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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 effect 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 grade crossing operated error free during a one-month trial period, with the Frauscher axle counter running in shadow mode with the existing system. This error free trial solidified the operator's confidence in the Frauscher system. Following the trial period, they cut over to the axle counter system, safeguarding the crossing and traveling public. This location is the first public grade crossing to utilize Frauscher axle counters on a Class 1 railroad track in North America.

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. In addition, the optional Supervisor Track Section function was incorporated, allowing the system to automatically bypass many external interferences without effecting safety, uptime or reliability. 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 the FAdC 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 relay output. Their engineers decided to keep the existing system operational in parallel with the Frauscher system. The outputs of each are compared by the solid state controller, and since both systems are vital and fail safe, a track section recorded as clear (vacant) by either system will keep the crossing open, providing maximum availability. The potential exists to rely solely on the Frauscher system; however, the FAdC can continue to work successfully as an overlay to the existing track circuit technology.

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

Figure 1

The approach outputs of the FAdC (TS1 and TS3) were combined using "AND" logic with the predictor outputs. The crossing will activate only in the event that the predictor approach AND the FAdC approach show "occupied". The same combination was implemented between the controller island track circuit and FAdC island track section, keeping the track relay energized in case of false activation of the predictor during flooding, increasing availability. A more detailed explanation is provided in the chart 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 using relays, via the input/output extension board IO-EXB.

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.

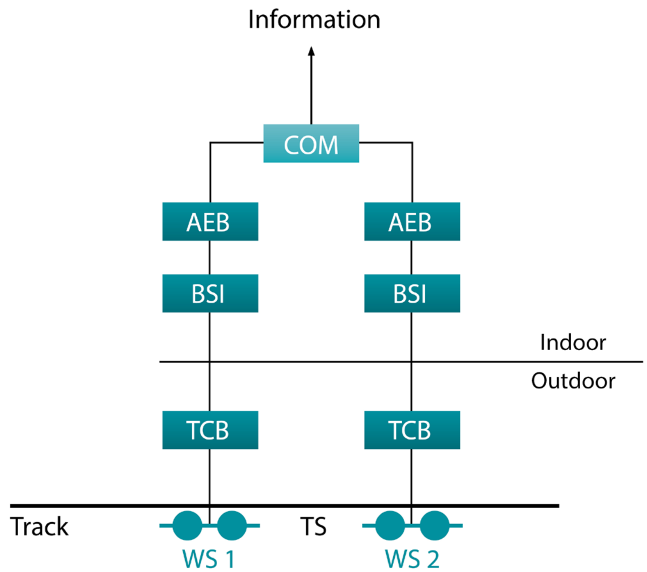

Figure 2

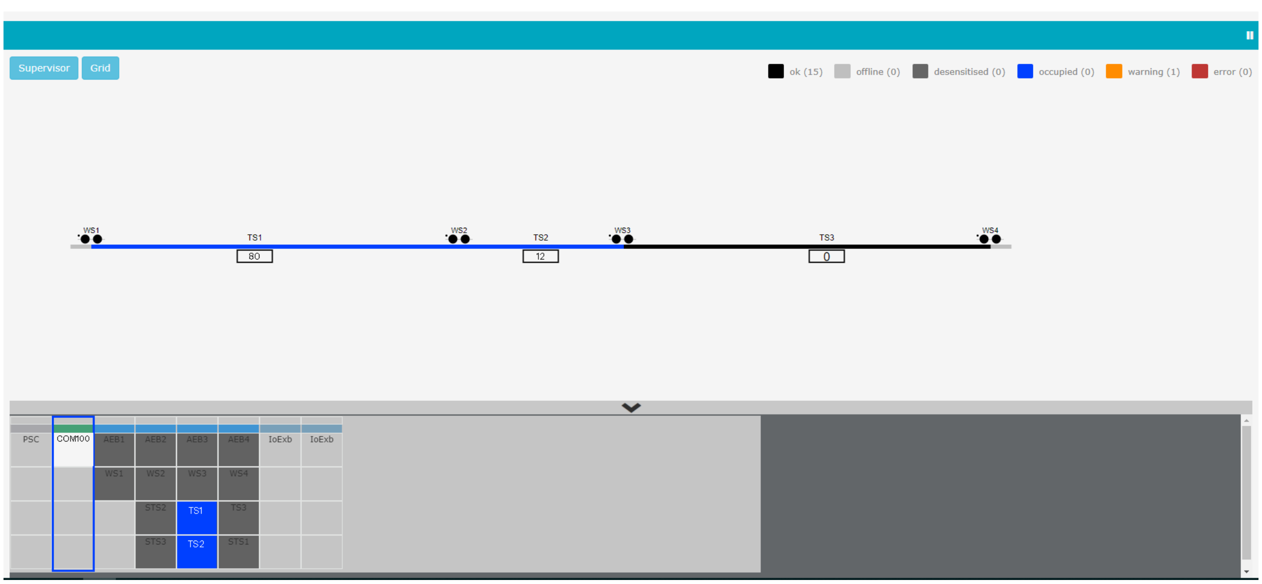

Figure 3

Supervisor Track Section

The Supervisor Track Section (STS) function utilized in this crossing's system design helps increase uptime and reduce maintenance events, without compromising safety or vitality. This function corrects external interferences by establishing supervisor track sections that monitor and synchronize the track sections within them. Every two track sections are overlaid by a supervisor section, allowing a faulty track section to be reset without manual intervention if the corresponding supervisor section is clear. Similarly, a faulty supervisor section is automatically reset if the two corresponding track sections are clear. This automatic correction feature provides a major benefit to the operator, optimizing system availability without additional equipment or negative effects on safety.

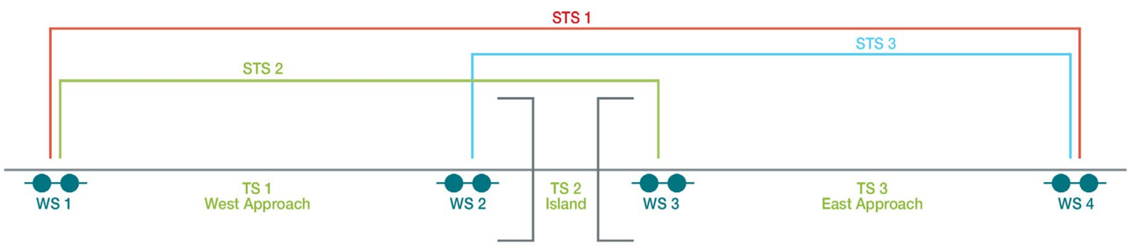

Figure 4

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. Due to the quick installation and integration of the Frauscher system, they were provided with a relatively "easy fix" to the problems experienced at this crossing. By increasing uptime during flooding and under other conditions that cause shunting issues, this upgrade will continue to have a significant positive effect on the uptime and availability of the crossing. Improved overall traffic flow will provide a welcome benefit to the surrounding community.