

Port Applications, based on multi-layer scanner

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ABOUT THE COMPANY

LASE is one of the worldwide leading companies for laser-based sensor applications for industry. We offer innovative and productive solutions by combining state-of-the-art laser technologies and sophisticated software applications. The broad product range of precise and reliable **1D**-, **2D**-, **3D** and **Multi-layer** laser measurement systems can be applied for several industry sectors.





Company Profile



LASE is a specialist for laser-based measurement solutions

Company data:

- Founded and private owned since 1990
- Located in Germany
 Wesel (Head office) and Bremen (Project House)
- 90 employees with 30 Engineers
- Subsidiaries in Singapore, Australia, Russia, Chile and soon in the USA
- Representatives in an additional 15 countries

Main business lines:



Products:

• 1D-, 2D-, 3D- and Multi-layer laser measurement systems

• System solutions

(solution provider for Hardware, Software, and Engineering, also upon request we can provide a turn-key solution)







Multi-layer Laser Scanner

The "multi-layer" laser scanners employ technology where there are several, nearly parallel layers. The sensor family provide sensors with up to 128 scan planes, each with 360° horizontal- and with different vertical opening angels. All devices have onboard inertial measurement unit (IMU).











Main features

Ranges:

Scan planes:

Field of view:

Ingress Protection: Operating Temp.: Dimension:

Weight:

170m *or* (**557.74** *ft.***)** with 80% reflectivity 90m *or* (**295.27** *ft.***)** with 10% reflectivity

32, 64 or 128 channels

Horizontal: 360° Vertical: 22.5° (below horizon) 45° (+/-22.5°) 90° (+/-45°)

IP 68 -20...+ 55°C **(4....160 °F)** Diameter: 85 mm **(3.34 in)** Height: 73.5 mm **(2.9 in)** 447g **(15.76 oz.)**



Multi-layer scanner principle



Multi-layer principle

















Multi-layer scanner principle



Multi-layer principle









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LaseTLP-ML Truck Anti-Lifting	
LaseLCPS-ML Load Collision Prevention	
Lase TPS Truck Positioning	LaseTPS
LaseGCP-ML Gantry Collision	
LaseASTO Area Surveillance Truck Operation	



LaseTLP – ML

Truck Lifting Prevention with Truck Cabin Detection



Requirements

In some cases, it is possible that a Truck/Trailer is lifted up by the hoist of the crane when one or more twist locks are still connected (or not completely loosened) to the corner castings of the container.

Solution

The LaseTLP-ML application detects the lifting of the trailer very early in the lifting process. The system generates an alarm signal to stop the hoist movement before serious damage happen. In addition, the system tracks the truck cabin position so that the truck can not move forward with a connected container.



The sensor are installed on the crane at the level of the chassis with the sensor directed to the truck lane. When a container is lifted, the sensor recognizes if the truck/trailer is being lifted up together with the container.

The Lase TLP-ML solution offers a multi-function approach:

- Truck lifting prevention
- Truck Cabin Position detection



OS0-64













Multilayer horizontal view



Container lifted - end fixed



Container lifted – front fixed



Container lifted - end single fixed



normal hoist







Truck Lift

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Truck cabin position tracking

Possible Option: <u>Human Detection</u>

When a person is near the chassis, the scanner can see the person and determine if the loading process should be stopped based on predetermined safe location for the person.

LaseLCPS – ML

Load Collision Prevention

Requirements

Every year, many terrible accidents occur in ports around the world due to containers falling from stacking areas.

An integrated measuring system can assist the crane operator in his work to prevent collisions.

Solution

The LaseLCPS-ML system assists crane operators to prevent collisions between the load and the stacks in the yard (operation bays and adjacent bays) plus it ensures a soft-landing of the load.

The system is connected to the crane control and if there is a danger of collision, the PLC will recognize the danger and influence the move so that no damages can be caused by collisions.

The sensors are installed on the trolley and create a 3D-Profile of the yard. The developed profile will prevent collisions between the load and the container stacks in the yard.

OS1-64

-System layout-

The system consist of 2 Multilayer-Laser scanner, installed on both sides of the trolley. The sensors are connected to a LASE Control Unit (LCU = IPC) with the application software onboard and communicates to the crane control via an interface.

LaseLCPS-ML Function

As the crane travels with the load over the yard, if a collision is recognized, the measurement system gives an alert signal and interacts with the crane control system. The crane movement will be slowed down and finally stopped to avoid any collisions.

LaseLCPS-ML Function

LaseTPS – ML

Truck Positioning Crane

Requirements

Reduction of personnel in such danger zones while STS spreader operations.

Accelerates container handling operations both, at the water and land sides, as well as the loading areas by more accurate truck positioning.

Solution

LaseTPS-ML helps to determine the position of trucks, trailers, AGVs or containers on the vehicles as well as on the ground. This system is also particularly important for double hoist/spreader operations –otherwise the crane driver needs considerably more time to get the spreader on the container.

By the assistance of a traffic light system, truck drivers easily can reach their final loading and unloading position.

The LaseTPS-ML is primarily designed for STS cranes but basically it can also be applied for stacking cranes, which require the exact positioning of vehicles.

Solution LaseTPS-ML

Solution LaseTPS-ML

Solution LaseTPS-ML

Each Multi-layer scanner can cover 2 operation lanes at the same time

Live Video

40 ft. box, center

20 ft. box, rear

LaseGCP – ML

Gantry Collision Prevention

LaseGCP-ML

Requirements

Collisions between the crane and object that are in the Gantry moving direction of the crane. This can lead to serious accidents, which can result in mechanical damage as well as personal injury

Solution

When an object enters into the <u>dynamic</u> surveillance fields, an output will be given to the crane control system and the PLC will influence and finally stop the crane motion before the object makes contact to the crane. The ML-Scanner provides a significantly larger and wider adjustable monitoring range when compared to products that only monitor only one height (plane). With this device it is also possible to reliably detect obstacles on the ground.

Option: an additional camera can provide a picture showing the object which has entered the area.

Solution LaseGCP-ML

One multi-layer scanner will be installed on each leg of the crane. By scanning the area in front of the gantry motion, objects that are on the ground will be detected.

LaseGCP-ML Function

LaseGCP-ML Function

The system provides 3 dynamic and adjustable safety zones

S4 **S**3 la, **S1 S2** Scan planes with colored surveillance cubes

Software view of current system status

Area Surveillance Truck Operation

Requirements

For the loading or unloading of containers by using RTG's, RMG's, ASC's or STS cranes, the interaction of people and machines is necessary for many operations.

For example, a truck driver must drive his truck into a transfer area that is operating in automated mode. As a requirement of the operation, the truck driver must exit his vehicle and stand on a pressure mat or hold a electronic switch. If he leaves this area, he can be in danger of coming in contact with the container being moved automatically by the crane.

Solution

To prevent this, LASE has developed the LaseASTO system. This is a safety system, equipped with multi-layer laser scanners to detect and <u>track</u> objects in area where the crane operates.

The system divides the scans into "danger areas" and "safety areas".

- The danger area is the area in which container loading/unloading takes place. If a detected person is in this area, an emergency shutdown of the crane system will be performed.

- If, on the other hand, the person is in the safety zone, container handling can be carried out as normal.

Alarms are not triggered if boxes have already been detected in the work area. Only persons trigger an alarm if they are not in the safety area or other persons enter the work area from outside.

Sensors are installed on the crane girder above the truck lane. They observe in 3-Dimensions, during the pick and drop process, whether the truck driver or workers are in the safe zones or in the operation area.

The multi-layer scanner covers the compete area around the transfer area. Transfer area means, where the truck stops to receive or deliver boxes.

Out of the 3D-Pointcloud of the scan area on the ground, the software determines the chassis, the driver cab, the container (when unloading truck) and person (objects) that are in the operation area around the truck.

When a person is detected, the LASE system sends an alarm to the crane PLC and the operation can then be stopped.

Comparison pointclouds and real video

Conclusion

By using multilayer scanners in conjunction with reliable and sophisticated evaluation software, collisions can be prevented much more reliably without slowing down the production.

In addition, multiple functions can be performed with the same equipment, which means the use of less hardware.

Have I aroused your interest and you still have questions?

You are welcome on our booth, E-4

THANK YOU

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