Warehouse and Distribution Centre operators are very aware of their responsibilities to provide a safe working environment for their staff. In addition to the legal and moral responsibilities, the financial consequences of a warehouse accident can be extremely high for both the employees and the company. This application note outlines the approach to a Collision Avoidance Safety Assistance System using the EPS™ RTLS system for tracking the pedestrian staff and the vehicles operating within the warehouse.

**Real Time Location System**

The EPS™ RTLS system uses a network of radio nodes to monitor the positions of tracked vehicles and pedestrians within the premises. The system uses a patented RF technique, operating at 2.4 GHz, which allows to accurately measure the distance between radio nodes.

**Infrastructure Nodes**

Following a site survey, the System Integrator will install an infrastructure of Reference Nodes, Gateway Nodes and Aisle Nodes to cover the tracking area. Specifics vary by site, but a general rule of thumb is that open-plan receiving or storage areas of up to 100m X 100m can be covered by 1 Gateway Node and 3 Reference Nodes, with one node in each corner. Areas with racking will typically require an additional pair of Warehouse Aisle Nodes for each Aisle. The Gateway Nodes are connected by LAN to a central computer running the Tracker Server software for position calculations, and the software applications to manage the collision avoidance safety assistance system.

**Vehicle Nodes and Alarm Systems**

The System Integrator outfits each Forklift, or other vehicle, with a Forklift Node. These nodes are installed with an antenna unit on the vehicle roof, and are connected to a DC power supply from the vehicle. The System Integrator also Installs a driver alert device, to provide audio and visual warnings of danger situations. The choice of driver alert device is made in consultation with the end customer and should be appropriate to the working environment.

**Pedestrian Safety**

Rechargeable battery-powered radio tags (Pedestrian Nodes) are typically fixed to high-visibility vests which are to be worn by personnel in the warehouse at all times. The System Integrator and Warehouse Manager organise that a working process is in place to ensure compliance with mandatory wearing of the tagged vests, and to ensure timely recharge of the batteries. A LED display on the
tag allows the user to verify it is operational before entering the warehouse area.

• **Collision Warning**

The system monitors the positions of the vehicles and pedestrians in the tracking area, and generates a warning when there is risk of a collision, or safety parameters have been violated.

Depending on the alarm device chosen, with a reaction time of less than one-quarter second, a strobe light and audio signal warn the vehicle operator when the system detects that the safety distance with adjacent vehicles or pedestrians is being violated.

• **Dynamic Safety Zones**

Each vehicle in the system is surrounded by its own fully configurable virtual safety zone. Penetration of that zone by a pedestrian or another vehicle results in warning signals for the drivers of each vehicle involved.

• **Inter-Node Ranging**

In addition to the collision avoidance based on position detection, the system also supports direct measurements of distances between vehicles, or between vehicles and pedestrians. This gives an added safety redundancy to the implementation and can be configured to trigger an alarm when the safety distances are violated.

• **Situational Awareness**

Using the EPS_IF API and Configuration GUI, the System Integrator can configure the installation so that the system has full awareness of features such as safety fences and bull bars. This prevents false alarms as the system will avoid generating proximity alerts where a pedestrian is close to a forklift truck but separated by a safety fence.

• **Blind Corner Safety Assistance**

Unlike alternative solutions, which rely solely on pedestrian tag detection by vehicle sensors, the use of full 2-D and aisle-tracking of vehicles and pedestrians can allow this system to help avoid collisions even when vehicles, or vehicles and pedestrians, are approaching a blind corner junction at 90 degree angles with no direct visibility of each other.

• **Incident Logging**

The system can be installed to maintain a log of all near-miss and collision incidents, including information such as: vehicles involved; timestamp and location; distance and vehicle speeds; other vehicles in the vicinity.

• **Fully Configurable**

When extended with all options, the System Integrator has full possibilities to configure individual safety zones for each vehicle depending on parameters such as:

- Size, weight and type of vehicle
- Current speed
- Number of vehicles nearby
- Location
- Time of day or night
- Certification or training level of operator assigned to vehicle

• **Reduced Downtime**

Safety is productivity. The reduction of collision or near-miss incidents with handling equipment increases the safety of the work environment. And a safe workplace avoids downtime due to incidents and thus increases productivity.

For more information

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