Case Study | US

Class 1 Grade Crossing Enhancement FAdC and RSR180

Requirements

Frauscher was approached by a US Class 1 railroad regarding a grade crossing owned and operated by them, on a track crossing a public road. The location is highly susceptible to flooding at the approaches, causing the existing signaling system to shunt. This results in a false activation of the crossing gates and lights. Additional shunting issues that affect this crossing are related to poor ballast and track conditions. The operator's main goal was to find a signaling solution that would keep the crossing operational under any of these conditions. In addition, a design goal for the new system was that it would seamlessly integrate with the current crossing controller.

Solution

The Class 1's staff conducted the design and engineering work for this trial project, upgrading the current system with the addition of the Frauscher Advanced Counter FAdC. The crossing was equipped with the FAdC and four Wheel Sensors RSR180. The wheel sensors were attached to the rail with the Frauscher rail claw SK140-002. The rail claw is quickly and easily installed onto the rail, without drilling, in approximately five minutes. The Frauscher axle counting system, running in shadow mode with the existing system, operated without miscounts or faults for twelve months. This error-free trial gave the operator confidence in the capabilities of the Frauscher system. Following these positive results, the goal is for the axle counter to become operational as an overlay to the current system to improve control of the crossing.

Benefits

Frauscher's axle counter solution successfully met the requirements of the operator. The system functions reliably in all adverse environmental conditions, so uptime and availability are greatly increased. The optional Supervisor Track Section STS function was also incorporated, allowing the system to automatically bypass potential external interferences without affecting safety, uptime or reliability. As a note, this function was not needed during the 12 month trial, due to the absence of any faults as mentioned above. Finally, the axle counting system was able to seamlessly integrate with the existing controller, as specified by the operator during the design phase of the project.

Grade Crossing System Upgrade Project Details

Replacement Requirements and Challenges

The railroad wanted to test the FAdC to verify its capability to keep the crossing operational in the event the current predictor failed during flooding conditions, or when experiencing other track/ballast issues. They commissioned a new solid state controller, requiring the track section outputs of the FAdC to be integrated with the controller, via an easy to use and flexible discrete I/O output. The Frauscher system was set up to run in shadow mode with the existing system, with the outputs of each compared by the solid state controller. Since both systems are vital and fail safe, once the axle counter becomes operational a "clear" indication from either system would keep the crossing open, providing maximum availability. The Frauscher system has the capability to operate the crossing independently, but will also work successfully as an overlay to the existing track circuit technology.

This crossing was designed utilizing four wheel sensors to activate and deactivate the warning system – one per approach to activate the crossing, and two for the island. The wheel sensors form three track sections, indicated in Figure 1 below as: TS1, TS2, and TS3:

Figure 1

The system was designed to achieve increased availability once the FAdC is operational and running in parallel with the existing track circuit system. The approach outputs of the FAdC (TS1 and TS3) would be combined using "AND" logic with the predictor outputs. To overcome common shunt issues, the crossing would activate only if the predictor approach AND the FAdC approach showed as "occupied". The same combination could be implemented between the controller island track circuit and FAdC island section, keeping the track relay energized in case of false activation of the predictors during flooding. A further explanation of how this would work is detailed below:

Predictor Approach	FAdC Approach	Crossing Relay Indication
Clear	Clear	Clear
Clear	Occupied	Clear
Occupied	Clear	Clear
Occupied	Occupied	Occupied

The Frauscher Advanced Counter FAdC

Figure 2 illustrates a simple layout of the FAdC. The IP68 rated wheel sensors are connected to a trackside connection box (TCB), and then to the indoor equipment via star quad signaling cable. In this application the operator used their own TCBs, which are sealed against water and dust. The indoor equipment consists of an overvoltage protection board (BSI) to protect from interference voltages induced into the signaling cable. The Advanced Evaluation Boards (AEB) communicate with each other by means of an internal CAN bus. The COM board, also connected to the CAN bus, provides an Ethernet interface that has the ability to pass on vital fail-safe clear/occupied status information. This function was not utilized here, but can be used to connect adjacent crossings to share wheel sensor and track section data. In this application, the fail-safe clear/occupied indication is output via the input/output extension board IO-EXB.

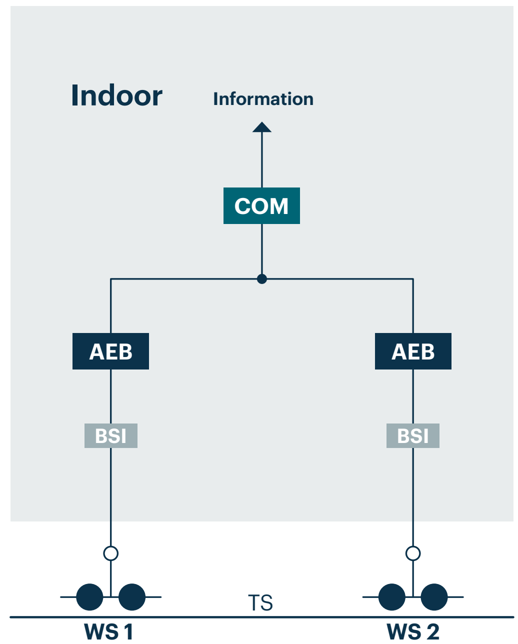

Figure 2

As illustrated in Figure 3 below, the Frauscher Diagnostic System FDS uses a Graphic User Interface to remotely diagnose events in real time, as well as logged events occurring in the past. This 24/7 diagnostic tool allows for fast, efficient and time-saving trouble shooting.

Figure 3

Conclusion

This Class 1's requirements for the grade crossing were met utilizing Frauscher's axle counter system as an overlay to their existing system. The positive results displayed by the Frauscher system, together with its quick and easy installation, showed the operator that once the axle counter system becomes operational it will provide an "easy-fix" for the issues experienced at this crossing. The absence of faults or miscounts in 12 months, even in flooding and other adverse conditions, are a clear indication that the Frauscher system would avoid the prevalent shunting issues. This would significantly increase uptime at the crossing, improving overall traffic flow and providing a welcome benefit to the surrounding community.



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