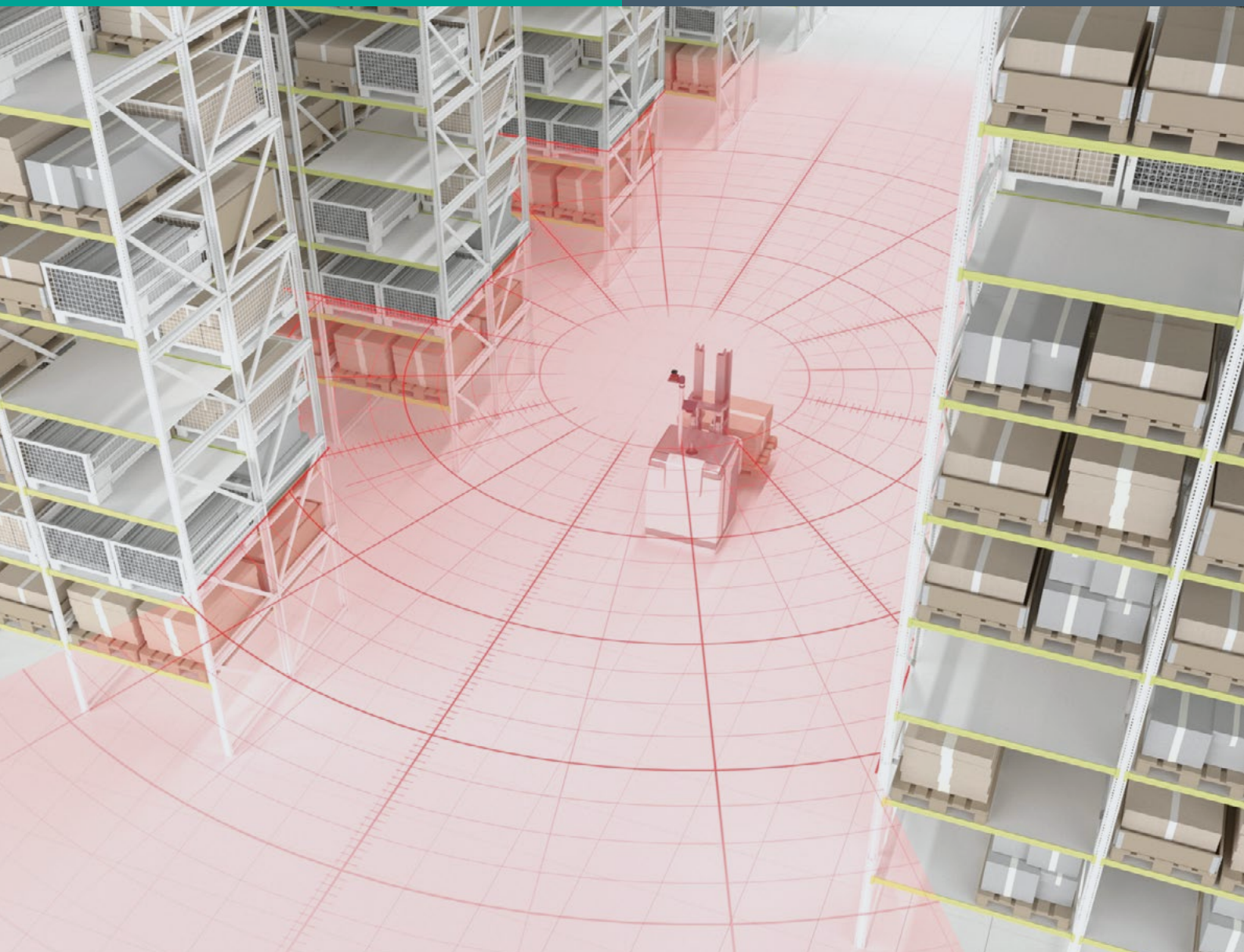


# Safe Positioning of Automated Guided Vehicles

Vehicle protection at transfer and bottleneck points

## At a Glance

- Safe AGV positioning with PL d
- Safety according to standards ISO 3691-4:2020(E) and ISO 13849-1
- Contour navigation with 360° R2000 2-D LiDAR sensor
- Highly precise position detection due to angular resolution of 0.014° and very small light spot
- Additional position information via RFID system at transfer and bottleneck points



## The Application

Two functions are essential for the operation of automated guided vehicles (AGVs): reliable navigation and safeguarding. Different methods exist for navigation, e.g. lane guidance or navigation with LiDAR sensors. These either use reflectors installed on factory walls or navigate via taught-in environmental contours.

For safeguarding the vehicle, a variety of sensors are usually used. In certain situations, such as at transfer points, gates or when entering narrow rack aisles, these safety devices must be switched off, because otherwise they will set the AGV in safe state. In such cases, the standards ISO 3691-4:2020(E) and ISO 13849-1 require that the position of the AGV at this point must be safeguarded or determined with PL d.

## The Goal

When operating automated vehicles, it must be ensured at all times that neither persons nor machines are harmed. In order to guarantee this in these circumstances, safe positioning of the AGV must be detected in accordance with PL d, while complying with standardized requirements such as documentation, calculation, etc. In addition to the highest precision and robustness of the sensor technology used, knowledge of the standards and guidelines, the development of a complete safety concept as well as calculation and validation are essential.

## The Solution

The sensor data used for navigation is enhanced with information from an RFID system. A 2-D LiDAR sensor of the R2000 series is installed on the AGV, which uses contour navigation to determine the position of the vehicle. In addition, an RFID read/write head is mounted underneath the AGV.

An RFID transponder embedded in the floor transmits the location information as soon as the read head is directly positioned above it. The redundancy of the sensor data means that the safe position of the vehicle in the facility can safely be determined and other safety equipment can be switched off.

## The Advantages

With the position data from the R2000, a sensor that is already installed on the AGV anyway, is used for positioning—this means there are no additional costs for this sensor incurred. The high angular resolution and the particularly small light spot of the 2-D LiDAR sensor guarantee maximum precision and therefore an accurate position measurement. The use of the RFID system with its robust transponders also further increases reliability, since dirt or debris does not affect measurement results.

The plant operator receives this comprehensive solution from a single source: In addition to the sensor technology, Pepperl+Fuchs offers the complete safety concept including documentation—developed by specialists in the field of machine and vehicle safety.

