



## Case Study | CN

# Fenghuan Maglev

### Project Introduction

Fenghuang Maglev is a medium-low speed maglev rapid transit line. The line can operate at speeds up to 100 km/h. Its first phase is 9,12 km long with 4 stations and has been put into the test operation in May 2022.

It is the first maglev project in which Frauscher applied the Frauscher Advanced Counter FAdC and communication board COM-RSSP, and it's also the second maglev project that Frauscher participated in (the first one was Beijing Metro Line S1).

This project is located in Fenghuang Old Town, an ethnic group of Tujia and Miao in Hunan Province. This old town is one of the "Ten Cultural Heritage Sites" in the province, surrounded by mountains, rivers and streams.

Fenghuang Maglev is the first tourist maglev line in China, connecting the Fenghuang Railway Station on the Zhangjiajie-Jishou-Huaihua highspeed railway and the Fenghuang Folklore Park. It passes through a section of undulating terrain, with frequent alternating road and bridge tunnels. The entire line is built halfway up the mountain in an elevated form. In this way, while providing visitors with the best viewpoint to enjoy the beauty of the old town, it also increases the difficulty of implementing the project.

### Project Details

Due to the signal system requirements of the operation mode of medium and low speed maglev trains, the train's position must be detected in a timely and reliable way. However, the levitation of the train is achieved due to the existence of electromagnetic forces between the electromagnet and the track which ensures that the train runs without any physical contact, which is one of the pain points in detecting the axles of the train.

#### Maglev train detection

Since maglev trains do not have wheels, traditional wheel-based detection systems cannot be directly applied to maglev traffic engineering. Therefore, to ensure that the wheel detection system functions correctly and is able to accurately detect the position of the maglev train, the project is implemented with detection plates mounted on the bottom of the maglev train.

The special design of the detection plates in combination with the used sensor assembly device ensures, that the train position is detected accurately and reliably, meaning this method can effectively solve the problem of maglev trains not being able to utilize trackside detection equipment.

### Wheel Sensor RSR180

Furthermore, unlike ordinary railways, the magnetic flux leakage (MFL) of the levitation magnetic field and the magnetic field induced when vehicles pass the maglev track may cause electromagnetic (EMI) to the trackside equipment. In order to overcome the extreme high requirements a wheel sensor which is highly resistant against EMI disturbances had to be selected.

Besides effectively resisting magnetic track brakes, the RSR180 has a flexible installation method which copes effectively with this challenge. The simple and convenient operation simplifies the difficulty and complexity of on-site installation and subsequent maintenance, which is fully applicable to the areas with complex terrain.



RSR180 installed on the rail

### Frauscher Advanced Counter FAdC

Fenghuang Maglev is the first maglev line in the world to use the Frauscher Advanced Counter FAdC. FAdC is our new generation axle counting system, which has obtained the CENELEC SIL 4 Certification.

In addition to the traditional relay hardware interface, FAdC also provides a protocol-based fully electronic interface. Its functional modularity and flexible scalability enable the unification of small central facilities and complex system operations.

In this project, the Frauscher team configured the COM-RSSP communication board specifically for the FAdC's electronic interface that supports the customised protocol – RSSP-I.



Frauscher Advanced Counter FAdC

### Communication Board COM-RSSP

The protocol RSSP-I is the abbreviation of the Railway Signal Safety Protocol – Type I of RSSP, which is introduced as a Chinese standard by China's Ministry of Railways. This protocol has been widely applied in the CBTC of passenger dedicated lines in China.

The COM-RSSP board of Frauscher has three main functions:

- Communication between the interlocking system
- Configuration data providing
- Counting head information forwarding

COM-RSSP has obtained the CENELEC SIL 4 Certification.

## Conclusion

In Chinese, Fenghuang means Phoenix. As its name, since its planning and design in 2019, Fenghuang Maglev has attracted countless attention. As the world's first project of "Maglev + Culture + Tourism", the train of this line connects local transportation hubs with tourist attractions. The selection of Frauscher products in this project fully proves that Frauscher is highly expected and trustworthy in the Chinese railway industry. With the opening of the Fenghuang project, the reliability and stability of the FAdC and Frauscher communication boards supporting the RSSP protocol have been verified once again.

## Key Facts

|                             |                         |                      |          |
|-----------------------------|-------------------------|----------------------|----------|
| <b>Operator</b>             | Hunan Maglev Group Co.  | <b>Country</b>       | China    |
| <b>Application</b>          | Track vacancy detection | <b>Wheel Sensor</b>  | RSR180   |
| <b>Axle counting system</b> | FAdC with COM-RSSP      | <b>Segment</b>       | Maglev   |
| <b>Scope of project</b>     | 67 detection points     | <b>Project start</b> | May 2022 |