BUILDING A SMARTER WORLD:

HOW RFID CAN TRANSFORM THE RAIL INDUSTRY

A BRIEF HISTORY of RFID & RAIL

The history of rail transportation dates back nearly 500 years, with modern rail transport (i.e., steam locomotives) beginning in Britain in the early 19th century. Fast forward to the 20th century: Businesses are becoming exceedingly competitive, so many industries are forced to adopt new technologies that will increase efficiency while reducing costs. Some of the technologies being adopted include barcode technology, machine vision, and radio frequency identification (RFID), as they provide a quick means of automation and subsequently cost reduction.

As various industries searched for ways to become more efficient, the rail industry also followed suit. North American rail officials began looking at various technologies, including barcode technology, to automate many tedious processes that were being done manually. This included tracking railcars and ticketing. Unfortunately, barcode technology was deemed ineffective and did not satisfy the needs of the rail industry. For example, the rail industry required railcars to be tracked while in transit (usually at fast speeds) and also required tags that could be read in unfavorable weather conditions, like precipitation and extreme temperatures. RFID, a form of wireless communication that uses electromagnetic fields (radio waves) to identify and track tags that are attached to objects, was already being used successfully in electronic toll collection so officials looked at how RFID could also be used for rail.

RFID met all the needs of the rail industry, as it did not require line-of-sight and could be used in extreme weather conditions. Since the rail system in North America was so interconnected, all stakeholders had to agree on one system for use in North America. That is how the Amtech RFID system was born. In the 1990s, the Association of American Railroads (AAR) adopted this RFID system as an industry standard. Today, RFID continues to be used by the global rail industry to identify and track railcars, keep personnel safe, and improve customer service.

BENEFITS of RFID in RAILWAY

RFID has proven to be an extremely effective form of automation and efficiency across the railroad industry. In rail, RFID tags are attached to railcars (also known as locomotives) and programmed with basic information, such as the identification number, company, type of equipment and

details regarding the railcar contents. Often, this information is cross referenced to a database that will ultimately provide even more granular information regarding the lading, origin, and the destination.

In addition to tagging railcars that carry commodities, RFID is also used in the passenger rail segment. For example, RFID can be used in rail stations for ticketing purposes and even portal access (i.e., rail doors opening and closing automatically). In this application, RFID is used to enhance customer service, increase safety, and reduce errors. In the example of automatic rail doors, RFID reduces the risk of injury, death, and even lawsuit.

Below are the main benefits of using RFID in the rail industry:

Asset Management	• **Tracking**: The ability to track equipment and railcars (specifically in-transit) to ensure traceability and maximum asset utilization • **Security**: Prevent theft and tampering of cargo (i.e., anti-conterfieting)
Efficient Ticketing	• **Customer Satisfaction**: Provide real-time information on train location that can be used to update passengers at stations and terminals • **Efficiency**: Automatically collect fares, reducing lineups and improve overall travel times
Maintenance	• **Service History**: Track the service and repair history for individual railcars to prevent any mechanical issues
Increased Safety	• **Personnel Safety:** Ensure the safety of trackside work crews • **Railcar Safety:** Monitor the temperature of the axle bearings to prevent overheating; Detection of defective wheels and pantographs; Detection of load imbalances • **Portal Access:** Ensure that rail doors are opened at the appropriate time

THE RFID ADVANTAGE

There are many technologies that claim to increase efficiency and reduce operating costs, but in order to be successful, the technology must be well-suited to the industry and the specific application. For example, barcode technology, which is highly successful in both retail and healthcare, was tested in the rail industry but was abandoned because of performance issues. Another example of a failed technology in the rail industry was an infrared system. This technology was also abandoned because, like barcode, infrared tag require line of sight. Consequently, RFID met the design requirements of accuracy, ruggedness, and economy.

RFID is well suited for the railway industry for many reasons:

- RFID systems operate in all weather; they are rugged and durable for various weather conditions
- RFID systems have a long read range allowing railcars to be automatically scanned in-transit
- RFID readers automatically read tags, even when the train is travelling at high speed
- RFID tags do not require “line of sight”; dirt can cover the tag and it can still be read
- RFID tags do not require batteries and are not harmful to the environment
- The rail industry is already familiar with the use of radio waves, so adoption adds little burden
- There are no privacy issues when tracking railcars with RFID
- RFID integrates well with GPS as a complementary technology to further improve tracking capability
- Passive RFID tags contain no power source and therefore have a very long life

CONCLUSION

RFID is a proven technology in the railway industry. It has been adopted across the globe by numerous railway companies. In fact, there are certain regional legislations that require the use of RFID in certain applications. There are numerous benefits to adopting RFID, including asset management and real-time tracking, streamlining ticketing processes, tracking maintenance at an individual railcar level, and increased safety by monitoring the “health” of a particular railcar. RFID is a versatile technology that can be used in a variety of ways to achieve many different results. In the rail industry, railcars can be tagged, but RFID can also be used at the rail station to automate ticketing and other functions, like portal/door access.

Rolling out an RFID program in rail must be carefully planned for a successful implementation. Adopting RFID often requires changes in business processes and workflow, and these changes require various resources such as time, money, and coordination as to not disrupt normal operations during the rollout. Additionally, industry protocols must also be followed.

RFID and the Rail Industry

Adopting RFID in the rail industry can result in fewer derailments, lower maintenance costs, and more effective use of the transportation network. It improves the safety of cargo, passengers and personnel. As time has shown, RFID has proven itself as a worthwhile investment in the rail industry and the return-on-investment can be achieved quickly.

A TRUSTED RFID PARTNER

Engineers looking to adopt RFID technologies can benefit by partnering with companies that have deep RFID engineering expertise. Many suppliers can offer a wide variety of RFID products to choose from, but unlike most data collection manufacturers, JADAK has one of the broadest RFID product portfolios in the industry, backed by engineers with the resources and technical expertise to help partners implement solutions to meet their specific needs and requirements.

JADAK's deep knowledge of RFID, particularly in the global rail industry, makes them uniquely positioned to solve many different types of challenges. By embedding RFID technology into new and existing products, companies can now gain the differentiation and competitive advantage that RFID-enabled features and functions impart, while at the same time protecting revenue streams and brand integrity.

In addition to the rail industry, JADAK's RFID solutions are engineered for applications such as retail, logistics, medical equipment tracking, access control, and more. To learn more about JADAK's full line of HF/UHF RFID products and services, contact them at 315-701-0678 or info@jadaktech.com

ABOUT JADAK:

JADAK, a business unit of Novanta, is a market leader in machine vision, RFID, barcode, printing, and color and light measurement products and services for original equipment manufacturers. The company designs and manufactures embedded detection and analysis solutions that help customers solve unique inspection, tracking, scanning and documenting challenges. The company is ISO 9001 and ISO 13485 registered.

Novanta is a trusted technology partner to OEMs in the medical and advanced industrial technology markets, with deep proprietary expertise in photonics, vision and precision motion technologies.

ThingMagic is JADAK's RFID line of products and services.

www.jadaktech.com

JADAK
A Novanta Company

USA Office
phone:+1 315.701.0678
email: info@jadaktech.com
web: jadaktech.com

European Office
phone:+31 (0)76.522.5588
email: info@jadak.eu

Asia Pacific Office
phone: +86 512.6283.7080

Novanta