FRAUSCHER

Track more with less.

Case Study

MTA Baltimore North Avenue Yard RSR180 and FAdC®i

Requirements

The Baltimore North Avenue Yard is a storage and maintenance facility for light rail vehicles. Upon entering, train drivers were required to obtain their route within the yard, exit the train to throw the necessary switches with a manual lever, and then drive the vehicle to the correct location. This process was inefficient, time consuming and unsafe for drivers. Reliable and precise train detection was needed to automate the yard and significantly increase efficiency and safety. Requirements of the Maryland Transit Authority (MTA) for this new system included the ability to conduct speed measurement, to improve safety by keeping drivers from going on track to throw switches, and to provide information regarding the number of cars present in the yard at any given time.

Solutions

The MTA's need to modernize and automate the North Avenue Yard was answered by the decision to install an axle counting system. The Frauscher Advanced Counter FAdCi and Wheel Sensors RSR180 were selected for this automation project, to provide train detection throughout the yard. The FAdCi is a CENELEC SIL 3 safety-rated axle counter for vital applications. The system utilizes the Frauscher Safe Ethernet FSE protocol, reducing the amount of wiring required compared to commonly used relay interfaces. The FSE also allows the collection of additional types of information required by the MTA.

Benefits

One of the reasons the MTA chose the FAdCi was the available Ethernet-based interface to the axle counter. The Ethernet networking functionality of the FAdCi eliminates the need for relays, which are costly and time consuming to install, require frequent maintenance and have a limited life span.

This is compared to the maintenance-free Ethernet interface of the FAdCi. The modular and flexible architecture of the FAdCi enables the system to be distributed among multiple locations, using an Ethernet link to exchange information.

Project details

Yard features and operation

The North Avenue Yard layout included 24 switch machines and 13 tracks, with storage capacity of 47 light rail vehicles. Four tracks were occupied by a maintenance shop, and a fifth by a carwash.

The Yard was still manually operated in early 2012. Train operators aligned each switch along their route by exiting their vehicles and moving the switch to the desired position with a hand thrown lever.

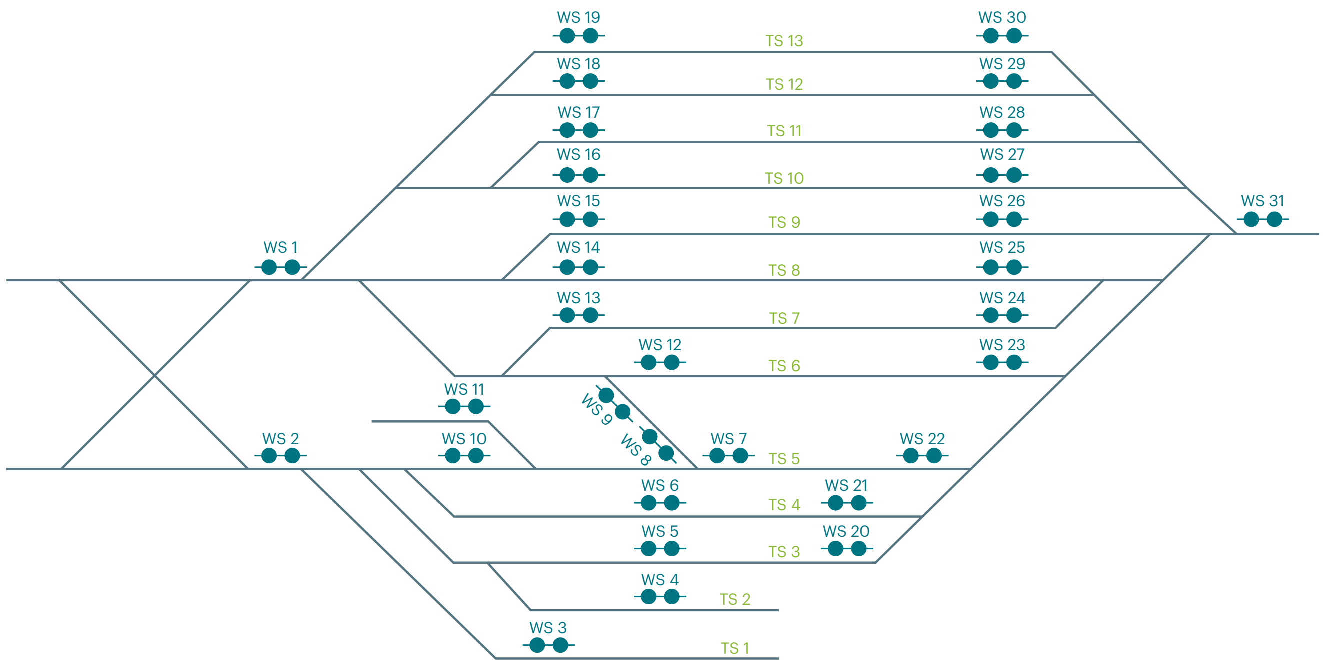
Later in 2012, electric switch machines were installed. Although the physical effort of pulling the hand levers was eliminated, operators still had to exit their vehicle to set each switch. The electric switches offered minimal improvement, but movements were still time consuming and driver safety was not increased.

Operator Specifications

Based on the long-term success of axle counters in Europe, Australia and Asia, the MTA designated this technology for the project. The MTA was influenced in part by important information available with modern axle counting systems that cannot be provided by track circuits. These include speed indication information and real-time views of the number of axles present within a given track section, for yard management and storage capacity control.

A detailed analysis was conducted by the project's engineering design firm M.C. Dean Inc. The results led them to choose the Frauscher Advanced Counter FAdCi and Wheel Sensors RSR180. A critical deciding factor was the open Ethernet interface to the axle counter data. The MTA chose the Schneider Electric Quantum Programmable Logic Controller (PLC) platform, since it was familiar to the MTA and can be interfaced with existing equipment and systems.

Baltimore MTA North Avenue Yard



WS Wheel Sensor **TS** Track Section

Yard and equipment design

The Yard was divided into 13 track sections, and 31 Wheel Sensors RSR180 were installed to provide train detection for all switches. Some areas of the yard had complex switch layouts. By using wheel sensors, the track structure did not need to be modified in any way, which would have been required with track circuits (joints, bonding, etc.). The layout of the North Avenue Yard, including track sections and location of the wheel sensors, is illustrated above.

The FAdCi was chosen to gather and process information from the wheel sensors. The FAdCi is designed to detect trains at speeds between 0-50 mph, ideal for yard environments. Cabling and installation costs were significantly reduced by choosing wheel sensors over track circuits. Overall life cycle costs were also reduced. Since relays have a limited number of switching cycles, the cost of replacements would add up over time in a busy yard. The software-based output solution provided by the Frauscher system eliminates this issue.

The indoor equipment is housed in two trackside huts. The Programmable Logic Controller is connected to the FAdCi using the FSE protocol, consolidating data from all evaluation boards. Implementation of the FSE resulted in a more efficient design and quicker, less costly installation. The FSE can also provide non-vital diagnostic information. Frauscher provided complete training and support to MTA personnel, enabling them to operate, troubleshoot and maintain the system independently, increasing uptime and reducing costs.

Conclusion

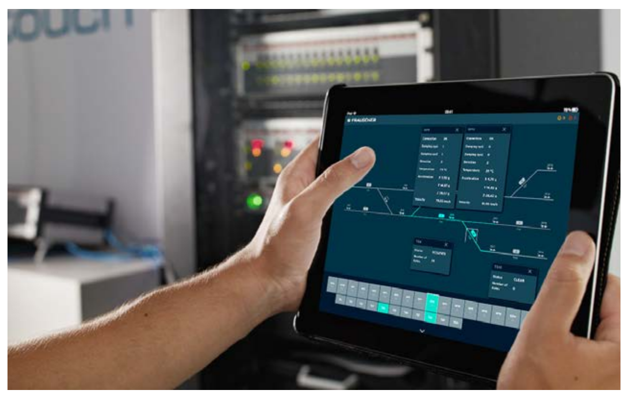
The FAdCi provides a software interface to the PLC via FSE, a protocol that enhances the system's capabilities beyond traditional track circuit vehicle detection. The FAdCi provides real-time data regarding the number of axles stored in a track section to determine space availability, efficiency in operator scheduling and vehicle movement, reduction in the risk of operator injury, elimination of switch machine damage, and continuous event and alarm logging.

The significant advantages of axle counters over track circuits were of specific benefit for this project – ease and low cost of installation and maintenance with no changes required to the existing track structure.

Update

In 2020, the Frauscher system has been operating successfully in the Baltimore North Avenue Yard for five years. During this time, MTA has consistently experienced firsthand the reliability, functionality and extremely low maintenance requirements of the system.

The level of satisfaction is best reflected by MTA's recent plans to expand the use of Frauscher wheel sensors and axle counters to the MTA subway line.



Operator	MTA Maryland	**Wheel Detection**	Wheel Sensor RSR180
Partner	M.C. Dean	**Country**	USA
Scope of Supply	Delivery of components, trial system, training	**Segment**	Urban & Mass Transit
Scope of project	31 wheel sensors	**Application**	Train detection
Axle Counting	Frauscher Advanced Counter FAdC®i	**Project start**	2015