

Reliable Lateral Protection for Autonomous Transport of Large Tanks

Unique Ultrasonic Sensor System
Meets Requirements for PL d

At a Glance

- Reliable detection of people and objects in defined protection and warning fields
- Detects regardless of surface properties and the material of the objects
- Insensitive to dirt and visual effects
- Rugged ultrasonic sensor system for outdoor use in all weather conditions
- Compact design for flexible mounting
- Safe outputs and safe control function

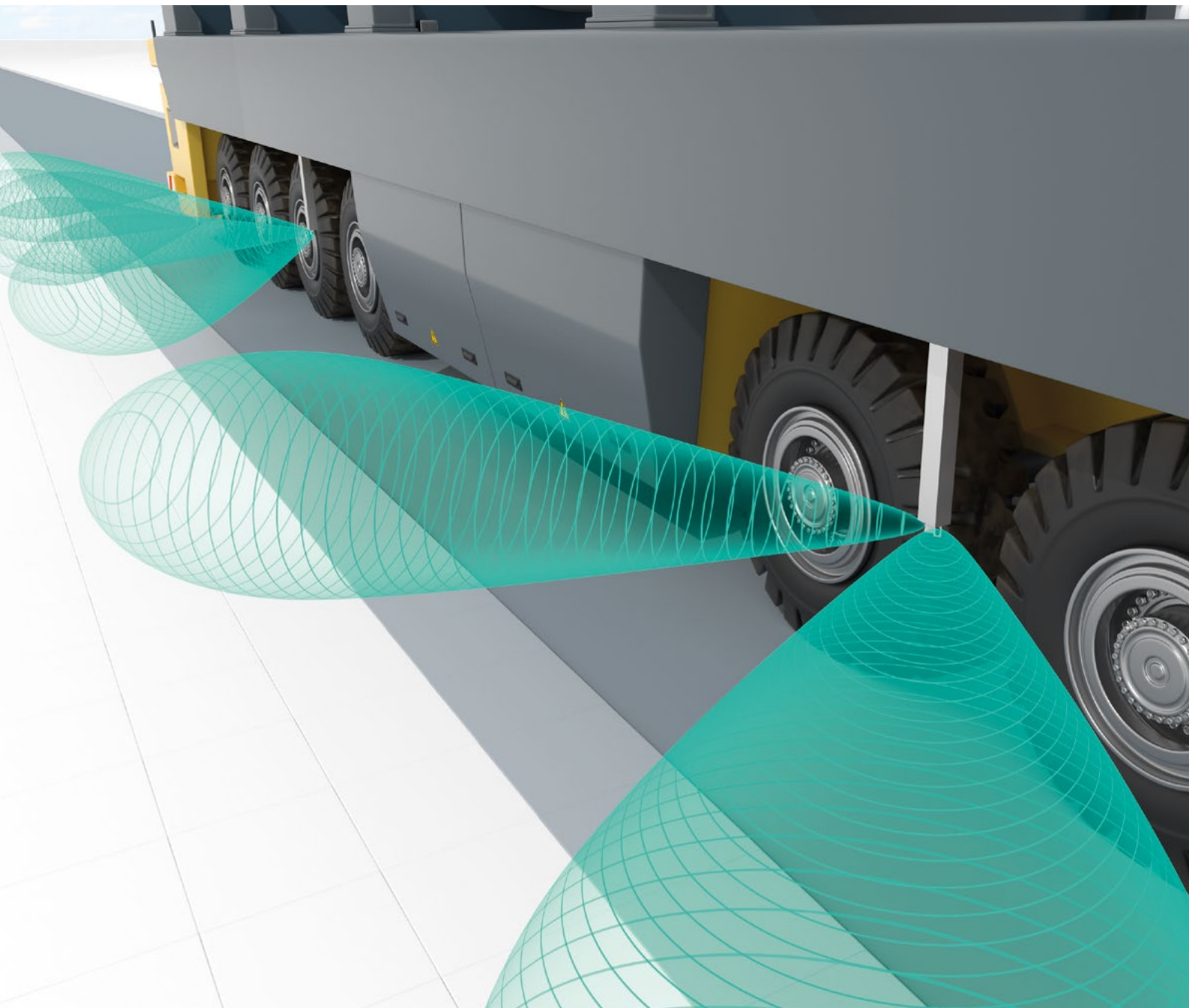


The Application

In the chemical industry, tanks as long as 20 meters can be moved around the site with correspondingly large automated guided vehicles (AGV). Additionally, the routes are used by other vehicles, and also by people, either on foot or riding bicycles. The AGV is controlled using an electronic connection to a tag track. However, long tanks require a correspondingly large radius when cornering and—especially at these points—lateral collision protection. The AGVs operate outdoors and are exposed to weather conditions.

The Goal

In autonomous transport, in addition to the direction of travel, the side areas of the vehicle must also be monitored in order to avoid any collision with people and objects when cornering. An automatic protective system on board the AGV must detect people and objects present in the area around the sides of the vehicle. The vehicle must be safely stopped before an impending collision. The sensor technology used must withstand weather conditions and function reliably in the event of dirt, humidity, mist, and other interference. The protection must comply with the ISO 13849-1 standard, category 3 PL d.



The Solution

Several USi-safety ultrasonic sensors are distributed on each side of the vehicle. The very compact sensor unit can be mounted in places where other types of sensor would not fit, for example in the wheel area. The sound beam functions as an acoustic "sensor," which enables noncontact control of the side area during transport. The devices reliably detect all obstacles in a defined safety area. If required, the safety outputs intervene in the vehicle control system. The USi-safety system meets the requirements for functional safety according to EN ISO 13849, category 3 PL d.

The Benefits

The actual sensors are separated from the control interface and can be flexibly positioned with minimum space requirements. The control interface has two safe OSSD outputs per channel for the protection field and a PNP switching output for a warning field. Both fields can be parameterized as required. The elliptical shape of the sound beam is optimized for monitoring a three-dimensional area. Ultrasonic sensors are insensitive to weather conditions, visual irritation, and dirt. They detect objects regardless of the material or surface. Mutual interference suppression prevents USi-safety systems on different AGVs from interfering with each other if they cross paths.

Technical Features

- Sensing range up to 2500 mm
- IP protection class: sensor unit IP69/
control interface IP65
- Typical response time: 99 ms
- Safety rating compliant with EN ISO 13849,
category 3 PL d
- Temperature range -30 °C ... +50 °C

