



MARITIME

INTELLIGENT SOLUTIONS FOR THE SHIPPING INDUSTRY

SICK
Sensor Intelligence.

CHALLENGES IN THE SHIPPING INDUSTRY

Even today, ever-expanding environmental regulations require monitoring of SO_x and NO_x passing through exhaust gas scrubbers and SCR plants as well as extensive CO_2 reporting. Regulations for measuring soot ("black carbon") will follow soon. SICK provides measurement solutions beyond emission monitoring – e.g. for the efficient use of fuel, for reducing time of loading and unloading cargo with bulk carriers or for improving baggage and the whole logistic chain on cruise ships which are growing in size. These are investments which increase the competitive edge and quickly pay off. With its wide range of intelligent sensors and solutions, SICK is the ideal partner for the shipping industry: With process and emission monitoring, object and hazard detection to loading and unloading ships.



More information on sensor solutions → www.sick.com/maritime



Process and emission monitoring

SICK analyzers and analysis solutions monitor and check emission limit values and the emissions of pollutants into the environment. Liquefied natural gas (LNG) is gaining importance for driving ship engines. That is why vibration-resistant gas flow meters are becoming more important for optimal engines control and fiscal accounting of gas consumption.



Object detection system at and on ships

SICK sensors secure locked access areas on board or visualize the length of stay, movement direction and movement speed or persons and groups and analyze movement profiles of the public in real time. With SICK 2D LiDAR sensors, reliable man-overboard systems are implemented and help to save lives.



Hazard detection

When a ship leaves the port, it is on its own. That's why it's important to detect hazards in a timely manner. Sensors from SICK detect vehicles at risk for a fire before the journey begins to pick them out in time. Hazardous goods signs on trucks are automatically read and classified. Anti-collision systems prevent crashes with fixed and moving objects in the portal crane area.



Loading and unloading

SICK sensors measure the volume of bulk goods on conveyor belts as well as the levels in containers and tanks. There is a suitable solution even for the measurement of the oxygen content of inert gases in bunkers and loading ships with fuels or chemicals. In baggage logistics, SICK sensors optimize self check-in of passengers in the cruise terminal.



Service and maintenance

SICK is a one-stop shop for a complete range of services – expert advice, skilled planning services, detailed project planning and engineering, installation, and commissioning. And it goes without saying that SICK is at your side for quick and uncomplicated maintenance and repair.

PROCESS AND EMISSION MONITORING



Monitoring of gas emissions on ships

The MARSIC ship emissions measuring device measures emissions on ships in accordance with MARPOL Annex VI, NTC 2008 and MEPC.259(68). MARSIC is approved for this application by DNV GL, ABS, CCS, BV, KR and NK, and it measures SO_x and CO_2 upstream and downstream of scrubbers as well as NO_x upstream and downstream of SCR systems. It can be used for the measuring of CH_4 after gas fired dual fuel engines. MARSIC features minimum maintenance effort, has hardly any wear parts or moving parts and can be calibrated using internal calibration filters. One MARSIC covers multiple measuring points.

- MARSIC ship emissions measuring device



→ www.sick.com/MARSIC



Monitoring of dust emissions on ships

The International Maritime Organization (IMO) will introduce limit values for dust and soot emissions ("black carbon") on ships. Soot emission monitoring can be used for controlling and optimizing the engine, particularly when it is switched between various fuels. That saves fuel, and potential requirements for maintenance are detected early on. Here, SICK offers the FWE200DH for an application downstream of scrubbers (wet exhaust gas), while the DUSTHUNTER SB100 is used for measurements in hot exhaust gas. Both systems are US-EPA-compliant.

- DUSTHUNTER SB100 and FWE200DH scattered light dust measuring devices



→ www.sick.com/DUSTHUNTER_SB100



→ www.sick.com/FWE200DH



Measuring and reporting of mass emissions on ships

The maritime emissions legislation in accordance with IMO MARPOL Annex VI and EU 2015/757 (MRV directive) requires that emissions be determined as a mass flow, e.g. NO_x in g/kWh and CO_2 in kg/h. For this purpose, the exhaust-gas mass flow has to be known in addition to the measured emissions. This can be measured easily and directly using the FLOWSIC100. Thus the measuring device records the exhaust gas volume flow accurately and without faults—regardless of the fuel and operation of the engines, boiler and scrubbers on-board.

- FLOWSIC100 volume flow measuring device



→ www.sick.com/FLOWSIC100



Measurement of natural gas consumption

Recording the volume of gas before it enters a ship's engine provides the necessary information on gas consumption. The FLOWSIC600-XT ultrasonic gas flow measuring device, which combines up to two high-precision gas flow meters each with four measurement paths in the one housing, offers both of these benefits and can also be used for fiscal billing purposes. The FLOWSIC600-XT recognizes faults before they have a chance to affect the results of the measurement. The measuring device has a compact, rugged housing and works without issues, requiring no maintenance.

- FLOWSIC600-XT gas flow meter



→ www.sick.com/FLOWSIC600-XT

INTELLIGENT DETECTION OF PEOPLE BESIDE AND ON SHIPS



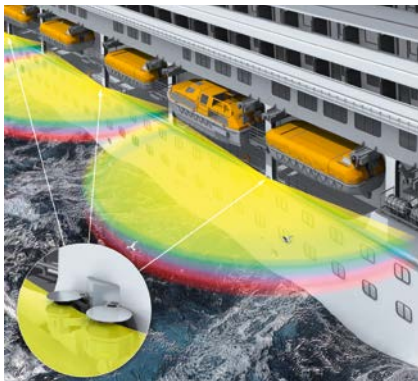
Securing access areas on ships

Monitoring various deck areas and other ship areas provides security onboard. LMS5xx 2D LiDAR sensors can be individually adjusted to the profile of a ship's deck and its railing, where they define access to certain areas as permitted or prohibited. That enables detection of people around the clock. Birds and other objects are blanked. That prevents faulty alarms. The LMS5xx laser scanner is extremely rugged and functions with high accuracy.

- LMS5xx 2D LiDAR sensor



→ www.sick.com/LMS5xx



"Man overboard" detection

Video cameras are frequently used for monitoring the outdoor areas of ships. They continuously record events, but do not trigger any alarms. When MRS6000 3D LiDAR sensors are installed, a defined area around the ship is scanned. As soon as a defined object falls through the multilayer scan area, the crew is immediately notified by an alarm. That enables the crew to view the video recordings promptly and take action, if necessary. The intelligent MRS6000 sensors blank, for example, spray, waves and birds, thereby preventing faulty alarms.

- MRS6000 3D LiDAR sensor



→ www.sick.com/MRS6000



Detection of people flow onboard

There are various applications for recording and visualizing particular or all movement profiles of the public in real time. The LMS1xx 2D LiDAR sensor combined with the software visualizes and analyzes the number, direction and speed of people. This enables, for example, overfilled escape routes to be detected early on so that passengers can be rerouted. People who act suspiciously, for example, by moving in the opposite direction of the other passengers during disembarking, can be reliably identified and an alarm can be generated.

- LMS1xx 2D LiDAR sensor



→ www.sick.com/LMS1xx



Non-contact access control

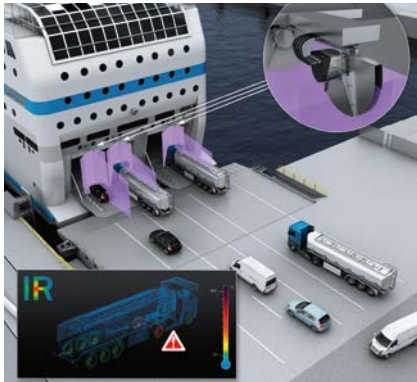
The RAM security system is ideal for flexibly managing access rights. An RFID read/write device integrated into the system reads the transponders of authorized individuals and grants them access as appropriate. Thanks to the system's large scanning range, persons are detected in good time and doors open without contact being made. RAM can be used, for example, on the bulkheads of machine rooms or entrance to the bridge.

- RAM security system



→ www.sick.com/RAM

EARLY DETECTION OF HAZARDS



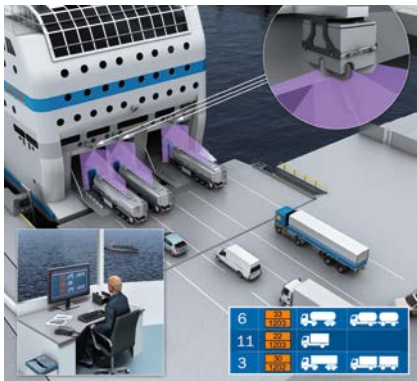
Detection of vehicles posing a fire risk before ferrying

Vehicles posing a fire risk must be detected and unloaded before they leave with a ferry. For this purpose, the VHD Vehicle Hot Spot Detector combines data from the LMS511 2D LiDAR sensor and temperature data from infrared cameras. This enables individual vehicle components, such as wheels and exhaust systems, to be differentiated and checked against specific temperature limits without impeding the flow of traffic. For example, if the brakes are too hot, an alarm is triggered and the vehicle is not allowed to drive onto the ferry.

- VHD profiling system



→ www.sick.com/VHD



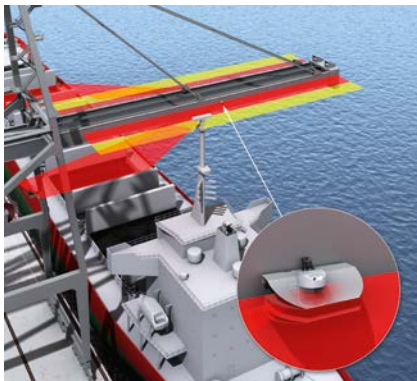
Detection of vehicles transporting hazardous materials

For ferry operators to provide safety, they have to know the type and number of vehicles transporting hazardous materials on their ferries. An infrared camera detects the hazardous materials placard based on its characteristic shape and reads its content. In addition, the integrated TIC102 profiling system records the 3D profile for analysis of possible positions of the hazardous materials placard. This significantly increases the detection and reading speed and prevents misinterpretations.

- TIC102 profiling system



→ www.sick.com/TIC102



Collision avoidance on booms and between cranes

On gantry cranes, the AOS502 STS object detection system safely and reliably detects ship superstructures, such as radar systems. By analyzing the various warning and stopping fields of the 2D LiDAR sensors, the AOS502 STS provides for collision avoidance on the boom as well as between cranes. The system's safety controller and integrated control software monitor the system functions and ensure reliable operation.

- AOS Prime object detection system



→ www.sick.com/AOS_Prime



Early detection of imbalances and wear

Numerous fast and rotating objects, such as propeller and generator shafts, are used on ships. Therefore, all units are often subjected to alternating dynamic forces. This leads to wear and, consequently, to imbalances and disruptive vibrations. The OD5000 displacement measurement sensor measures contact-free vibrations, elongation and torsion in the μm range, thereby detecting imbalances early on. The sensor has a high measuring frequency, so it has excellent measuring performance even for objects that are fast and rotating.

- OD5000 displacement measurement sensor



→ www.sick.com/OD5000

LOADING AND UNLOADING



Detection of bulk materials for safe loading of ships

The Bulkscan® LMS511 flow sensor can be mounted on firmly installed and movable cranes and simplifies the work in materials stores in the outdoor area. The sensor reliably monitors the loading of bulk materials and the uniform loading of conveyor belts. In addition, it detects when material on the conveyor belts is too large. The flow rate of the bulk material is determined by factoring in the speed of conveyance. This allows for loading a ship safely and uniformly

- Bulkscan® LMS511 flow sensor



→ www.sick.com/Bulkscan_LMS511



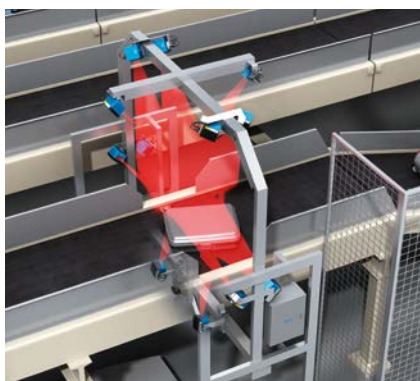
Automated baggage label reading during self-check-in

The automated bag drop in the cruise terminal enables self-check-in for passengers. CLV65x bar code scanners are integrated into an automated bag drop system and reliably identify bar code labels on bags — regardless of where a label is attached to a bag. The CLV65x with auto focus and a high depth of field combines high reading performance with a reading algorithm. The bar code scanner reads and decodes even damaged, poorly printed or half-covered bar codes.

- CLV65x bar code scanner



→ www.sick.com/CLV65x



Automated baggage label reading

Automated baggage handling is becoming ever more important even for cruises. Baggage labels ensure the clear identification of baggage. Important information is coded onto the labels in the form of a bar code, RFID tag or plain text. The ALIS track and trace system reliably reads baggage labels — regardless of where a label is attached to a bag. SICK offers customers a complete system with ALIS, including electronic components, encoders, photoelectric sensors and diagnostic software. SICK also stands by you as an experienced partner during installation, commissioning and maintenance of the system.

- ALIS track and trace system



→ www.sick.com/ALIS



Inerting of tanks and cargo holds on ships

When ships are being refueled or loaded with fuel or chemicals, it is possible for hazardous gases to escape. To minimize risks to the environment and the danger of explosion, TRANSIC100LP measures the content of oxygen. Two redundant TRANSIC100LP units are positioned in front of the blower, which takes in and diverts the air displaced from the tank or cargo hold. If the level of oxygen in the piping is too high, it is displaced by adding inert gas, which prevents the creation of an explosive atmosphere.

- TRANSIC100LP gas transmitter



→ www.sick.com/TRANSIC100LP

EVERYTHING FROM A STAND-ALONE SENSOR TO COMPLETE SYSTEM SOLUTIONS

An experienced team of project engineers and system designers from the fields of electrical and mechanical engineering plan and develop customized solutions for the requirements of the customer – including PLC connection,

data processing and evaluation. All solutions are designed and implemented in accordance with recognized international standards. SICK supervises every project from order to commissioning and involves local service specialists for cus-

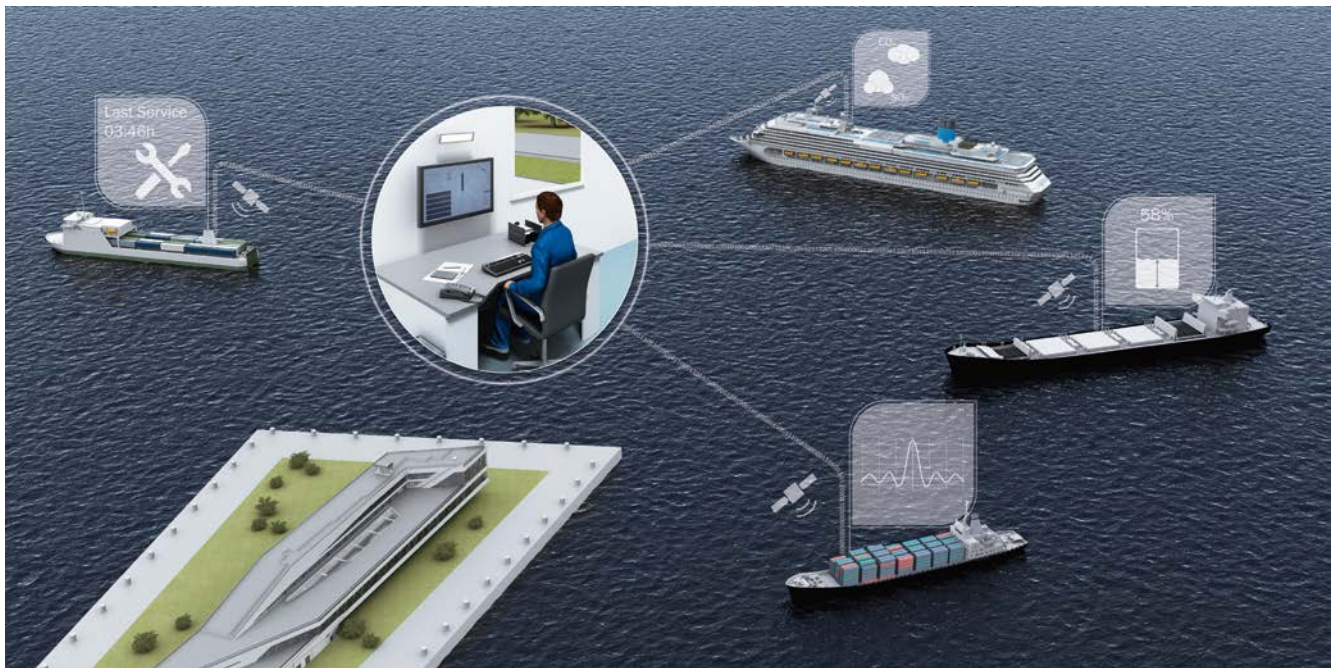
tomers consultation. SICK's expertise is not limited to the purchase of the individual product. SICK also offers support with service and maintenance 24 hours a day – worldwide.



With 70 years of experience, SICK stands for innovative products and solutions which set standards in the field of sensor technology all over the globe. SICK's product range includes over

40,000 sensors for a wide array of applications and therefore offers the right product for any task: Monitoring and controlling, measuring, detecting, protecting, identifying position and, finally,

connecting and integrating. Intelligent sensor solutions and safety controllers from SICK offer a variety of integration technologies, which provide easy access to the data supplied by our sensors.



The TDC (Telematic Data Collector) gateway system collects and saves data from sensors using various interfaces. The mobile communication feature – WLAN or Ethernet – included with the system transmits the data to a custom-

er server or the SICK cloud. Analyses can also be performed in the TDC system based on the incoming data to provide real-time outputs (reactions) via I/Os or SMS messages (alarms). The incoming and outgoing data can be used

for downstream process optimization and to improve transparency, thereby increasing productivity. SICK offers optional customer-specific cloud solutions (SaaS) for this purpose.

SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for factory, logistics, and process automation. With more than 8,800 employees and over 50 subsidiaries and representative offices worldwide, SICK is always close to its customers. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

SICK has extensive experience in various industries and understands their processes and requirements. With intelligent sensors, SICK delivers exactly what the customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes SICK a reliable supplier and development partner.

Comprehensive services round out the offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

That is “Sensor Intelligence”.

Worldwide presence:

Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hong Kong, Hungary, India, Israel, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Romania, Russia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Arab Emirates, USA, Vietnam.

Please find detailed addresses and additional representatives and agencies in all major industrial nations at

→ www.sick.com