number of contractors, subcontractors and other parties involved in the project required accurate and comprehensive project management.

Good co-operation with the customer, high-level knowledge and the commitment of each party played a significant role in this project, which had an exceptionally tight schedule. Strict adherence to the schedule, continuous communication between all parties and a clear definition of responsibilities were required to ensure smooth progression of the project and the desired end result.

PROJECT SCOPE

Mipro's delivery scope included:

- > Interlocking system
- > ATS Automatic Train Supervision system
- > Passenger information system
- > Interfaces to other systems
- > Interface to the existing Helsinki metro
- > Track equipment

FACTS AND FIGURES OF WEST METRO

- > 28 kilometres of track in total
- > 8 new stations
- > 170 000 passengers every day
- > The highest permissible speed is 80 km/h
- > The current traffic frequency of 4 minutes at the maximum will fall to 2.5 minutes after commissioning
- > Two parallel shafts



HIGH AVAILABILITY

The fully-redundant system architecture and modular structure of the interlocking system installed in West Metro enable high availability for each station as well as for the entire West Metro line. The impact of an eventual disturbance or a failure in the system can be limited to a certain area; other parts of the interlocking system and the traffic area of West Metro remain in operation.

Furthermore, the modules of the interlocking system have been designed so that they can be easily replaced in failure situations.

ATS AUTOMATIC TRAIN SUPERVISION

The ATS automatic train supervision is a modern computer-based system addressing all operational requirements for reliable and efficient metro line control and management. The system's features and functionalities are designed for automatic operation. Furthermore, the system scope includes a training simulator and local workstations.

The ATS systems have been centralised in the control centre in Helsinki (Herttoniemi) in the same location where the existing Helsinki metro is controlled from. Connections with the interlocking systems are implemented by using redundant ring topology fibre optic connections.

REDUNDANT COMMUNICATION

The interlocking systems at various stations are connected with each other through a redundant optical fibre network that is implemented in a ring format. Communication and data transmission between the stations and interlocking systems is based on the SIL4 certified SafeEthernet data communication.

The interlocking system actively controls the state of the data communication network; the switchover from the active network to the back-up one takes place automatically. The change does not cause any functional breaks in the interlocking system or require any actions from the user.

INTERFACES TO OTHER SYSTEMS

The West Metro interlocking system has a large number of interfaces to track equipment and other systems, e.g. safety system for fire roll shutter door control, emergency stop handle, third rail disconnection, and power supply to the SCADA system.

The interlocking system also includes an interface to the existing Helsinki metro interlocking system, which enables fluent and efficient use of the lines together. The interface is implemented both in the interlocking and passenger information system level so that the passenger does not notice any interface between various systems.



FURTHER METRO PROJECTS IN THE HELSINKI AREA

Mipro is continuing with further metro projects in the Helsinki area, such as the Helsinki metro line project which includes replacement of the existing interlocking, ATS and passenger information systems.

The Helsinki metro line is over 20 kilometres in length and includes 17 stations which will be controlled by four interlocking systems. The line runs partly in the tunnel and partly on the ground. Delivery also includes a new interlocking system for the metro depot near Itäkeskus.

The extension of the West Metro line from Matinkylä to Kivenlahti will start at the end of this decade. The new line of seven kilometres with five stations runs totally in the tunnel.

Mipro's interlocking system solution for this line will have the same system architecture as the first nine interlocking systems already delivered for West Metro. Delivery will also include an interlocking system for the new metro depot.

Download the *West Metro* case study: <http://www.mipro.fi/en/Customers/lansimetro-signalling-system-project-2015-2017/>

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