

SHIP LOADER TO VESSEL PROTECTION SYSTEM

MRA is a 20-year pioneer of smart automation technology for bulk materials handling with products across the supply chain, including train load-outs, dump station, stockyard and ship loader. With a strong PLC background, our smart products are designed to integrate seamlessly into the existing PLC control systems.

MRA's Ship Loader to Vessel ACS (Anti-Collision System) and add-on modules are a complete ship loader protection system that provide tools to assist loading and protect the safety of personnel and help eliminate accidents impacting operational continuity.

The ACS builds a highly accurate, 3D map of the vessel via millions of data points collected from scanners installed on the ship loader. The scanners are relatively low-cost, long-life LiDAR suited to the harsh environmental conditions typical to ship loader operations.

COLLISION DETECTION AND INHIBIT

The ACS establishes a real-time protection zone surrounding the ship loader's boom and shuttle, its spout / spoon and operator cabin. The improved visibility eliminates blind spots. Any object entering or nearing these dynamically defined zones will trigger a collision or inhibit unsafe movement.

Key separation distances for the ship loader are available to the PLC for actioning including, alarm, slow down and inhibit. I.e. all control resides in the existing machine PLC

ADD-ON MODULES

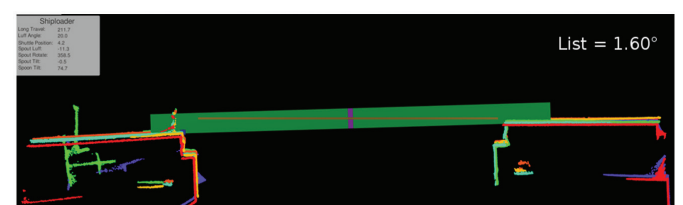
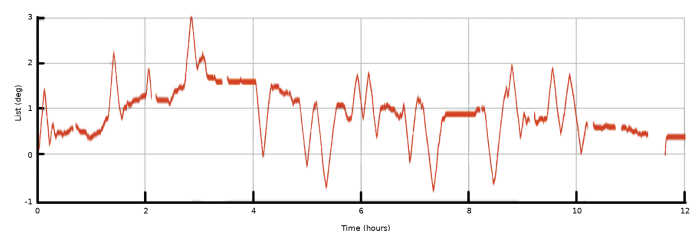
Vessel Loading Balance Detection Vessel list, trim and draft, and the position along the wharf during loading are tracked in real-time. The operator can use this information to adjust the loading pattern, to ensure the vessel is "upright" prior to

completion. This module also reduces the face to face contact between port and operational staff and crew members.

Vessel Drift Detection Monitoring for unexpected vessel movement, such as drift due to a broken or loose mooring line. Early warning enables the operator to respond in a safe and timely manner. With the addition of berth mounted scanners, this detection can be performed any time.

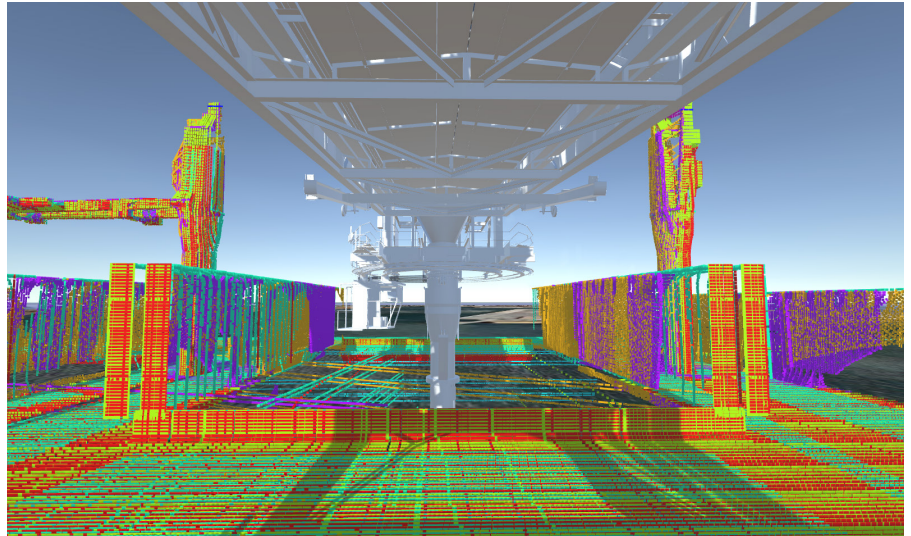
Hatch Detection Operator support tool that uses advanced object identification to determine hatch state – open/closed; hatch dimensions; hatch edge identification; and, deck gear. This information can be used to by the PLC to ensure the ship loader is located at the correct hatch for loading.

From top: Calculated vessel list angle during loading; live laser data of hatch cross section with list angle.



Key benefits of the MRA's Ship Loader to Vessel ACS

- Reduce personnel safety incidents
- Provide improved visibility for operators, minimising blind spots from cabin / CCTV systems
- Increase site efficiency
- Eliminate ship loader accidents
- Ensure continued operations



Port Kembla Ship loader laser models perspective from under the boom with the spout lowered into hatch.

REMOTE CONTROL THE SHIP LOADER – OPERATOR RELOCATION

Relocating the operator cabin from the ship loader improves operator safety particularly where the operator cabin is mounted on the boom and comes in close proximity to the vessel during loading. MRA's 3D visualisation greatly enhances operator visibility of how the ship loader is positioned in relation to the vessel and so aids the concept of remote operation of the ship loader. With pre-defined camera positions as well as full pan rotate and zoom fly-around capability, our 3D visualisation

allows operators to “fill in the gaps” from traditional CCTV and thermal cameras.

The ACS supports all major vessel classes and hatch types and can operate in harbours with tide and passing water traffic as well as challenging open port environments.

Our off-site simulation environment helps us fast track optimal setup for each machine geometry. All PLC interactions can be modelled offsite, increasing accuracy and lowering the cost of setup and commissioning.

SNAPSHOT

100 months of collision-free incidents

Port Waratah Coal Services, Carrington

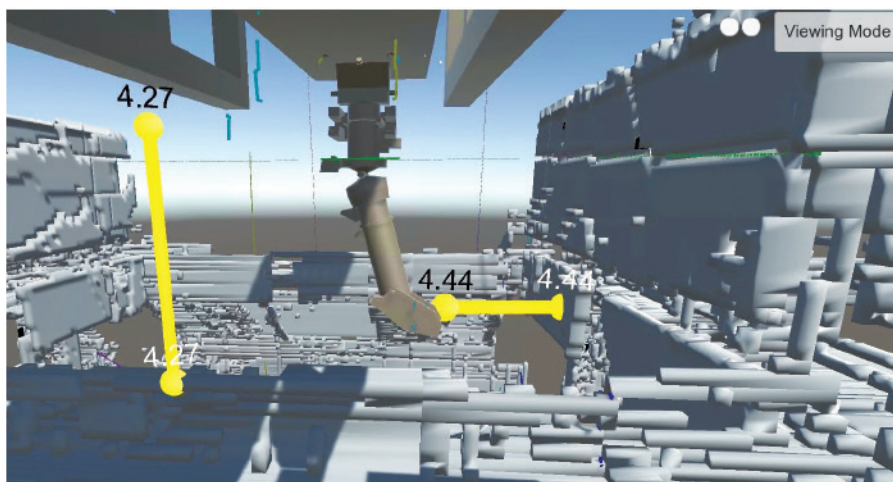
Two A-Frame ship loaders

Port Kembla Coal Terminal

Bridge type ship loader

CITIC, Port Hedland

Automated barge loader



Port Waratah The accuracy of the laser model and the real CCTV view can be seen with separation distances from the boom and spout to the hatch edge displayed. Distances shown in metres.

Keen to find out more?

You're welcome to contact our Engineering Manager Peter McPherson **m** 0403 453 250 **e** peter.mcpherson@mra.com.au **w** mra.com.au