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Eurotunnel | FR

Axle counting adds fail-safe control to laser diagnostics

/ TRAIN DETECTION

When MERMEC set out to install a laser-based Wheel Profile Measurement System in close proximity to the Eurotunnel, they faced a critical challenge: how to avoid unintended laser exposure without compromising the system's ability to inspect up to 200 trains per day. To meet these requirements, MERMEC partnered with Frauscher.

Partner	MERMEC
Country	France
Segment	Shunting Yard
Application	Track vacancy detection, Triggering of systems
Products	FAdC, RSR123
Year of commissioning	2025

Background

MERMEC, a specialist in railway diagnostics, was commissioned to install a high-speed, laser-based system for inspecting wheel profiles of trains entering the Eurotunnel. The system would operate at speeds of up to 62 mph (100 km/h) and be able to scan up to 150 axles per train for nearly 200 trains per day. However, the constrained track layout left no room for protective barriers between adjacent lines, introducing a safety risk of unintended laser exposure to nearby trains and passengers.

To enable safe operation under these conditions, MERMEC required a safety critical method to disable laser emissions with real-time responsiveness and precision. This is where Frauscher stepped in, providing an axle counting solution in the form of the Frauscher Advanced Counter FAdC.

Solution

To meet the demanding safety requirements of this project, Frauscher worked closely with MERMEC to develop an integrated solution that would combine train detection and laser control with precision and reliability. A key outcome of this collaboration was a custom designed relay interface connecting the Frauscher Advanced Counter FAdC with MERMEC's laser-based Wheel Profile Measurement System. The open interface architecture of the FAdC allows direct communication with the laser system's control logic, enabling dynamic activation and deactivation of laser emissions in sync with train movements.
This interface allows the FAdC to monitor two critical track sections and control laser activation based on real-time train presence. Achieving this required a highly accurate configuration of relay parameters including current thresholds, switching logic, and timeouts. This configuration ensures safe, interference-free operation under busy traffic conditions.
By combining Frauscher's proven axle counting technology with MERMEC's laser-based system, the outcome is a fully automated, safety-certified setup that eliminates manual intervention and mitigates the risk of accidental laser exposure.

/ Hardware Setup

To simplify deployment and reduce onsite installation time, Frauscher delivered a fully integrated, pre-tested hardware solution which consisted of the following:

- Frauscher Advanced Counter FAdC with IO-EXB interface boards for relay outputs
- Wheel Sensor RSR123
- Pre-configured and tested cubical that houses the entire system

Status outputs (clear and occupied) are delivered for both track sections, enabling direct control of laser operation.

/ Support Services

Frauscher's support extended from initial setup to commissioning and handover. The installation included support for MERMEC staff and continuous cooperation throughout the integration process, ensuring a smooth and reliable rollout.

/ Safety by Design

The system is based on a strict fail-safe principle to safeguard against any unintended laser activation. In the event of a power loss or system fault, the FAdC automatically sets both relay outputs to an open state, preventing the laser-based system from being triggered, maximizing safety.
Recovery requires manual intervention, meaning operators must verify that the track is clear before pressing dedicated reset buttons to resume normal operations. This approach provides an additional layer of safety that effectively eliminates unintended laser exposure to passengers and staff, helping to maintain a controlled and secure operating environment.

Together with MERMEC, Frauscher was able to provide the ideal solution for this project.

Partnering with Frauscher on the prestigious Eurotunnel project highlights the power of combining complementary strengths. By bringing our advanced expertise and innovation capabilities together with Frauscher's renowned know-how, we created a synergy that enabled us to tackle complex challenges and deliver exceptional results.

Enrico Betterle
MERMEC

Benefits

Through close collaboration, Frauscher and MERMEC delivered a safety-critical solution that meets the real time inspection needs of the busy Eurotunnel. The benefits include:

Fail-safe logic

Relay outputs are designed to default to a safe state during outages, preventing unintended laser operation.

Dual-track monitoring

The FAdC monitors both adjacent track sections in parallel, enabling precise control of laser triggering based on real-time train detection.

Turnkey system integration

Delivered in a pre-configured cubical, the solution was fully tested and ready for deployment, with installation support included.

Dynamic control for live environments

The intelligent interface ensures that laser systems only activate when safe to do so, which is crucial in busy mainline applications.

Future-ready platform

The flexible internal logic of the FAdC allows the system to be customized according to the operator´s needs, offering a flexible and reliable solution.

GET IN TOUCH!

Do you have any questions about our solutions? Click on the link below to get in touch with a qualified contact person.
www.frauscher.com/en/contact

Further references are available at the following link: www.frauscher.com/en/references

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