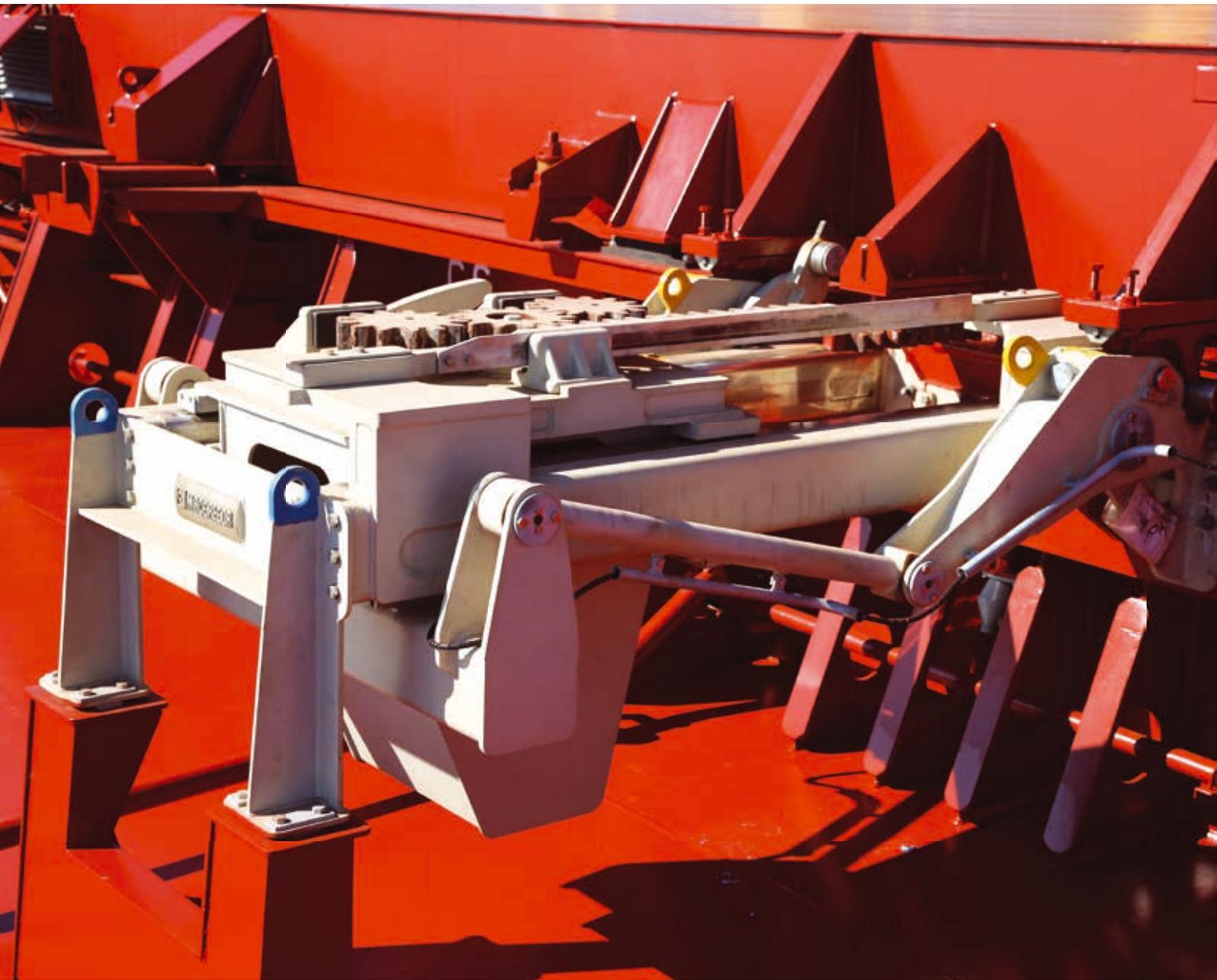


MacRack

An all-electric operating system for side-rolling hatch covers



MACGREGOR

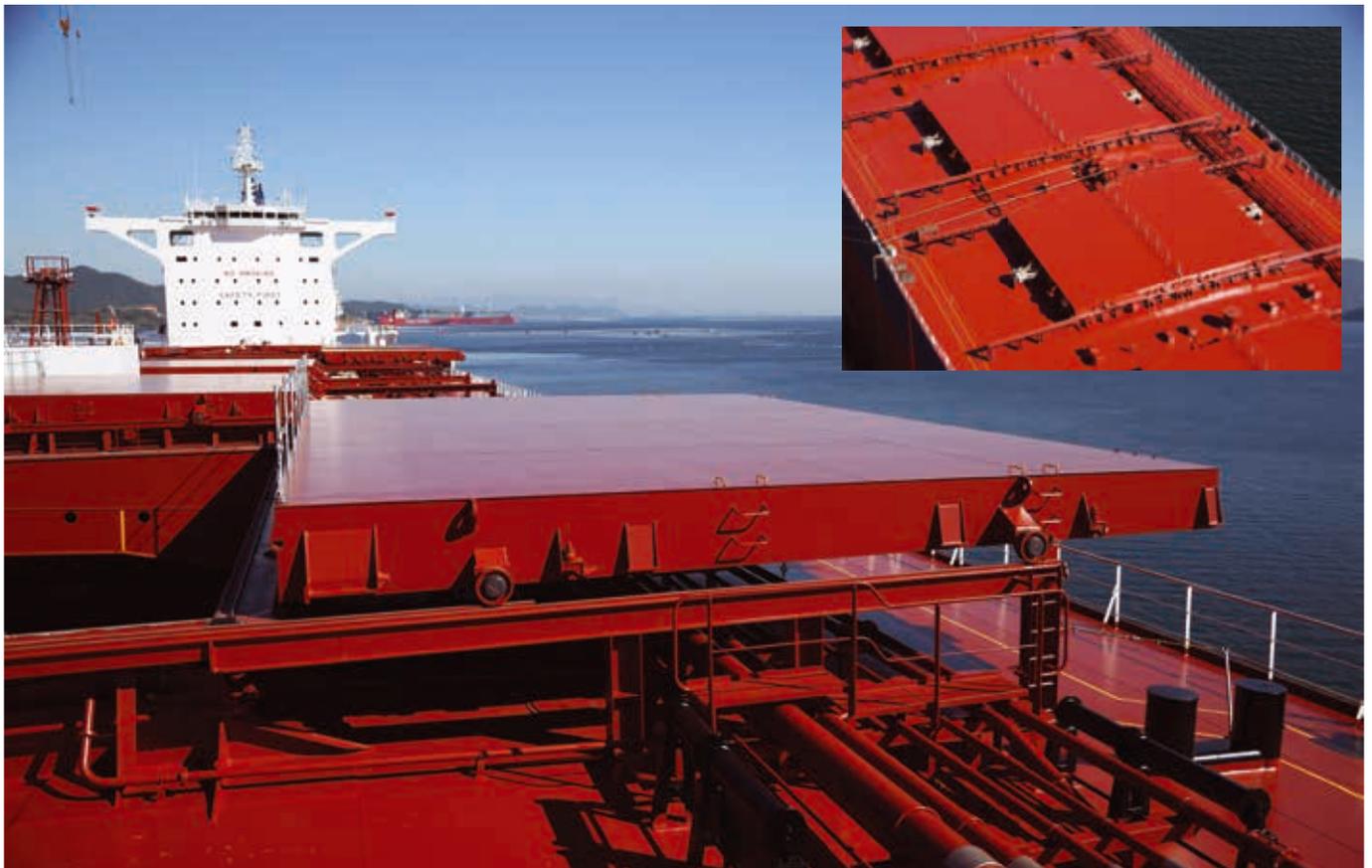
MacRack

An economical, competitive and environmentally-friendly electric-drive system that combines drive and lift operations for side-rolling hatch covers.



MacRack employs a combined rack-and-pinion drive and lifter system that makes separate hatch cover lifters obsolete. Electric operation removes the need for hydraulic pipework and other components.

When opening hatch covers the lifting force needed is achieved by the MacRack lever mechanism, which converts rotational movement into vertical movement. When closing, the mechanism lowers the covers and pushes them together to achieve the correct compression of the hatch cover seals. This ensures the weathertightness which is vital for the protection of bulk cargoes.





Electric drives offer important advantages compared with hydraulic versions. There is no need to install pipework and other hydraulic components and the risk of oil leaks is eliminated. Electric drives offer energy savings and they are easy to monitor.



MacRack brings important advantages compared with hydraulic drives

For the shipowner:

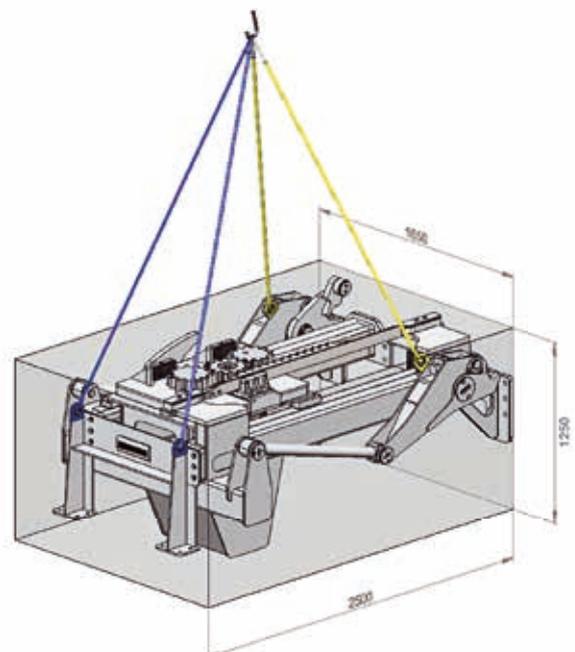
- fast, easy and reliable to operate and to monitor
- the operator is free to move on deck within the cable range of the portable operating unit
- no risk of pollution from hydraulic oil
- maintenance friendly with simplified inspections
- cost savings during a ship's lifetime
- less cold climate sensitive than hydraulic drives

For the shipyard:

- increased productivity
- cost savings due to reduced work
- installation friendly (plug and play)
- no separate lifters to install
- no hydraulic pipes, no pump unit and no control valves to fit
- no system to flush
- standard installation interface

Technical details:

- Dimensions: width 1,650mm, length 2,500mm, height 1,250mm
- Weight: approx. 1,750kg
- Minimum coaming height required: 1,200mm
- Max panel weight: 60 tonnes



Operating principle

MacRack's electric motors are controlled by programmable logic controllers (PLC) and variable frequency drives (VFD). Each hatch has two electric motors: one for the port-side and one for the starboard-side. Several hatch covers can be operated at a time, depending on the system configuration.

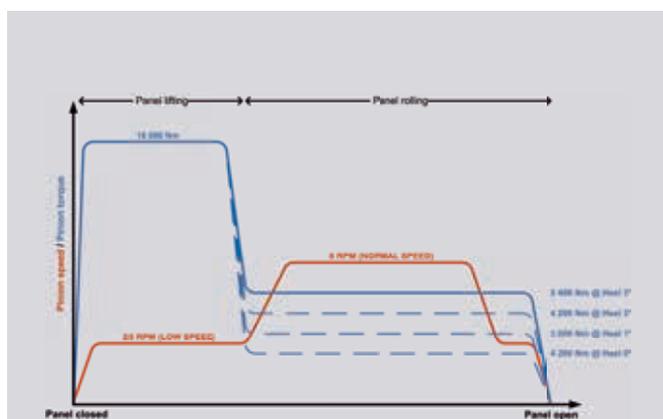
The drive unit is located half way along the hatch side coaming. It both lifts and rolls the panel into the open position. The drive unit's mechanism converts the electric motor's rotational force into lifting and horizontal movements.

Each panel is operated by one MacRack unit consisting of:

- Drive unit (connected to a hatch coaming and the weatherdeck)
- Lifting consoles, rack extension and panel rack (connected to the underside of the hatch cover panel)

MacRack uses VFD technology, which allows for the optimised use of electric power.

The operating speed is slow at the start of the opening process when high force is needed to lift the panel. Rolling takes place at full speed and slows down again when the panel is close to the end stops.



Torque in relation to speed:

At the start of the hatch opening operation, high torque is achieved at low speed to lift the hatch cover. When this part of the operation is complete, lower torque is sufficient and the cover is rolled aside at higher speed.



The maximum operational hatch cover weight is 60 tonnes.

MacRack units are thoroughly tested for strength and performance by applying overloads in a 1:1 size hydraulic test bench.



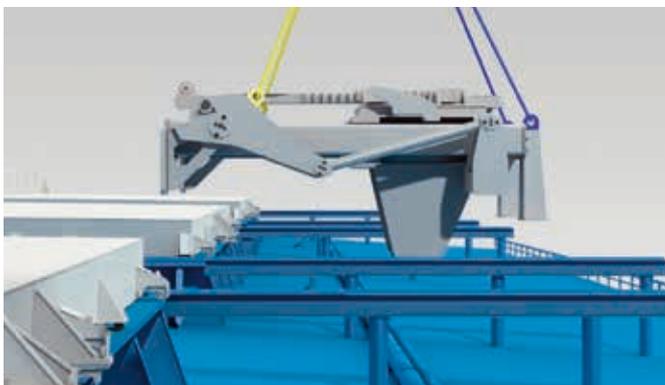
1

INSTALLATION PLATE: The installation plate is the basic interface to the coaming.



2

PEDESTAL ON DECK: A deck-mounted pedestal supports MacRack's outer end.



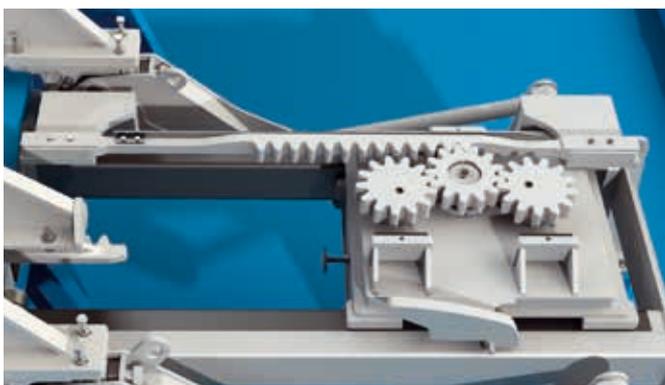
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HOISTING MACRACK ONBOARD



4

INITIAL ADJUSTMENT: Initial adjustment is carried out by inserting/removing shim plates.



5

CONNECTING: Once the MacRack unit is in place, it can be electrically connected.



6

OPERATIONAL TEST AND FINAL ADJUSTMENT: Smooth operation is verified by a test run and any necessary final adjustments are made by inserting/removing shim plates.

Ease of installation

The modular configuration makes a standard installation procedure possible. For shipyards this means speeding up the installation process.

Standard horizontal seals can be used for whole perimeter, because the initial lift is practically straight up.

Due to the nature of bulk shipping, the possible downtime of cargo handling equipment must be reduced to an absolute minimum. It is therefore reassuring to know that MacRack components are interchangeable and that parts can be replaced quickly even on board, or, if necessary, the whole unit can be changed during one port call.

Easy and safe operation

The MacRack comes with two control cabinets, one containing the variable frequency drives and the other one containing the programmable logic control. These cabinets are installed in a sheltered area, e.g. the deck house.



PREPARING FOR OPERATION: Connecting the portable operation unit to the control box.



OPERATION: The portable operation unit allows the operator to move freely around the coaming to observe and control the operation from wherever is most convenient.



Safety is simple solutions

At sea

MacRack's operating mechanism is disengaged from the panel when the vessel is at sea, allowing free relative movements between the ship's hull and hatch covers. This is important to avoid any structural stresses which could allow water to penetrate the cargo hold.

In exceptional conditions

In exceptional conditions, the control system allows optional operating methods, such as manual control mode at reduced speeds.

In fault situation, operation is still possible in manual control mode, with the automatic position control switched off and only low operational speeds allowed.

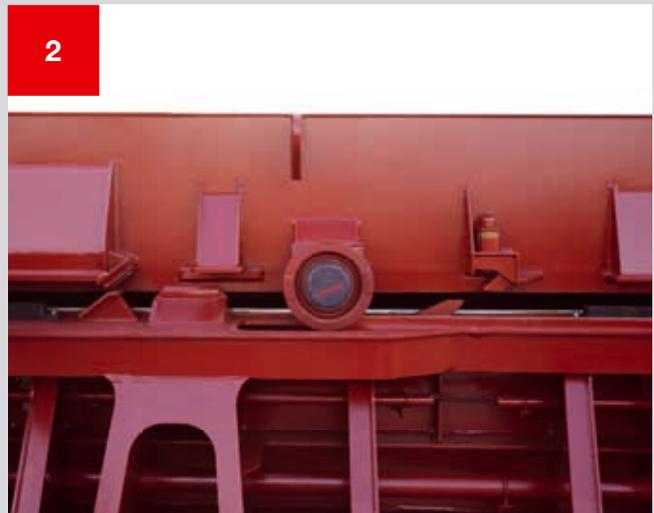
Furthermore, if the system detects a problem this is indicated to the operator by the portable operating unit.

If shipboard electrical power is not available, MacRack units can be connected to an alternative power source via an auxiliary operating unit.

Simultaneous operation

The MacRack unit lifts the hatch cover

The wheel rides up a short ramp onto the rail. At the same time the cleats and the stoppers automatically disengage.



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MacGregor offers world leading engineering solutions and services for handling marine cargoes and offshore loads. The scope of our integrated packages is growing and now also includes Hatlapa, Porsgrunn, Pusnes and Triplex products.

MacGregor serves the offshore, maritime transportation and naval logistics markets in ports and terminals as well as on board ships and rigs. MacGregor solutions combine load and cargo access, stowage, care and handling functions to optimise lifetime profitability, productivity and environmental sustainability.

MacGregor is part of Cargotec. Cargotec's class B shares are quoted on NASDAQ OMX Helsinki Ltd.

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