



MARITIME

INTELLIGENT SOLUTIONS FOR YACHTS

SICK
Sensor Intelligence.



CHALLENGES IN THE YACHT INDUSTRY

Yachts are often unique in both their design and in their custom equipment, selected by the owner. On top of this, the regulatory construction requirements for individual or mass-produced yachts are constantly increasing. This includes complying with energy efficiency requirements as well as taking into account safety technology-related issues. Technical details are usually elegantly integrated in the ship's hull. Monitoring access authorization on yachts takes up a significant portion of the safety measures. Docking systems for helicopters are just as vital as the secure monitoring of transport routes from ship to ship or proximity warning systems. However, all of this is only possible with the corresponding assistance systems.



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



Efficiency

Automation plays an increasingly important role on modern sailing boats. Setting all of the sails and monitoring the sail tension is now automated. Integrated sensors in winches and hydraulic cylinders give direct feedback about the sail tension and alignment.



Safety and protection

When yachts leave port, the captain or skipper is then responsible for safety. Especially considering the increasing number of recreational boaters, support in protecting against hazards is required here. Distance and height monitoring with SICK sensors helps to avoid collisions or damage to the boat, such as during lock maneuvers or passing bridges.



Object detection system beside and on yachts

Sensors secure specific areas on board or visualize the length of stay, movement direction and movement speed of persons and groups. If a yacht is moored at the harbor railing, access to the ship can be monitored with laser scanners and an alarm can be triggered in case of unauthorized access. On the water, reliable "man overboard" monitoring systems help to save lives.



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's experts are at your side for quick and uncomplicated maintenance and repair.

FROM INDIVIDUAL SENSOR TO A COMPLETE SOLUTION

An experienced team of project engineers and system designers from the fields of electrical and mechanical engineering plans and develops solutions customized according to customer requirements – including PLC connections, 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 customer consultation. SICK's expertise is not limited to the

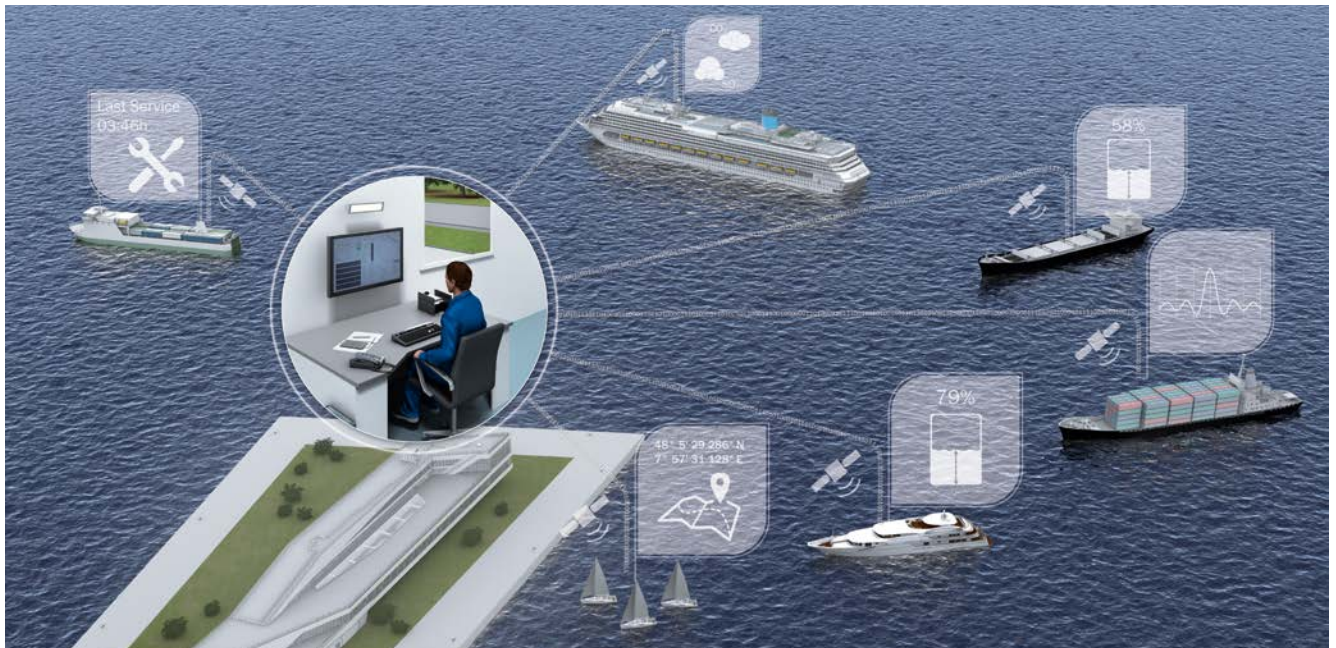
purchase of the individual product. SICK also offers support with service and maintenance 24 hours a day – worldwide.



With over 70 years of experience, the SICK name stands for innovative products and solutions that 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, networking and integration. Intelligent sensor solutions and safety controllers

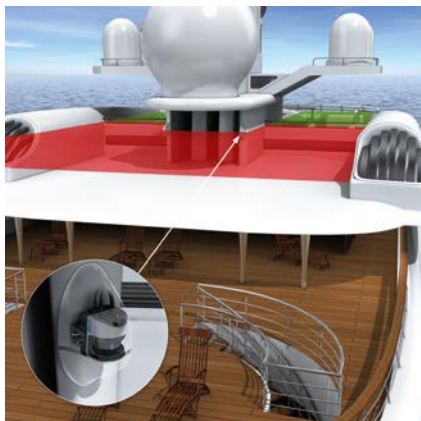
from SICK offer a variety of integration technologies, which provide easy access to the sensor data.



The TDC (Telematic Data Collector) gateway system is an open IIoT platform that links sensors and machines together for reliable network communication. As well as transmitting data to the target platform via a wired, mobile or wireless

connection, the TDC also has data processing capability. Data can therefore be analyzed and evaluated locally (edge computing). With digital inputs and outputs, user-defined real-time alarms (SMS notifications) can be set based on rele-

vant data. Process, status and diagnostic information is made more transparent, increasing the productivity and efficiency of industrial processes. SICK offers customer-specific cloud solutions (SaaS) for this purpose.



Securing access areas on ships

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

- LMS5xx 2D-LiDAR sensor



→ www.sick.com/LMS5xx



Detecting “man overboard”

Video cameras are frequently used for monitoring the outdoor areas of ships. They continuously record events, however they do not trigger any alarms. MRS6000 3D LiDAR sensors scan the defined area around the ship. As soon as an object intrudes into the sensors' multi-layered scan area, the crew is immediately notified by an alarm. Consequently, video recordings can be checked promptly and measures can be taken where necessary. The intelligent laser scanners avoid false alarms by blanking spray, waves or birds, for example.

- MRS6000 3D LiDAR sensor



→ www.sick.com/MRS6000



Detecting where people go on-board

There are various useful applications for recording and visualizing individual people or all movement profiles of the public in real time. The 2D LiDAR sensor, combined with the corresponding software, visualizes and analyzes the number, direction of movement and speed of people. This means that access to the locked deck is promptly reported. On passenger ships, this enables, for example, an early detection of overfilled escape routes so that passengers can be rerouted. People who are moving in the opposite direction of the other passengers during disembarking, for example, can be reliably identified.

- LMS1xx 2D-LiDAR sensor



→ www.sick.com/LMS1xx



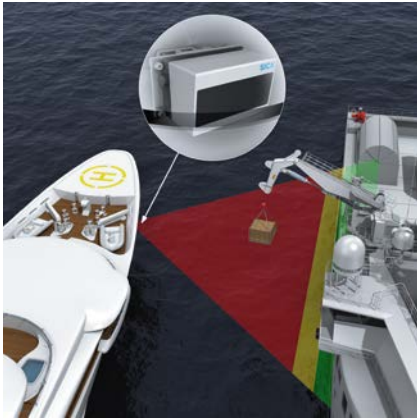
Triggering height and distance checks

Sensors, which prevent free transit regardless of the water level and in combination with nautical chart data, are used to avoid collisions with bridges, locks or other ships. SICK laser scanners have a scanning range of 300 m in laser class III. They constantly measure the height or distance profile and trigger early warning course correction signals. These proactive scanners can be integrated into the ship's hull.

- LD-MRS 3D LiDAR sensor



→ www.sick.com/LD-MRS



Monitoring goods transport from ship to ship

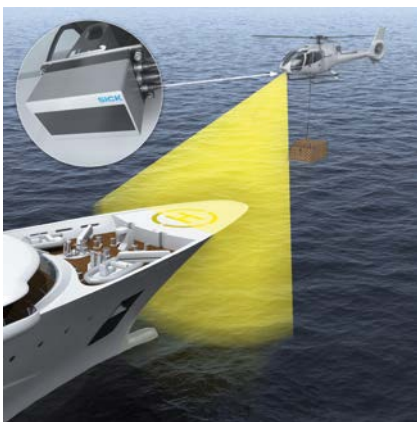
Supplying food or fuel to yachts often happens at sea. The goods are transported on board using wire rope hoists. The ship must keep a stable course during reloading.

SICK 3D LiDAR sensors transmit course correction information to the ship's steering system. They also transmit the necessary correction data to an intelligent winch control to keep the transport rope taut.

- LD-MRS 3D LiDAR sensor



→ www.sick.com/LD-MRS



Monitoring lowering helicopters

If yachts are supplied with food or fuel from the air, helicopters must keep a safe distance from the ship superstructures during delivery. In addition, the material must be laid down gently. The ship must keep a stable course during this time. Course correction information is transmitted to the ship's steering system. Alternatively, the sensors can also be installed on the helicopter.

- LD-MRS 3D LiDAR sensor



→ www.sick.com/LD-MRS



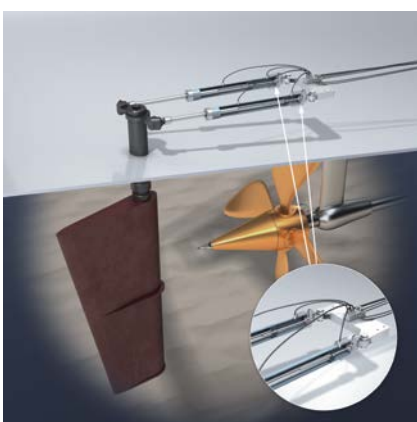
Positioning helicopters

Yacht owners and passengers usually want to get onto the ship as quickly as possible. For this reason all large yachts are equipped with helicopter landing pads. To ensure safe landing and that the landing space can be approved, LiDAR sensors monitor danger zones and detect possible objects in the hazardous area. The sensors are elegantly integrated in the ship's design under glass domes.

- LMS1xx 2D-LiDAR sensor



→ www.sick.com/LMS1xx



Positioning rudders

If a new course is to be taken, then the rudder position must be changed to the new direction. The rudder blade is moved by hydraulic cylinders. Linear encoders integrated in the hydraulic cylinders give μm -exact feedback on the position change and therefore the position of the rudder blade. This allows large yachts to be maneuvered more exactly and steered more efficiently. Thanks to the direct feedback from the linear encoders in the cylinders, part-automated control using GPS data can be used.

- MAX linear encoder



→ www.sick.com/MAX48



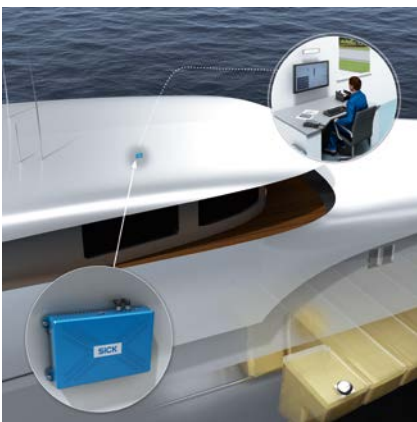
Measuring the fill level of water and fluid tanks

Every yacht has different tanks on board for storing service water, pool water, blackwater and drinking water. For drinking water in particular, hygienically faultless level measurement is required. Stainless steel level sensors meet the hygienic and maritime requirements. SICK's level measurement records the tank level continuously and conveniently. By connecting to the TDC (Telematic Data Collector) gateway system, monitoring and triggering alarms can even be done online.

- LFP Inox level sensor



→ www.sick.com/LFP_Inox



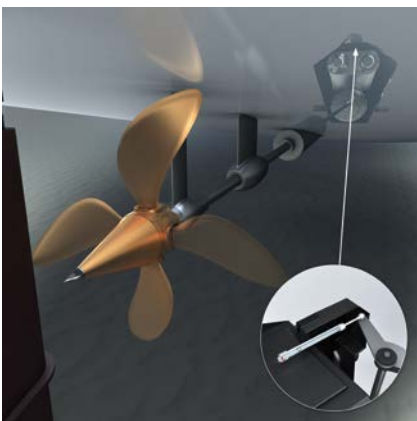
Monitoring diesel tanks

Sensors monitor the diesel fill level independently of the primary level sensor. A web/GPS-based analysis and alarm system sends an alarm to a cellphone if there is a sudden drop in filling level. This makes the prevention of fuel theft and identification of those involved easier. Data regarding the ship's position and the diesel tank's fill level can also be sent for cloud-based analysis via a compact industry PC and a modem/SIM card and can be linked with the GPS data. The information is then available in real time. Consumption and fueling can be planned more precisely.

- TDC-B200 gateway system, level sensor



→ www.sick.com/gateway-systems



Optimizing controllable pitch propellers

Controllable pitch propellers are used when good maneuverability, generator operation and/or varying continuous speeds are required. The propeller blades are fixed to the hub and can rotate. Linear encoders are placed in hydraulic cylinders that act on the shaft for controlling the rotor blades; these encoders display the angle of inclination of the propeller blades. The rotor blades can be moved to the desired position, adjusting down to the μm range. This allows for highly efficient maneuvering or propulsion of the ship.

- MAX linear encoder



→ www.sick.com/MAX48



Measuring ship inclination

It is possible to mostly compensate for swells using stabilizers. The TMS inclination sensor registers the ship inclination to optimally align the stabilizers. This ensures that the yacht lies as still as possible in the water. This has several positive effects: A ship position optimally adapted to the driving resistance, meaning a reduction in fuel, and fewer seasick passengers too. SICK's precise and reliable inclination sensors take care of this.

- TMS/TMM dynamic inclination sensors

→ www.sick.com/inclination_sensors





Recording opening/closing positions

SICK's inductive proximity sensors monitor hatches, loading ramps and bulkheads. They give direct feedback to the ship's monitoring and guidance system. This simplifies checking that all hatches are airtight before the ship sails.

- IM30 AC inductive proximity sensor



→ www.sick.com/IM_AC



Checking anchor winches

The AFM60 Inox absolute encoder reliably measures the length of the unrolling or cast-out anchor chain. This information is used to brake the anchor winch in good time before reaching the end of the chain. This measurement prevents the anchor winch from being damaged by sudden impact or chain links shattering. The encoder is integrated in the anchor chain control and boasts an IP67 enclosure rating and shock resistance, resulting in high reliability.

- AFS/AFM60 Inox absolute encoders



→ www.sick.com/AFS_AFM60_Inox



Monitoring sail tension

Setting all of the sails and monitoring the sail tension is now almost always fully automated on modern sailing boats. SICK linear encoders integrated in winches and hydraulic cylinders give direct feedback about sail tension and alignment.

- MAX linear encoder



→ www.sick.com/MAX48



Aligning keels

Aligning the keel is automated on modern sailing yachts. Depending on the water depth e.g. near the coast or in waters with varying sandbanks, the keel can be damaged or the ship may even run aground. Exact position determination with the MAX48 linear encoder in the hydraulic cylinder means that the keel is only retracted as far as necessary so as not to jeopardize the stability of the sailing yacht.

- MAX linear encoder



→ www.sick.com/MAX48

SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 8,800 employees and over 50 subsidiaries and equity investments as well as numerous agencies 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, Hungary, Hong Kong, 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.

Detailed addresses and further locations → www.sick.com