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Ensuring reliable rail operations across India´s longest railroad bridge

/ TRAIN DETECTION SYSTEM

The Bogibeel Bridge is India's longest railroad bridge that connects the states Assam and Arunachal Pradesh, carrying both rail and road traffic across the Brahmaputra River. Harsh environmental conditions and structural constraints made conventional signaling impractical. The Frauscher Advanced Counter FAdC axle counting system was selected for its proven reliability and low maintenance requirements, even in challenging conditions.

Background

At three miles (4.94km) long, the Bogibeel Bridge is India's longest rail / automobile bridge. It is also the first fully welded steel bridge providing greater durability and reduced maintenance. It is strategically important to the region as it connects two states separated by the Brahmaputra River.

The bridge's steel construction required a reliable railway signaling system to cover an eight mile (13 km) block section, including the three mile bridge span.

Partner	Technocom
Operator	Indian Railways - Northeast Frontier Railway
Country	India
Segment	Main Line
Application	Block Section
Project start	2018
Scope of project	8 counting heads, 4 track sections (Dual Detection)
Solution	FAdC, RSR180

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Challenges

Selecting the right signaling solution required careful consideration of operational and environmental challenges. The infrastructure demanded a system that could function reliably on a steel bridge, where conventional track circuits were not a feasible option.

The key challenges and factors detailed below had to be considered to identify the right solution for the project:

- Conventional track circuits are prone to shorting on metallic structures, making their implementation on the bridge impractical.
- DC track circuits require a significant investment in glued joints, power arrangements, and precise maintenance of positive and negative rails.
- The signaling system would need to support the smooth transmission of reset commands via network for effective operation of the axle counter.
- The solution had to withstand conditions such as high humidity, potential electromagnetic interference, and operational load of the bridge (wight of trains, vibrations, etc.).
- Due to space constraints, a key consideration was to avoid active trackside electronics and earthing.

Solution

Considering these challenges and requirements, Frauscher's Train Detection System utilizing the Frauscher Advanced Counter FAdC was chosen as a cost effective, reliable, and future-ready solution. Its advanced technology, flexibility, and proven performance in demanding railway environments ensured seamless integration while addressing all project requirements.

The Frauscher Advanced Counter FAdC is a SIL 4 axle counting solution. It was implemented with the Wheel Sensor RSR180 at Tangani Station and Dhamalgaon Block Cabin, protecting the Bogibeel Bridge block section. The system features a Dual Detection configuration, where instead of just two wheel sensors defining the track section, two additional sensors are installed directly adjacent to the first pair for redundancy and enhanced reliability. Media redundancy was further achieved through the implementation of both Optical Fiber Cable (OFC) and copper mediums, ensuring uninterrupted operation in case of a communication failure. A distributed architecture with redundant power and communication was deployed, further increasing system reliability. The system provides clear / occupied indications to the interlocking via Q-series relay, ensuring seamless integration with railway signaling operations.

The system also provides Co-Operational Reset Functionality, where the Up line is reset by the Station Master at Dhamalgaon, while the Down line is reset by the Station Master at Tangani. The resets follow an inverse pattern, so each station controls them in one direction only. By distributing responsibility delays are minimized, and traffic flow is optimized, improving overall operational efficiency.

The Frauscher Diagnostic System FDS was installed at Tangani, enabling real-time diagnostics and monitoring of axle counter performance. The FDS is accessible from both locations, enhancing decision making and reducing downtime

Additionally, the Frauscher rail claw facilitated the quick and efficient installation of the Wheel Sensors RSR180 without drilling the rail, preserving structural integrity and providing cost savings. The rail claw allows sensors to be easily detached and reattached as needed for maintenance activities such as tamping.

No trackside electronics were required, fulfilling a key consideration and requirement of the project.

Finally, Frauscher provided hands-on training to employees of Indian Railways to monitor and manage the system efficiently, and with minimal support.

Benefits

The deployment of the Frauscher Advanced Counter FAdC for the Bogibeel project proved to be a game changer, delivering unparalleled reliability, efficiency, and safety. The key benefits include:

Exceptional reliability

The distributed architecture of the FAdC enhances operational safety and dependability, ensuring smooth and secure railway operations.

Seamless installation & track integrity

The Frauscher rail claw provides simplified installation of the Wheel Sensor RSR180 without drilling the rail, preserving track integrity and allowing easy detachment and reattachment during track maintenance.

Uninterrupted operation with media redundancy

By leveraging both Optical Fiber Cable (OFC) and copper mediums, the Frauscher system ensures fail-safe performance, thereby minimizing disruptions.

Minimal maintenance & enhanced efficiency

The absence of active outdoor electronics significantly reduces maintenance and eliminates the need for earthing, enhancing long-term efficiency.

Cost-effective alternative

By delivering a high level of redundancy and safety, the FAdC provides a cost effective solution without compromising on performance.

The successful implementation of the axle counting solution at the Bogibeel Bridge block section demonstrates how Frauscher's innovative technology, combined with a customized approach, can address complex infrastructure challenges and ensure seamless railway connectivity, safety, and operational efficiency.

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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