

Avoiding being crushed in ‘elephant land’: Innovative lasers detect obstructions

Lyttelton Port, Christchurch, NZ

It's a problem worldwide. Ships getting bashed by container cranes; straddle carriers nearly losing their cabs as they stray into the path of a crane spreader; not to mention the damage to containers as a misaligned spreader bounces off its side.

The hurly burly of life on the waterfront, as three or four elephantine straddles line up to service a couple of mammoth ship-to-shore cranes, inevitably leads to a few scrapes. The container terminal at Lyttelton Port of Christchurch (LPC), handling 200,000 TEUs per annum, has incurred on average five crane to straddle accidents and two crane to ship collisions for each of the past three years. Fortunately, none have resulted in injury.

For bigger ports, the problem is much greater. Damage to critical infrastructure like radars has caused ships to be laid up in port awaiting new parts – a costly exercise for shipping lines and ports alike. Injury to personnel can lead to massive insurance liabilities, not to mention the consequences for the workers concerned.

An innovative solution

Rather than waiting for their luck to run out and human error leading to tragedy, LPC, its crane supplier Liebherr, and local company Computer Engineering Ltd have come up with an innovative solution involving crane mounted lasers, that

automatically detects obstructions between the crane's legs (in the case of the straddle carriers) or between the crane trolley, the end of the boom and the ship as it is loaded.

LPC specified the fitting of the Sick LMS laser unit for the installations. A laser sited between the crane's legs looks for any object in the area which is taller than two containers (which can only be a straddle carrier, as no more than two containers can be stacked under the crane). The laser is sensitive enough to be able to identify the lane the straddle carrier is in and signal the crane control to prevent the crane trolley from getting closer than one full lane width from the obstruction.

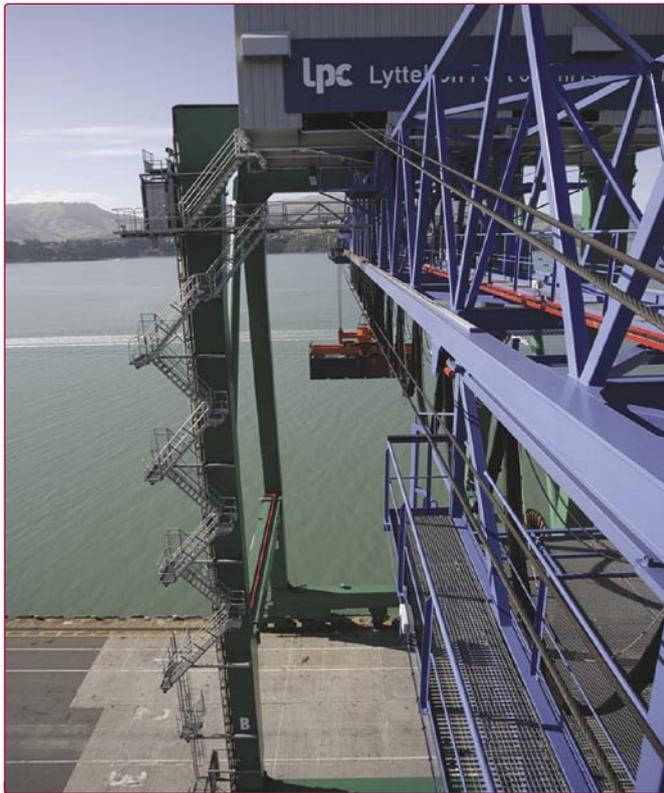
Another Sick LMS laser unit is mounted on the boom tip which then scans landward and warns the driver of obstructions such as ships cranes, masts, radars or even the ship's superstructure. The crane control prevents long travel on the crane if a collision is imminent.

Cost effectiveness

The laser units have been fitted and tested on LPC's newest ship-to-shore crane, built by Liebherr at its Killarney, Ireland facility. The port's two existing cranes, an older Liebherr and a Paceco, will also be fitted with the system as they are refurbished to match the new crane's functionality.



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Crane mounted lasers automatically detects obstructions between the crane trolley, the end of the boom and the ship as it is loaded.

LPC's Maintenance Manager, Mike McGlinchey, says the new technology has proven to be a flexible and cost effective solution. The lasers have been operating for three months and to date there have been no incidents. On the expectation that the accident register continues to be clear, he expects the collision avoidance system to pay for itself, in terms of loss from damage and lost productivity, within a year.

Straddle alignment system

According to Mr McGlinchey, the potential for payback on a third component – the straddle alignment system – was also good. This job used to be handled by a 'chalk man' who literally drew lines on the tarmac where the containers were to be dropped, so that the crane spreader dropped neatly on top of the container.

The chalkies were replaced about six years ago by cameras which identified the container's position by locking onto a 'barcode' on the legs of the straddle carriers. "Now there's one less man on the ground in elephant country," Mike says.

Since then, the optical system had been working reliably but had the disadvantage that it was susceptible to errors if the barcodes on the straddles got dirty, Mike said. "It's been a very successful system but had become obsolete by the time we came to purchase the new crane."

Auckland-based Computer Engineering supplied a new system based again on Sick Laser LMS units. This system is calibrated by lowering the crane headblock and scanning it with the laser to set the container position. The laser identifies the position of the straddle carrier and relays the data to a visual display visible from the straddle carrier cab. The visual display



The collision avoidance system should pay for itself within a year.

has a series of lights which illuminate as the straddle carrier approaches the correct position and change colour when the container is in line.

The system is more efficient as it does not break down if the straddle barcodes are not visible, therefore cleaning the straddles is no longer an operational requirement (although they still get cleaned for other purposes)!

“After the initial setup the lasers have performed reliably and required very little maintenance, apart from cleaning the lenses every six weeks. The straddle carrier alignment and collision

avoidance lasers can be accessed from the ground for cleaning and the boom collision avoidance laser is mounted on an arm that can be swung onto the access platform at the end of the boom for cleaning,” Mike said.

He adds that he believes this is the first time laser units have been used for straddle carrier alignment purposes. “We are not aware of any other ports that have come up with this solution.

“It’s not uncommon worldwide for cranes to do significant damage to ships. It’s not the way to make friends with shipping companies.”

ABOUT THE PORTS

Lyttelton Port of Christchurch is the largest port in the South Island and the third largest in New Zealand. It is New Zealand’s largest coal port, exporting over two million tonnes a year. Coal is largely mined on the West Coast and railed through the Southern Alps to Lyttelton on the East Coast. Coal trains alternate with a passenger train called Tranz Scenic on what is described as one of the world’s greatest train trips. Lyttelton Harbour is set in the broken caldera of an extinct volcano. Its steep sides make it a perfect deepwater port, giving the charming Victorian town of Lyttelton ringside seats to the world’s largest cruise liners and container ships. The South Island’s largest city – Christchurch, the ‘Garden City’ – is 15 minutes away by tunnel.

ENQUIRIES

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