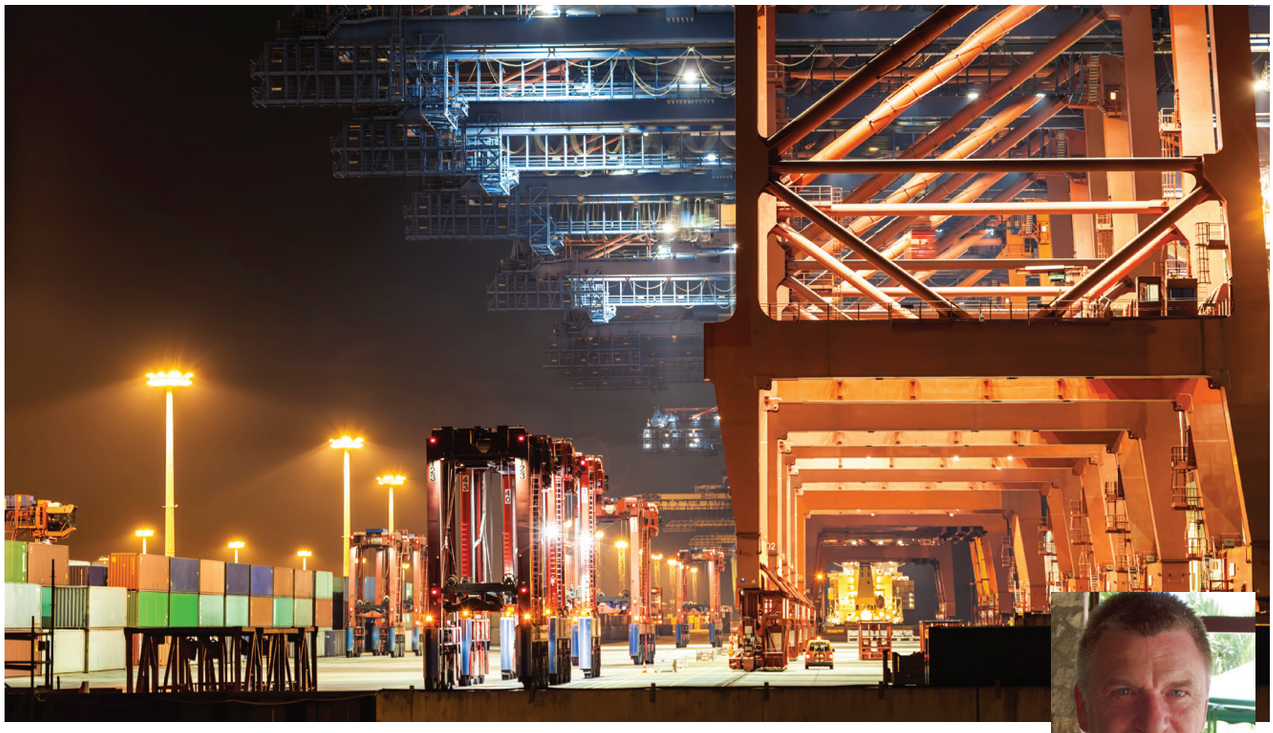

ANTI-COLLISION MEASURES

ENHANCE PRODUCTIVITY AND PREVENT ACCIDENTS

Walter Schneider, Technical Industry Manager, Ports & Cranes,
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Investments in crane technology could be said to fall into two broad, and sometimes overlapping, categories: those that enhance productivity and those that prevent accidents. Of course, investment in productivity, with its focus on the return on investment, will always be more quantifiable and, therefore, more immediately justifiable for boardrooms. However, anti-collision enhancement measures are a more difficult proposition. Incidents in individual container yards may be infrequent, even if they are high on a wider industry level. Businesses with a focus on a traditional measure of productivity – the speed with which containers are moved – can often lose sight of these unpredictable but preventable accidents.

The container port sector has invested extensively over the last quarter of a century in automation in its pursuit of higher efficiency and productivity. The potential of advances such as the Internet of Things – the transfer of data and connectivity between objects – will add a new dimension to this exposure. However, there are sound arguments why operators should invest in anti-collision technology, too. There is the long-term financial and reputational benefit of reducing injuries and damage costs over the life of a crane. Downtime for equipment and operations affected by incidents can be very costly, while the reputational impact of an accident on ship operators can come at a huge cost as well. Insurers have taken a lead to encourage investment in anti-collision measures. The TT Club has waived the deductible fee from policies for crane operators that have installed non-contact, anti-collision systems. TT Club has stated that the specialist insurer maintains that fitting sensors to quay cranes can save the industry millions of dollars from reduced damage and operational downtime.

INVESTING IN SENSOR TECHNOLOGY

The industry's larger operators have recognised the advantages of investing in sensor technology for cranes to prevent accidents and to safeguard the 24/7 flow of their highly automated port terminals. Understandably, operators are concerned about the cost of installing these systems, whether on new orders or by retro-fitting.

Many are reluctant to invest until they see evidence of competitors taking similar measure. The global, varied nature of port terminal operations has hindered the drive for international standards, and this process lags behind other land-based freight handling companies in highly developed economies. However, PEMA, TT Club and ICHCA International (the supply chain association) have promoted voluntary minimum safety features for quay cranes since 2010 and are supportive of laser technology.

EXISTING ANTI-COLLISION SOLUTIONS

There are a variety of existing anti-collision solutions other than sensor technology that are used on ship-to-shore quay cranes and rubber tyre gantry cranes. The

whisker switch is one option for rubber tyre gantry cranes. Working on a similar principle to the 'curb feelers' that were used on American cars in the 1950s, these devices offer a rudimentary way to give crane operators some warning of contact with other objects and potential collisions – but only after contact has been made. Wire rope pull systems are another physical-contact mechanical solution often employed for quay cranes.

Of course, operators are attracted to lower costs. Consequently, mechanical systems are popular and often supplied when specifications call for anti-collision measures. But there are drawbacks. Maintenance levels are high to keep tension in the wire. And contact with the sensing element must occur before the device can send a signal to a controller to stop the crane, which at full speed of an STS can take easily 5 or more metres. Irrationally, the wire is often positioned only a metre from the boom. Wire ropes and whisker switch technology are basic but insufficient in today's sophisticated port environments.

There are more technologically advanced sensor approaches. Ultrasonic and camera systems are popular solutions for rubber tyre gantries. Ultrasonic solutions are based on time of flight technology, while camera-based solutions use large volumes of image data to monitor for potential hazards. Despite the uptake across the industry, the performance of both technologies can be hampered by adverse weather conditions-which are often a feature of port operating environments. Likewise, the information collected by ultrasonic solutions can be too simplistic, while that gathered by camera-based solutions is often too complex. Both can lack clarity for the operator – a major drawback for any collision prevention system.

LASER MEASUREMENT TECHNOLOGY

Laser measurement technology is an advanced solution using simple fundamentals to prevent collisions. When a laser sensor emits a beam, an internal clock is activated; when the light hits an object and is reflected back, a scanner made up of rotating mirrors is able to detect and measure surrounding objects.

Unlike whisker switches or rope systems, laser technology can monitor multiple hazards. Moreover, lasers can operate in adverse conditions – whether dust, fog, rain, snow or sand storms – often found in port environments, which cause problems for both ultrasonic and camera-based technology.

Boom-to-vessel collisions are the single largest cost of claims, according to TT Club. Laser systems can be installed on ship-to-shore cranes under the boom with laser scanners providing surveillance fields that can help prevent these costly incidents, as well as mishaps with other cranes. When another object is detected within the surveillance field, a warning signal, an alarm or, in case of emergency, an automatic stop can be generated. This allows for a far more rapid response to hazards than is available with whisker, rope and ultrasonic and camera solutions.

Rubber-tyred gantry cranes are commonly-used, highly-flexible pieces of equipment that can switch between aisles during container stacking. However, they are prone to collision with other containers or other yard vehicles and equipment as they move. Installed by the wheels of the rubber-tyred gantry, a laser-based scanning solution with predefined warning and stop laser fields are monitored by a safety controller and integrated software. The scanner automatically detects obstacles and can halt operations more rapidly than other solutions.

New anti-collision laser scanning solutions for terminal operations have benefited from incorporating wiring techniques developed in other industries.

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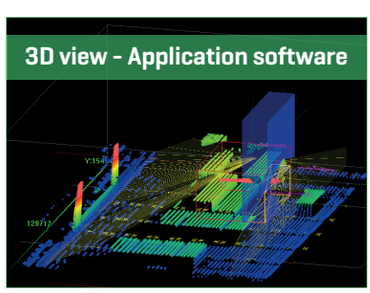

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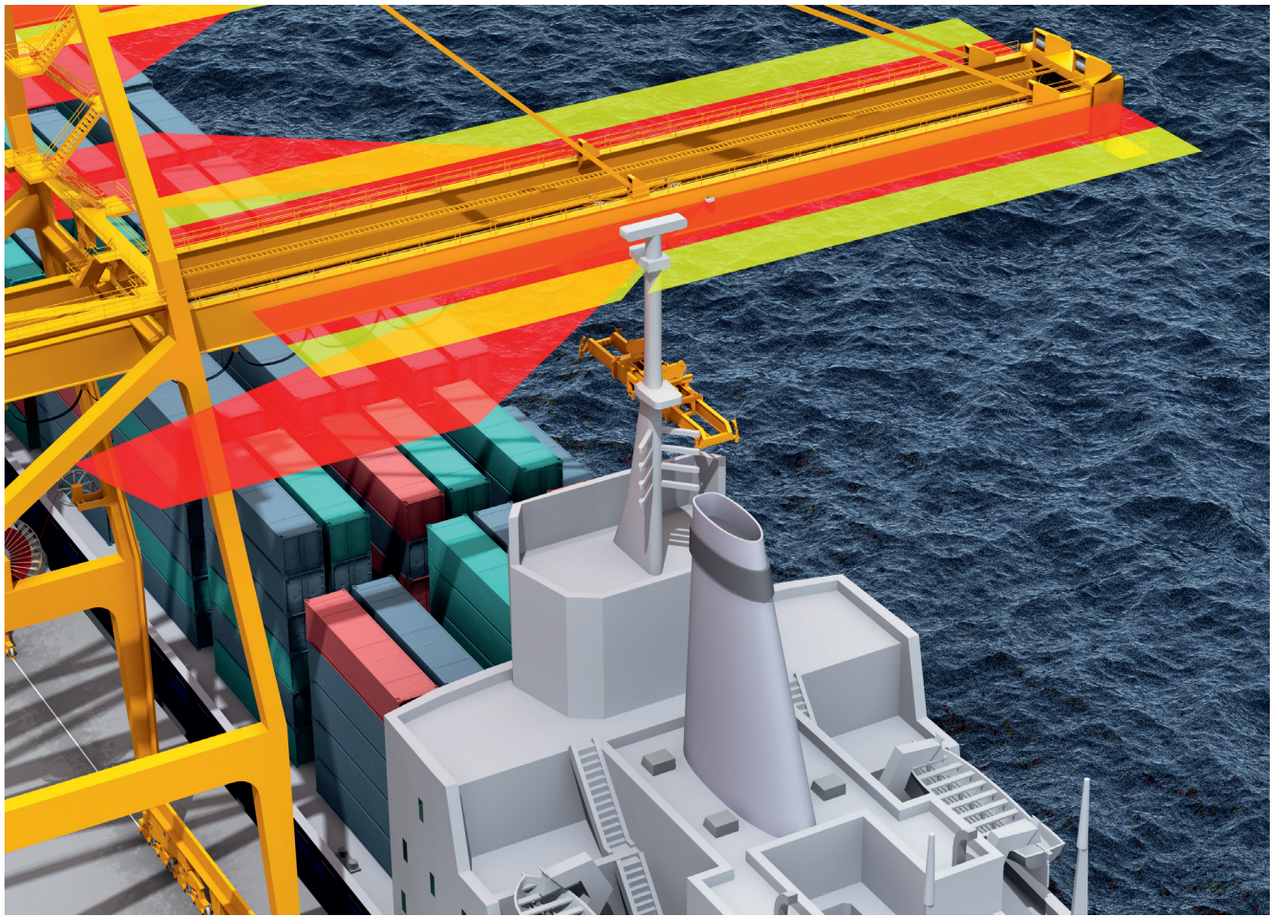

A pre-configured system, with a laser scanning sensor and a controller, is designed to test the laser scanner's detection zones, to detect any cable faults between the scanner and controller, and to ensure the overall health of the system. The system has several self-testing functions that use a fixed test target, such as the legs of a crane, and regularly checks all of the scanner's functions against this specific target. Crucially, the integration of the laser scanner with the controller has allowed for a high degree of diagnostic coverage and reliability.

LONG-TERM BENEFITS

Accident prevention measures come at a financial cost, but, as part of a risk management plan, offer long-term protection against unnecessary accidents and their financial consequences. When accidents do happen, measures that may have minimised downtime and the operational and financial impact on a business – and third parties – start to look like very sensible investments. The cost of anti-collision laser measurement systems – which can range between $10,000 and $30,000 per unit – is marginal compared with the hundreds of thousands of dollars-worth of claims often associated with quayside accidents and the cost of business interruption.

Laser scanning measurement technology combined with a smart controller is a little more expensive than other solutions, but it is acknowledged as a cost-effective, long-term investment. Although the wider industry uptake has been slow, industry leaders such as insurances continue to champion this technology over and above other sensor solutions. Increased focus on anti-collision has to be a primary and not a secondary consideration, and once integral to a business can bring financial and reputational gain. This should be a given, and, when there are technological solutions like laser measurement technology, achievable for all. The technology exists for all of a terminal operator's assets and equipment, the challenge for the global industry is for it to more widely adopt laser measurement technology.

ABOUT THE AUTHOR

Walter Schneider has worked for more than 30 years in the automation and sensor business in Product Management, Direct Sales and Market Management as well as in Industry Management. He has a broad view on the demands for sensor technology. Since 2011, he has taken care of technology trends in the ports and crane industries.

ABOUT THE ORGANISATION

SICK is one of the world's leading producers of sensors and sensor solutions for industrial applications. Founded in 1946 by Dr.-Ing. h. c. Erwin Sick, the company with headquarters in Waldkirch/Germany ranks among the technological market leaders. With more than 50 subsidiaries and equity investments as well as numerous agencies, SICK maintains a presence all around the globe. In the fiscal year 2015, SICK had more than 7,400 employees worldwide and achieved Group sales of just under EUR1.3 billion.

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