

Logistics solutions for naval vessels

State-of-the-art products and services



Photo: Bernard Bigier, STX Europe

Throughout the lifetime of your ship

Naval ships need reliable cargo handling systems that will enable them to fulfil their intended mission in a fast, safe, efficient manner.

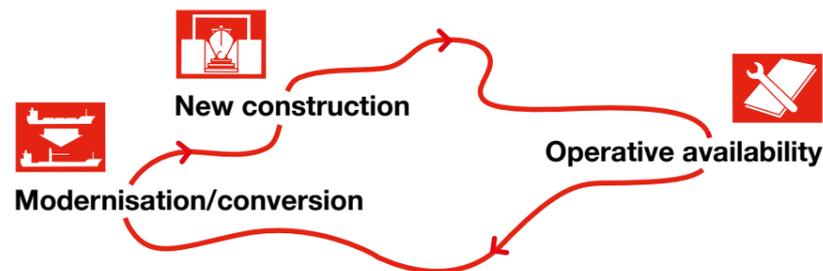
MacGregor offers integrated cargo flow solutions which optimise and enhance the functionality of your ship's cargo profile. This benefits its productivity, environmental impact and profitable service lifetime.

MacGregor equipment is installed on more than 250 ships deployed by the world's navies, as well as on 30,000 ships in the world's merchant fleets. Our robust and reliable equipment and systems incorporate innovative technology and will not let you down in challenging situations.

Early in the design process, before the final general arrangement plans have been decided, we can offer preliminary studies and engineering services. Based on the specified requirements and deployment needs, we can then supply ramps, doors, lifting platforms, hatch covers, cranes, lashing equipment, winches and offshore systems as an integrated solution.

MacGregor is a global company with facilities located near ports worldwide. This is the beginning of a life-long partnership. Once the vessel is in service, we aim to provide lifetime support in the form of maintenance and service solutions that ensure the operative availability and reliability of the equipment.

Throughout the ship's lifetime we can modernise and convert the original solution to optimise the performance to match changing needs.



Strategic reasons to choose MacGregor's solutions

Risk-free solutions, well-proven in commercial operation

MacGregor's long experience in turnkey supplies of shipboard cargo handling solutions, provides the essential reliability, cost efficiency and time savings in the most demanding projects. Robust and reliable MacGregor equipment incorporates innovative technology and have a long track record of operational availability and reliability.

State-of-the-art products

All engineering products and solutions are proven extensively in commercial operation and are adapted for naval applications. Current solutions include the best characteristics of previous generations, combined with innovative technology to meet today's needs for higher efficiency and lower environmental impact.

We have equipped a growing number of the navy-owned and operated fleets and a majority of the specially equipped merchant vessels. The navies concerned know that by stipulating MacGregor's equipment they will be using state-of-the-art equipment from the world's leading supplier.

It is our aim to benefit our customers by driving innovation and taking the lead in further developing safe, energy efficient and sustainable products and solutions.

Low life-cycle cost and lifetime support

We believe that the value of our products and services is not confined to their ability to function well; it extends to their through-life performance, reliability and managed costs, achieved through quality assurance on a global scale.

We have the know-how, the resources, the experience and understanding of naval procedures to meet naval quality requirements. We work closely with shipowners, shipyards, port authorities, suppliers and consultants in designing complete solutions that define all functionalities of a purpose-built ship.

Safety and product quality

Being the market leader, MacGregor's ship experts are invited by national authorities and classification societies to use its expertise, gained from numerous installations, to develop and evaluate new rules and regulations.

As we are actively engaging us in considering all safety issues, the equipment will incorporate a number of safety features and high quality components.

Product quality is ensured by working in close cooperation and having long-established trading relationships with selected qualified sub-contractor partners.

Worldwide ISO certification

All in-house processes are certified to ISO 9001:2008 standards and we have worldwide ISO certification, including all product lines and service centres. In Sweden and at our offshore facilities in China and Singapore, we are also certified to ISO 14000:2004 environmental management system and OHSAS 18001:2008 occupational health and safety management system standards. Our quality assurance covers both in-house and sub-contractors' activities.

Integrated Logistics Support (ILS)

We supply various ILS modules to ensure optimal cost effectiveness, by integrating and influencing design decisions from an equipments dependability, service and lifetime perspective. These ILS elements are developed in cooperation with the customer and end-user, to ensure an optimal system solution.

Energy efficient electric drives

Electrically-driven MacGregor products are energy efficient, easy and safe to use and environmentally-friendly.

Global presence, local service 24/7

Our global network of trained engineers and service personnel, available 24/7, can provide 100 percent level of support readiness, which can be of decisive importance to naval operations.

Dedicated to the needs of the world's navies and coast guards

Being the market leader, we have a reputation for engineering excellence, acquired during more than 75 years in the business. The most well-planned and efficient cargo handling solutions are ensured by involving MacGregor's cargo handling experts at an early planning stage.

Cutting-edge technology

We are always on the forefront of developing high reliability equipment and our R&D experts continue to develop innovative solutions that incorporate innovative technology.

Launch and recovery system

One example is the RHIB launch and recovery system onboard the Littoral Surface Craft Experimental, *Sea Fighter*, formerly *X-Craft*. A multi-purpose stern ramp and cradle system allows manned and unmanned surface and sub-surface vehicles, such as a Rigid-Hull Inflatable Boat (RHIB), to be launched and recovered.

Ramp and heave-compensation technology

Another example is the innovative MacGregor Test Article Vehicle Transfer System (TAVTS) for the US Navy, used to demonstrate the transfer of military vehicles between ships at sea, as part of the Sea Basing strategy.

The delivery included a self-deploying ramp system and a self-deploying side port platform. A dynamic positioning system allows the vessel to hold a specified position and orientation alongside another ship while underway, within a defined tolerance.

Heave compensation mode is employed and laser sensors measure and maintain the spatial and correct relationship between the ramp foot and the platform. During US Navy's full-scale sea trials, personnel and vehicles such as a 70-tonne battle tank were successfully transferred between the ships in high Sea State 3 and low Sea State 4.



An RHIB launch and recovery system



The Test Article Vehicle Transfer System (TAVTS) demonstrates transfer of vehicles between ships at sea

Innovative energy efficient electrically-driven solutions

Electric drives has received an increasing interest of navies from around the world, and represent proven, mainstream technology with a solid history of operational reliability and performance. Environmental benefits are energy savings, the elimination of hydraulic oil leaks, safe operation and easier monitoring.



(RSD) to provide continuous data input for round the clock analysis. The 'health' of a piece of equipment can be assessed at any time. In addition, the electromagnetic brake of an electric motor experiences virtually no wear because it activates at almost zero speed. This makes electric drive almost maintenance-free.

Ease of operation

Quiet technology with smooth, stepless speed control over a wide range delivers precise operation. Automated speed-up and slow-down functions contribute to easy operation. Routine inspections are simplified by the nature of the machinery.

Benefits

- No oil pollution or damage to cargo by hydraulic oil
- Energy savings as no continuous running is needed
- Maintenance-friendly
- Easy to operate, monitor and service
- Time, money and energy is saved while shipbuilding; it is easier to install electrical cable than piping and no pump units are needed.
- No flushing work is required
- No need for high-pressure hydraulic skills
- No pump units are needed
- Easy installation, reduced initial cost

Clean seas and efficient ships

Energy-efficient electric drives use less energy than hydraulically operated equivalents. They are easy to install, monitor and service and eliminate the risk of hydraulic oil leaks that can pollute the sea and damage cargo.

Electric drive product portfolio

- Cranes
- MacRack side-rolling hatch covers
- Winches
- RoRo equipment: stern quarter and stern ramps, side ramps, internal ramps, lifting/loading platforms and shell doors

Electric motors, gears, actuators and winches replace their equivalent hydraulic components and therefore eliminate hydraulic oil leaks.

Electric drives only run when the equipment is manoeuvred, whereas hydraulic drives require continuous pump operation.

Reduced energy consumption

Electrically-driven systems are not affected by pressure drops within the piping system. It is possible to feed power back into the ship's power supply when larger winches, such as those found on quarter ramps, lower heavy loads.

Easy to service

Electric drives are easy to monitor and service. When using all electric components, onboard monitoring systems (OMS) make diagnostic fault-finding easy. The equipment can be linked to remote diagnostic systems

Complete project packages

Consult us for the entire scope of your project and save time and costs. We have the flexibility to adapt our organisation to your needs. MacGregor products can be purchased in a variety of forms, ranging from the design and supply of key components to complete deliveries on a turnkey basis.

Complete deliveries are the most cost-efficient solution from an installation and commissioning point of view. It simplifies the ship-building process for the shipowner and shipyard. Tailor-made MacGregor equipment can be supplied as an efficient and optimised solution package that includes the design, installation, commissioning, service, spare parts and crew training. The benefits are considerable.

Cranes for challenging operations

Our crane product portfolio covers all the cargo-handling demands of the marine and offshore industries. Being a world-leading cargo crane supplier with extensive experience and know-how, we have over the years designed and successfully introduced a wide range of MacGregor crane types suitable for a variety of challenging operations, such as rough seas, subsea, ship-to-ship, rescue, high sea states and heavy loads.

Where appropriate, cranes are equipped with active heave compensation systems that enable modern subsea vessels to continue working under adverse weather conditions.

Shipboard cranes

Luffing, knuckle-jib and telescoping-type shipboard cranes are designed for safe and accurate deck lifts on board ships and offshore installations, and cargo handling within harbours. The cranes are delivered with the appropriate safe working loads and various slew bearing dimensions and pedestal heights to accommodate operational requirements and industry regulations.

MacGregor shipboard cranes can be mounted on a CRV (cargo-rail vehicle) trolley system, which enables them to travel along the cargo rail covering the entire length of the aft deck on offshore vessels. These cranes can also be fitted with various manipulators for specific deck operations. Robust and extremely smooth to control via remote control system, our cranes give the operator a new tool for safer deck operations.



Two sets of twin cranes in a quadralift team operation



Cargo rail crane outfitted with a deck handling manipulator for safer and more flexible operations on the aft deck



U.S. Navy by Mass Comm. Spec. 2nd Class Meranda L. Keller

A Sea State crane

Sea State cranes

Higher sea states often create problems during operations at sea. Sometimes it is not enough having a skilled crane operator to cope with them; this can endanger the safety of employees and cargo. A number of our systems can be used to simplify loading and offloading during difficult sea conditions. The systems, well adapted to work on US Navy vessels, are divided into three modes: RBTS, IRBTS and NAPA.

Rider Block Tagline System (RBTS)

RBTS is an anti-pendulation system that reduces the amplitude of load oscillations. The system can also be used to move the cargo closer to the crane, which can prove to be a helpful tool for accurate load positioning.

The RBTS uses a rider block, which is controlled by winches. The block lowers the effective position of the crane top, resulting in a shorter pendulum length and providing the crane operator with the opportunity to remove the load from resonance frequencies.

Integrated Rider Block Tagline System (IRBTS)

A crane with RBTS has five degrees of freedom. To minimise steering complexity for the crane operator, by reducing the crane's degrees of

freedom to three, an IRBTS can be used instead of an RBTS. The IRBTS is a further development of the Rider Block Tagline System and has an integrated built-in intelligence that automatically controls the rider block.

Anti Pendulation Control (APC)

The most advanced system, APC, takes the anti-pendulation systems to a higher level by using a set of motion sensors to detect and prevent pendulations induced by sea motion and other forces. The sensors can detect

movements of both the crane and the load. Another important feature of APC is its ability to compensate for ship motions in other vessels during ship-to-ship operations.

Similar sensors are placed on the target vessel and APC uses motion data from both vessels to make cargo landing and lifting operations as smooth and safe as possible. APC can be used with or without RBTS/IRBTS.



MacGregor's unique cargo handling aid cancels out swing motions when cranes are transferring cargo between moving or stationary locations

Active heave compensation technology assures safe and accurate subsea lifting operations



Offshore equipment

You will find that our innovative offshore solutions will help you accomplish your mission in the toughest environments and will withstand any challenge as your operations take you to colder climates, greater depths and rougher seas. MacGregor's equipment is designed to meet offshore needs and ensures smooth and efficient operations.

- Cranes: Active Heave Compensation (AHC) subsea, rescue and marine shipboard cranes
- Rescue davits
- Deck handling equipment
- Launch-and-recovery systems (LARS) for remotely operated vehicles (ROVs)/remotely operated tools (ROTs)
- Winches: Umbilical and Advanced winch systems for anchor handling, towing and mooring

- Fibre rope handling systems for ultra deepwater operations
- Module handling systems
- A-frames

Active heave compensated subsea cranes

Our subsea cranes of active boost or semi-active type are designed for accurate subsea lifts in harshest of environments worldwide. Active heave compensation, auto-tension and auxiliary winch and tugger winch functions are integrated within a powerful and intuitive control system, assuring precision and safety of critical operations. The cranes may be designed to handle loads up to 1200 tonnes at depths down to 4000 meters (HPU and winch may be placed below deck). Numerous other functions and options are available.

Launch and Recovery Systems

MacGregor offers a comprehensive portfolio of Launch and Recovery Systems (LARS) for all types of ROV/Ts in service today.

We offer portable, overhead and deck-mounted A-frames and moonpool-based LARS systems. These robust and accurate systems enable safe operation of heavy tools in adverse weather conditions of -20°C to +40°C and sea states up to Hs6 at unlimited depths (exceeding 6,000m).

In addition, we offer a wide range of optional equipment and provide tailor-made solutions in accordance with client's specifications to accommodate any ROV/T.



An anchor handling winch.

Winches

The standard designs of MacGregor winches with up to 600 tonnes line pull are based on extensive experience of winches for offshore, subsea and marine operations.

Power packs and control systems are normally supplied as a complete package together with our winches, windlasses, capstans and shark jaw tow pins.

Although usually equipped with hydraulic motors, the equipment can be supplied with electrical drives. All MacGregor winch systems are designed in compliance with classification rules and standards.

Rescue davits

Rescue and workboat davits, including pivoting and telescoping types, are available for handling small or large daughter craft including MOB and other rescue boats.

SOLAS approved davits incorporate emergency backup power systems for guaranteed operation even during dead-ship conditions. Davits can make use of optional shock absorbers, heave compensation and/or constant tension features for safer handling in severe weather conditions and for heavy boats. An associated towing boom — slewing, luffing or telescoping — with optional jigger winch keeps the boat under control during launch and recovery.

A-Frames

We supply a complete range of self-contained and self-erecting A-Frames with capacity of up to 800 tonnes. A-Frames are available in centre-rigged, side-rigged, knuckle-jib and telescopic versions. They may include winches and pendulum dampening scissor frames.

A-Frames can be either side- or stern-mounted. They are designed for a variety of load handling operations offshore, such as launch and recovery of special equipment, ploughing and trenching, deep ocean scientific operations and missions in hazardous environments.



Rescue davits are designed for easy installation, efficient space utilisation and reliable, long-time operations in severe conditions



LARS expand the operational weather window in the harshest environments

Swift and safe docking of landing craft achieved using a submersible stern ramp



BAE Systems, Mary-Anne Lane

The side ramp on board Landing Helicopter Dock (LHD) HMAS Canberra that provide access for 65-tonne vehicles

RoRo equipment

We focus on innovative RoRo cargo access solutions to secure ship integrity and increase mission flexibility:

- Side, bow and stern ramps/doors
- Submersible stern ramps
- Ramp-to-ramp marrying
- Ship-to-ship transfer systems
- Internal doors
- Internal ramp covers
- Internal hoistable ramps
- Lifting platforms for helicopters and cargo
- Turntables.



An internal hoistable ramp



A helicopter lifting platform on board Landing Helicopter Dock (LHD) Dixmude BPC3.



A hangar door



Hatch covers must meet two principal requirements: safety and ease of cargo handling operations

Hatch covers

MacGregor hatch covers are safe and cost-effective, offering long service lifetimes, with low maintenance costs.

Weather-tightness is assured and strong emphasis is placed on manufacturing covers with either corrosion-free or easily replaceable components.

MacGregor hatch cover types:

- lift-away
- standard folding
- multi-folding
- side-rolling
- stacking
- tweendecks
- pivoting
- movable bulkheads.

Lashing systems

A full range of MacGregor lashing systems for naval ships of all types is available.

Convert to adapt to new needs



MacGregor sliding bulkhead doors fulfil SOLAS requirements onboard RFA Argus.

MacGregor's modernisation solutions are a cost-effective way of enhancing or modifying ships to meet changing market requirements. It can be a retrofit or an upgrade; replacement, addition or alteration of an existing cargo flow system.

Our know-how and global presence ensure short lead times and rapid completion of all projects and turnkey delivery, from the smallest alteration to a complete conversion.

Especially appointed conversion teams utilise our global resources for efficient project execution.

Modernisation

We have the expertise and the resources to upgrade outdated cargo flow equipment to the latest performance standards.

Conversions

Our comprehensive turnkey conversion packages adapt, enhance, or change the original design of the ship and the functionality of the system, re-designing it to meet changing deployment requirements and extending the lifetime of your equipment. We take full responsibility for the design, materials and installation of our conversion deliveries.

They may involve a complete turnkey delivery including an initial study, technical solutions, design, manufacture and installation.

Conversions are carefully pre-planned operations. They will be carried out with minimum effect on ships' schedules and they will be performed in the shortest time possible to reduce the ship's off-hire period.

Even if most of the work has to be carried out in port or at the shipyard, our resources allow conversions to be carried out at sea.

Worldwide presence, local service



Operative availability

Our ambition is to ensure the operative availability of your MacGregor systems. MacGregor's cargo flow experts are on standby worldwide to provide a rapid response to your needs.

We operate in approximately 50 countries we are constantly strengthening our local presence to meet changing market needs. MacGregor's service network consists of more than 60 service centres in major ports around the globe, staffed by specialists.

Spare part packages

As we supply commercial fleets with original MacGregor spare parts and repair services on a planned schedule, on demand, or on an emergency basis, we can supply spare parts at short notice.

Global presence 24/7

Our service portfolio covers a wide range of service products for on board, offshore and onshore equipment. Armed with our world-class expertise in cargo and load handling, we can provide service to our customers all over the world. Our worldwide service network means that we are able to respond rapidly to our customer's needs.

Planned maintenance

MacGregor's planned maintenance concept relies on the solid foundation of the worldwide service network, and

allows you to plan your operating budget.

On demand service

Our service centres worldwide solve problems as they arise, helping to keep your ship up and running. We also provide a comprehensive damage assessment and repair service.

MacGregor Onboard Care (MOC) service contracts

Availability support, onboard maintenance, spare part management and customer training are the four main elements of an MOC service contract. It offers a modular service concept where you can choose the necessary modules to suit your individual needs in terms of operating security, budgets and comfort.

Crew training

Tailor-made theoretical and hands-on crew training in the maintenance and operation of MacGregor's equipment and systems.

Inspections

Inspections produce neutral reports on equipment condition and provide recommendations for necessary repair work and spare parts.

Inspections do not affect your ship schedules. As the equipment gets professional attention on a regular basis, the crew is released for productive tasks instead of time-consuming inspection

and maintenance work.

Avoid breakdowns and keep your equipment operational. An inspection provides:

- Regular, tailored inspections for each product
- Quick analysis of the situation
- Professional, neutral reports on findings
- Recommendations for remedial measures
- Fixed prices for maintenance
- Global availability of standby expert resources

Frequent assessment of the condition of equipment is available anywhere in the world, through remote diagnostics and onboard inspections.

Drydockings

Let us know your schedule well in advance and we will plan drydocking services for you accordingly.

Naval references – extract

MacGregor equipment is installed on more than 250 naval and coast guard ships as well as on 30,000 merchant ships. Below is an extract from our extensive reference list.



SEALIFT, PREPOSITIONING AND MULTIROLE SHIPS

United States

- **Fast Sealift Ships Algol class (8 ships)**
Conversions: RoRo equipment, cranes
- **LMSR Bob Hope class (7 ships)**
Class Standard Equipment and internal access equipment, cranes.
- **LMSR Bob Hope class (2 ships)**
Conversion of slewing stern ramp for launching of amphibious vehicles.
- **LMSR Watson Class (8 ships)**
Class Standard Equipment, cranes
- **LMSR Watson Class (2 ships)**
Conversion of slewing stern ramp for launching of amphibious vehicles.
- **LMSR Gordon class (2 ships)**
Conversions: Class Standard Equipment, internal access equipment, cranes
- **LMSR Shughart class (3 ships)**
Conversions: Class Standard Equipment, cranes
- **LMSR Shughart class (21 ships)**
Conversion of slewing stern ramp for launching of amphibious vehicles.
- **MPS – Military Prepositioning Ships (13 ships)**
Extensive range of single and twin-cargo handling cranes, slewing stern ramps, hoistable ramps and decks, shell and stern doors, hatch covers

United Kingdom

- **Point Class Sealift Ships (6 ships)**
Stern ramp/door, side ramp/door and internal door, cargo handling cranes

New Zealand

- **Multirole Vessel**
Stern ramp/door, side ramp/door and internal door

France

- **Multipurpose Frigates (8 ships)** Patrol boat davits



AMPHIBIOUS/DOCK AND LANDING SHIPS

United Kingdom

- **Albion Class LPD (2 ships)**
Stern ramp, side ramp and internal ramps

France

- **Mistral Class LHD (3 ships)**
Helicopter lifting platforms, stern and side ramp, internal doors
- **Foudre Class LPD (2 ships)**
Helicopter lifting platform, bulkhead doors, hatch covers, and stern and bow ramps/doors, including functionality for stern amphibious operation
- **Batral Series LST (10 ships)**
Stern and bow ramp/door and hoistable ramp

Greece

- **Jason class LST (5 ships)**
Stern ramp, bow ramp, bow door, bulkhead door, internal ramp, turntable

Spain

- **Strategic Projection Ship**
Stern ramp/door, including functionality for amphibious operation
- **Galicia Class LPD (2 ships)**
Stern ramp/door, including functionality for amphibious operation

Singapore

- **Endurance Class LPD (4 ships)**
Helicopter lifting platforms, stern and bow ramp/door, including functionality for amphibious operation

Korea

- **Dokdo Class LPH**
Stern ramp/door, side ramp/door and internal doors

Australia

- **Canberra Class LHD (2 ships)**
Stern gate, side ramp, light lifting platform, side shell door

Thailand

- **Endurance Class LPD**
Stern ramp/door, side ramp/door, lifting platform, hangar door, turntable

India

- **Shardul Class LST (3 ships)**
Bow doors, bow ramp, hatch ramp, hatch cover



LOGISTIC SUPPORT, SURFACE AND COAST GUARD SHIPS

United States

- **T-ACS Crane Ships (7 ships)**
Twin cargo handling cranes
- **T-AKE Lewis and Clark Class Dry Cargo/Ammunition Ships (14 ships)**
Cranes and hoists
- **Littoral Surface Craft-Experimental Sea Fighter (formerly X-Craft)**
Launch and retrieval system for RIBs, lifting platform

Thailand

- **Offshore Patrol Helicopter Carrier**
Helicopter lifting platforms, ammunition/supply lifting platforms

Norway

- **Nansen Class Frigates (5 ships)**
Rescue davits
- **Norren Class Coast Guard Patrol Vessel (4 ships)**
Rescue davits

Spain

- **Patrol Boats**
Advanced davits

Greece

- **Ydra Class Frigates (3 ships)**
Offshore/rescue cranes

France

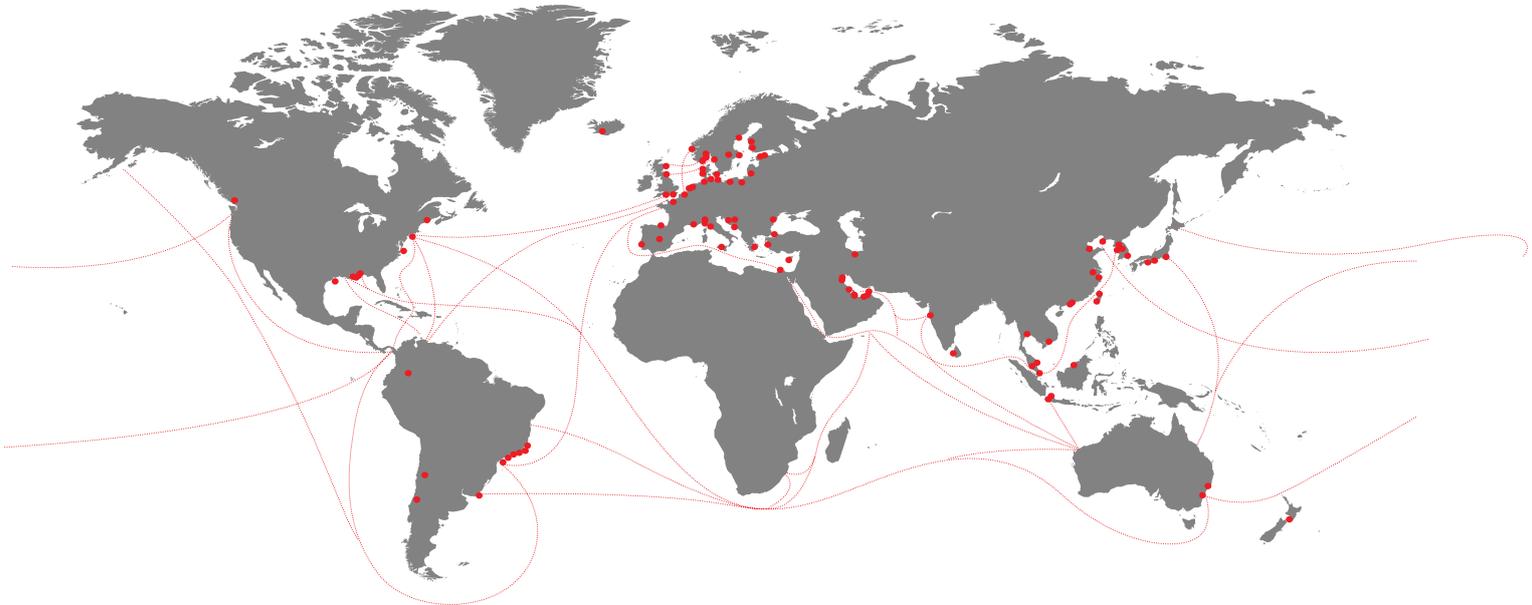
- **Oceanographic Vessel**
Special hydrographic workboat handling system
- **Specialised Navy Offshore Vessels**
Offshore telescopic crane
- **Coast Guard Multi-purpose Salvage Tugs/Standby Safety Vessels**
Cranes and advanced rescue davits
- **Coast Guard Standby Safety Vessels**
Cranes and advanced rescue davits

United Kingdom

- **Aviation training/primary casualty receiving ship - Conversion (1 ship)**
Bulkhead doors (SOLAS stability compliance)

Wherever needed, you can rely on our support.
We serve our brands globally:

- Ankerlökken Marine
- Allset
- ASCA
- Becker
- BMH
- Conver-OSR
- Grampian Hydraulics
- Flintstone
- Greer Marine
- Hamworthy
- Hatlapa
- Hydramarine
- Häggglunds
- Interschalt
- KGW
- KYB - ASCA
- KYB - Kayaba Industries / Navire Cargo Gear
- Luezhoe
- MacGregor
- MacGregor-Conver
- MacGregor-Häggglunds
- MacGregor-Kayaba
- MacGregor-Navire
- Navire Cargo Gear
- Nordströms
- Ozean Service & Reparatur
- Platform Crane Services (PCS)
- Plimsoll
- Pusnes
- Porsgrunn
- Rapp Marine
- Triplex
- Vestnorsk Hydraulikkservice (VNH)



MacGregor shapes the offshore and marine industries by offering world-leading engineering solutions and services with a strong portfolio of MacGregor, Hatlapa, Porsgrunn, Pusnes and Triplex brands. Shipbuilders, owners and operators are able to optimise the lifetime profitability, safety, reliability and environmental sustainability of their operations by working in close cooperation with MacGregor.

MacGregor solutions and services for handling marine cargoes, vessel operations, offshore loads, crude/LNG transfer and offshore mooring are all *designed to perform with the sea*.

MacGregor is part of Cargotec (Nasdaq Helsinki: CGCBV).

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