

How RFID Technology is Transforming the Railway Industry

People | Power | Partnership

READ TIME: 7 MIN

Transit and freight operators require tools and equipment to perform their jobs efficiently without exceeding their annual budget. Improving processes, recording data, implementing changes and managing software can be time-consuming and costly. When it comes to software improvements, many systems have complex, proprietary or costly add-ons to get the data you really want. IIoT systems, using RFID and proprietary tags, are one example of this. Not anymore.

HARTING understands the demands of the rail industry and focuses on delivering mission-critical, reliable RFID solutions for maintenance, train positioning, platform identification, trackside signaling and other RFID solutions. This paper is written to provide a few examples of applications where IIoT and RFID systems have been deployed to improve operational efficiency and maintain a State of Good Repair using an open-sourced, competitively priced system.

Maintenance and IIoT



A USA based catenary train going into the locomotive maintenance yard

Whether you transfer freight or operate a heavy or light rail transit system, all of these have standard maintenance schedules (SMS). Tracking these schedules, determining which systems and components need to be serviced, inspected, and maintained, and accurately recording data require time and often manual entry of information into a database. As such, misinformation, tracking changes and user entries in databases are often lost, incomplete or not accurately recorded.

IIoT, via a combined solution of stationary and mobile RFID-tagged components, provides your maintenance team with an automatic system for lifecycle-based

maintenance. This includes component-status data acquisition and managed confirmations via open-sourced middleware software.

RFID-tagged components, such as wheel sets and bogies, can be read and tracked as your equipment moves in and out of maintenance yards during their entire lifespan. The data from those components are automatically stored in your database using middleware software and available to you when needed.

Routine Service and IIoT



A Lower Rail Vehicle (LRV) washing location

Positioning and vehicle location during routine service

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can often be difficult based on line-of-sight obstacles. Examples of such would include moving and triggering a washing system for a Light Rail Vehicle or positioning a Light Rail Vehicle to fill a sandbox. Both require a coordinated and often manual process.

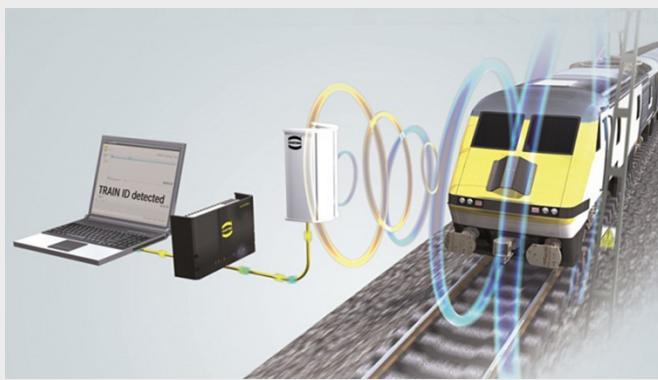
To improve this process, RFID antennas can be positioned within the railyard or maintenance facility, and RFID tags on the Low Rail Vehicle can be used to register the vehicle's position. Based on the vehicle's position, a trigger can start washing system or a pneumatic pump to fill up the Light Rail Vehicle's sandbox system.

An additional advantage is that a complete RFID system can record the frequency, the date, and the time of these events. This improves operational efficiencies and reduces downtime for manual inspections all while reducing the amount of time the car sits in the railyard.

Train Positioning and IIoT

Passenger trains must stop at specific positions along the arrival train platform. The train or platform doors must only be allowed to open when a vehicle is safely positioned at the platform. Unfortunately, optical sensors and mechanical contacts often fail due to dust, dirt and water found in all transit environments. Furthermore, on some cars, the driver manually operates the door systems, which can lead to unintended consequences and passenger safety risks.

Contactless and maintenance-free RFID systems allow precise and reliable train positioning. A typical train position implementation consists of placing RFID transponders along the route, RFID Transponders on the platform, and RFID reader on the railcar. The transponders on the route and platform serve as unique position markers, and the train can locate itself exactly as it passes, identifying the location, speed and platform (left or right).



HARTING RFID for Rail System

Additional applications that can benefit from accurate train positioning include:

- Passenger information system, notification and station information for incoming cars.
- Connecting into overhead lines to charge onboard battery systems.
- Trackside and onboard signaling to trigger an indicator within the cab to determine speed changes.
- Improved track safety for railroad crossing points and maintenance yards.
- Interlocking redundancy for communication-based train control systems (CBTC).
- Automatically triggered, curve lubrication system.



Ha-VIS RFID Control ETB

HARTING and IIoT

HARTING has been providing and improving railway operations and safety with automatic identification components and environmental hardened tags for many years. We offer a comprehensive line of RFID rail-certified solutions for all types of railway vehicles that is highly accurate, robust, easy-to-install, and cost-effective.

HARTING RFID technology enables train operators to proactively react to rail track conditions, improve operational efficiencies, automate previously manual tasks, and reduce downtime while withstanding the environmental challenges found in transit and freight applications.

The middleware interface provided with the HARTING solution provides access to your data from a laptop or a cloud-based storage network. This allows you to manage, change and assign access to specific transit team members as well as perform real-time actions on the RFID data, which include logging into a database, filtering information and triggering specific actions.

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Rail-certified HARTING RFID systems can capture the position of moving trains with high precision - within five centimeters of location - and defined read zones from as small as one to three millimeters to as long as 50 feet or more. The systems can accurately read tags at speeds of more than 125 miles per hour and support the bulk reading of more than 300 tags per second.

HARTING utilizes passive UHF RFID products, as this technology has been proven in harsh environments and rail applications for many years. Our RFID readers support a variety of standard communication protocols including LLRP, and our middleware is designed in accordance with the GS1 ALE 1.1 standard.

EN and environmental standards that HARTING products meet include:

- Railway (rolling stock)
- EMC EN 50 121-3-2
- Vibration EN 61 373 Cat. 1B
- Shock EN 61 373 Cat. 1B
- Wet heat (cyclic) EN 50 155 / EN 60 068-2-30
- Fire protection EN 45 545-2
- FCC 47 FCR Part 15

HARTING AG & Co. KG was founded in 1945 with headquarters in Minden, Germany. One of the pillars of the company is the railway industry, which has a place in the organization's history since Minden is a traditional rail location. For many years, the German Rail Central Office (BZA) was in Minden, and even today the city is an important location for the DB-Systemtechnik (German Rail system technology). As a rail industry partner, HARTING designs their products according to the demanding requirements.

HARTING offers a variety of solutions tailored to meet specific rail application environments and needs



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