



**Case Study | CN**

# Tram Huangpu Line 1

**Requirements**

Tram Huangpu Line 1 (HP1) is the first tram line in Huangpu District of Guangzhou, which stretches 14.4 kilometers from Xiangxue Station to Xinfeng Station with a total of 20 stations and can support trams running at a maximum speed of 70 km/h. The vehicles operating on this line are manufactured by CRRC Zhuzhou, adopting the hybrid charge-discharge automatic control technology without catenary charging.

The line is located in urban areas with high traffic density, so there are many level crossings and an estimated daily passenger flow of more than 8 000. The task of providing safe and efficient wheel detection for HP1 was awarded to Frauscher Sensor Technology.

Furthermore, in Guangzhou, adverse weather conditions including heavy rain, typhoons and high humidity levels can subsequently cause flooding of the trackbed which may affect operation. Such conditions place a high demand on the system intelligence and the environmental adaptability of outdoor equipment of Frauscher.

**Solution**

With the collaboration of CRSC Xi'an Railway Signal Co., Ltd. (CRSC Xi'an) and the system integration of CRSC Research & Design Institute Group Co., Ltd. (CRSCD), the Frauscher Advanced Counter FAdC was installed for the whole line. The full-electronic interlocking system is a kind of point control system specially designed for trams by CRSCD. It can carry out point control, signal control and operation instructions execution from the Train Control Centre.



Tram Huangpu Line 1

## Project Details

The Frauscher Advanced Counter FAdC is the latest generation of axle counter based on the serial interface and has obtained CENELEC SIL 4 certification. Its functional modularity, flexible scalability, hardware and Ethernet-based software interface permit a wide range of configuration options. Based on this, only a few components are needed for system optimisation and integration in the signal device, which has an absolute advantage in terms of functionality, space, as well as investment and running costs.

## Customised Interface

The software interface of the FAdC can be configured with the Frauscher Safe Ethernet FSE protocol or other customised protocols.

The original plan of this project was to adopt the COM-FSE at the end of 2019, and the COM board had been debugged and passed that time. But considering its universality to the safety protocol of the whole project, it was decided to implement the Railway Signal Safety Protocol RSSP-I protocol—Type I of RSSP, which is introduced as Chinese standard by China's Ministry of Railways. RSSP has been widely applied in the CBTC of passengers

dedicated lines in China. It is especially applied in the exchange of safety-related information between railway signal equipment under the environment of closed transmission systems such as railway safety communication networks.

In response, both the Chinese and Austrian teams of Frauscher worked together closely to provide the RSSP-implemented FAdC product for the first time with an efficient and customised service. The COM-RSSP has been given the CENELEC SIL 4 certification in March 2021.

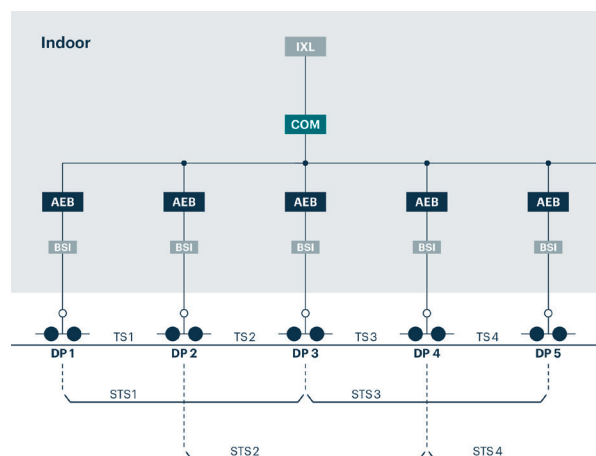
## Increasing system availability

In addition to the customisable software interface, the Supervisor Track Section STS functions were implemented in this project. The main purpose of this function is to monitor and synchronise track sections within the supervising section.

The high availability of STS takes negative effects such as lightning into account, reducing the costs and times of maintenance. Moreover, the STS can be integrated into a modern efficient interlocking system so that the troubleshooting and component replacement can be carried out simultaneously, saving time for operators.



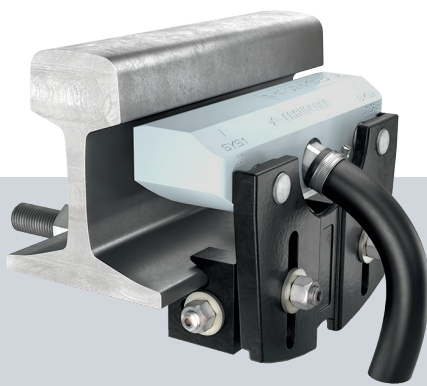
Frauscher Advanced Counter FAdC



Supervisor Track Section STS

The Frauscher Wheel Sensor RSR180 works reliably in harsh conditions including flooding, snow, leaf fall, debris, rusty rails and road salt. The high protection class of this product is one of the features that ensure its high availability in facing environmental challenges. The IP68 standards ensure high reliability and precision of detection, even in flooded areas.

The cable connection is set in the middle of the wheel sensor to make the installation easier, as well as to prevent cable faults and damage to the sensor resulting from stress on the cable connection. Furthermore, the housing design and bolts increase the stability of the entire system in the face of extreme mechanical influences.



In this project, the Frauscher Rail Claws SK150 and SK420 are used to ensure simple and easy mounting of the wheel sensor to the track without any drilling. The Rail Claw SK420 is used on the main track and the SK150 on the track of depot. The SK420 can also be installed on grooved rails, and the SK150 has clamps on both sides to make it extremely easy to adjust the claw for different sizes of rail foot.



Cubicle

## Key Facts

<b>Operator</b>	Young Tram	<b>Country</b>	China
<b>Partner</b>	CRSC Xi'an	<b>City</b>	Guangzhou
<b>Application</b>	Train Detection	<b>Project Start</b>	2019
<b>Axle Counting</b>	FAdC and RSR180	<b>Segment</b>	Mass Transit