Optimizing Warehouse Efficiency with Real-time Vehicle Tracking in Mixed Operations

R2000 Series Combines Highly Dynamic Positioning with Economical Efficiency for RTLS

At a Glance

- Integration of manually operated vehicles into a centralized traffic management system
- Contour-based localization without additional infrastructure
- Optimized traffic flow in mixed operations involving AGVs and manually operated forklifts
- Reduced downtime and increased throughput
- Scalable solution for existing fleets



The Application

In modern production and distribution environments, autonomous guided vehicles (AGVs) and manually operated vehicles, such as forklifts, operate simultaneously in the same traffic area. While AGVs are centrally controlled, forklifts operate flexibly on a task-by-task basis. To coordinate the flow of materials efficiently, end-to-end traceability of all traffic participants is required.

The Goal

The goal is to optimize traffic flow in mixed operations, reduce bottlenecks, and minimize waiting and downtime. At the same time, the focus is on increasing safety and creating a scalable solution, without requiring full automation of the existing forklift fleet or additional infrastructure.



The Solution

The R2000 2-D LiDAR sensor from Pepperl+Fuchs is mounted on manually operated vehicles and captures the surroundings in a 360° field of view. Based on the measurement data, the position of the vehicle within the facility layout is determined using contour matching. For this application, the OMD60*-HD-* is used as a cost-optimized variant, since high-precision localization is not required for integration into the traffic management system. The sensor's high rotation speed enables stable, real-time acquisition of environmental data, especially during the dynamic movements of manual forklifts.

For autonomous vehicles, more sophisticated variants such as the OMD60*-UHD-* are used to ensure highly accurate positioning. The position data collected from all vehicles is transmitted in real time to a higher-level traffic management system. This supports dynamic traffic flow adjustments, optimizes AGV routes, and enables early detection of potential conflicts in mixed traffic.

The Benefits

By continuously tracking all relevant traffic participants, the system creates a comprehensive, dynamic view of the material flow. This enables more efficient use of existing transport resources while reducing downtime and bottlenecks. In mixed traffic environments, visibility into manually operated vehicles significantly improves process stability.

Another key advantage is ease of integration: Because no additional infrastructure, such as reflectors or magnetic strips are required, existing vehicle fleets can be retrofitted cost-effectively. This allows companies to implement a scalable solution that supports phased automation while delivering excellent value for money.

Technical Features

- 360° all-around scanning for complete environmental mapping
- Range up to 60 m on natural objects
- Angular resolution up to 0.042° for high-precision contour detection
- Scan rate from 10 to 50 Hz for dynamic applications
- Ethernet interfaces (TCP/IP, UDP/IP, HTTP) for easy integration
- Rugged industrial design with IP67 degree of protection



For more information, visit: **pepperl-fuchs.com/px-R2000**