



Case Study | CN

Beijing Metro Line 12

Background

Beijing Metro Line 12 (hereinafter called "Line 12") is currently under construction in Beijing, and is expected to be put into operation at the end of 2023. The line is laid along the North Third Ring Road, from the Sijiqing Station in the west of the city to the Dongbabeijie Station in the east, with a current length of 29.6 km and 21 stations.

The signal system of Line 12 will use Frauscher Advanced Counter FAdC® that communicates with the higher-level interlocking system via the protocol RSP-I. This project is also the first metro line that combines FAdC® and RSP. Previously, the technique was applied to the Guangzhou Huangpu T1 Tram project and the Hunan Fenghuang Maglev project in China.

Project Details

Line 12 is a traffic artery running east-west through Beijing along the North Third Ring Road, passing through four major districts. Its special location will improve the traffic conditions of northern Beijing, greatly enhancing the commuting efficiency of residents and the traffic-bearing capacity of the urban area.

It is the first Communication Based Train Control System (CBTC) project in urban rail that combines interconnection with fully automated operation (FAO).

As for the Interconnection, Line 12 has a high commuting requirement, so when the number of passengers increases, vehicles from Beijing Metro Line 3 (under construction) can be put into operation here depending on the rush-hour demand.

The reliability, availability, maintainability, and safety of FAdC® as a CBTC fallback system will be fully proven in this project.

Solutions

In this project, based on the full electronic interface of the FAdC® system, the Frauscher team customised the communication board using the Railway Signal Safety Protocol Type I (RSP-I) which was issued by the National Railway Administration of China.

Frauscher Advanced Counter FAdC®

The FAdC® is the latest generation of Frauscher axle counter, which has been certified by CENELEC SIL4. Its modular design, flexible configuration and hardware/software interfaces provide this system with a wide range

of applications and advantages in terms of functionality, space, investment, and operating cost.



Frauscher Advanced Counter FAdC®

Frauscher Advanced Counter FAdC® system is mainly implemented by modular components such as the power board (PSC), Advanced Evaluation Board (AEB), input/output expansion board (IO-EXB) and communication board (COM). In addition to the traditional relay hardware interface, FAdC® can also provide a fully electronic interface via Frauscher Safe Ethernet FSE, EULYNX or customised protocols such as FSFB/2 protocol.



Main components in the FAdC® system

For Line 12, Frauscher provides efficient customisation services according to customer requirements—the customised COM board with RSSP-I protocol for FAdC®.

COM-RSSP

At present, the RSSP-I protocol has been widely used in the CBTC system of China, especially for the exchange of safety-related information between railway signal equipment in closed transmission system environments such as railway safety communication networks.

In China, COM-RSSP, the Frauscher communication board that supports data transition via RSSP protocol,

Key Facts

Operator	Beijing Metro	Country	China
Application	Rail Vacancy Detection	City	Beijing
Axle counting system	Frauscher Advanced Counter FAdC®	Segment	Urban & Mass Transit
Wheel Sensor	RSR180	Estimated operation time	2023

has been running safely for more than 2 years since it was first applied in the Guangzhou Huangpu T1 Tram project. The safety and high availability of COM-RSSP in maglev projects were also verified with the successful operation of Fenghuang Maglev in Hunan Province in April 2022. The COM-RSSP has been applied to Beijing Metro Line 12 as a metro project, further expanding its application market.

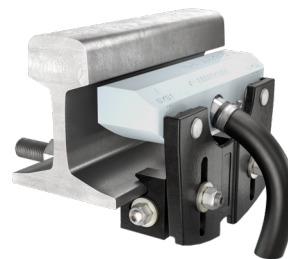
The COM-RSSP has been certified by CENELEC SIL 4 in 2021.

The outdoor equipment

The Frauscher Wheel Sensor RSR180 will be used on Line 12. Since being introduced in 1989, against the background of new technological possibilities and experiences from all over the world, it has been continuously optimised over the years. Today, its area of application ranges from open lines to grooved rails around the globe.

Frauscher trackside equipment is developed to withstand harsh environments according to EN50125-3, as well as to operate without trackside electronics, and withstand electromagnetic interferences according to EN50121-4. With an IP68 rating, the fully sealed wheel sensors are 100% waterproof and protected against dust, mud, snow, water, and road salt.

In this project, Frauscher Rail Claw SK150 has been selected. It has clamps fitted on its sides that make it extremely easy to adjust for different sizes of rail foot without any drilling. Frauscher also provides the preassembly of sensors and rail claws.



Wheel sensor RSR180 with rail claw SK150

In Mainland China, Frauscher Wheel Sensor RSR180 has been applied to more than a hundred projects in 20 provinces and municipalities.