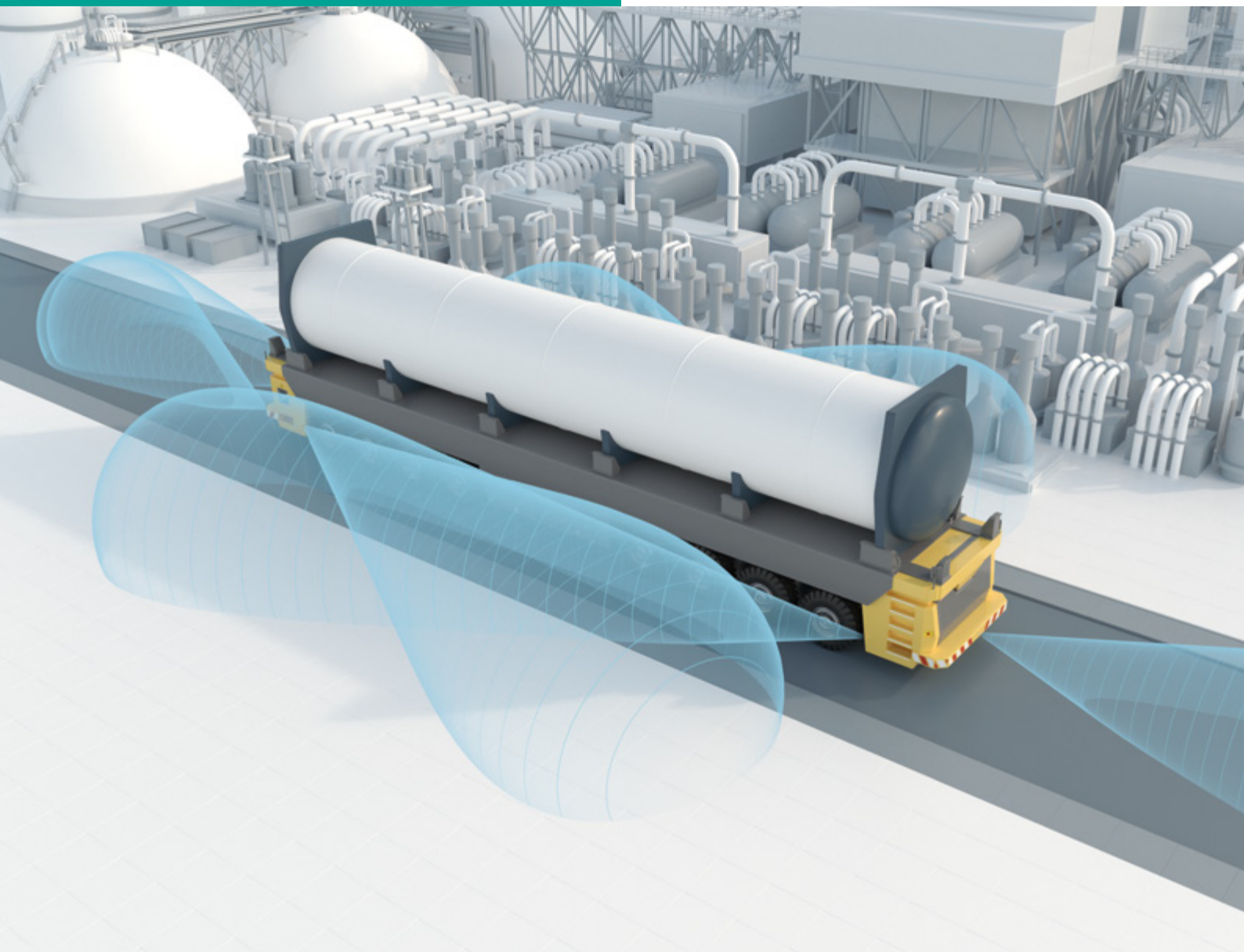
Defying Elements.

Interference-free distance and velocity measurement.
Even in rain, fog, wind, or dust.

Industrial Radar Sensors
with CAN Interface



Your automation, our passion.

PEPPERL+FUCHS

Industrial Radar Sensors

Unique—in Many Respects

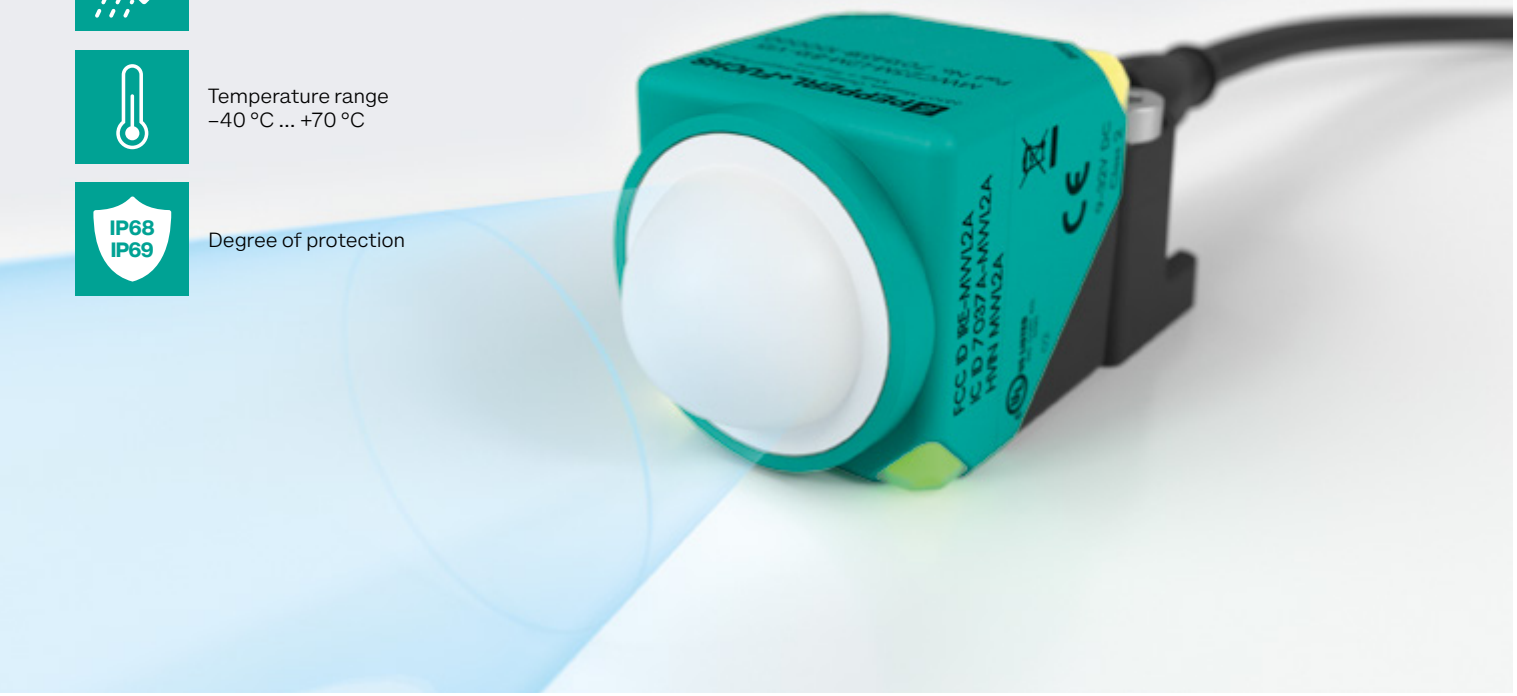
Independent of ambient light

Irrespective of rain/snow, wind, fog, dust

Temperature range –40 °C ... +70 °C

IP68 IP69

Degree of protection



Interference-free measurement even in rain, fog, wind, or dust. The industrial radar sensors defy the elements and are perfect for outdoor applications where fast distance and velocity measurement over long distances is required.

Long Ranges for High-Speed Applications

Advanced frequency-modulated continuous-wave (FMCW) radar technology enables distance and velocity measurement as well as the detection of the direction of motion in a single device. With sampling rates of up to 200 Hz, radar sensors from Pepperl+Fuchs detect motion speeds in the range of –80 ... +80 m/s at distances of over 25 meters.

Reliable under All Conditions

Even under the most adverse conditions, industrial radar sensors deliver reliable measurement results. This is ensured by the combination of the low-interference operating principle, robust CAN technology, a high degree of protection, and an extended temperature range. Outdoor applications and those under extreme environmental conditions can therefore be implemented without any problems.

Seamless Integration into Mobile Machines

Whether in automated guided vehicles or wheel loaders: optimized for use in mobile machines, the sensors can be quickly and easily integrated into vehicles. With E1-comparable EMC values, an integrated CAN interface, and vehicle-typical connectors, they are ideal for these special applications.

Sensor variant	MWC25M-L2M-* -0,3M-DT6P	MWC25M-L2M-* -0,3M-APS5P	MWC25M-L2M-* -2M	MWC25M-L2M-* -V15
Measuring range distance	0.5 ... 25 m			
Measuring range velocity	±0.1 ... 80 m/s			
Sampling rate	1 ... 200 Hz, parameterizable			
Repeat accuracy	1 mm			
Interface	CANopen, J1939			
Ambient temperature	–40 °C ... +70 °C			
Connection type	Fixed cable with plug (DEUTSCH)	Fixed cable with plug (AMP)	Cable	Connector plug (M12)

For more information, visit
pepperl-fuchs.com/pf-industrial-radar

CANopen SAE J1939

Technology

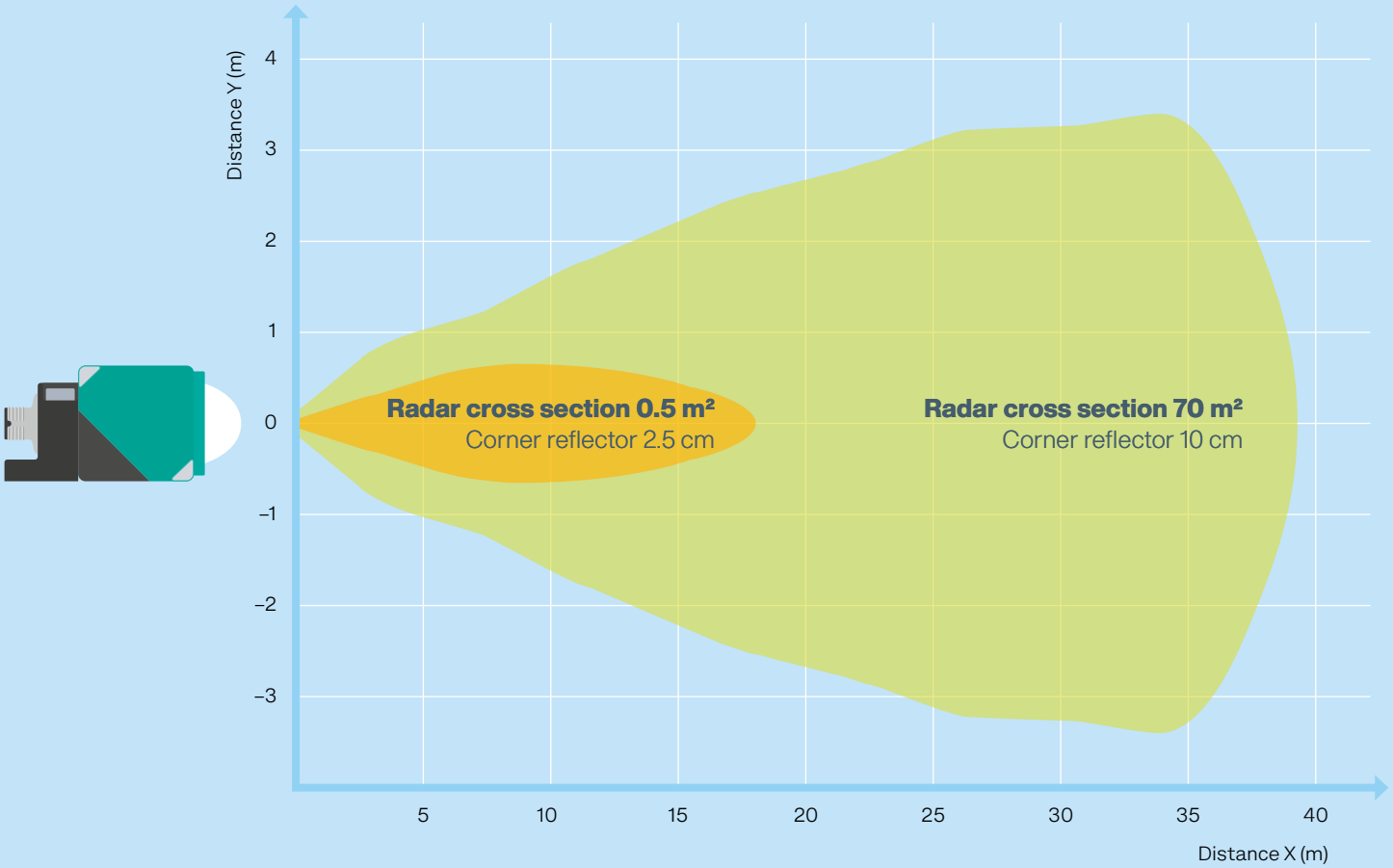
Universal Sensing Principle

Advanced FMCW radar technology for reliable, interference-free measurement—regardless of the environment and on virtually any material.

Measurement on Natural Objects

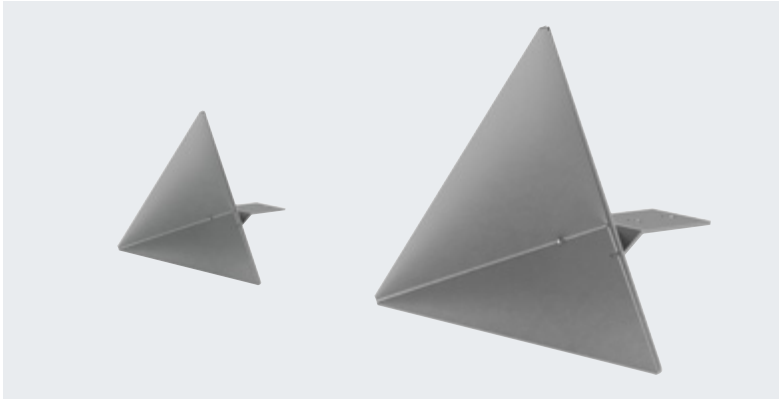
A key advantage of this physical sensing principle is that radar technology enables the detection of nearly all materials and is therefore not limited to specific objects. However, the possible detection range and the measuring range depend on the reflective properties of the target object, the so-called radar cross section (RCS). The larger the RCS, the better the electromagnetic waves are reflected back to the sensor.

Depending on the material, the radar waves are reflected back to the radar sensor to different degrees and are therefore detected to a greater or lesser extent. This degree of reflection is also influenced by the thickness, size, and shape of the target object. A flat metal surface offers perfect reflection and is therefore very suitable as a target object.



Corner Reflectors Stabilize the Measurement

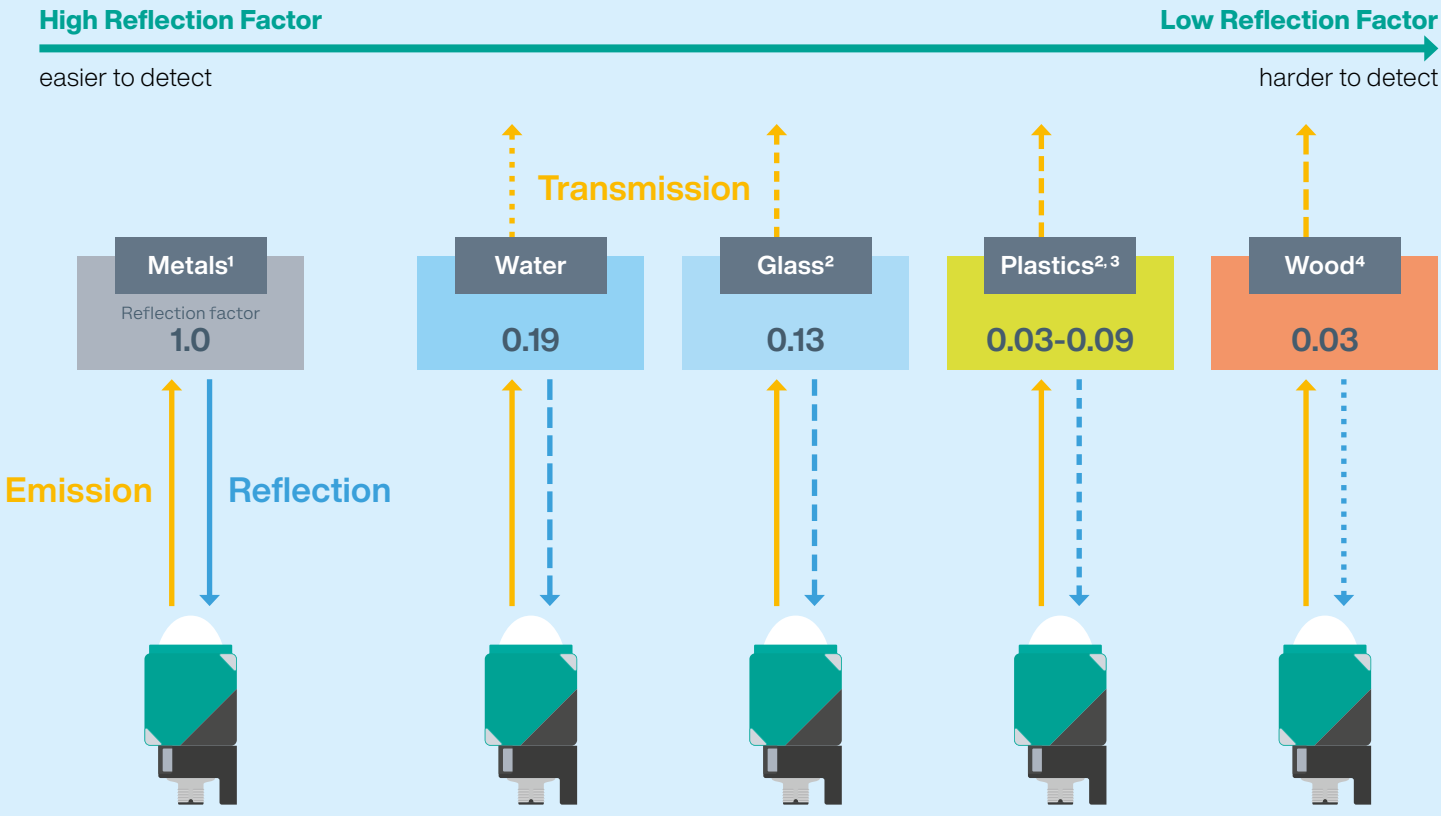
Multiple corner reflectors are available as accessories. These consist of three orthogonal metal plates and create a highly effective reflective surface. If a corner reflector made of metal is attached to a weakly reflective object or an object that is not ideally aligned with the radar sensor, its effective reflection area increases considerably. This makes it easy to stabilize measurements on the intended target object and therefore optimize the application.



Easily Ignore Interference Targets

At close to the speed of light, radar waves are almost impossible to stop. Up to a certain degree, they can penetrate most materials. If the target object offers a higher reflection amplitude than the other objects in the detection range, these can simply be suppressed. This means that the measurement is not affected even if there are interfering objects directly between the sensor and the target object.

For more information, visit
pepperl-fuchs.com/pf-radar-technology



¹Depending on direction, ²depending on thickness, ³depending on material, ⁴depending on contained humidity

Measurement Modes and Installation

Maximum Functionality Guaranteed

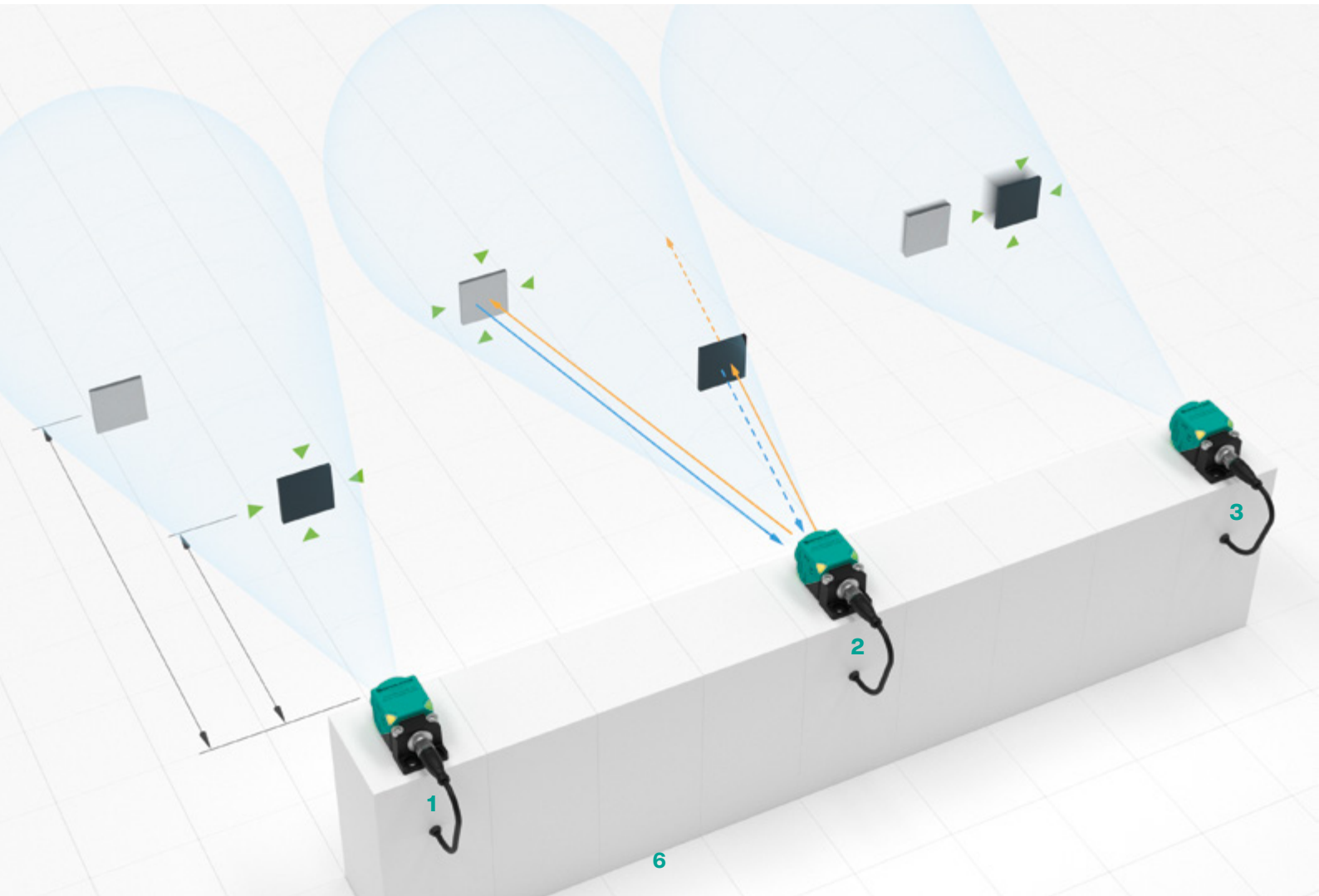
One sensor, three measurement modes, five measuring directions: With the proven L2 design and convenient switching of the measurement modes via PACTware or directly on the CAN bus, the industrial radar sensors can be quickly and easily adapted to your application.

Collision Avoidance with “Closest Distance” (1)

In “closest distance” mode, the object closest to the sensor is detected, regardless of its material. This mode is ideal for collision avoidance, i. e., with mobile construction machinery. Any objects that are within the extension range or action radius of the vehicle and boom are reliably detected.

Interference Target Suppression with “Best Reflection” (2)

When “best reflection” mode is activated, the sensor detects the object with the best reflective properties. This means that interfering objects can simply be ignored, even if they are directly between the sensor and the actual target object. For example, it is possible to “see through” the outer layer of a tank to detect the fill level inside.

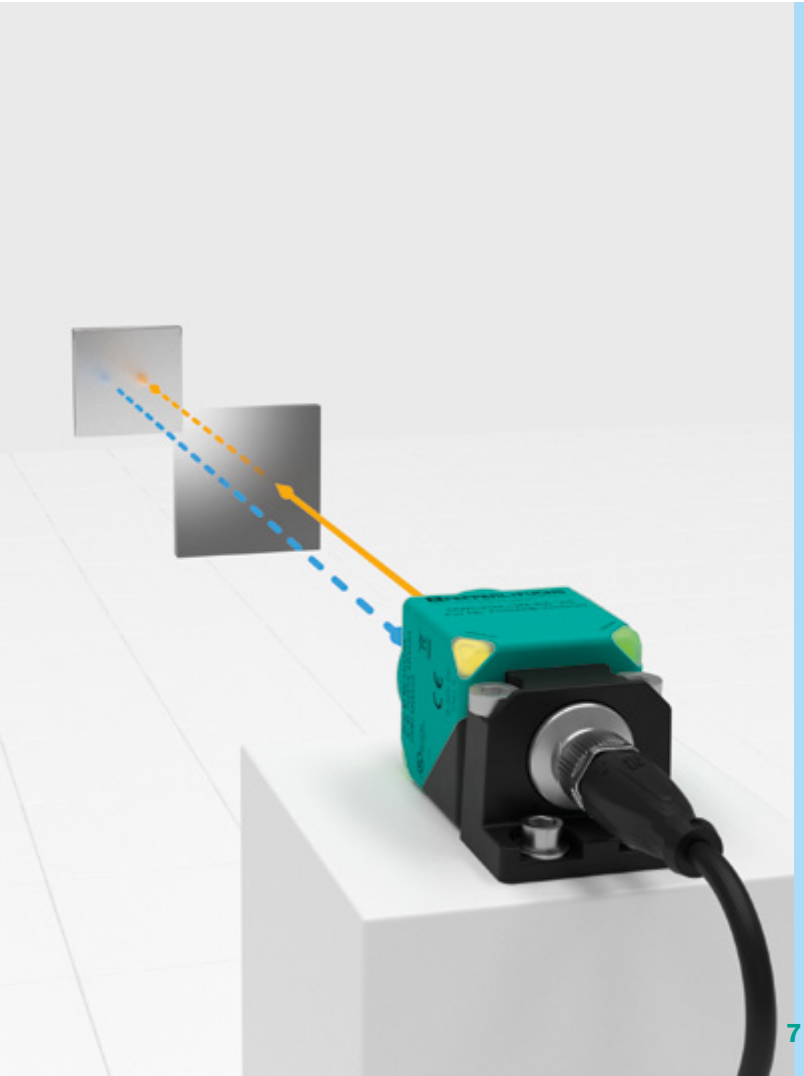


Track Monitoring with “Fastest Velocity” (3)

In “fastest velocity” mode, the radar sensor detects the object that is moving the fastest towards or away from the sensor. This measurement mode effectively supports monitoring an automated guided vehicles (AGVs) track, for example.

Proven Housing Design for Maximum Flexibility

Implemented in the proven and extracompact VariKont-L2 design, the radar sensors create additional freedom. A rotatable and swiveling sensor head enables the sensor head to be optimally aligned in the respective installation. A robust metal mounting with two screw connections serves as a receptacle for the sensor head and prevents problems caused by harsh ambient conditions and machine vibrations.



Applications

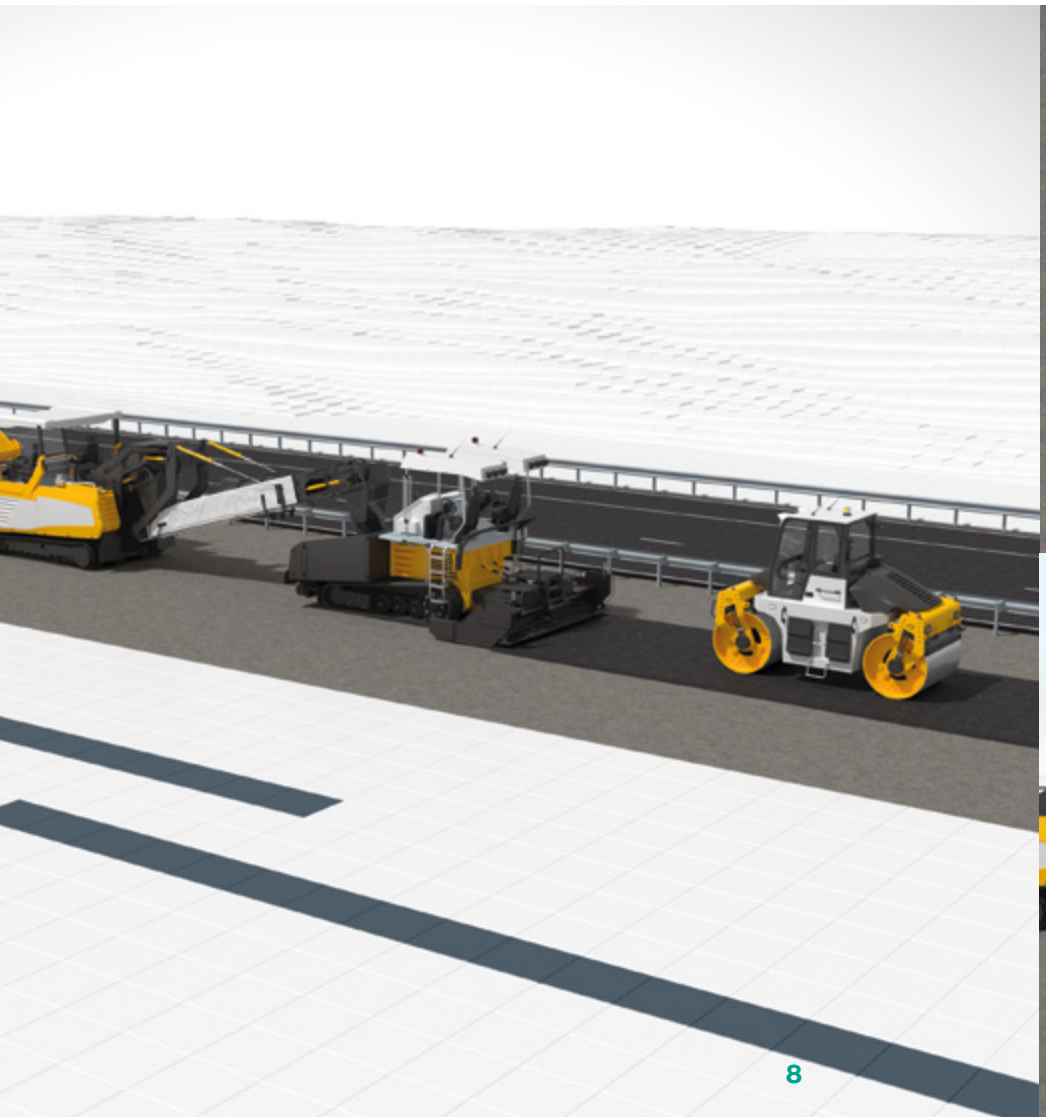
Optimized for Mobile Machines

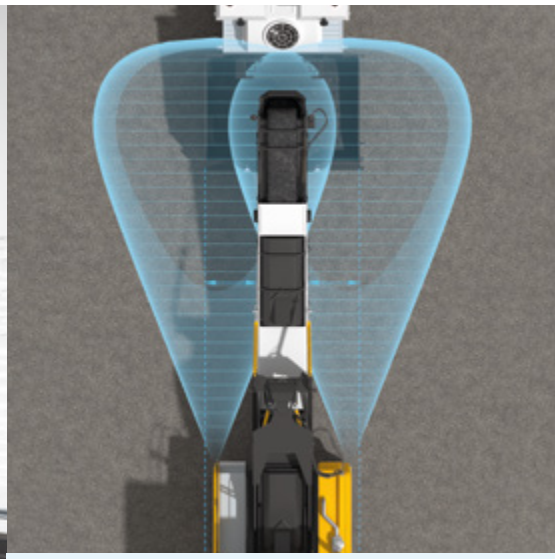
Maximum robustness, vehicle-specific connectors, and an integrated CAN interface—the industrial radar sensors open up new possibilities in the automation of construction machinery.

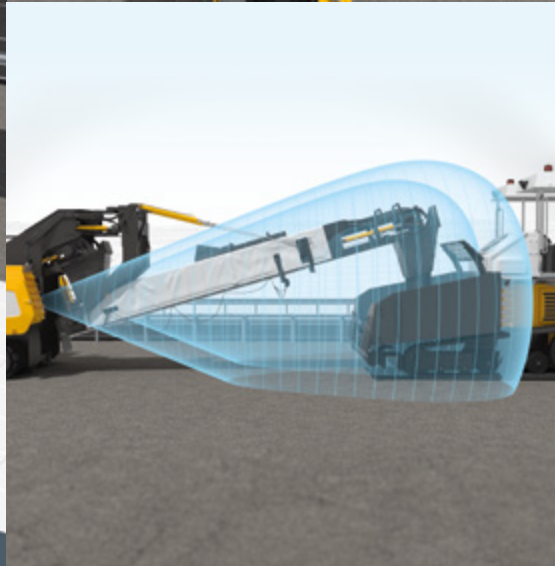
Process Optimization in Road Construction

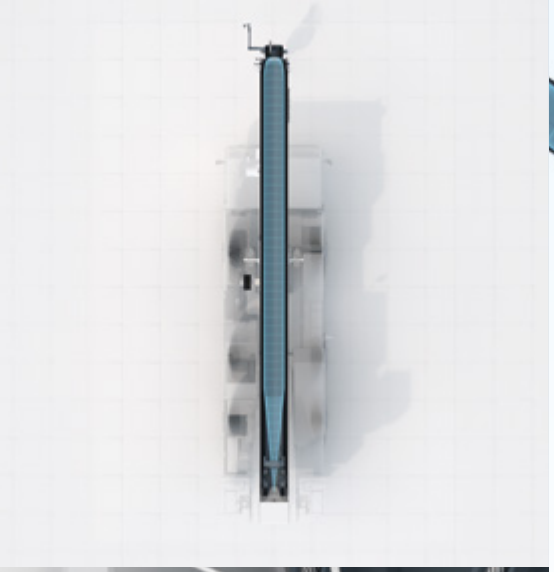
In road construction, a tandem of paver and feeder is often used for placing the pavement. The feeder continuously feeds the paver with material, such as asphalt, while the paver is on the move. It must be ensured that the distance and alignment to each other are correctly maintained at all times.

The use of two robust radar sensors increases precision. Mounted on the feeder, they measure on two corner reflectors attached to the paver. Even minimal distance or track deviations can therefore be registered and corrected immediately. Even harsh ambient conditions, as are common in road construction, have no influence on the measuring operation.









Distance Measurement in Mobile Crane Booms

Radar sensors from Pepperl+Fuchs effectively support the precise control of mobile crane booms. The radar lobe of a radar sensor mounted in the main boom is directed at a corner reflector positioned in the tip of the hydraulic telescopic element. If this telescopic element moves forward or backward when the boom is extended or retracted, the sensor registers this change in distance and transmits these values to the crane control system as the basis for further positioning operations.

Through vehicle-typical connectors such as AMP Superseal or DEUTSCH and the CANopen or J1939 interface, the sensors can be easily integrated into the on-board network. Even contaminants such as hydraulic oil residues inside the crane arm do not impair the performance of the radar sensors.

Applications

Tough in Agricultural Applications

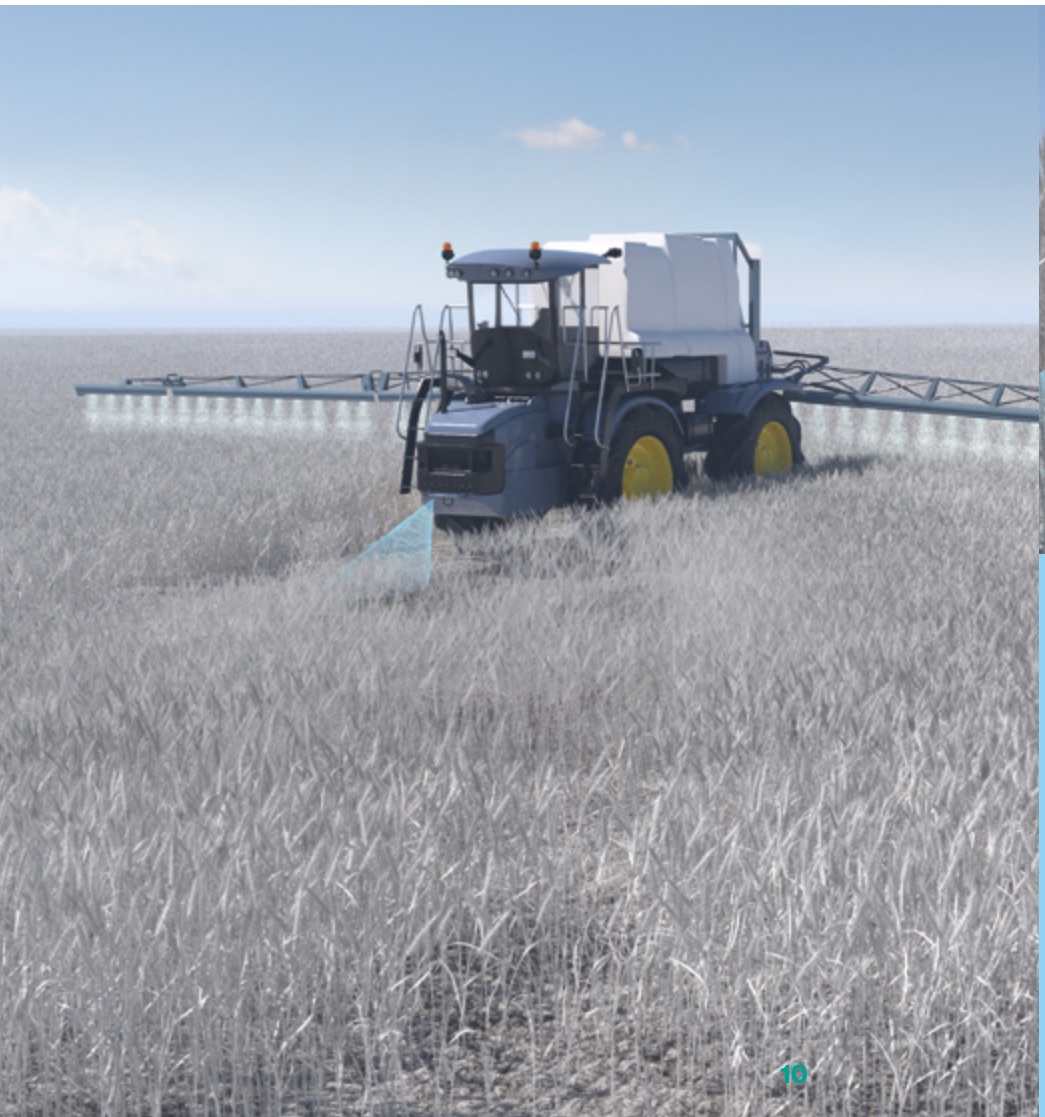
Speed measurement on seed drills, level measurement on field sprayers, or collision avoidance in large harvesting machines. Developed for outdoor use, the radar sensors can be used in a wide range of agricultural applications.

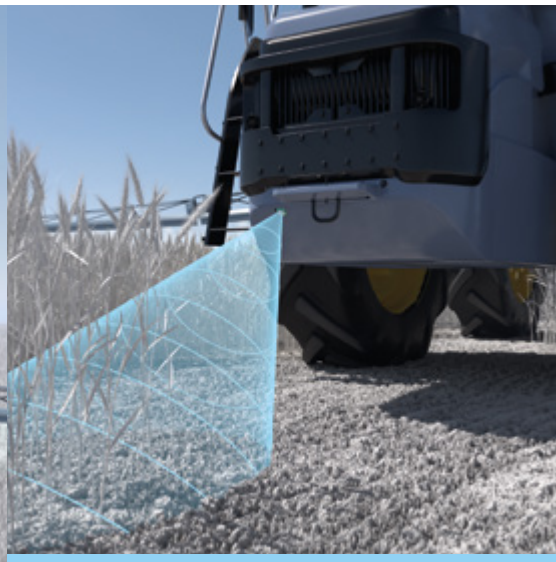
Precise Ground Speed for Optimized Crop Protection

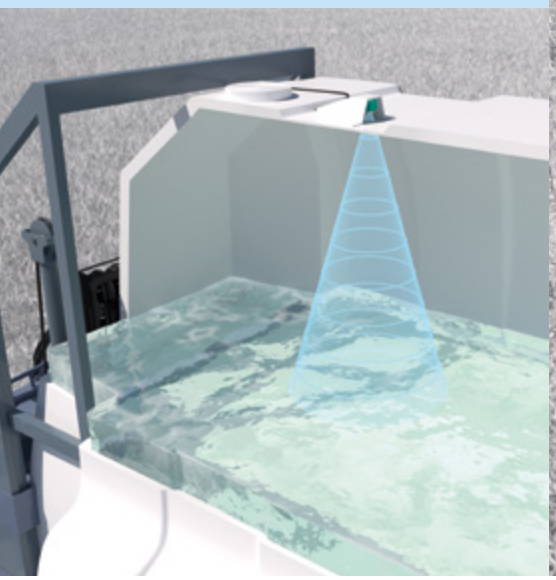
Integrated into agricultural machinery, industrial radar sensors precisely measure the actual movement of vehicles in relation to the ground (speed over ground). Rough surfaces are reliably detected and possible interfering objects such as plants are simply suppressed by the penetration of the radar wave.

This enables precise control of agricultural equipment such as field sprayers, harvesters, and seed drills. The efficiency of the process is increased, overlaps and gaps are minimized and the use of seeds, fertilizers, and pesticides is optimized.

Due to the CANopen or J1939 interface and vehicle-specific connectors, the sensors can be seamlessly integrated into existing vehicle bus networks.







Precise Level Measurement in Field Sprayers

Industrial radar sensors can also play a decisive role in level measurement on spraying tanks. Here, radar technology enables precise monitoring of the fill level through the plastic tank wall, depending on the thickness of the wall, without the need for physical intervention in the tank. This also makes retrofitting possible, which significantly increases flexibility.

In addition, this enables continuous and reliable monitoring of the fill level to ensure the correct amount of spray agent is used, maximizing the efficient use of resources and avoiding overdosing and wastage, while early warning of low levels optimizes operations.

Applications

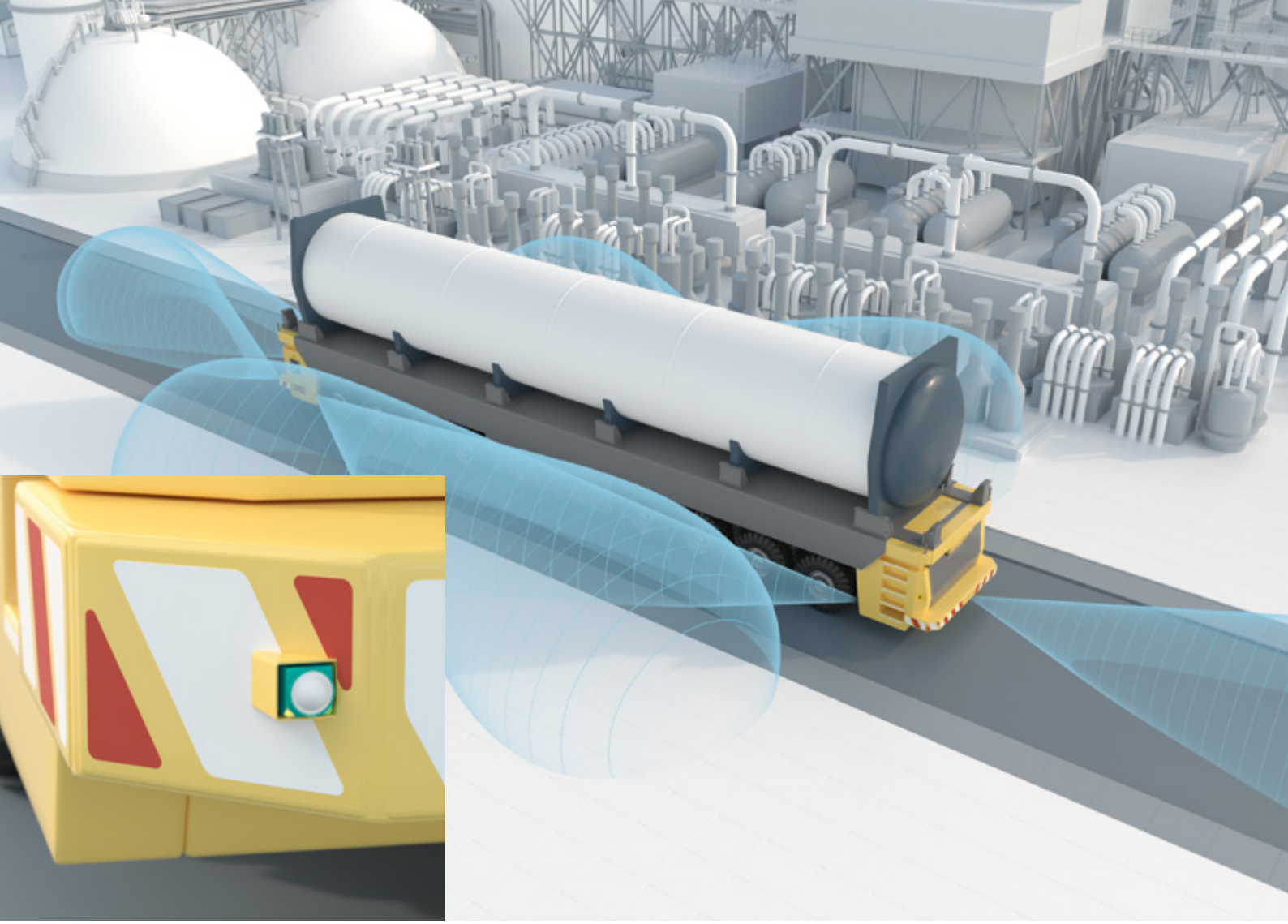
A New Chapter for Intralogistics

Reliable collision avoidance in outdoor applications, simple detection of natural objects, and exceptionally long ranges. Industrial radar sensors enable new applications in warehousing and material handling.

Maximum Speed Reduction on Forklifts

Speed is a decisive factor in material handling. This also applies to the use of forklifts on company premises. While a high speed is still an advantage outdoors, where surroundings are generally easy to see, certain restrictions are necessary in plants and warehouses for safety reasons.

To relieve personnel of this responsibility, a vertically aligned radar sensor that detects the hall ceiling or metallic cross bracing below it can immediately determine whether the forklift has reached an indoor area. If this is the case, the maximum possible speed is automatically limited to a tolerable level and only released again when the forklift leaves the hall. Due to the strong reflectivity of the metal crossbars, the installation of a corner reflector is not necessary here. Moreover, because of the high range of the sensors, this application can also be realized with correspondingly high hall ceilings.



Collision Avoidance for Heavy-Duty AGVs

The safe use of heavy-duty AGVs for liquid or gaseous media places special demands on sensor technology. The dimensions of the vehicles and the associated large monitoring area must be taken into account, as well as the weather influences in outdoor areas. Due to their long measuring range, radar sensors from Pepperl+Fuchs offer an efficient solution here that enables the reliable protection of driving movements. It is also possible to easily monitor the flanks of long vehicles due to the long range of the sensors.

Outdoor weather conditions do not affect the measurement accuracy, as the radar technology is less susceptible to interference. Mutual interference between radar sensors mounted in close proximity to each other is also ruled out by the frequency modulation used.

Quality Promise

Quality Standards That Exceed Even the Highest Demands

At Pepperl+Fuchs, quality stands for much more than simply complying with the prescribed standards. The company aims to offer the best products on the market, so it applies test criteria that far exceed the requirements. High-quality, customer-oriented sensor solutions are developed based on decades of experience, expert knowledge of the industry, and in-depth technical know-how.

Expertise across All Industries

The requirements for sensor solutions in factory automation are as diverse as the industries that use them. In-depth knowledge of the wealth of application- and approval-specific requirements is essential to support customers across the globe with their individual processes—from vehicle approval to complex specifications for offshore or hazardous-location applications. Decades of experience in all industries makes Pepperl+Fuchs an expert partner for customers all over the world.

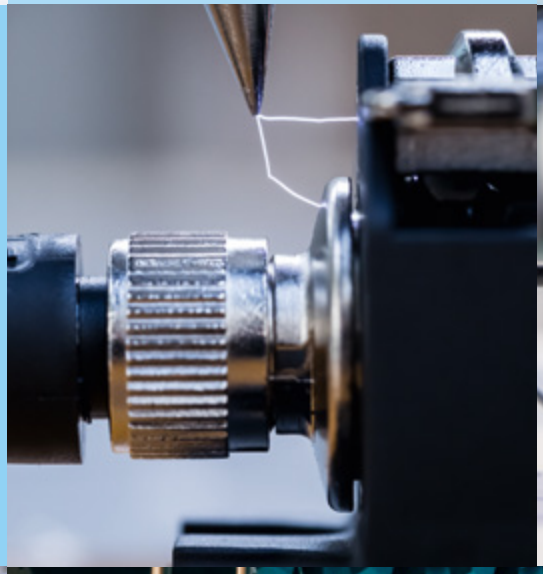
Strict Quality and Performance Standards

Ensuring the highest quality standards across the entire portfolio is both a fundamental requirement and a driving force for Pepperl+Fuchs. The company relies on rigorous quality management and an in-house audit department with criteria far beyond the normative requirements. A range of tests are carried out, including environmental tests that verify optimal functionality under extreme loads. In the mobile equipment range, for instance, testing includes:

- Humidity tests (according to DIN EN 60068-2-38)
- Repeated temperature cycles
- Chemical resistance testing through exposure to vehicle and hydraulic oil, brake fluid, battery acid, and road salt

These strict criteria ensure that Pepperl+Fuchs devices have a long service life, are incredibly reliable, and exceed the most stringent global performance standards. They are available with all major international certifications and approvals, such as:

- E1 approval for mobile equipment
- SIL and PL certification
- DNV GL for marine approval
- ATEX Directive 2014/34/EU, IECEx, UL Hazardous Locations, Ex NEPSI for hazardous areas
- Special approvals for specific countries and applications (e. g., ANZ-Ex/Mining Queensland)



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