Navigating the Industrial Frontier:
Empowering Businesses with Real-Time Location Systems (RTLS)

A Beginner's Guide to Understanding How RTLS Works and
What It Can Deliver for Businesses across Different Industries

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Navigating the Industrial Frontier :

Empowering Businesses with Real-Time Location Systems (RTLS)

In the dynamic landscape of the industrial Internet-of-Things (IIoT), real-time location systems (RTLS) are helping organizations transcend the limitations of traditional tracking methods and unlock a world of possibilities. This cutting-edge technology has the power to transform multiple industries, including manufacturing, warehousing, supply chain, oil-gas, mining, and aviation.

RTLS enables businesses to navigate the industrial frontiers with precision and agility. It empowers organizations to optimize processes, enhance safety protocols, and maximize productivity by providing real-time tracking and monitoring capabilities. Scalability, accuracy, and adaptability are among the key attributes that position RTLS as a force multiplier in industrial operations.

Organizations across industries have harnessed the transformative power of this technology to enhance operational efficiency, improve safety, and drive sustainable growth. While the potential of RTLS is vast, its implementation can pose challenges.

This white paper:

01

Explores the potential of RTLS, its unique advantages over traditional tracking technologies, and how it empowers manufacturing, warehousing, supply-chain, oil-gas, mining, and aviation industries to thrive in the era of digitalization.

02

Serves as a guide for organizations to leverage the transformative potential of this game-changing technology to enhance operational safety and efficiency in their industries.

03

Equips industry leaders with the knowledge and tools they need to harness the full potential of RTLS and manage industrial operations with confidence and vision.

Revolutionizing Industrial Operations:

Unleashing the Power of RTLS

RTLS, a cutting-edge technology for real-time tracking and monitoring of assets and people, has emerged as a transformative force in IIoT. By harnessing the potential of RTLS, organizations can unlock numerous advantages in their industrial operations

Asset Tracking and Management

RTLS empowers organizations with real-time visibility into the location and status of assets, optimizing utilization, reducing losses, and streamlining maintenance processes for enhanced operational efficiency.

Safety and Security

Accurate personnel tracking through RTLS ensures the safety of workers, enabling timely response during emergencies. Additionally, RTLS mitigates theft risks and unauthorized access, bolstering security within industrial facilities.

Workflow Optimization

Leveraging RTLS data, organizations can analyze movement patterns, identify bottlenecks, and optimize workflow processes. Real-time notifications and alerts enable efficient resource allocation, reducing downtime and boosting productivity.

Condition Monitoring and Maintenance

Integrating RTLS with sensor data facilitates predictive maintenance strategies, allowing proactive detection of equipment anomalies and suboptimal maintenance scheduling, leading to downtime minimization and maintenance optimization.

Supply Chain Optimization

RTLS enables end-to-end visibility and traceability in the supply chain, enhancing logistics and inventory management, reducing errors, and thus improving supply chain efficiency.

Energy and Resource Management

RTLS is pivotal in monitoring and optimizing energy, water, and resource consumption. By tracking equipment, personnel, and environmental conditions, organizations can identify energy-intensive areas, implement energy-saving measures, and improve overall resource efficiency.

Data Analytics and Decision-Making

The wealth of data RTLS generates empowers organizations with valuable insights. Analyzing location data enables informed decision-making, process optimization, and efficient resource allocation, thereby improving overall business performance.

By embracing RTLS in the IIoT era, organizations can transform their operations and enjoy the benefits of enhanced visibility, efficiency, safety, and optimization. RTLS-derived insights can foster data-driven decision-making, cost reduction, and superior operational outcomes, positioning businesses at the forefront of industrial innovation and success.

03

UWB RTLS and
Other Alternatives

Ultra-Wideband (UWB) RTLS offers distinct advantages compared to the other alternatives for RTLS, such as Wi-Fi-based, Bluetooth-based, infrared-based, and magnetic-based RTLS. UWB RTLS excels in terms of accuracy, precision, scalability, and versatility.

Precision and Accuracy

UWB RTLS outshines alternatives by providing centimeter-level accuracy, surpassing the precision offered by RFID, Wi-Fi, Bluetooth, and other technologies. This high level of accuracy is crucial in industrial environments where precise tracking of assets and personnel is essential.

Immunity to Interference

UWB RTLS operates in a dedicated frequency range, ensuring uninterrupted tracking capabilities in challenging environments. This sets it apart from Wi-Fi and Bluetooth, which may be prone to signal disruptions from other wireless devices in crowded frequency bands.

Scalability and Capacity

UWB RTLS exhibits remarkable scalability, efficiently tracking thousands of assets, personnel, or devices simultaneously without compromising accuracy or performance. This scalability advantage distinguishes it from alternatives like RFID and magnetic-based RTLS, which may have limitations in handling large-scale tracking requirements.

Versatility and Adaptability

UWB RTLS excels in indoor and outdoor environments, making it suitable for diverse operational scenarios. This versatility sets it apart from technologies like infrared-based RTLS, which require a clear line of sight, or magnetic-based RTLS, which may have constraints in accuracy and range.

Power Efficiency

UWB RTLS devices consume minimal power, leading to extended battery life for battery-operated tags or devices. This power efficiency advantage differentiates it from technologies like Wi-Fi and Bluetooth, which may require more frequent battery changes or higher power consumption.

UWB RTLS is a superior choice for organizations seeking precise, reliable, and scalable tracking solutions. Its accuracy, immunity to interference, versatility, and power efficiency empower industries to optimize operations, enhance safety, and drive efficiencies in various industrial settings.

Industrial Safety Challenges:

An RTLS Implementation Use Case

Fostering a culture of safety within organizations involves addressing specific challenges unique to each industry and protecting personnel and assets. Implementing advanced technologies such as Real-Time Location Systems (RTLS), which enhance visibility, automate emergency response, and streamline safety compliance, can significantly improve industry safety outcomes.

Industrial Safety Challenge in
Manufacturing

The manufacturing industry faces significant safety challenges, including delayed response times, increased vulnerability, compliance complexities, and the need for comprehensive safety training. Ensuring safety compliance in manufacturing environments presents an ongoing challenge, as manual monitoring and enforcement of safety protocols increase the risk of violations and accidents.

Manual processes, such as periodic inspections, hinder the prompt identification and mitigation of safety concerns, leaving room for accidents.

Manual roll-calls and headcounts during emergencies prove time-consuming and error-prone, hindering swift response efforts and potentially compromising personnel safety.

Comprehensive safety training and raising employee awareness require effective dissemination of information on potential hazards and a thorough understanding of safety protocols.

Industrial Safety Challenge in
Warehousing and Supply Chain

The warehousing and supply chain industry needs more visibility and monitoring capabilities than afforded by manual inspections for prompt identification of safety risks and implementation of proactive measures.

Safety compliance monitoring in such environments is also challenging, as manual monitoring is cumbersome and increases the likelihood of violations and associated risks.

The coexistence of forklifts and pedestrians in shared spaces amplifies safety concerns due to low visibility and inadequate communication, heightening the likelihood of accidents and injuries.

Advanced solutions that enhance visibility, automate emergency response, streamline safety compliance, and address the specific risks posed by forklift operations and pedestrian interaction are necessary for the warehousing industry.

Industrial Safety Challenge in
Oil, Gas, and Mining

The oil, gas, and mining industries need more visibility and monitoring capabilities, as manual inspections and surveillance hinder the timely identification of safety hazards that personnel and assets may be exposed to while working in hazardous environments. Efficient emergency response protocols are necessary to address the unique challenges faced in these industries.

Advanced solutions that improve visibility, automate emergency response, and ensure effective safety protocols in hazardous environments are required to overcome these industry-specific challenges.

Industrial Safety Challenge in
Aviation

Real-time tracking and monitoring are essential for promptly identifying and addressing safety concerns in the aviation industry. Innovative solutions are needed to enhance visibility, automate tracking processes, and implement robust security measures.

Operational safety is of paramount concern to safeguard against collisions, malfunctions, and unauthorized usage. Preventing unauthorized access and theft is crucial for maintaining security and uninterrupted operations. By implementing advanced technologies, organizations can ensure safe working environments that protect personnel and safeguard valuable assets.

Efficiency is also a key aspect of aviation operations. Real-time data on the speed, fuel consumption, and location of aircraft and vehicles can provide valuable insights to optimize operations. By analyzing this data, organizations can identify inefficiencies, such as suboptimal fuel usage or inefficient routing, and take proactive measures to improve operational efficiency. Additionally, real-time tracking enables dynamic assignment of vehicles to the nearest planes, optimizing ground operations and reducing turnaround times.

RTLS Implementation
Use Cases

Enhancing Worker Safety with Risk Monitoring

Implementing Real-Time Location Systems (RTLS) improve safety in high-risk environments. For instance, Litum's UWB RTLS technology tracks employees accurately with rechargeable badges. The system facilitates geofencing, access restriction, and automatic alerts.

The system reinforces lone worker safety and warns of the proximity to machinery or overhead load risks. It detects lone worker locations in real time to minimize the impact of injury or accident. A panic button provides immediate assistance during emergencies.

The system automatically monitors employees, detecting accidents, falls, collisions, and inactivity.

It promotes risk awareness, reports employee movements, and detects high-risk behavior.

Geofence alerts prevent unauthorized entry or exit into pre-defined areas.

Tailor-made reports and data analytics support informed decision-making.
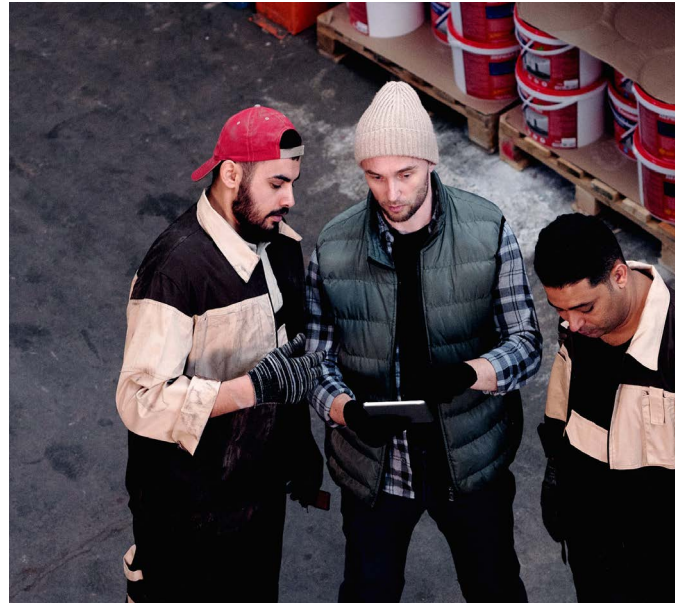
Enhancing Emergency Mustering with Automated Roll-Call

Efficient emergency mustering and accurate headcounts are vital for employee safety during evacuations. An automated roll-call system achieves precise and instant headcounts, improving emergency response. It integrates mustering access control with time and attendance systems, providing an updated personnel roster.
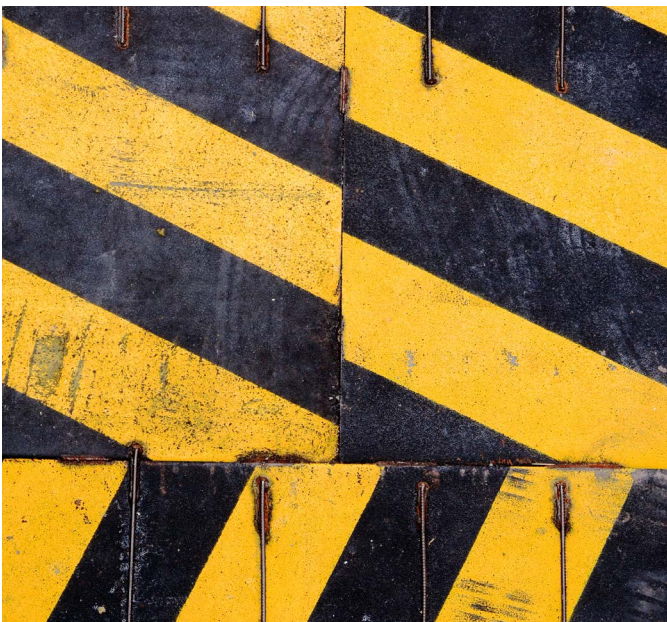
The system's automated emergency headcount feature offers comprehensive coverage regardless of the number of muster points or area size.

Electronic BLE beacon badges replace traditional ones for easy initial user conversion.

It identifies and reports missing employees in real-time, facilitating quick response.

Litum's Automated Roll-Call System, with BLE beacon-enabled ID badges, ensures reliable data transmission up to 50 meters. It integrates with most time and attendance management systems. Operating on a cloud server and GSM, it remains functional during outages. The system improves compliance and speeds up the identification of missing individuals.

Enhancing Forklift Safety with Collision Warning System

The Forklift Collision Warning system minimizes accidents through audio-visual alerts for people or other forklifts in proximity. Automation such as reduced speed near other vehicles and designated low-speed areas boost safety.
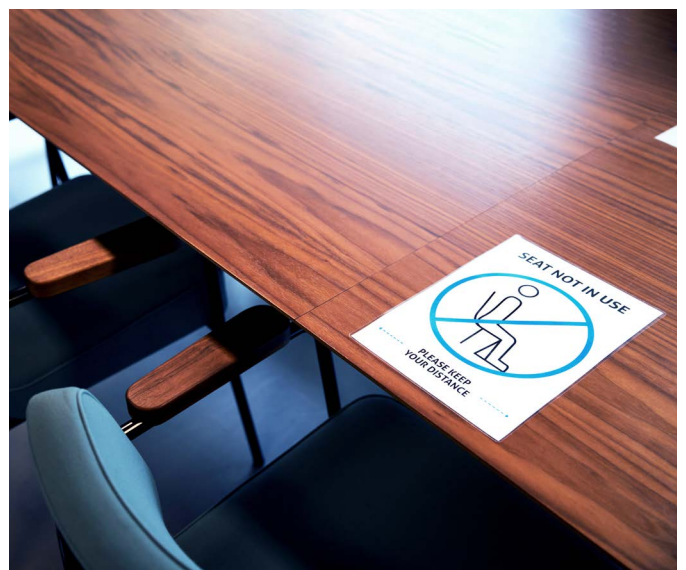

The system tracks forklifts and pedestrians with an RTLS asset tracking system, relying on UWB RTLS technology and battery-powered active RFID tags. These tags, along with the RTLS mesh network, create an "indoor GPS" system for precise forklift tracking. Real-time insights are provided through the RTLS application software.

Pandemic Preparedness through Real-time Tracking

The Pandemic Safety System allows businesses to securely bring employees back to the workplace. The system prioritizes personal safety, reduces employee stress and anxiety that may result from returning to the workplace, and enforces regulatory compliance. It tracks employee movement, sends alerts to minimize contact, and enforces social distancing measures based on business requirements. The system proactively triggers alerts to prevent overcrowding beyond established guidelines. It establishes a safe environment by utilizing real-time tracking for contact tracing.

Contact tracing is efficient, providing detailed reports of employee interactions within the past 14 days while respecting privacy regulations. Continuous transmission of highly accurate location data enables real-time alerts for social distancing breaches. The system accurately tracks every employee and visitor by integrating UWB-driven RTLS system and rechargeable badges.

Real-time actions are managed through the RTLS software, swiftly responding to safety breaches. Tailor-made reports and data analytics support informed decision-making, enabling adaptive safety measures. Organizations can navigate these challenging times confidently, demonstrating their commitment to employee well-being and a secure work environment.

Litum Safety Solution in Action
Grand Paris Express Project

Litum's advanced Real-Time Location Systems (RTLS) technology played a vital role in enhancing safety and security during the construction of the Grand Paris Express, an ambitious project of monumental scale. By utilizing Litum's innovative solution, Paris Metro successfully monitored and ensured the well-being of thousands of construction workers laboring in the tunnels, surpassing previous safety standards for large-scale infrastructure projects.

Overcoming the challenge of establishing a safety system with two-way communication in demanding work environments and limited underground network infrastructure, Litum's solution centred around battery-powered UWB RFID tags, anchors, and gateways that communicated via a mesh network structure. This comprehensive approach allowed precise location monitoring with sub-meter accuracy, bolstered by features such as access control, zone monitoring, equipment proximity alerts, and duress help calling.

As a result, the implementation led to a notable reduction in accidents and collisions, improved emergency response efficiency, and ensured full compliance with rigorous regulatory guidelines.

Industrial Efficiency Bottlenecks:

An RTLS Implementation Use Case

Efficiency is critical to achieving a competitive advantage in today's fast-paced business environment, as it directly impacts productivity and cost reduction. However, outdated practices limit the ability to streamline processes, optimize resource allocation, and achieve optimal performance.

Manufacturing

Lack of real-time data and insights hinders workflow optimization in the manufacturing industry, leading to decreased productivity. Identifying bottlenecks and streamlining processes becomes challenging without access to real-time data, resulting in inefficiencies.
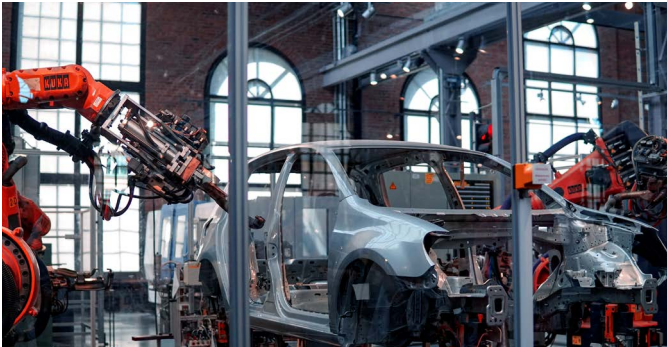
The inability to provide real-time insights and feedback impedes employee productivity, leading to suboptimal performance levels.

Manual tracking methods and outdated systems contribute to asset loss and shrinkage, further reducing operational efficiency.

Identifying underutilized resources, optimizing inventory levels, and minimizing unnecessary downtime is difficult without access to real-time data.

Without real-time data on material movement and progress, organizations struggle to minimize downtime and address process inefficiencies.

Operating costs increase due to inefficient processes and resource allocation.

Warehousing & Supply Chain

Traditional tracking methods in the warehousing and supply chain industry pose substantial challenges, including inefficient inventory management, limited asset tracking capabilities, suboptimal workflow management, and ineffective route optimization. Without real-time visibility, organizations struggle to accurately track inventory levels and locations, leading to inefficiencies. Asset tracking becomes challenging, resulting in difficulties in monitoring the locations and status of valuable assets.
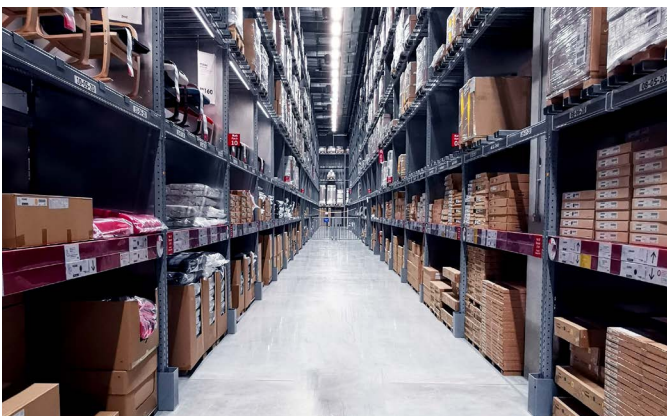
Forklift tracking with manual records makes monitoring usage, maintenance, and safety compliance difficult.

Due to manual paperwork or radio communication, yard management suffers from inefficient coordination, delays, and congestion.

Asset tracking, including inventory management, equipment maintenance, and location monitoring, is labor-intensive and prone to errors, impacting operational efficiency and decision-making processes.

These challenges collectively reduce productivity, increase costs, and hinder order fulfillment and customer satisfaction. Overcoming these challenges requires real-time insights and accurate tracking systems to streamline operations and improve efficiency.

Efficiency Bottlenecks in
Oil, Gas, and Mining

In the oil, gas, and mining industries, traditional tracking methods create challenges for employee and asset tracking in remote and hazardous work environments, leading to inefficient resource allocation and management.

Manual processes such as sign-in sheets or time clocks for employee tracking waste time and introduce errors, impacting attendance and productivity tracking.

Poor workflow management due to delays, bottlenecks, and miscommunication hampers the smooth flow of goods and information.

Inefficient workflow and process optimization lead to an increase in costs, impacting the productivity of personnel and assets.

Efficiency Bottlenecks in
Aviation

The aviation industry faces efficiency challenges related to asset, gate, and workforce management, and baggage handling.

Manual processes for asset tracking lead to delays, misplaced items, and increased costs.

Inefficient gate management and aircraft turnaround time due to imprecise timing and communication result in delays and decreased efficiency.

Baggage handling and tracking challenges impact passenger satisfaction and increase operational costs for airlines.

Workforce management difficulties arise from tracking and coordinating diverse tasks and personnel.

Inefficient resource allocation, task completion delays, and reduced productivity hinder operational efficiency

in the aviation industry. Overcoming these challenges requires real-time asset tracking, improved gate management systems, streamlined baggage handling processes, and efficient workforce management.

RTLS Implementation
Use Cases

Improving Efficiency

Organizations are increasingly recognizing the urgent need for innovative solutions that can unlock the full potential of their operations. The efficiency of operations can be significantly improved by incorporating advanced technologies like Real-Time Location Systems (RTLS), which enhance the visibility of processes.

RTLS optimizes workflows and workspace utilization, providing benefits such as location monitoring and equipment tracking. It enforces rules such as access control and generates compliance reports. Geofencing restricts access, while alerts and reports with big data analytics enhance decision-making, thereby optimizing workflows.

- Advanced analytics differentiate value-added activities to improve productivity.

- RTLS ensures accurate long-range tracking, maintaining system integrity.

- Real-time monitoring enables efficient schedule management and resource allocation.

- Detailed time reporting supports data-driven decisions.

Asset Tracking

The Asset Tracking system revolutionizes asset management by providing remote capabilities, reducing retrieval time, and mitigating risks. Its accurate location detection instills confidence, preventing equipment loss and increasing cost savings.

- Real-time tracking monitors asset status, expediting resource allocation and enhancing efficiency.

- Zone alerts leverage UWB technology for real-time monitoring and compliance.

- Integrating RFID and UWB RTLS technology, tamper-proof asset tags ensure precise location monitoring.

- The comprehensive mesh network establishes an accurate "indoor tracking system."

Litum's asset tracking system guarantees dependability and fortifies security. The flexible system supports diverse tracking requirements, minimizing search time and optimizing efficiency. Implementing this cost-effective solution curtails shrinkage and empowers businesses to achieve productivity.
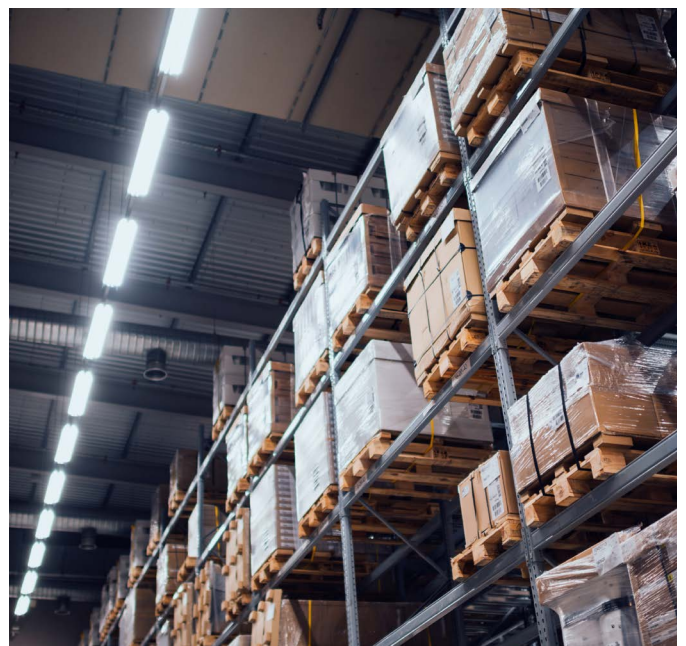
Forklift Tracking and Forklift Fleet Analysis

The Forklift Tracking and Fleet Analysis system provides cost reduction and improved efficiency by optimizing workflow and routes, resulting in streamlined operations and lower costs.

Data-driven analysis of forklift locations, utilization, and work order completion improves productivity.

Fleet analysis minimizes expenses and resource wastage.

Installation is simple, with minimal wiring and battery power consumption.

Litum's Forklift Tracking System optimizes operations, ensures worker safety, and provides peace of mind. The system ensures high accuracy and integrates with the Forklift Collision Warning System for enhanced safety. Using UWB and RFID technologies and proprietary algorithms; it creates an "indoor forklift GPS tracking system."
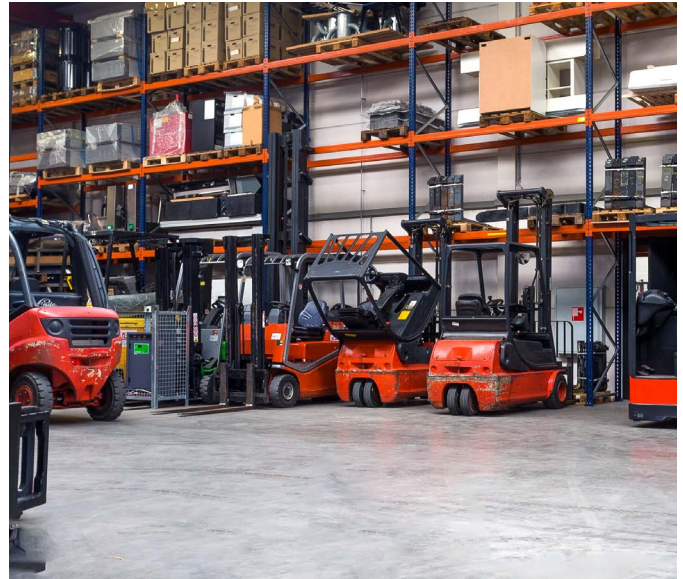
Yard Management

The Yard Management system enhances material handling processes and reduces turnaround times by creating a digital twin of the yard. Real-time monitoring of trailers, equipment, and personnel provides complete visibility, empowering managers to make informed decisions. The yard management solution offers intelligent analytics, comprehensive dashboards, and detailed reports for data-driven decision-making optimizing yard management processes. Seamless integration with existing systems ensures a cohesive approach, enhancing efficiency and productivity.

Bottlenecks are identified and addressed, optimizing overall efficiency.

Automating check-ins and check-outs at the gates eliminates wasted person-hours, streamlining operations and enhancing productivity.

Directing trailers to available docks significantly reduces queues and optimizes vehicle movement, minimizing delays and maximizing efficiency.

Integration with forklift tracking and employee tracking systems further improves loading and unloading times, accurately locating all assets and personnel for streamlined operations and resource allocation.

Litum's system uses UWB-based active RFID tags for accurate location tracking. Customizable software enables real-time monitoring and empowers managers to optimize yard management processes and overall operational efficiency.
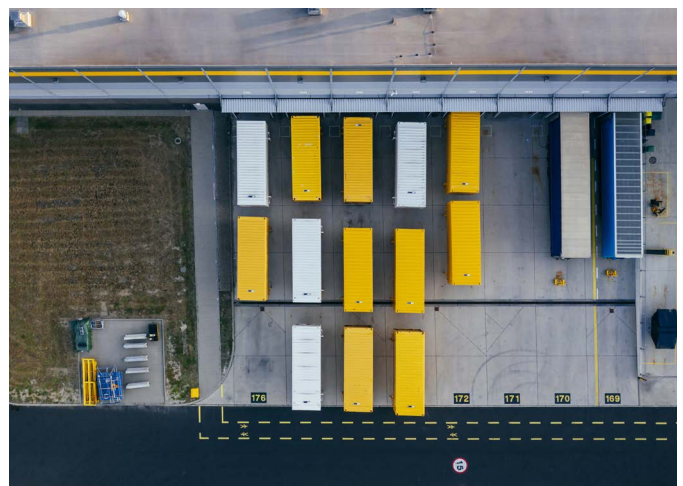
Manufacturing Process & Maintenance Tracking

The Manufacturing Process & Maintenance Tracking system revolutionizes production control, efficiency, and visibility. It enables real-time tracking and tracing of manufacturing processes, ensuring thorough monitoring at every step.

The system integrates maintenance tracking capabilities, identifying assets needing attention and facilitating quick repairs.

It provides assembly workers with product-based information, optimizing workflows and identifying areas for improvement.

Efficient maintenance tracking reduces repair time and streamlines equipment replacement, minimizing downtime. Complete visibility into raw materials, subassemblies, and finished products prevents disruptions.

The system utilizes RFID and UWB RTLS technologies for accurate tracking. Customizable business rules enable continuous monitoring and process improvements, enabling businesses to achieve enhanced efficiency in their processes.
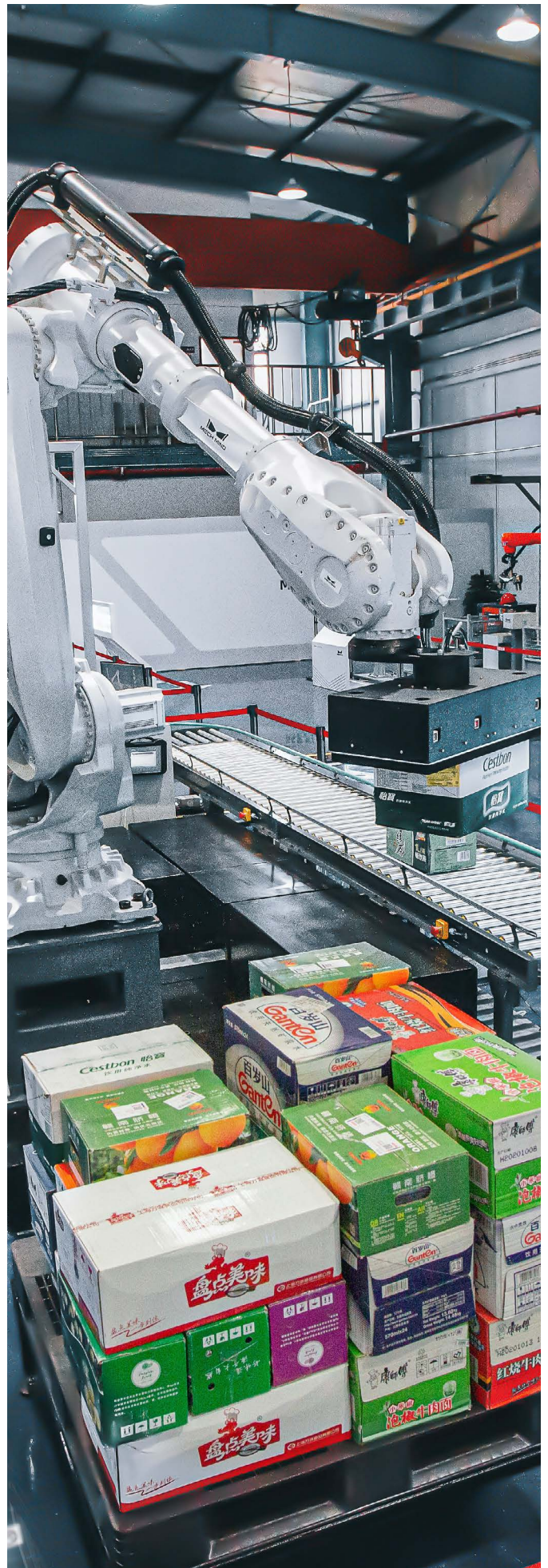
Simeco/TEKA

Simeco/TEKA has improved its workflows and achieved remarkable success in the kitchen appliance industry. Implementing Litum's process tracking system, Simeco/TEKA has streamlined workflows, reduced errors, and transformed its operations. RTLS technology has enabled Simeco/TEKA to optimize its processes and achieve higher productivity.

Challenges in Implementing RTLS Solutions

The implementation of RTLS solutions in industries poses challenges, such as integration complexity, scalability, interference, signal disruption, and battery–life and maintenance concerns.

Integration complexity arises from the need to customize and integrate RTLS with existing systems, which can be daunting without expertise.

Scalability challenges arise when accommodating numerous assets or locations, especially for global operations.

Interference and signal disruption can affect accurate tracking in complex environments or near heavy machinery.

Battery life and maintenance become challenging when managing the power consumption of multiple RTLS tags.

Litum offers practical solutions to these challenges. Litums's expertise ensures seamless integration and customization support for successful RTLS implementation. Its scalable RTLS solutions can be adapted to the needs of different industries for streamlined operations, enhanced safety, and improved productivity. Advanced signal processing techniques minimize interference, guaranteeing accurate tracking in complex environments without disruptions. Litum optimizes battery usage, prolongs tag life, and provides tools for monitoring and managing batteries, simplifying maintenance. It also offers comprehensive support services for system maintenance and performance optimization as needed by the customers.

Litum RTLS Solutions

RTLS is a transformative solution that revolutionizes operations, enhances safety, and improves efficiency. It provides a real-time view of assets, personnel, and equipment, enabling data-driven decision-making, streamlined workflows, and operational excellence. The precise location tracking capabilities of RTLS helps optimize processes, minimize errors, and reduce downtime. Scalability and adaptability are key advantages of RTLS. It seamlessly integrates with existing systems, making it a cost-effective choice for businesses. RTLS ensures reliable and accurate tracking in both indoor and outdoor environments, facilitating asset monitoring across extensive areas or complex facilities.

Anchor

Vehicle Tag

Asset Tag

Platform
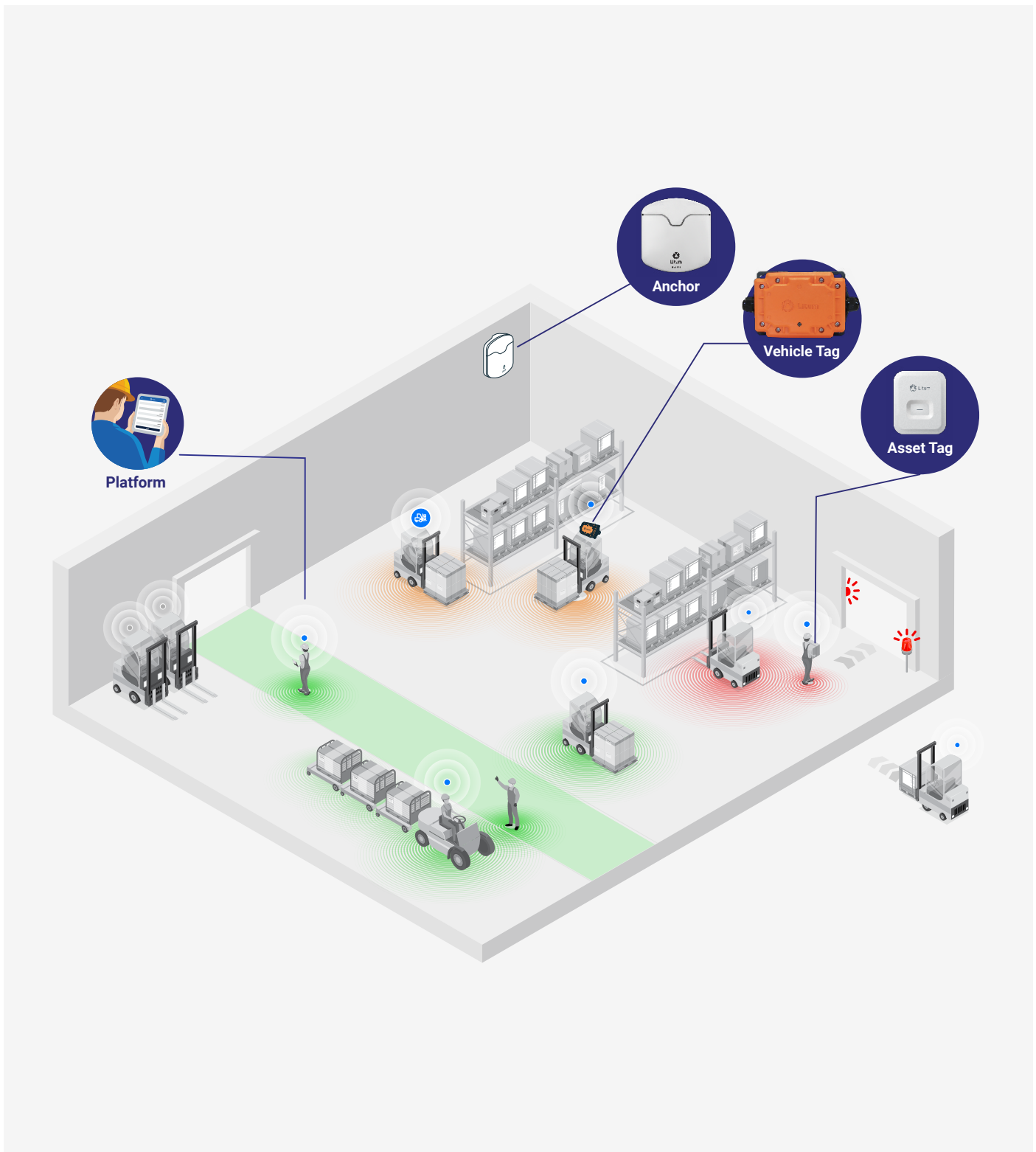
While implementing RTLS in industrial settings may present challenges, such as infrastructure requirements and integration complexities, these hurdles can be overcome through meticulous planning and strategic implementation. Partnering with experienced RTLS providers, such as Litum, guarantees success. Through comprehensive site surveys, infrastructure assessments, and robust data management systems, Litum ensures smooth and effective RTLS implementation.

RTLS offers significant benefits that surpass traditional tracking technologies. It empowers real-time visibility, enhances operational efficiency, and provides actionable insights for well-informed decision-making. By partnering with Litum, organizations across industries can realize the transformative potential of RTLS.

About Litum

Founded in 2004 by three engineers, Litum is a global leader in real-time location systems (RTLS). Litum offers a comprehensive portfolio of solutions that encompass hardware, software, and system integration services, improving safety and efficiency across various industrial and healthcare settings. Litum has been trusted by major companies in over 50 countries, including Fortune 500 names and government institutions. Find out more at **www.litum.com** and contact us at **info@litum.com** for more information.

Litum