RoRo

Quarter ramp/door

Planning the quarter ramp/door

Over the years we have designed, manufactured, delivered and installed a great variety of stern quarter ramps/doors for efficient RoRo operations.

The quarter ramp/door will be tailor-made and meet the required needs in terms of quality, efficiency, overall economy and security, while fully meeting the specific operating requirements. Yet it will be standardised in all major functions.

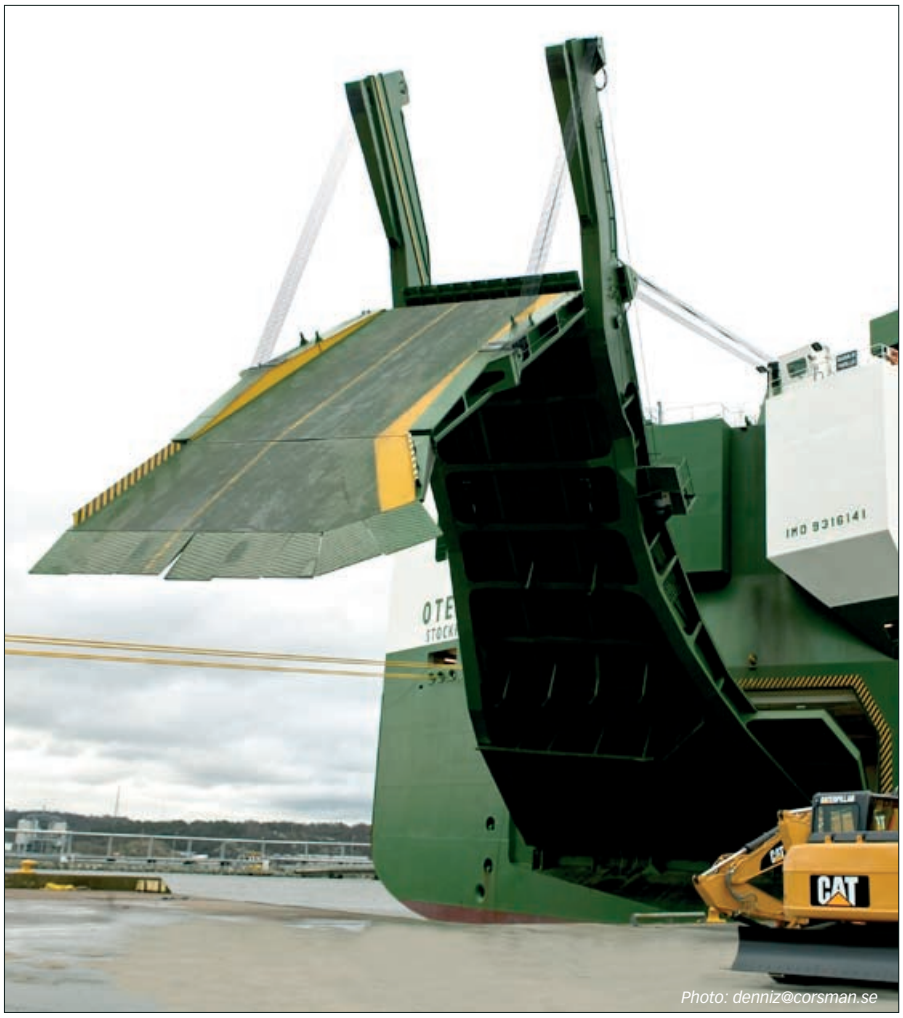
The ramp is normally installed on the starboard side, but port side installations are available.

The quarter ramp is divided into three articulated sections, to meet a specified range of quay heights. It is arranged at 30-40 degrees angle to the vessel's centre line, which allows it to berth at a conventional quay without the need for dedicated RoRo arrangements. It must be designed to cope with all tidal conditions.

Everything from cars, trucks, trailers, high-and-heavy cargo and special project cargo can efficiently be loaded and discharged. Large Car and Truck Carriers (LCTCs) and deepsea RoRo vessels typically have an extra wide and strong stern quarter ramp for loading heavy cargo units.

Container RoRos (ConRos) can carry a full weatherdeck load of various cargo and containers, which are lifted on and off by shore cranes at the ship's forward end, while simultaneously loading and unloading cargo over the quarter ramp. The larger quarter ramp variant is called a jumbo ramp.

The following factors determine the information required before commencing a project. If this information is made available at the earliest stage possible, it saves work in the latter stages of the project. Valuable time is gained by shortening the lead time between the initial contract and delivery.



Operation of the quarter ramp: main winches and wire ropes for section one are located on the uppermost deck, one secondary winch is fitted on the ramp for folding section two.

Quarter ramp types

The quarter ramp/door is divided into three sections: two ramp sections and a ramp foot. Depending on the size and dimensions of the quarter ramp, there are two major types, A and B.

- **A:** The main section is non-watertight. Watertightness is achieved by having a separate stern door. The ramp can be wider than the type B ramp.
- **B:** The main section doubles as a watertight door. This type is less costly than type A.

Options

- Angle adjustment by automated quay sensor buttressing cylinder.
- Manual angle adjustment in steps.

Interface between ship and quay

To establish the length of the ramp, certain important dimensions, as well as information about the maximum gradient and transition angles, are required.

Essential measurements are the height of the threshold deck above water level under ballast and full load, combined with the quay height above water level at both high and low tide, and the distance to quay. Together these give distances A and C. If the gradients are not known, the types of vehicles and wheelbases, clear height and ground clearance should be provided instead.

Based on this input, it is possible to calculate the most suitable ramp length to meet the needs of various operating conditions. The ramp must be lowered onto a horizontal quay. The longest calculated value represents the minimum ramp length. Dimension A is the minimum total length and dimension B is the length of section two, which is derived in relation to distance C (see Fig. 2 to 4).

Electrically-driven cargo access equipment makes car carriers cleaner and more efficient.

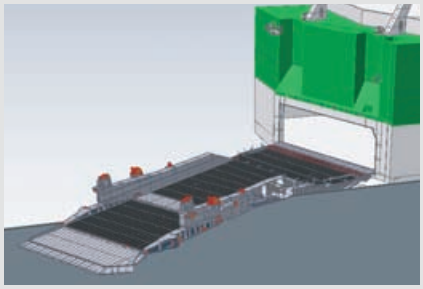


Fig. 1: The main section functions as a watertight door

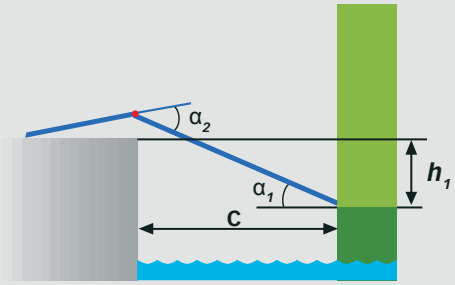


Fig. 2: Loaded ship during low tide
α_1 = Max. gradient
α_2 = Transition angle
C = Hinge to quay distance
h_1 = Max. distance below quay

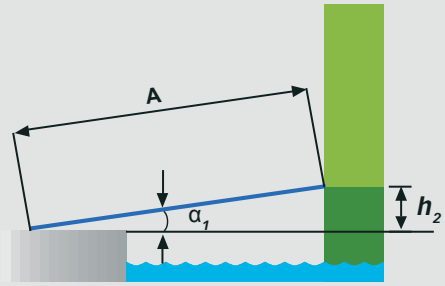


Fig. 3. Light ship during high tide
α_1 = Max. gradient
h_2 = Max. distance above quay

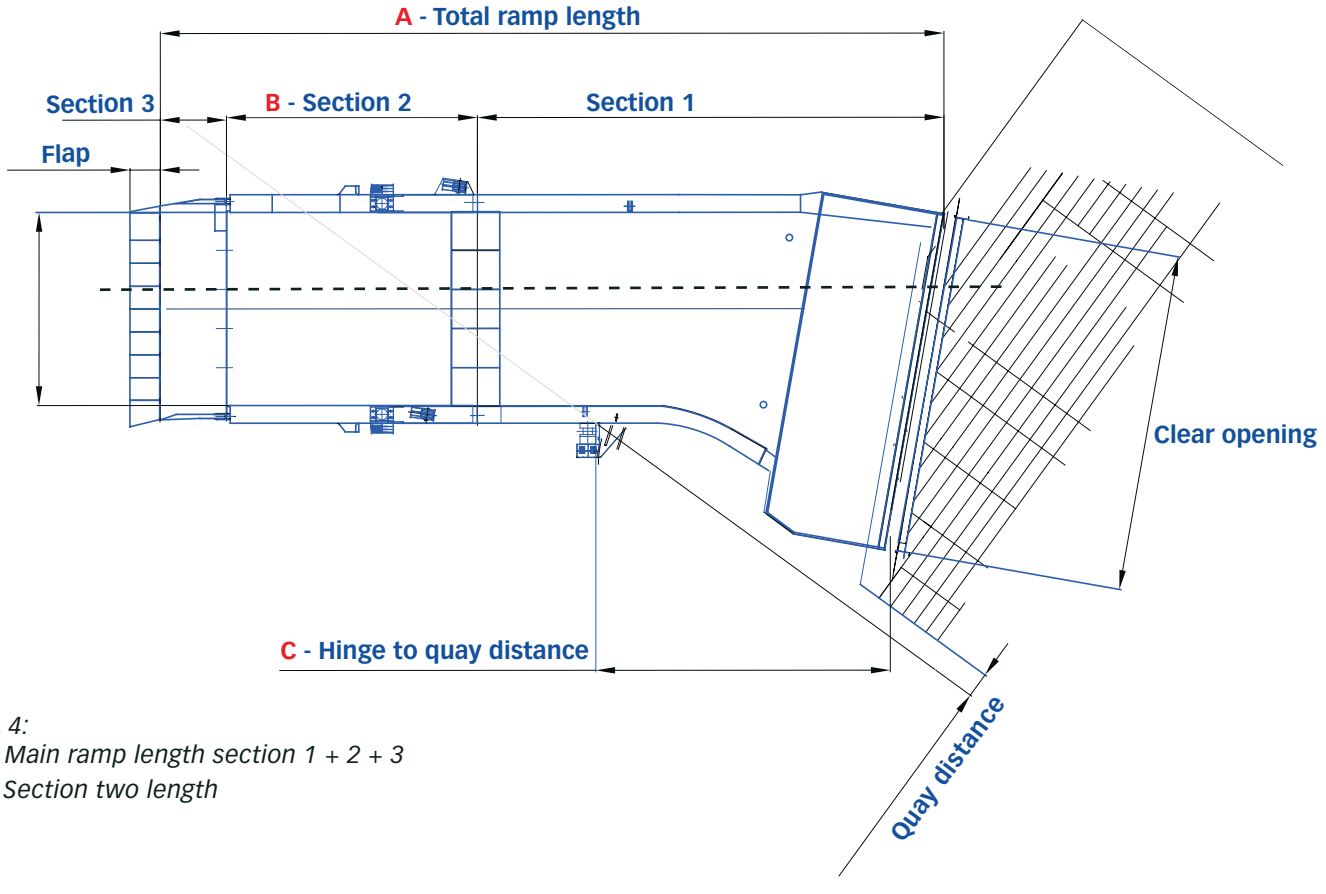
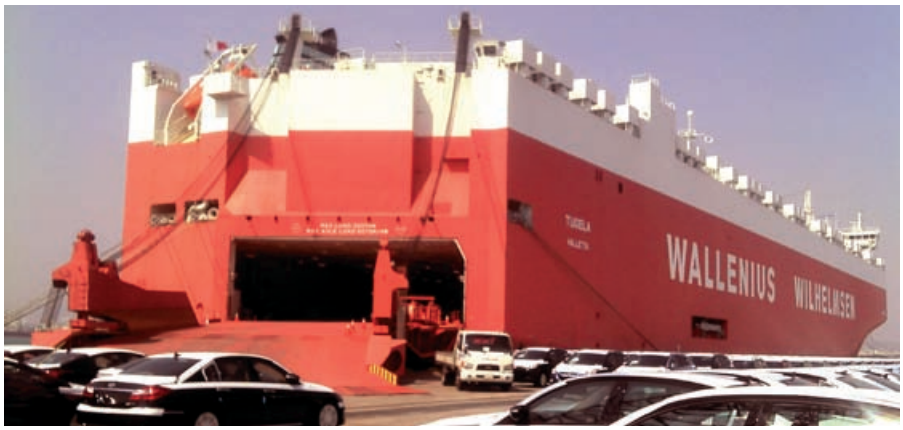


Fig. 4:
A - Main ramp length section 1 + 2 + 3
B - Section two length




Herringbone


Expanded metal


Anti-slip coating

Ramp width

Describe the internal cargo flow at the quarter ramp. Indicate the required number of driving lanes and any pedestrian gangways. Specify the width clearance of the lanes and height clearance.

Loadings

To arrive at the correct dimensions for the steel structure, it is necessary to know the following:

- The type of vehicles that will drive over the ramp
- Axle loading and the print area of each wheel
- Number of axles and the distance between them
- The total load carrying capacity requirements of the ramp, based on the maximum number of vehicles

Operating system options

There are two main operating systems for a quarter ramp:

- Hydraulic winch
- Electric winch

For both options, operations are carried out using winches and wire ropes. In a typical set-up, the main winches are located in the hull in front of the ramp. The winches for folding ramp section two are normally located in section one.

The governing factors for overall operating system capacity are the size of the ramp and the time requirements for raising and lowering of the ramp.

For an average size ramp, 15 to 20 minutes are required for opening and closing the ramp; this excludes opening and closing the securing devices. Hydraulic systems have a maximum and minimum ambient temperature operating limit, which is between +35ºC and -25ºC. The shorter the operating time, the greater the size and cost of the oper-ating system. Clearly, there is also a technical feasibility limit. The electric drive solution is a power-saving option, as power can be fed back into the ship's electrical system when large ramps
are lowered.

Regulatory bodies

MacGregor equipment meets the highest regulatory standards, however, some requirements are specific to certain authorities, so it is necessary to specify which classification societies, national authorities and other organisations, such as the IMO, are to be satisfied.

Control options

Two different control systems are available:

- Semi-automated system: push button or a lever to initiate and complete each opening or closing sequence.
- Manual system: each step in the operation is controlled by hand-operated hydraulic valves.

The greater the degree of system automation, the easier and faster its operation. A fully automated system will be particularly cost-effective on shorter runs where there is a need for faster loading and unloading.

Anti-slip options

Three different anti-slip devices are available. Welded square bars in a herringbone pattern provide a robust skid-resistant, but uneven, surface with a high degree of friction.

Expanded metal provides a lower investment-cost alternative with an even running, high-friction surface, but the design is more prone to mechanical damage and wear, which may lead to higher maintenance costs. The third alternative is an anti-slip coating consisting of epoxy mastic topped with a friction-resistant material, which provides a high-friction, even surface.

MacGregor quarter ramp standard

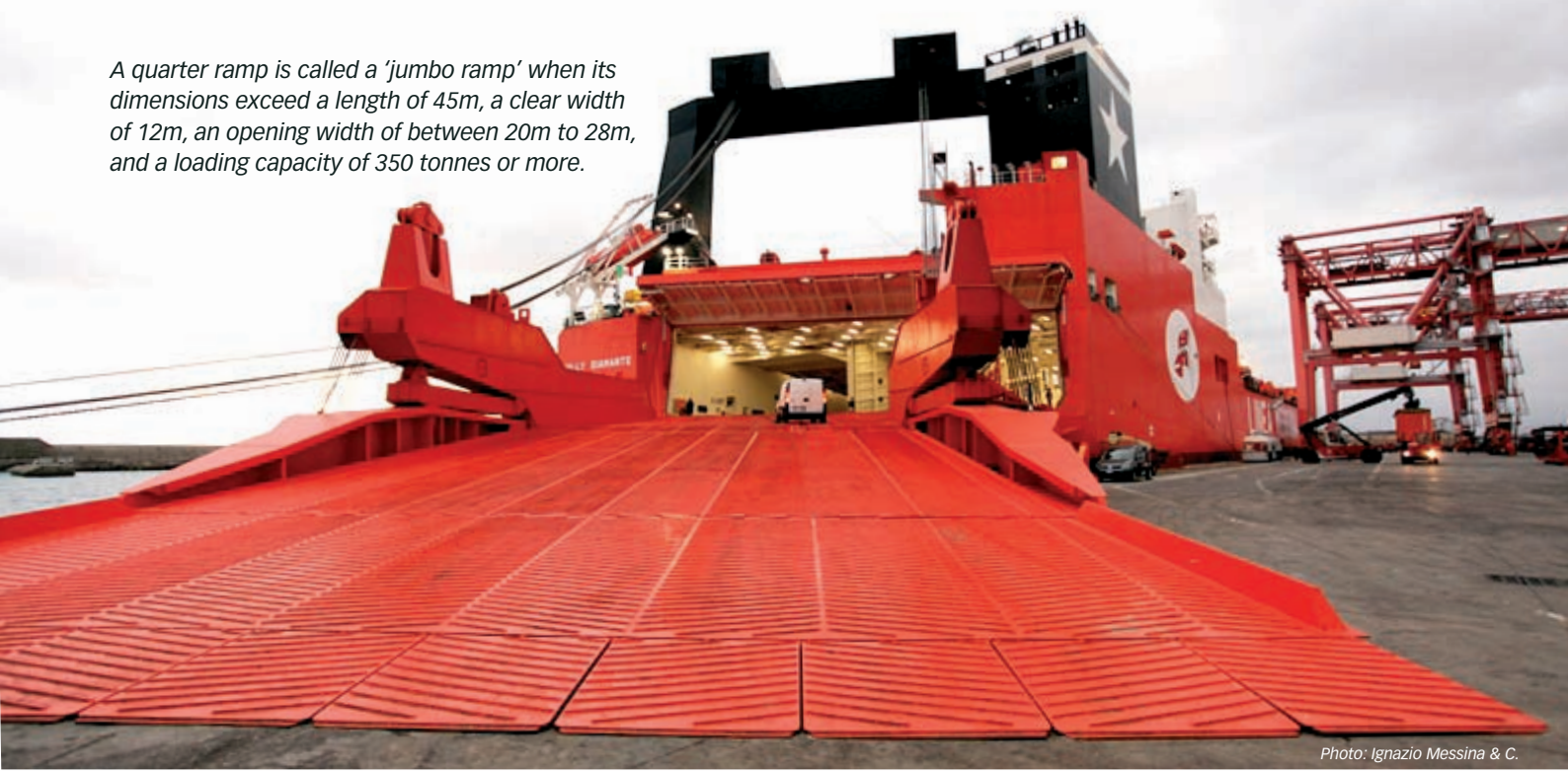
Over the years we have designed and manufactured a great variety of quarter ramps for different types of ships.

We promise that your ramp will meet your needs in terms of quality, efficiency, security and overall economy. Yet it will be standardised in all major functions. In other words, you will be supplied with well-proven equipment, which is easy to repair in the event of an accident and easy to maintain for long-term trouble-free operation. We believe in high quality in every respect.

Steel structure quality

High-tensile steel is used throughout the ramp structure as standard. It is designed as a flat top plate with an open web construction to meet the torsional strength demands from hull movements or the ship heeling.

Fixed wheel kerbs are fitted at each side of the driveway when needed and fixed or foldable handrails wherever possible. Elsewhere, portable handrails are employed.



A quarter ramp is called a 'jumbo ramp' when its dimensions exceed a length of 45m, a clear width of 12m, an opening width of between 20m to 28m, and a loading capacity of 350 tonnes or more.

Photo: Ignazio Messina & C.

Quality of fittings

Shafts and pins that are exposed to the weather are made from stainless steel. Main hinges and cylinders are fitted with spherical bearings.

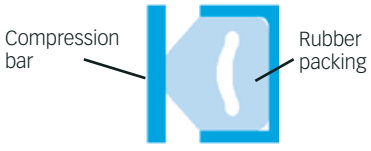
Sealing and securing quality

A rubber packing is placed in and around the perimeter of the opening of the hull. When closing the ramp the rubber is pressed against compression bars made of stainless steel.

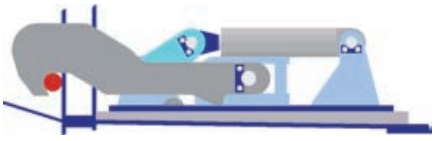
These have a very smooth surface to guard against any penetration of water. The packing is of the sliding type which allows relatively large racking deflection of the stern opening. The ramp is secured in the closed watertight position by hydraulically- or electrically-operated hook cleats and bolts.

These are well-proven MacGregor solutions that can be relied upon in all weathers. The hooks are placed above the stern opening and the bolt cleats at each side of the opening.

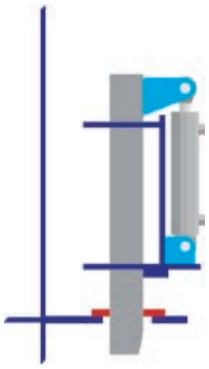
The equipment is easily monitored via a user-friendly touch-screen control panel.



Sealing



Hook cleat



Bolt cleat

ISO9001 • ISO14001
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Lloyd's Register Quality Assurance certifies that the Quality Management System for MacGregor is ISO 9001:2008 compliant.

***MacGregor** is the world's leading brand of engineering solutions and services for handling marine cargoes and offshore loads. MacGregor products serve the maritime transportation, offshore and naval logistics markets, in ports and terminals as well as on board ships. Our cargo flow solutions integrate cargo access, stowage, care and handling functions to suit a particular ship's cargo profile. This benefits its productivity, environmental impact and profitable service lifetime. www.macgregor-group.com*

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