SICK AG - MULTISCAN100-S

first safety-certified 3D LiDAR sensor for safe collision avoidance in automated container terminal operations

the challenge

Automation in container terminals has always involved balancing safety, productivity, and system availability. While automated operations promise efficiency and reduced human intervention, ensuring safe collision avoidance introduces significant challenges.

Container Handling Equipment (CHE), such as Rail Mounted Gantry Cranes (RMGs), illustrates these issues clearly. Automated RMGs typically operate in restricted zones with physical access barriers or rely on collision avoidance systems based on safety sensors. These sensors are designed to detect obstacles and prevent accidents, but they often face limitations: environmental conditions can trigger false alarms, and restricted detection ranges force slower operating speeds. This leads to reduced productivity and availability, as equipment may stop unnecessarily to maintain safety.

Safe collision avoidance is therefore not just about installing sensors—it requires highly reliable detection technologies, robust algorithms to minimize false positives, and seamless integration with terminal control systems. Achieving this balance is critical: overly conservative safety measures can compromise throughput, while insufficient safeguards risk accidents.

In short, safe collision avoidance is the cornerstone of automated container handling, demanding continuous innovation in sensor accuracy, system design, and operational strategies to harmonize safety with performance.

the innovation

multiScan100-S: Redefining Safe Collision Avoidance

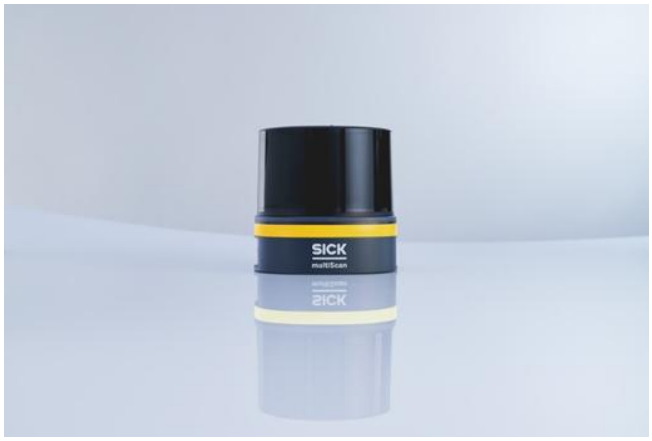
The challenge of balancing safety, productivity, and availability in automated container terminals has long been driven by sensor limitations. The multiScan100-S addresses this head-on as the first safety-certified 3D LiDAR sensor with focus on industrial applications.

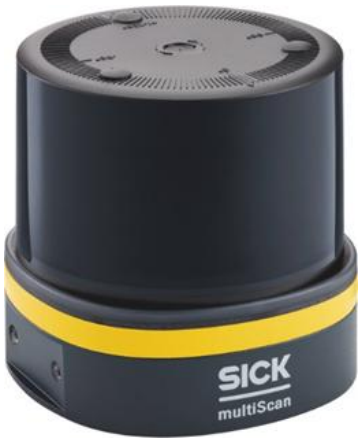
Unlike conventional systems, multiScan100-S introduces Safe Multi-Echo Technology, enabling it to filter out environmental disturbances such as rain, fog, or dust. This means the sensor can “see through” these conditions and still detect the actual object behind them—maintaining its full safety-rated detection range. This capability eliminates false positives that typically slow down operations, ensuring both safety and maximum process speed.

Its innovative certification concept sets a new benchmark: compliance with ISO 13849 (Performance Level b) and IEC TS 62998 (Performance Class C) for outdoor detection. Furthermore, the sensor is “Performance Level c ready”, as proven detection reliability for higher safety levels is already certified. When integrated with standard safety controllers and

well-known diagnostic methods—such as cyclic field set switching—systems can easily achieve enhanced safety performance.

With up to 20 meters of safety-rated range, multiScan100-S enables high-speed operations for mobile machines in container handling environments. Combined with exceptional availability and flexibility for application-specific designs, it delivers what the industry has been missing: safe collision avoidance without compromising productivity.





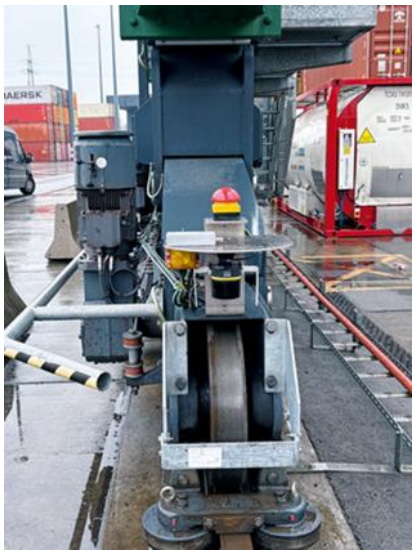
how it was implemented

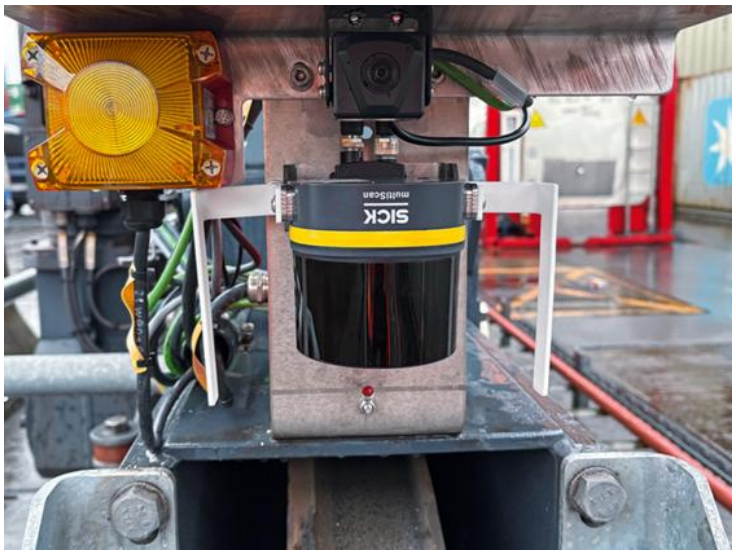
multiScan100-S: Customizable Safety Functions for Advanced Collision Avoidance

The multiScan100-S sets a new standard in safe automation by combining two certified safety functions: **Safe Measurement Data** and **Safe 3D Object Detection**.

Safe Measurement Data goes beyond traditional sensing. Instead of limiting data to internal decision-making, the sensor provides both raw and pre-processed measurement data via a standard **UDP Ethernet interface**. This enables any processing unit to access safety-rated data, giving system integrators advanced capabilities for creating customized, high-performance safety solutions and enhanced situational awareness. While ensuring transmission integrity through the well-known black channel principle, Safe Measurement Data **extends far beyond conventional approaches** - enabling safety-related localization and mapping, as well as point cloud aggregation for developing classification or tracking algorithms.

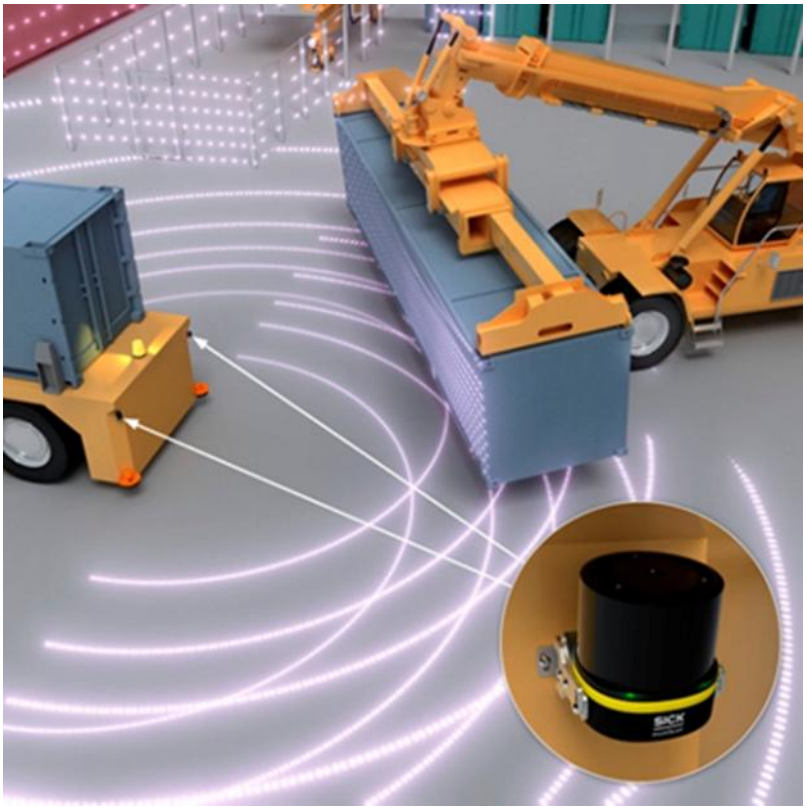
Complementing this, Safe 3D Object Detection is an on-device decision-making function. It detects objects within defined zones and communicates status through a switching signal to the control system. This approach combines the innovative advantages of multiScan100-S—such as cutting-edge LiDAR technology and its unique certification concept—with the proven principle of protective fields. As a result, it ensures compatibility with virtually all existing Safety PLCs commonly used in RMGs and other Container Handling Equipment.





For demanding applications, both safety functions can operate simultaneously, delivering maximum flexibility and reliability. Together, they enable integrators to design systems that meet stringent safety requirements without sacrificing productivity.

With this dual-function architecture, multiScan100-S bridges the gap between **next-generation sensing technology** and **industry-proven safety concepts**, making it the ideal solution for safe collision avoidance in automated container terminals.



result

With its powerful measurement technology and safety certification tailored to real-world requirements, the multiScan100-S successfully addresses the long-standing challenges in automated container terminals. Issues such as false positives caused by environmental factors, limited detection ranges, and reduced process speeds are now significantly mitigated.

The sensor's **Safe Multi-Echo Technology** ensures reliable detection even in harsh outdoor conditions like rain, fog, or dust, maintaining full safety-rated range without unnecessary stops. This directly improves availability and productivity while preserving uncompromised safety.

Beyond solving these core challenges, multiScan100-S introduces **true 3D detection capability**, delivering advantages that conventional solutions cannot match. It can identify **overhanging objects**, such as containers carried by reach stackers, and perform **full-body detection of persons**, enabling higher safety ranges and supporting faster machine speeds. These features are critical for complex environments where traditional 2D systems fall short.

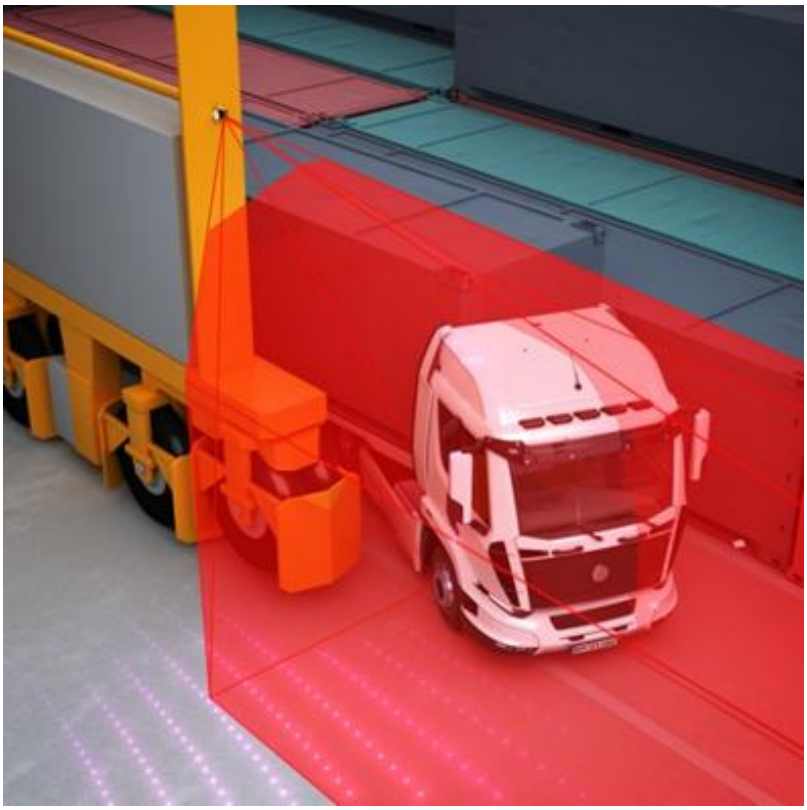
Combined with its dual safety functions - **Safe Measurement Data** for advanced integration and **Safe 3D Object Detection** for on-device decision-making—the sensor offers unmatched flexibility. It integrates seamlessly with existing safety PLCs while providing future-ready options for demanding applications.

The result is a solution that not only meets but exceeds industry expectations: **maximum process efficiency, robust safety, and adaptability for next-generation container handling systems**.

conclusion

Within the last 12 months Künz GmbH has run a successful test installation with multiscan100-s for collision prevention on a rail mounted gantry crane. iSAM AG has also completed a successful 9 month intensive testing programme of the multiscan100-s.

The safety certification of multiScan100-S includes explicitly validated and broadly defined usage limits for all relevant environmental factors. This means the sensor can operate with its full safety-rated detection range under certified conditions—without requiring any additional validation by system integrators or end users.



LINK: https://sickconnect.com/

SICK
Sensor Intelligence

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