

# MacGregor News

 **MACGREGOR**

Customer magazine Issue 173 Autumn 2018

## Customers benefit from **intelligent cargo handling** 6

[www.macgregor.com](http://www.macgregor.com)

It pays to put cargo at  
the core of ship design  
page 11

Co-creation projects  
pioneer industry advances  
page 14

Combined expertise cuts  
wind turbine installation times  
page 16



A new digital era has intelligent cargo handling at its core

6



MacGregor on social media networks

Have you visited our social media channels yet? Follow us on LinkedIn to receive our latest news and to learn more about upcoming job opportunities. Follow us on YouTube – [youtube.com/c/macgregor](https://youtube.com/c/macgregor)





MacGregor News is MacGregor's customer magazine with distribution of approximately 15,000 copies. **Publisher:** MacGregor, part of Cargotec. **Editor-in-Chief:** Heli Malkavaara **Layout:** Zeeland Family **Printed by:** Punamusta, Joensuu, Finland. The opinions expressed by the authors or individuals interviewed do not necessarily represent the views of MacGregor. The content of the magazine (with the exception of photos) may be reproduced provided that the source is mentioned.

## contents

- 4** News
- 6** Smart, connected solutions: delivering benefits way beyond basic functions
- 11** It pays to put cargo at the core of ship design
- 12** Cargo Boost: take your vessel from under to over achieving
- 14** Co-creation projects pioneer industry advances
- 16** Combined expertise cuts wind turbine installation times
- 18** Autonomous discharging cranes: raising bulk handling standards
- 20** New-generation bow loading system showcases improved connections
- 23** FibreTrac: fibre-rope crane construction enters final stages
- 24** Lifecycle support ensures long-term success
- 25** Green conversions: a clean switch from traditional hydraulic oils to biodegradable ones
- 26** RoRo expertise bridges the continental construction gap between China and Europe
- 28** Ramp flap innovation helps keep ports quiet
- 30** Fishing fleets gain from expanded expertise
- 34** Industry seeks MacGregor's professional opinion

MacGregor shapes the offshore and marine industries by offering world-leading engineering solutions and services with a strong portfolio of MacGregor, Hatlapa, Porsgrunn, Pusnes, Rapp Marine 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*.

[www.macgregor.com](http://www.macgregor.com)

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

## Not just clever, but smart solutions

MacGregor's commitment to shape the maritime industry, drive its transformation and pioneer intelligent cargo handling means that we are investing in the growth of digital services, which are being developed under the MacGregor Smart framework (page 6).

We all operate our businesses in an increasingly digitised environment, with many new smart solutions available to make operations safer, more efficient, and in turn, more profitable. The key to successfully adopting them is identifying which solution would make the most difference and then effectively implementing it to ensure that it delivers the best advantage. Knowing which solution to choose may be obvious to some, but in many cases it is undetectable losses that mean profits are literally slipping through the fingers of operators.

MacGregor understands that customers in every sector need different solutions because their priorities are different, and their customers' priorities are different again.

We want our customers to be able to capitalise on the wide-ranging benefits that our broad digital portfolio can offer. These solutions are not long-hoped for dreams, but are available now. We can monitor, safeguard and optimise assets and operational performance. We can help reduce inefficiencies and maximise capacity utilisation and, through automation, improve safety and efficiency even further. For example, we are delivering the very first autonomous discharging cranes the industry has seen (page 18).

Our other commitments also continue. We are strengthening our position in China with a new joint venture (page 4) and our Shanghai-based RoRo team is proving invaluable for European owners looking for guidance when embarking on newbuild projects in the country (page 26).

The fisheries and high-end, specialist research vessel sector can now benefit from our acquisition of Rapp Marine and we are already seeing ground-breaking technology stemming from our broader portfolio (page 30). MacGregor's first fibre-rope offshore crane, known as FibreTrac, is entering its final stages of construction, ready for introduction to the market later in the year (page 23). We are confident that the technology will deliver some of the most significant advances that the offshore load handling market has seen in years.

On a final note, we maintain our position that the industry landscape is changing so fast that all major stakeholders must work together. Through collaborations, we are shifting the way that we develop products and services for customers, ensuring that they reap the benefits (page 14).



Michel van Roozendaal, President, MacGregor

# news 360°



Thirty years of cooperation underpins first CSSC Nanjing Luzhou and MacGregor joint venture production facility

Sun Wei, Vice President, CSSC Group (right) and Michel van Roozendaal, President, MacGregor (left)

Earlier this year, MacGregor and China State Shipbuilding Corporation's (CSSC) Nanjing Luzhou Machine Co., Ltd. (LMC) opened their first joint venture production facility in Nanjing, China. Thirty years of successful cooperation underpins the trust that CSSC LMC and MacGregor have established. The joint venture is the next logical step for the companies and represents a new era of a long-term strategic cooperation. It also strengthens MacGregor's commitment to be closer to customers, partners and key stakeholders in Asia.

"This joint venture establishment is a new cooperation model between our companies who both operate in the challenging market conditions," says **Sun Wei**, Vice President, CSSC Group. "CSSC Nanjing Luzhou and MacGregor

have built a solid foundation through 30 years of friendly cooperation. The new joint venture will combine MacGregor's strengths in design, technology, management and global aftersales service with Nanjing Luzhou's strengths in domestic production and sales based on the scale and industry strength of the CSSC Group.

"By actively exploring effective and innovative ways of cooperation, we are together able to achieve a win-win situation and good market prospects for the joint venture," notes Mr Sun.

The vast majority of global shipbuilding takes place in Asia, with China having the largest share. CSSC is a leading company in this major market, and a very important cooperation partner for MacGregor.

"When looking at CSSC and MacGregor, we see two leaders joining forces," continues **Michel van Roozendaal**, President, MacGregor. "CSSC is the primary shipbuilding group in China, and well positioned as a global leader in the industry. MacGregor is the global leading expert of marine and offshore cargo and load handling solutions. We shape the industry we operate in and this powerful combination will help us serve our customers even better than before."

The joint venture production facility will be gradually developed by both companies to become the centre of excellence for air compressors, with an aim to progressively expand the cooperation to include other suitable products in the future.

# Offshore mooring expertise wins customer appreciation

**M**acGregor Pusnes offshore mooring systems now successfully secured Royal Dutch Shell's largest semi-submersible floating production system (FPS) in the Gulf of Mexico, *Appomattox*. Moored at a depth of over 2,100m in hurricane-prone waters, *Appomattox* is designed for decades of continuous production and is stationed in the Gulf of Mexico's Mississippi Canyon, 129km from Louisiana shores.

"It would have been impossible to maintain and operate the equipment to hook-up the mooring lines, pre-stretch the polyester ropes, move the FPS to the riser hook-up position, and secure the platform chains in a timely manner without the assistance provided by the MacGregor team," says Shell representative, **Pierre Liagre**. "It has been tough work and there were some stressful moments, but we came out victorious with *Appomattox* being installed to safely withstand hurricanes and in position to receive the first riser."

*Appomattox's* mooring line hook-up was a carefully-planned operation, led by marine

contractors, Heerema, in cooperation with Shell and MacGregor.

During this year's Offshore Technology Conference (OTC) in Houston, USA, Mr Liagre awarded a prize to **Høye Høyesen**, Vice President, Advanced Offshore Solutions, MacGregor, as a token of the multi-national oil company's appreciation of the outstanding work MacGregor performed during the *Appomattox* project.

"Offshore hook-ups are a critical phase for the client, with high-cost risks," says Mr Høyesen. "During these operations we are really able to demonstrate the quality of our skills and capabilities.

"Throughout the whole project, we never lost our focus on safety and the environment, and its successful mooring shows this," he adds.

In addition to this third semi-submersible production platform, there are thirteen spar platforms in the Gulf of Mexico with Pusnes mooring systems from MacGregor.

*Appomattox* has been successfully secured with MacGregor Pusnes offshore mooring systems in a carefully-planned operation led by marine contractors, Heerema, in cooperation with Shell and MacGregor



# Seven Hapag-Lloyd container vessels benefit from enhanced earning potential

**E**arlier this year, MacGregor completed the upgrade and optimisation of the container stowage systems on board seven Hapag-Lloyd C-class (Samsung 9,300 TEU series) container vessels. The work was carried out under a MacGregor Cargo Boost service, designed to increase the earning potential of existing container vessels through improving cargo carrying efficiency.

"Prior to the contracts, Hapag-Lloyd and MacGregor worked closely to identify the optimum solution for each cargo system and its implementation process," says **Tommi Keskilohko**, Director, Customer Innovations, Cargo Handling, MacGregor. "Every MacGregor Cargo Boost upgrade is unique to ensure that it matches a shipowner's specific needs. However, all are designed to maximise a vessel's efficiency, deliver a better return on investment for the owner and to reduce emissions per transported cargo unit."

These particular upgrades were designed to deliver greater cargo system flexibility and allow for higher stack weights for 40ft containers; a sector identified as holding some revenue potential.

"In the case of these C-class vessels, it was not possible to take them out of service for any length of time; therefore all work had to be done under tight schedules and completed within only a couple of working days," explained **Lutz-Michael Dyck**, Director Technical Fleet Management at Hapag-Lloyd. "This called for very careful and detailed pre-planning, which was complemented with full-time supervision on board the vessels during the upgrade work."

When the first three optimised vessels were returned to service Mr Dyck noted that: "We are very satisfied with MacGregor's performance."





# Smart, connected solutions, delivering benefits **way beyond a basic function**

The industry is on the brink of a new digital era with intelligent cargo handling at its core; **Pasi Lehtonen**, Senior Vice President, Marketing, Business Development and Strategy, explains how MacGregor can help customers to capture the benefits

**T**he fact is, the world is changing, digitalisation and intelligent solutions are being delivered at an incredible pace. As a leader in cargo handling, we also need to be a leader in intelligent cargo handling.

We are uniquely positioned to lead. Cargotec has a broad footprint in cargo flow ecosystems and a holistic understanding of every different element of cargo handling value chains. MacGregor focuses on cargo handling at sea, Kalmar in port and Hiab on the road.

But what does intelligent cargo handling mean? In the past, the maritime industry used to be a very mechanical business, driven by applications using hydraulic systems. The trend has been the gradual movement towards the electrification of equipment, which has opened the door further towards automation. It has been an evolutionary process.

## Connected equipment

Our framework for developing intelligent systems is called MacGregor Smart. We are building digital features into MacGregor equipment and by the end of the year, all new relevant equipment will be configured to offer connectivity capabilities, and ready to be activated if a customer requests it. Digitally connected equipment on a vessel at sea can bring significant value to customers' operations through remote equipment monitoring, trouble-shooting, and preventative maintenance.

Connectivity in our equipment is a first step in a wider picture, leading to many other possibilities. It is still equipment-centric, but one cannot avoid or skip this step as it is the building block for future developments.

A key part of MacGregor Smart is cargo awareness. We predict the status of equipment, and then we safeguard the cargo associated with it. At this point we are not just thinking about MacGregor equipment any more, we

are thinking about the cargo itself; the underlying purpose of the vessel. Is the cargo safe and lashed properly, or is it moving? Are the hatch covers leaking? Is the cargo overheating? We are not only experts in the equipment that we provide, this expertise also extends to the transportation of the cargo that our equipment moves, stows and protects.

## Beyond conventional functions

If we take a typical product, for example hatch covers. They are critical parts of the vessel's structure and customers need them. Hatch covers are designed to keep the cargo and the vessel safe. But they do not guarantee that cargo condition always remains unchanged. As the industry thought leader, we have added intelligence to the hatch covers. Our systems will assess and measure hatch cover performance and inform customers if there is a leak or there is something wrong, but importantly they can also predict if there is a potential issue and warn customers. Cargo hold temperatures can also be monitored to keep it at the right level for temperature-sensitive cargoes. MacGregor is going far beyond the conventional functionality of a hatch cover.

Sensors can also monitor container stacks and how they behave in a seaway during a voyage. They can signal to the bridge to divert the route if conditions are too rough and inducing too much movement, or suggest that the vessel reduces its speed. This directly benefits a customer with increased cargo safety by fewer container damages or losses, lower insurance premiums, minimised inefficiencies, and most importantly, an overall increase in the safety of the operating environment.

## Planning for complexity

We can then go another step further, how do we improve and optimise our customer's businesses? How can we



“Digitally connected equipment on a vessel at sea can bring significant value to customers' operations”

Pasi Lehtonen

help shipowners make the most of their investments? A good example is applying digital technology, in combination with cargo handling systems and operational intelligence, to general cargo vessels. These vessels carry multiple different cargoes, including project cargoes, and call at many different ports. How do we optimally plan for that complexity?

Traditionally, it has taken a long time to plan cargo stowage on these vessels; at least several hours, depending on the nature of the cargo. Today, with new tools using algorithms and the understanding of how vessel holds and cargo handling systems are designed, we are able to carry out the planning work for cargo stowage in minutes, and in the most optimised way. This can increase the cargo carrying capacity of a vessel by up to 20 percent (see separate box).

What makes it beautiful for our customers is that we are able to link our knowledge of cargo handling systems and their operation and then think about the space as a whole. We offer this as a software advisory service, improving processes and the transparency of information. It is applicable to both new and existing vessels, like a MacGregor



Cargo Boost (page 12) for general cargo ships, and a new way to avoid running half-empty vessels.

## Imagination is the limitation

In terms of benefits for customers and the industry as a whole, imagination is the limitation. Emissions are just one aspect; how can CO<sub>2</sub>, SOx and NOx emissions be reduced? The more half-empty vessels are sailing, the more emissions they generate, which is not only ecologically damaging, but also a huge waste. Preventing such situations is the easiest way to reduce emissions. This is just one area where intelligent cargo handling can make a difference.

Within Cargotec's several business areas, all are looking into removing inefficiencies, including its software arm, Navis, which developed the advanced collaboration platform, XVELA; on its mission to make global trade smarter, safer and more sustainable.

We are applying simulation and virtual reality capabilities to our systems, benefiting customers in the early design phase of their projects, and offering powerful crew training tools. Using MacGregor software, such as C-HOW, it is possible to simulate, test and improve a product before production even begins.

Our digital portfolio MacGregor Smart is constantly expanding and extending to specialist service solutions including navigation and communication (NavCom) systems; for example, voyage data recorders (VDRs), and the maritime data engine (MDE) that normalises data from multiple sources, making it easily accessible for real-time and historical use.

## An automated future

The rise in automation within the industry means that we in MacGregor are participating in a number of autonomous development projects, including the first autonomous discharging cranes (page 18).

Our cargo handling expertise is needed to predict safeguarding issues. For example, for vessels that will sail with few or no crew,



MacGregor's breakbulk cargo optimiser is the first automated, cloud-based service for the optimised stowage of breakbulk cargoes

# Breakbulk solution optimises cargo stowage and improves business performance

MacGregor can now offer breakbulk owners and operators a platform to optimally plan the stowage of breakbulk cargoes in a process that increases vessel and fleet utilisation rates and improves business performance. The planning work for cargo stowage can be completed in a few minutes, in comparison with traditional tools taking several hours.

"The MacGregor breakbulk cargo optimiser is the first automated, cloud-based service for the optimised stowage of breakbulk cargoes and makes full use of MacGregor's expertise in cargo handling systems and the loading-computer expertise of Navis, Cargotec's software business area," says **Tommi Keskilohko**, Director, Customer Innovations, Cargo Handling, MacGregor.

Currently breakbulk stowage planning mostly relies on time-consuming, manual planning processes based on the capability and experience of an individual planner or team of planners. No-shows of cargoes and last-minute changes can further add to the time it takes to complete a stowage plan.

MacGregor's new breakbulk solution optimises a vessel's stowage plan by taking into consideration all influencing factors including what cargo is already on board,

incoming cargoes, available cargo space, the actual capability of the cargo handling system, port rotations and vessel stability.

"Pilot cases on board customer vessels have shown that the amount of cargo that can be carried can be increased substantially, which increases operational efficiency and earning potential," Mr Keskilohko notes.

"Also there are a lot of potential process improvements," he adds. "Time-savings in planning processes and the increased availability and transparency of fact-based information are just a few of these. Reduced environmental impact is another as vessels are running at much higher capacities, which improves operational efficiency."

The MacGregor breakbulk cargo optimiser can be used for one vessel or the whole fleet, and enables users to identify predefined key performance indicators at a ship, voyage, rotation or fleet level.

"Traditionally the utilisation rates of general cargo and breakbulk vessels are relatively low and fleet-wide utilisation measurements are rarely known or recorded," Mr Keskilohko says. "Our aim is to help customers improve their businesses and MacGregor's new breakbulk cargo solution is a perfect match for that."

it is critical to understand how cargo movements can affect the vessels. Cargo movement influences a vessel's behaviour much more than people think. Cargo stacks can move; one must understand how they move, so they do not damage the vessel or the cargo.

The key to container stack monitoring is the reliability of data. If accurate information is fed into a system, the system can inform the shipowner that the vessel is going over tolerances. We cannot lash the system again, but we can let a 'virtual captain' know that a situation is changing, so the vessel can slow down or take evasive action.

## Real-term benefits

When we asked our customers for their opinion about intelligent cargo handling and digitalisation services, they wanted to see the practical benefits that these can deliver. Customers are keen to think about adopting new ideas, but these have to be understandable and deliver real-term benefits.

Because of our knowledge and expertise throughout the cargo handling chain, we are able to help customers adopt and integrate new solutions that will deliver true value in the digital arena. Of course we must be able to describe, quantify and verify the benefits in monetary terms. For example, fuel consumption efficiency comparisons per tonne of cargo or container transported.

There are many open issues with the new developments including data security and ownership. Nobody is able to plan for every eventuality, but you need to take the first step to take the next step, and for us that means leading in intelligent cargo handling. ■

# The future of port call management

By combining MacGregor's experience with its new cloud-based voyage and port optimising solution, MacGregor can increase the operational efficiency of RoRo vessels and port calls, unleashing substantial potential savings for operators.

"RoRo ship performance is normally measured by its cubic metre utilisation," explains **Phillip Tipping**, Director Customer Innovation, RoRo, MacGregor. "However, this figure does not show inefficiencies surrounding port operations. Until now there has not been an effective way of measuring time spent in port and reasons for delay. These are known, but undetectable losses that can cost a shipping line as much as USD2.5 million dollars per vessel per year.

"Shipping lines need a management system to detect these losses, allow them to modify the voyages before they start and learn valuable lessons to avoid future mistakes. This is where the MacGregor voyage and port optimiser can make a difference and will allow shipping lines to maximise efficiency and minimise environmental impact, while saving millions."

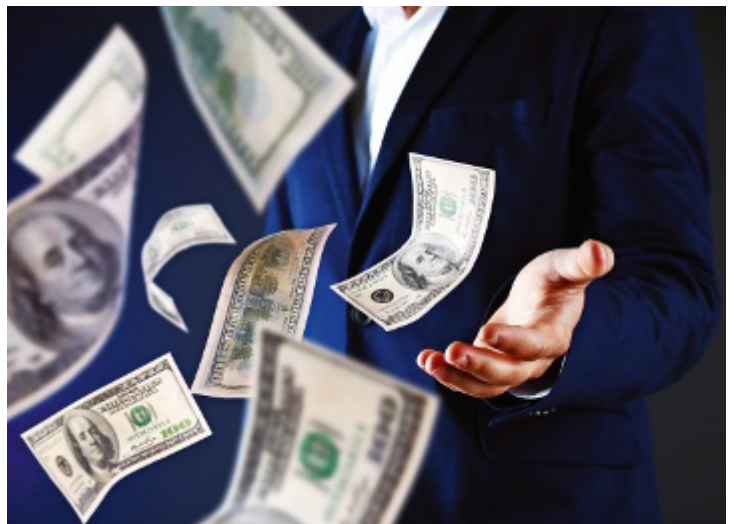
The optimiser uses extensive pre- and post-voyage analytics and obeys 'do, check and act' rules, enabling it to deliver a continuously improving system. "Data can be used to identify losses, which can be verified by audits," Mr Tipping adds. "Performance can then be improved by creating, distributing and following up on actionable plans; it is the future of port call management."

## OnWatch Scout: predicting the potential for costly downtime

MacGregor OnWatch Scout is being used to predict and monitor upcoming critical issues and communicate them to offshore and merchant crane customers, reducing unplanned downtime and giving back more cost control to the operator or owner of the equipment. The service also includes access to our OnWatch experts, who can connect to the equipment and effectively help resolve ongoing issues.

This prediction service is based on decades of trusted, proven knowledge and technical expertise, along with the use of sensor data, which can detect changes that are not perceivable to humans. MacGregor believes that OnWatch Scout is an invaluable service tool for customers and plans to make it widely available across its equipment portfolio.

OnWatch Scout connects equipment to advanced monitoring systems that constantly analyse component condition and predict maintenance needs. It detects if there are patterns in component state or equipment behaviour, which by experience, and artificial intelligence, can indicate the potential risk of failure. This information is then made available to the customer through multiple digital channels, which ensures an effective platform for managing maintenance tasks and continuing communication with the OnWatch experts, if needed.



# It pays to put cargo first

Intelligent cargo handling is not just about using smart technology, it is about making smart decisions; putting cargo back at the core of ship design is a good start, says **Marcus Ejdersten**, responsible for Strategic Marketing at MacGregor

**E**fficiency is the key to our future sustainability as an industry and at the same time, the best and only approach to simultaneously drive business and environmental benefits.

At the turn of the millennium, when global shipbuilding was almost at capacity, the market was flooded with vessels that were often constructed as quickly and cheaply as possible, built to standard designs and without detailed analysis of their cargo profiles, automatically incurring a loss in efficiency.

Today, we are building new tonnage; more efficient, cleaner ships, which comply with the latest regulations, but the old ones are still in business. This means that overall vessel traffic and global marine transport capacity is increasing faster than the fleets' average performance.

A day may come when a ship is not allowed to enter a port, if it is not utilising its total cargo carrying capacity. Half-full ships are a waste of energy and money, and they are a risk to the environment. As an industry we must move forward and away from sub-optimised standard design practices, putting cargo profiles at the core of a ship's design.

## Smart decision making

This is where intelligent cargo handling and smart decision-making

can make their mark. Forerunners in the industry have started to adopt solutions that solve some of today's challenges. These include upgrading older, existing vessels to enhance their cargo carrying capabilities, analysing ship operating systems and utilising algorithms to optimise cargo planning and stowage.

This drives down emissions per transported cargo unit and at the same time reduces the cost of transportation.

When these solutions are widely adopted, huge capacity will be unleashed through a more efficient global fleet, but into a market that is already oversupplied. This obviously poses a dilemma.

However, those who do not enhance their existing fleet will be left behind, when leaders operate with higher cargo densities and lower costs and carbon emissions per transported cargo unit. These pacesetters can potentially also run their ships at higher speeds again, delivering a faster service at lower inventory costs to their customers and end consumers.

We propose that you put cargo back into the centre of the picture; we already have solutions that make this approach pay off. Maximising your cargo density means that you will be more competitive than your rivals day after day. Can you afford not to? ■

“Maximising your cargo density means that you will be more competitive than your rivals day after day. Can you afford not to?”

Marcus Ejdersten



Marcus Ejdersten, Strategic Marketing, MacGregor: “As an industry we must move forward and away from sub-optimised standard design practices, putting cargo profiles at the core of a ship's design”

# Take your vessel from under **to over achieving**

Higher earnings are available for existing containership fleets; a MacGregor Cargo Boost optimises cargo carrying capacity, which in turn raises profits, **Tommi Keskilohko**, Director, Customer Innovations, Cargo Handling at MacGregor explains how

**N**owadays it is not enough to build a new vessel to a standard design without considering large-scale efficiencies such as fuel consumption and cargo handling. A prudent shipowner builds with efficiency at the forefront of

a design. For these owners, MacGregor offers its PlusPartner concept, which is a forward-thinking approach to ship design that maximises cargo carrying capacity and therefore earning potential, by considering all parts of the cargo handling

system as a whole. But what should shipowners do with their existing fleets, built before efficiency was the must-have companion or when fuel was cheaper and completion not so fierce?

What would you say if we could offer you an increase in your vessel's cargo system utilisation rate of up to 10 percent? If we could match your business needs and better equip your vessel to carry the cargo that is actually available on the market? Deliver you an alternative for a better return on investment than building a new vessel? This is not a futuristic idea, but a reality today.



“What would you say if we could offer you an increase in your vessel’s cargo system utilisation rate of up to 10 percent?”

Tommi Keskilohko

## Re-thinking cargo carrying

MacGregor is able to reconsider an existing vessel’s cargo handling system, so that it can be used to its maximum capacity on a specific trade. This service is called a Cargo Boost, also part of the MacGregor PlusPartner concept.

A few years ago classification societies changed their rules to allow certain route or seasonal and more recently weather-specific conditions, to be considered when calculating lashing arrangements. In most cases this meant that the cargo intake could be increased with only documentation updates, specifically the cargo securing manual. MacGregor recognised that more could be achieved and sees a Cargo Boost as a continuation of this process. In most cases mechanical changes are undertaken in addition to the documentation updates.

## Closing the usability gap

The Cargo Boost process always starts in a meeting with the customer, during which its current status is evaluated, including the challenges, and the cargo profile and the vessel’s intended future use is specified. When the vessel’s trade has been established, its cargo system is then evaluated and, together with the customer, different cargo system configurations are analysed to establish which delivers most benefits, that is, the best investment efficiency. A poor match between available cargo trade and the ship’s cargo system damages a vessel’s profitability, so by closing this usability gap, revenues are increased.

## Cargo Boost scope

The scope of a MacGregor Cargo Boost can vary from simple documentation

updates, to minor mechanical upgrades and all the way to major system upgrades combined with MacGregor’s Productivity Care service, which ensures that the retrofit is correctly used and the customer is able to capture the value as planned.

A mechanical system upgrade, for example, can be chosen if an owner identifies the need, based on its foreseen cargo profile, to have the flexibility to load both 20’ and 40’ containers in the same bays, but the vessel cannot currently accommodate this. MacGregor has developed products and services to convert the container arrangement from lashing gap to mixed stowage in a cost efficient manner minimising off-hire times.

The scope of work is always agreed with each customer on an individual basis. For mechanical system upgrade upgrades, MacGregor usually takes care of onboard visits and inspections, necessary designs, calculations and structural checks, class approvals, delivery of agreed hardware and supervision during installation. Cargo securing manual updates, coordinating

loading computer updates and crew and back-office training complete the service.

Some owners decided to opt for more radical capacity gains by lengthening existing vessels by one or two 40’ bays. As this is more substantial work and the vessel is in dock for a longer period of time, these projects present a good opportunity for owners to also upgrade existing cargo systems.

## A profitable investment

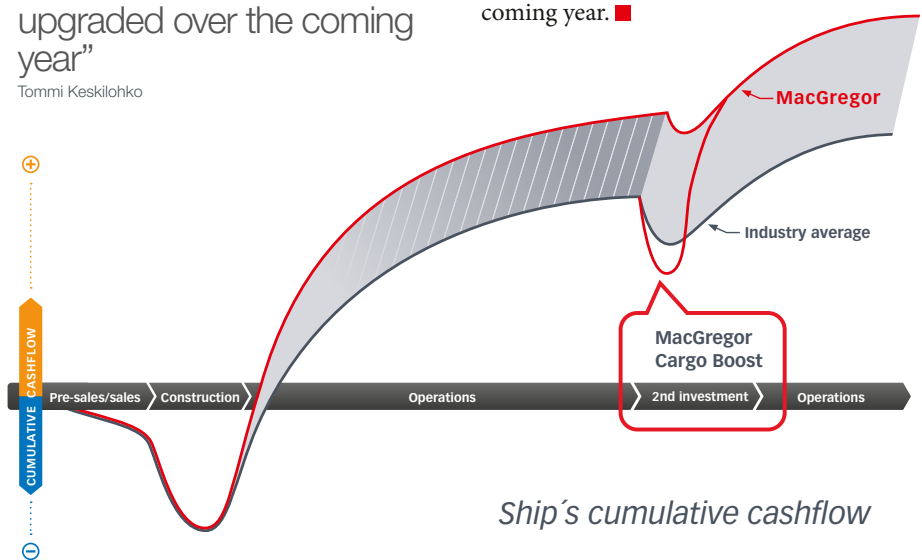
On average, a Cargo Boost takes about three to four months from order to delivery. To minimise downtime, a major Cargo Boost is ideally carried out during a planned drydock and preparation should preferably start about six months ahead of this. However, for some Cargo Boost projects it is possible to undertake work while the vessel remains in service.

The process for all updates is planned and agreed upon in advance with owner, this helps to keep work on schedule and on budget.

A Cargo Boost delivers a vessel that offers good investment efficiency, typically paying-back the cost of the upgrade in a year or less, depending on the scope of work and the vessel. Many ships have benefited from the service, with many more scheduled to be upgraded over the coming year. ■

“Many ships have benefited from a MacGregor Cargo Boost, with many more scheduled to be upgraded over the coming year”

Tommi Keskilohko



By closing usability gaps and maximising a vessel’s container carrying capacity, shipowners can increase revenues

# Co-creation projects pioneer **industry advances**

By working together with industry and academia, MacGregor is shifting the way that it develops products and services for customers, ensuring that they reap the benefits

**T**hrough alliances, partnerships, joint working agreements and informal collaborations, MacGregor is continuing its commitment to transforming the maritime transportation industry and advancing what it can offer customers.

The industry landscape is changing so fast that stakeholders must work together to innovate, test ideas, and ultimately plug innovation gaps with products and services that were previously unavailable, or substantially improve existing ones.

“We have multiple ongoing collaborative projects,” says **Magnus Sjöberg**, Senior Vice President, Cargo Handling, MacGregor. “We encourage knowledge sharing inside our organisation and actively build relationships with universities so that together we can



The MacGregor Vikings won this year's #intelligencehunt3 by collaborating to develop a solution that extends the scope and accuracy of a unique new MacGregor system for improving port and voyage efficiency for RoRo vessels

identify interesting areas for innovation to bring value to our customers and other stakeholders.”

## Accelerating industry advances

A recently-announced collaborative project is the Finland-Singapore Maritime Innovation camp, designed to accelerate innovative developments within the maritime industry. It will take place towards the end of 2018 in Singapore.

During the event, challenges will be presented to students by academic partners, the University of Turku (UTU) and the Singapore Maritime Institute (SMI) and corporate partners, MacGregor and the PSA Corporation.

“Universities are able to facilitate circumstances where new ideas can be created and new questions can be generated”

Janne Suominen

“Research collaboration is important because of the wider perspectives it provides,” says **Janne Suominen**, Manager, Offering Development, MacGregor Cargo Handling. “In our daily operations we tend to be focused on technical details, while students can consider a wider, more general, cross-industrial view without limitations in their ideas.

“The benefit for universities and students is the possibility to test theories on real life engineering challenges. Universities are able to facilitate circumstances where new ideas can be created and new questions can be generated, potentially leading to new opportunities,” Mr Suominen notes.

## Automation on the agenda

Automation was an important component at a start-up event called ‘The Shift’, which brought together growth companies,

start-up influencers and corporate stakeholders in Turku, Finland, earlier this year. Alongside Rolls-Royce and DNV GL, MacGregor hosted a round-table discussion about the expanding role that artificial intelligence plays in the industry.

In his keynote address, **Roni Jukakoski**, Director, Customer Innovations of Cargo Handling, MacGregor, raised the topic of minimising industry waste through the development of autonomous shipping and the expanding role of artificial intelligence. He invited innovators to collaborate with MacGregor, emphasising the importance of starting with the cargo profile when considering new ship designs. “We put cargo first and build the system around it,” he says. “We do not sacrifice flexibility in this approach; rather we maximise efficiency.”

## On the hunt for intelligence

MacGregor has developed a unique new system for improving port and voyage efficiency for RoRo vessels. Participating at this year’s SeaFocus #intelligence hunt3 awards, two teams were asked to collaborate and create a solution that would extend the scope and accuracy of this new MacGregor system.

The ‘hunt’ proved to be an ideal way for MacGregor and its experts to innovate and provide guidance for the MacGregor challenge. It involved developing a system that will enable precise tracking and cargo identification on board RoRo vessels, taking into account the constraints of large RoRo ships and their complex cargo operations.

MacGregor believes that a new cargo tracking system would be a valuable tool for shipping lines, replacing the long-obsolete systems in place today. Amongst many benefits, it would deliver accurate productivity measurements, automatic tallies and stowage plans, match the correct cargo to the correct vessel, and optimise the use of space.

The team, called the MacGregor Vikings, won this year’s hunt. It consisted of

“We put cargo first and build the system around it”

Roni Jukakoski

students from Åbo Akademi Turku, Finland, the University of Strathclyde, Glasgow, Scotland and Tampere University of Technology, Finland.

## Adding value, improving safety

Adding value to a product or service is extremely important, particularly in today’s financial climate; improving safety is of equal concern. MacGregor Advanced Offshore Solutions have entered an important ongoing collaboration project, which addresses both of these issues in the offshore sector.

The four-year LifeMoor project, is funded by the Research Council of Norway (RCN), Equinor (previously Statoil) and MacGregor. It is run by the Foundation for Scientific and Industrial Research (SINTEF) and the Norwegian University of Science and Technology (NTNU). LifeMoor is designed to address the underlying causes of mooring system failures. It also aims to improve the integrity of mooring chains, facilitate the development of monitoring systems to assess the state of mooring system mechanisms, and expand industry knowledge about the effects of degradation and fatigue.

Mooring line failures can have catastrophic consequences, but operators are understandably hesitant when it comes to replacing them because of high costs and potential production downtime. The wide-ranging factors that contribute to their failure also make it difficult to assess the condition of system components.

In addition to more reliable and cost-efficient mooring systems, MacGregor also expects that LifeMoor will offer better service life estimates on mooring chains, delivering a significant benefit to operators. ■

# Combined expertise cuts wind turbine installation times

A new monopile installation solution, developed between MacGregor and Kongsberg Maritime, eliminates unnecessary temporary mooring, offering substantial savings to the offshore wind energy market

**T**he offshore wind farms under development today are moving to more remote locations and increasing in capacity and size, bringing with them a host of new challenges. The biggest of these is created by a vast increase in the weight and height of turbines. This has driven the demand for a new-generation of monopile installation and maintenance vessels designed to cope with the industry's future developments and needs.

Monopile installation vessels have traditionally been jack-up units and to some extent moored floaters. However, as foundation sizes have increased, jack-ups are predominantly used. They typically employ pile-grippers on static frames, with complex mooring arrangements to hold the pile steady until it can be securely and permanently fixed to the seabed.

“A pile standing on the seabed will self-penetrate to a certain level, but it is not stable,” explains **Kristina Arutjunova**, Director Sales and Marketing Innovations, Advanced Offshore Solutions, MacGregor. “Wave forces can be considerable, therefore the pile must be held still by a guiding frame on the vessel until it is driven down to a stable position. If the vessel is moored very securely, and the sea state is calm, a traditional pile-gripper, fixed to a static frame, can be used. However, these ideal conditions are often not seen offshore.”

## Market-ready technology

Recognising this gap in the market and the need to offer operators a new monopile installation method that benefits from the latest automated solutions, MacGregor and Kongsberg Maritime embarked on a

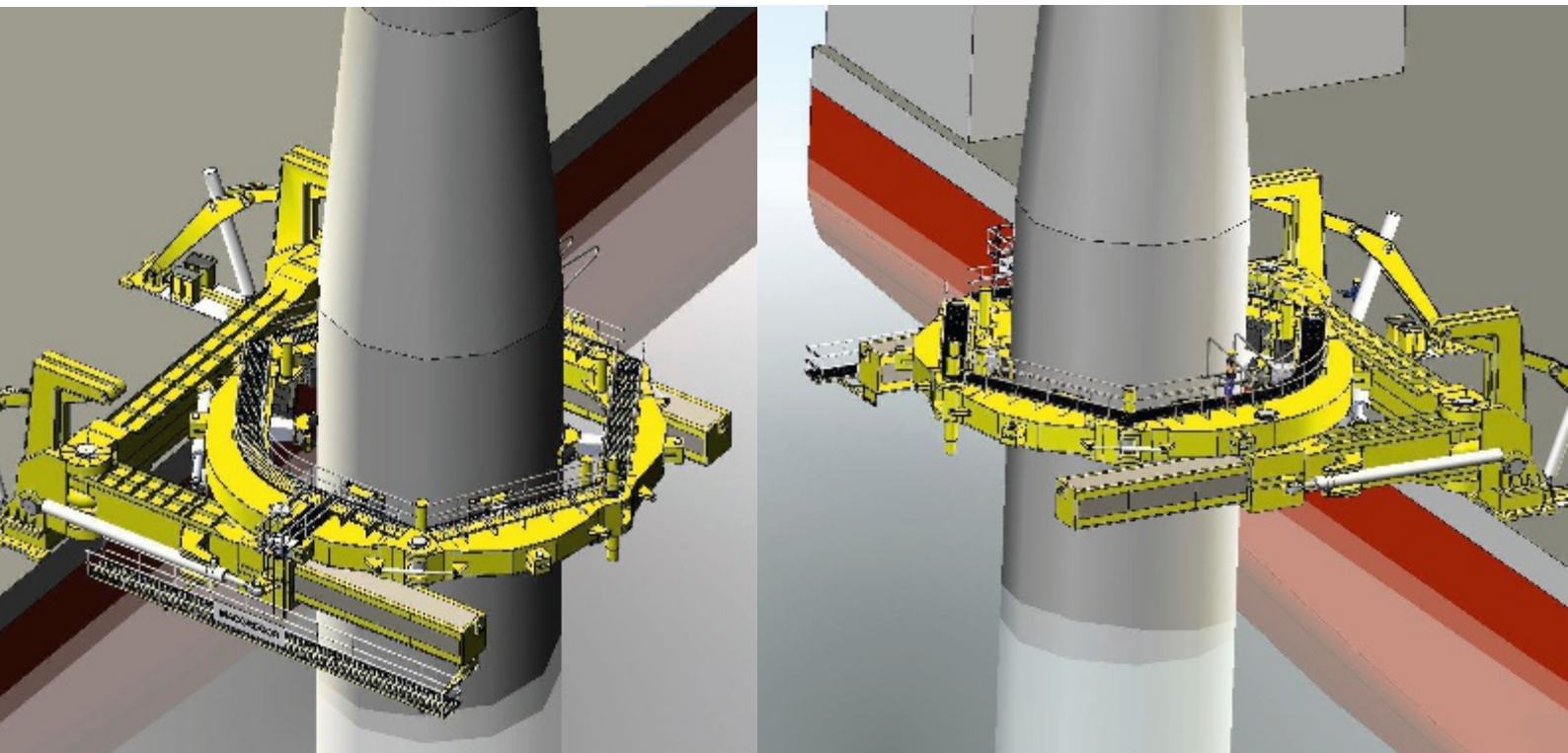
“The motion-compensated pile-guidance frame ensures shorter installation times”

Kristina Arutjunova

joint development project. Its aim was to deliver significant improvements in the operability, productivity and efficiency of future generations of monopile installation vessel fleets.

Both companies believed that substantial cost and time savings could be captured by applying motion-compensation technology, coupled with dynamic positioning (DP), to the monopile installation process. This resulted in the development of a new pile-gripper solution, which is now ready for the market.





The new pile-gripper offers substantial cost and time savings by applying motion-compensation technology, coupled with dynamic positioning (DP), to the monopile installation process

“We have developed a core solution that tackles the efficiency of turbine and foundation installation vessels by replacing lengthy, temporary mooring processes with full DP in combination with an innovative guidance system and hydraulic frame mechanism,” says **Gunnar Thorsen**, Executive Vice President Business Development, Kongsberg Maritime.

### Wider operational windows

“Our newly-developed pile installation method represents a considerable improvement over traditional methods,” Ms Arutjunova continues. “Piles can be installed in a wider range of sea states and operators are not longer constrained by waiting for ideal weather windows.

“Essentially, the motion-compensated pile-guidance frame ensures shorter installation times and increases operational weather windows, adding up to substantial cost savings.

“We are confident that the capabilities offered by this new system will meet the developing needs of the offshore wind energy capture market, especially as it addresses the fundamental issue of handling these larger turbines, but also the need to install a greater number of them more quickly and further offshore,” she concludes. ■

## A new monopile installation method is now available

The jointly-developed new pile-gripper solution consists of the following components:

- Motion-compensated, hydraulically-operated pile-gripper: provides a precise, responsive and powerful hydraulic frame mechanism for holding monopiles in a vertical position in open seas
- A pile-gripper guidance control system: this works in tandem with the high-precision DP system and provides a coordination link between the pile-gripper and the DP system
- A pile-gripper servo control system: this translates vessel motion and monopile position data to movement in the actuating cylinders. It also monitors loads and the status of the pile for feedback into the guidance system.
- Abandon monopile capability: if there is a loss of position, the monopile is guided into the last possible position, and then the gripper is opened for abandoning the pile.

# Intelligent lifts raise **bulk handling standards**

Setting new safety and efficiency standards, MacGregor is poised to introduce the world's first autonomous discharging cranes, equipped with self-learning capabilities

**A**proaching their final stages of construction, MacGregor will soon be able to test and showcase unique self-learning cranes on board commercial vessels. Developed as part of a joint project between MacGregor and ESL Shipping Oy, part of Aspo Plc, the world's first autonomous discharging bulk cranes will be fitted on ESL's two new liquefied natural gas (LNG)-powered Handysize bulk carriers, *Viikki* and *Haaga*.

ESL knows MacGregor cranes very well and relies on their proven technology on a number of vessels. Its latest 25,532 dwt bulkers are under construction at Jinling Shipyard in Nanjing, China and are on schedule for delivery later in the year. To serve each of their three holds, they feature three specially-developed MacGregor electro-hydraulic cranes, which have a safe working load of 30 tonnes with a grab and an outreach of 30m. Like the majority of its vessels, once delivered the 160m bulkers will serve the Baltic region.

"Our new environmentally-friendly LNG-fuelled ships will be operated on very demanding trades with a high number of voyages, port calls and crane operating hours annually," says **Mikki Koskinen**,

Managing Director at ESL Shipping Oy. "Autonomous operation will further increase our competitiveness and offer our clients unforeseen efficiency and safety advances."

## A great collaboration

"Working with ESL on this development project has been a fantastic experience and a great collaboration opportunity," says **Ipo Heikkilä**, Vice President, Engineering and R&D, Cargo Handling at MacGregor. "By combining the expertise of a forward-thinking shipowner and operator with our knowledge in intelligent cargo handling, we are able to develop safer and more efficient solutions for unloading bulk cargoes and therefore reduce unnecessary waste in the value chain."

**“**The cranes represent a significant change in what we can offer bulk handling operators and I am delighted that ESL will be the first to benefit”

Ipo Heikkilä

"Autonomous crane operation improves efficiency and safety, extends the service life of the crane and improves working conditions in port," continues Mr Heikkilä. "Discharging operations can be monitored and controlled from the bridge, or anywhere else where the system operator has a view of the crane position and operational control screen. This eliminates the need for personnel in hazardous operational areas."

## Maximised efficiency

A number of features maximise efficiency. Each crane pre-calculates suggested routes using MacGregor's command input shaping technology to optimise paths, ensure pendulum-free motion and minimise the total discharging time.

Using advanced sensor technology, material distribution in the hold can be analysed to ensure optimal unloading. The crane's topographic software module creates a map above each cargo hold to find optimal lifting points, further adding to the cranes' efficiency. The system also calculates which shore side hopper to use, depending on the hopper's capacity.

“Autonomous crane operation improves efficiency and safety, extends the service life of the crane and improves working conditions in port”

Ippo Heikkilä

The grab is controlled by an intelligent, self-learning algorithm that automatically adjusts to ensure that the bucket is filled to an optimum level and not overloaded. The auto-grip module readjusts lifting parameters when material properties change, automatically adjusting to switches between cargoes.

### Communication is key

The communication module between the cranes is the backbone of the system, sharing information such as current and upcoming positions and other important parameters. It essentially mimics a crane driver's desk and can be located on the ship's bridge or anywhere the system operator has a view of the crane position and the topographic cargo map. In addition to supervising and monitoring the system in operation, it also remotely controls each crane via dual monitors.

### Safety advances secured

Safety advances are a key benefit of autonomous discharging bulk cranes. Speed

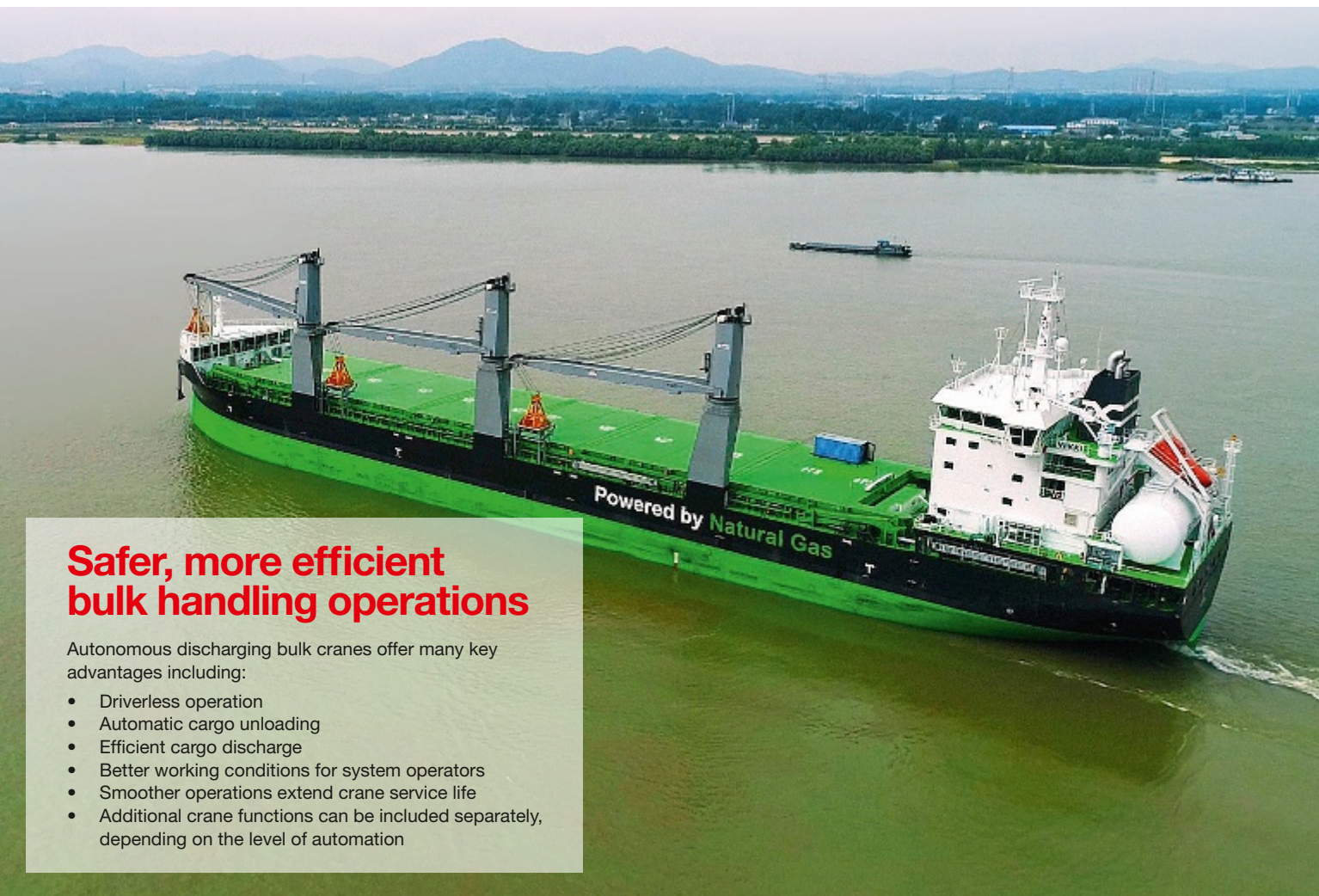
and crane movement are continuously monitored to ensure cargo is moved without causing pendulation. However, if this does occur, it is automatically corrected by the cranes' anti-pendulation system. Numerous sensors also compensate for a vessel's change in list and trim during operations, so a stable discharge point is continuously maintained.

“These cranes are another leap forward in our cargo handling division,” notes Mr Heikkilä. “They represent a significant change in what we can offer bulk handling operators and I am delighted that ESL will be the first to benefit.” ■

## Safer, more efficient bulk handling operations

Autonomous discharging bulk cranes offer many key advantages including:

- Driverless operation
- Automatic cargo unloading
- Efficient cargo discharge
- Better working conditions for system operators
- Smoother operations extend crane service life
- Additional crane functions can be included separately, depending on the level of automation





Pushes bow loading systems enable a shuttle tanker to safely and efficiently load oil from an offshore production or storage facility



New-generation bow loading system

# showcases improved connections

Delivering significant improvements over previous versions, the 5th generation Pusnes bow loading system offers wider operating parameters to ensure success where traditional systems struggle

**C**ontinuing its commitment to refining the development of products that serve the offshore oil and gas industries, MacGregor now offers its 5th generation Pusnes bow loading system. Featuring greater hose connection capabilities than previous generations, the new system promises operators all the proven safety and performance credentials as earlier ones, but with a wider operating scope.

Bow loading systems (BLS) enable a shuttle tanker to safely and efficiently load oil from an offshore production or storage facility, such as a floating production storage and

offloading (FPSO) installation. “Even with the advanced stability systems such as weather-vaning and dynamic positioning (DP2) in place, connecting two vessels in an open sea can be a difficult and dangerous business,” says **Stein Are Andersen**, Sales Manager Offshore Loading Systems, MacGregor.

## Increased operating opportunities

“The new-generation BLS system is capable of connecting the loading hose in wave heights up to HS 4.5m and at an entering angle of 110 degrees. This is 50 degrees more than our previous system,” Mr Andersen

continues. “Once the hose from the FPSO is connected to the bow loading system coupler valve, the whole system must deal with a sea’s considerable rolling and yawing motions up to wave heights of HS 5.5m.

“The ability to connect at much wider angles increases operating opportunities in conditions where shuttle tankers would normally struggle to connect,” he stresses. “Also, shuttle tankers can stay connected, even in sea states which generate wider relative angles to the FPSO, which traditionally would have meant that they must disconnect for safety and operational reasons.

“Together these deliver significant cost savings by improving operational times and connection speeds.”

The latest generation system also features a handheld wireless remote control, which provides enhanced flexibility for the crew operating the system.

In addition to adhering to strict environmental responsibilities, shuttle tankers have to operate in extremely

““ The new-generation BLS system is capable of connecting the loading hose in wave heights up to HS 4.5m and at an entering angle of 110 degrees. This is 50 degrees more than our previous system”

Stein Are Andersen

hostile conditions. The majority serve operations in the North Sea, offshore Brazil and the Arctic north of Russia. The 5th generation Pusnes bow loading system has therefore been specially designed to suit environmental temperatures ranging between +45 degrees to -20 degrees Celsius.

### Efficient liquid cargo handling

The bow loading system consists of two integrated units, a hose-handling and hawser-handling system.

The hose-handling system comprises a 20” bow-loading coupler, located forward in the centreline of the ship. The coupler is connected to the Pusnes hose end valve from the offloading platform or the FPSO/FSO installation.

A vital part of the system is the Pusnes moment-free bow loading coupler, which allows the coupler to follow the movement of the hose. The system includes a hose winch for pulling in and handling the hose during the connection and disconnection phases.

The hawser-handling system includes an adjustable roller fairlead, a chain stopper and a twin-drum traction winch for mooring operations during tandem loading, all of which are located on the platform deck.

The chain stopper is hydraulically-operated and self-locking, and can be released under full design load. Aft of the chain stopper is a guide roller with a built-in load cell which operates together with a traction winch. The system also includes a storage reel or bin for storing the messenger line during loading. ■

## 5th generation debut

As the offshore oil and gas industry undergoes its tentative return to growth, FPSO projects are already restarting off Brazil and the UK, and in the next three years experts anticipate renewed activity in the South China Sea, North Sea, and Gulf of Mexico.

Projects of the immediate future, will be designed to keep costs as low as possible and efficiency high. Even with fewer competitors in their own sector, operators in this field will be mindful of the competition they face from outside, from the US shale oil firms and elsewhere, and investing wisely to leverage the latest technologies.

These were the challenges facing MacGregor when, in a recent contract with Teekay Offshore Partners, it was

called upon to redesign its shuttle tanker bow-loading system to fit Teekay’s requirements.

Designed to fit Brazilian, Canadian and North Sea loading operations, MacGregor will deliver the design, fabrication and commissioning of the system on four of Teekay’s latest shuttle tanker newbuilds. The vessels are under construction at Korea’s Samsung Heavy Industries to Teekay’s new E-Shuttle design.

The new Aframax tankers will incorporate many other cutting-edge technologies, including dynamic positioning (DP2) and the use of liquefied natural gas (LNG) as fuel in combination with clean battery power. The first two are scheduled for delivery by 2020 and are planned for deployment in the North Sea.



# Fibre-rope crane construction enters final stages

With key components being tested and the crane systematically assembled, the market will soon be able to see all the benefits that a MacGregor fibre-rope offshore crane can offer

**M**acGregor's first fibre-rope offshore crane, known as FibreTrac, is entering its final stages of construction, ready for introduction to the market later in the year. Its deepwater capstan from Parkburn has been undergoing successful initial tests in the UK prior to delivery to MacGregor's Kristiansand facility in Norway, where the crane is being assembled.

MacGregor launched its fibre-rope crane range in 2016, developed through a cooperation agreement combining MacGregor's proven offshore crane technology with the fibre-rope tensioning technology perfected by UK company, Parkburn Precision Handling Systems.

## Prepare for a new standard

"We are so confident in the technology and keen to demonstrate the crane's capabilities, that last year we entered into a programme to build, certify and validate it," says **Ingvar Apeland**, Vice President, Business Development, Advanced Offshore Solutions, MacGregor. "I believe that it will be one of the world's most advanced

fibre-rope knuckle-boom cranes that the market has seen."

The FibreTrac crane has a MacGregor storage winch, capable of accommodating 4,000m of 88mm rope. It is designed and being built to DNV GL regulations. "Compliance with DNV GL's strict rules should provide end users with even greater confidence in the long-term use of this technology for this purpose," he notes.

Once delivered, FibreTrac will have a 150-tonne safe working load (SWL) capacity and will feature an advanced rope monitoring and management system that maximises rope lifespan and provides clear lift line status information for the operator at all times. It will be controlled with state-of-the-art technology that has the added advantage of providing real-time data feedback to onshore locations using the MacGregor 'OnWatch Scout' feature.

For owners wishing to leverage the technology for their existing cranes or stand-alone winch systems, MacGregor's fibre rope solution can be retrofitted and will be available with both hydraulic and electric drive options. ■

## Simple science, big benefits

Fibre rope weighs virtually nothing in water, so regardless of the length of rope paid out, it does not add anything to the load experienced by the crane. This is in complete contrast to wire rope, where the ever-increasing weight of wire paid out limits the load permissible in relation to depth.

Effectively, a fibre-rope crane with a 150-tonne SWL capacity is able to replace a 250-tonne SWL capacity wire-rope crane when lifting loads

at depths of 3,000m and it can continue to lift loads at even greater depths.

By employing fibre-rope technology, a crane is able to capitalise on its full lifting capacity at practically any depth, so a smaller crane and vessel can be used for more assignments, and owners are able to bid on a wider range of contracts; this is one of its greatest commercial advantages.



# Lifecycle support ensures long-term success

All vessels must be maintained throughout their service life, but they can also be improved; MacGregor modernisations, upgrades and retrofits meet the highest safety standards and maximise operational availability

**S**hipowners must continuously assess whether their fleets, firstly, comply with regulations and secondly, are as safe and efficient as they can be. If improvements can be made, then owners might look to modernise, with upgrade or retrofit solutions. This is specialist work, and as an experienced supplier to the merchant and offshore sectors, MacGregor is ideally placed to listen to customers, analyse what it can do to help and deliver the most cost-effective solution.

For the merchant market, MacGregor offers many modernisation options. These include

upgrading equipment, such as key components or control systems, for safer, more efficient operations and reduced maintenance costs. Going further, an owner might consider a MacGregor Cargo Boost, part of the MacGregor PlusPartner concept, which can improve the cargo carrying efficiency and therefore the earning potential of existing container ships (page 12).

Offshore sector upgrades are also diverse and include retrofits and modernisations that enhance vessel safety and efficiency. For example, the refurbishment of hose-end valves (HEVs) on Pusnes offshore bow loading systems.

## Critical connections

“Refurbishing hose-end valves in offshore bow-loading systems on board shuttle tankers ensures safer and more efficient loading operations for customers,” says **Jens Nyli**, Technical Manager, Global Lifecycle Support, MacGregor. “On average, we undertake ten to fifteen of these projects on an annual basis, and have been doing so since 1979. This means that we have a great deal of experience that we can offer customers.

“Over the time we have performed these overhauls, we have never seen cases of downtime

or any other safety related situations occurring. Neither have there been any oil spills from these valves caused by a lack of maintenance or incorrect use,” he adds.

A hose-end valve is the connection valve linking the hose from the ‘mothership’, either a floating production storage and offloading (FPSO) or a floating storage and offloading (FSO) vessel or platform, to the shuttle tanker. If this does not work, for any reason, loading and discharging operations cannot commence. Additionally and importantly, if there is a leak in this valve, there is a substantial risk to the environment.

During refurbishments, all shuttle tankers equipped with Pusnes bow loading systems and offloading systems on, for example, a FPSO, are refitted with original MacGregor hose-end valve spare parts to make it suitable for continued operation.

“The biggest challenge in these projects is the short delivery time,” he concludes. “We have to carry out an inspection and from this generate a report to be delivered within three weeks. Then as a result of the inspection’s findings the customer orders the overhaul job. At this point, we start obtaining all the necessary parts and typically between four to eight weeks, carry out assembly and factory acceptance testing to meet DNV GL or other third-party approval. This is a tight timeframe, but our experience and good planning make these projects possible.” ■

“Refurbishing hose-end valves ensures safer and more efficient loading operations for customers”

Jens Nyli





# Green conversions: benefit from a clean switch

Reinforcing its commitment to environmental protection, operators can now use a MacGregor 'green conversion' service to switch hydraulic systems from traditional oils to biodegradable ones

**T**he industry is gradually moving to the use of environmentally acceptable lubricants (EALs) and biodegradable hydraulic oils. Although some eco-conscious operators are automatically making the change, in many waters, tighter legislation is driving their uptake. To support customers looking to make the switch for any of their hydraulic systems, MacGregor now offers a 'green conversion' service.

"We initially decided to develop a solution for customers looking to convert to biodegradable hydraulic oils because lubricant manufacturers were not able to offer the service. This was a situation that could not continue," says **Paul Cooper**, UK Service Manager, MacGregor.

"Biodegradable hydraulic oils and EALs, which must also be biodegradable and non-accumulative, are a positive step for the environment," says **Fredrik Daland Röhm**, Head of Product Development, Global Lifecycle Support, MacGregor. "However,

they must also offer the same or better performance as traditional oils and lubricants, because critical vessel equipment relies on their effectiveness."

## Totally clean conversions

A MacGregor green conversion service combines the use of an environmentally acceptable hydraulic oil with a method that can very accurately measure the cleanliness of the hydraulic system. "This means that we can quantify how clean the whole system is after the conversion, which delivers peace-of-mind to operators and certifies environmental regulation compliance," explains Mr Daland.

Several RoRo vessels have already undergone a MacGregor green conversion as part of testing the service's effectiveness. The vessels' hydraulic systems were converted to using MacGregor GreenOcean HY 36 hydraulic oil. "Its performance is excellent and the customer is satisfied with the conversion process as well as the oil," notes Mr Daland. ■

## Expanding EAL portfolio

Developed to deliver a proven, environmentally-friendly, safe and cost-efficient hydraulic oil solution, MacGregor has introduced GreenOcean to its portfolio of biodegradable hydraulic oils and environmentally acceptable lubricants (EALs).

"GreenOcean demonstrates our commitment to promote the highest levels of safety and environmental-friendliness in our products, services and solutions," says Fredrik Daland Röhm.

Currently, GreenOcean, along with GreenGrease and Greenfluid are exclusively approved for use by MacGregor's RoRo branch. Ongoing approvals to qualify their use with other products are underway and will extend to cover applications such as compressor oils, open gear greases, gearbox oils and subsea wire greases.



MacGregor has a world-renowned reputation for RoRo deliveries and a global customer base; it can bridge the gap between European shipowners and Chinese shipyards

# Bridging the **continental** **construction gap**

# When European shipowners look to China for their new RoRo vessels, it often means navigating an unfamiliar process; **Andreas Behr**, Director Sales and Marketing, RoRo Division, explains how MacGregor's experience in this arena adds value

**M**acGregor is bridging the gap between shipowners who are looking to build their vessels in China and shipyards that are being contracted to build European RoRo vessels. The gap comprises many complex issues, which can impact the efficiency of, and owner confidence in, the entire newbuild process.

In Europe, design companies are usually contracted by European owners to support them through the newbuild design process, but their main concern is, quite understandably, limited to the design, and not the wider picture. We are an experienced 'pair of hands' and offer that broader knowledge. This extends along the entire newbuild chain, from design to fabrication, installation and commissioning, adding value at every stage. The RoRo sector is unique; many owners typically only build new vessels to replace tonnage or supplement their fleet about once every five to ten years, so every newbuild basically starts from scratch.

“We act as a bridge, smoothing the course of a vessel's construction, guiding complex contractual arrangements and ensuring a good end product; a win-win situation”

Andreas Behr

These are large-scale, complex projects for any owner to manage, but for RoRo owners in particular, as they are

infrequent, and only a handful of RoRo owners have large, experienced in-house teams for support. Add to this language and cultural differences and considerable distance, and the picture of a European ferry owner considering building a vessel in China is even more complex and difficult to navigate. This is where MacGregor can step in, offering a multi-sided approach.

## Powerful package of support

Firstly, we have our core RoRo competencies to draw upon, including decades of successful worldwide deliveries. We also have the most extensive global service capability on the market. Finally, we can be close to both our customers, the yards in China and the shipowners in Europe, as we have our design teams in China and our design and service teams in Europe.

Established just over three years ago, our Shanghai office now runs as a self-contained RoRo business area within MacGregor. When enquiries come in from national shipyards it is able to respond with good local knowledge, which can often smooth these cultural and language differences. However, it automatically has the back-up of MacGregor's wider organisation, which can prove invaluable. Together, this delivers a powerful package of support for any owner.

When owners opt to build in China, they are understandably looking to make cost-savings over yards that are closer to home, but want an end product that performs just as well in service. Therefore a lot is at stake, which can mean a daunting process that requires just as much, if not more, attention and input

than from an owner choosing to build at a European yard.

## A holistic approach

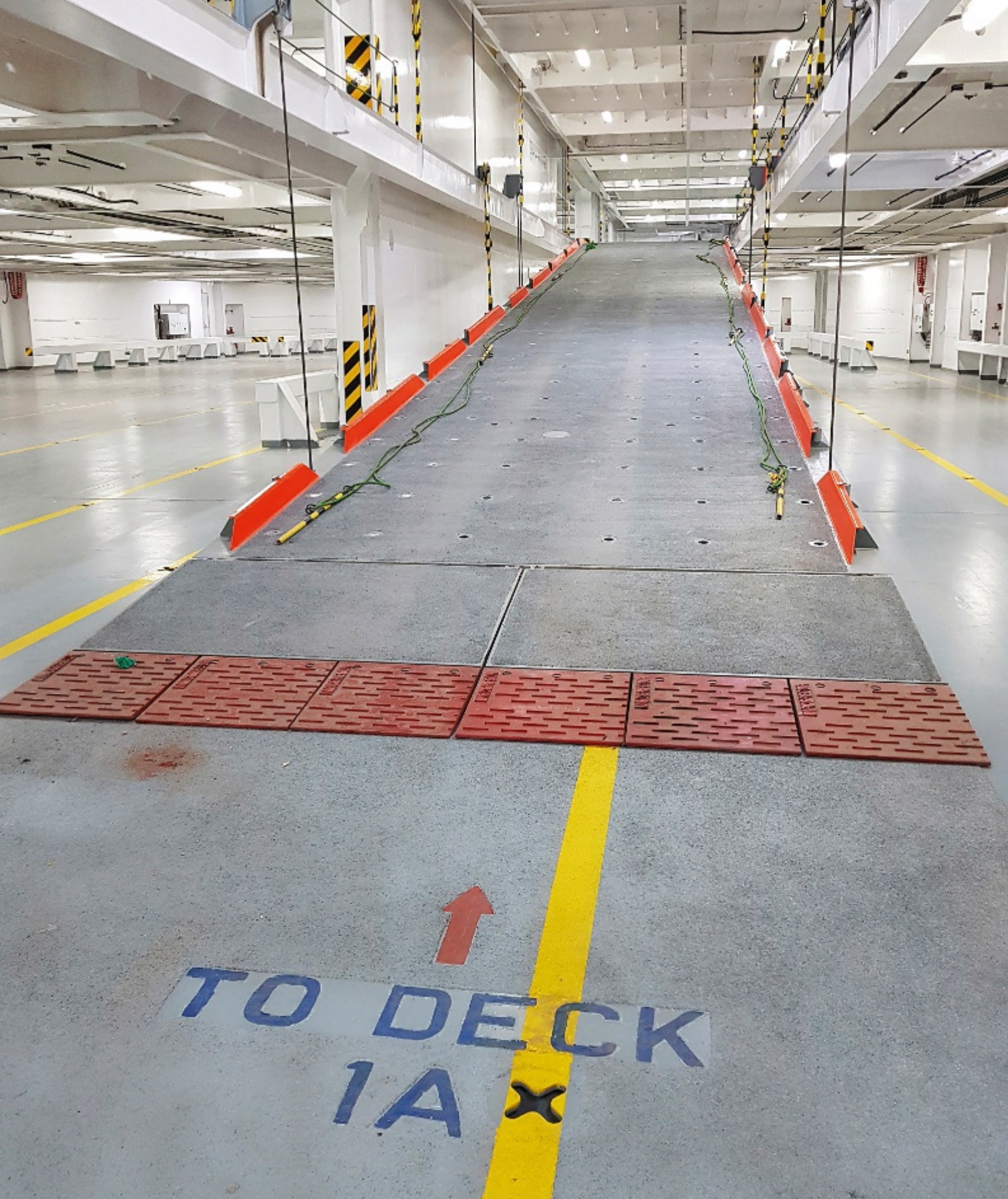
Our holistic approach considers a total view of the vessel's cargo access design and extends this support to the build process itself. We therefore ensure that first and foremost owners receive what they expect in terms of matching the product's end capability and performance with its intended service. This maximises operational efficiency and port turnaround times, key elements in RoRo and RoPax shipping.

Secondly, once the tendering process begins, we have the ability to help shipowners navigate this phase, because it is a process that is very familiar to us and brings them peace-of-mind.

## Navigating between customers

When I refer to customers, we often think about the shipowners, but actually the customer is more often the shipyard, so this is about linking both of our customers. We act as a bridge between them, smoothing the course of a vessel's construction, guiding complex contractual arrangements and ensuring a good end product; a win-win situation.

MacGregor has a world-renowned reputation for RoRo deliveries, and a long and successful track-record of working with Chinese shipyards and production partners. Add to these capabilities a strong local service and experienced design and sales teams working directly with shipowners in Europe, and you have a formula that adds value as well as reassurance. ■



# Ramp flap innovation helps keep ports quiet

An innovative solution, MacGregor Soft Flaps, not only keeps noise down in ports, but eliminates fatigue issues associated with steel ramp ends; operators and ports are already seeing the benefits

**T**he familiar 'ka-dunk' noise as a vehicle drives over the end of a metal ramp is a fixture in the lives of many living and working around ports. With hundreds of vehicles being loaded and offloaded at all hours of the day and night, the problem becomes immediately apparent. Add to this the fact that sound is amplified over water, and noise problems in ports become even bigger.

This was exactly the issue for leading European ferry operator DFDS, but it is certainly not alone. "DFDS had problems with noise levels when loading/offloading its RoRo vessels in the port of Gothenburg," explains **Magnus Göransson**, Branch Manager Denmark

**“DFDS will equip more vessels with Soft Flaps, and other leading ferry operators, as well as various ports, are also opting for this innovative solution”**

Magnus Göransson

and Sweden, Global Lifecycle Support, MacGregor. "Complaints were not predominantly received from people living very close to the port itself, but rather from those living in the idyllic Långedrag area on the opposite side of the bay; really showing how sound travels.

"By working together with different specialist teams within MacGregor, we came up with the solution," he continues. "We now have a product, Soft Flaps, which replaces the traditionally used steel flaps at the end of a ramp. Soft Flaps solve the problem of noise pollution caused by vehicles driving over a ramp's steel flaps, eliminate the issue of fatigue in these flaps and remove any sharp edges that might damage vehicle tyres."

## Silence: a great outcome

The first complete installation was successfully carried out towards the end of 2017 on the Kaj 700 linkspan in the port of Gothenburg. "The outcome was great, no more noise," notes Mr Göransson. "DFDS will equip more vessels with Soft Flaps, and other leading ferry operators, as well as various ports,

**“The outcome was great, no more noise”**

Magnus Göransson

are also opting for this innovative solution.”

Made from an industrial polymer, the flaps are resistant to chemicals, oils, ultraviolet rays, saltwater and mechanical abuse. The temperature limits of the flaps match MacGregor RoRo equipment; they harden below -20°C, and can easily withstand -40°C without becoming brittle. At the other end of the scale, they can withstand temperatures of above 80°C.

"You can cut it, drill it and saw it and produce a very high-quality end product," he says. "Our Soft Flaps prototypes have now been in service for almost two years and despite daily wear and exposure to extremely hard and heavy loads, they are as good as new."

MacGregor Soft Flaps are available for newbuildings as well as being ideal for retrofits, and can be easily and cost-effectively replaced. ■

Lowered into the water using a deck crane, the pump uses an electric motorised centrifuge to draw fish from the nets onto the ship's deck





# Fishing fleets gain from expanded expertise

MacGregor's Triplex brand, dedicated to serving customers in the fisheries and research vessel sectors, has been strengthened with the addition of Rapp Marine; the latest developments to stem from its wider portfolio are an electric fish pump and net hauler

**F**ishing is a dominant economic component in many countries. MacGregor's prominence in the global fisheries market started when major Norwegian fishing fleet equipment brand, Triplex, became part of the company in 2013.

"With MacGregor's Triplex deck-handling portfolio, we have a very strong position in the fisheries sector and in the market that supports research and high-end specialist vessels," says **Høye Høyesen**, Vice President, Advanced Offshore Solutions, MacGregor.

MacGregor has further strengthened its portfolios on offer to the fisheries and research vessel sectors by adding Rapp Marine to the family in February this year.

"The addition of Rapp Marine's team members and technologies further

strengthens these positions," adds Mr Høyesen. "We look forward to serving our existing and new customers with an expanded range of innovative and well-supported products and services."

## Embracing the opportunities

"We now have wider opportunities that we can offer to our customers," says **Ben Bolsøy**, Technical Director, Rapp Marine, MacGregor. "By having closer cooperation opportunities with MacGregor Triplex, we are able to drive developments for the benefit of our customers.

"We have been sharing engineering technology for many years and are keenly focused on developing the latest advances within our field," Mr Bolsøy adds. "We are particularly interested in sharing our

expertise within the research vessel sector and with state-of-the-art fishing fleets. As we will be under the same MacGregor umbrella, we will be able to offer total packages of equipment and services. This offers a huge advantage in today's market for our customers."

The latest development to emerge from this unified portfolio is a new Rapp Marine fully-electric centrifugal fish pump, which minimises power-consumption demands and reduces environmental impact. Lowered into the water using a deck crane, the pump uses an electric motorised centrifuge to draw various species of pelagic fish from netting onto the deck of the ship.

### A winning replacement

"Appetite for new equipment is strong throughout the fisheries industry," says Mr Bolsøy. "As part of MacGregor, we are now able to offer this new product throughout a much wider customer base.

"This revolutionary all-electric system has been designed to replace the hydraulic units, which have been used up until now,

massively cutting power-consumption, as well as reducing environmental impact," Mr Bolsøy explains. "The new pump also causes considerably less damage to the fish.

"In 1994 Rapp Marine developed a fish pump that very much focused on capacity and power consumption, and it ended up being the market's best pump in this area. However, there were opportunities for improvement, particularly when it came to minimising processing damage from the fish being pumped from the nets into the boat."

**“**We look forward to serving our existing and new customers with an expanded range of innovative and well-supported products and services”

Høyve Høyesen

Awareness of the health benefits of a fish-rich diet is increasing. This not only drives demand, but a hefty premium for the most presentable catch.

### The best on the market

"Fish are a valuable commodity and today, there is a major premium on sustainable fishing and fish quality," he says. "With this new design, we believe we can now offer the best fish pump that the market can deliver. This is why there are many eyes on its development. The market is really hungry for something that not only offers lower power consumption and protects the environment, but also ensures better fish quality, and adds to the sustainability of fishing in general."

Because of its electric-motor design, the new pump reaches efficiencies of 85 percent, compared with 50 percent for a top hydraulic pump from MacGregor's Rapp Marine. Another key advantage is that any accidental hydraulic oil leaks into the seawater are eliminated and with it any potential harm to the environment. "In a time when we are focusing on the

MacGregor's Triplex and Rapp Marine brands offer the fisheries and research vessel sectors cutting-edge products and services





“With this new design, we believe we can now offer the best fish pump that the market can deliver”

Ben Bolsøy

environment and pollution, removing this eventuality is vital and something that we successfully achieve with our electric system,” Mr Bolsøy highlights.

While the pump offers the same service life expectancy as hydraulic pumps, the system offers lower through-life maintenance costs, since the drive system comprises fewer parts, and electrical components can be readily replaced.

Mr Bolsøy believes the new pump is so much more advanced than its hydraulic predecessors that fishing vessels will move to retrofit it as a matter of course, giving far greater market share than would usually be available for such a product. “Hydraulic pumps might still make up around 20 to 30 percent of the market. But, we envisage a huge shift away from delivering old hydraulic-type pumps when we can deliver these new, electric systems that offer so many benefits.” ■



MacGregor's new Rapp Marine fully-electric centrifugal fish pump minimises power-consumption and reduces environmental impact

## Electric-drive net hauler sets new standards in efficiency, energy consumption and noise

Later this year, an electric-drive MacGregor Triplex net hauler will enter service for Norway's Peter Hepsø Rederi latest purser/ trawler, *Rav*, which is due for delivery in October 2018 from Karstensens Skibsværft in Denmark.

The new electric-drive net hauler delivers a considerable footprint advantage over conventional hydraulically-driven systems, allowing for more usable space on deck and a reduction in energy and fuel-consumption demands. It is also much less noisy, which improves situational awareness and working conditions for crew. Adding to its environmental benefits is the ability to switch from a system reliant on hydraulic oil, therefore eliminating the risk of oil spills into to the surrounding environment.

Electric systems also offer greater precision, thanks to the instantaneous stop-start functioning of the motors, and the ability to closely monitor the mechanism during

operation using an improved, more flexible control system.

The case for making the switch from hydraulic to electric systems on board fishing vessels is a compelling one, indicates Johnny Valle, Triplex Sales Manager, MacGregor. “The Triplex electric-drive net hauler offers a staggering range of benefits not seen in this market so far. In fact, they are so convincing that the installation or retrofit of this system will be difficult to ignore, with blanket improvements to every aspect of net hauler operation and a payback time measured in months.”

The electric-drive net hauler is designed for a maximum traction of 50 tonnes at full load. Each net hauler installation is tailored to the customer's needs, with different motor configurations and operating systems available. Its control system has been refined to improve accuracy and is operated from a control panel on both the deck and the bridge.



# Industry seeks expert opinions

Authorities, policy-makers, owners and operators all benefit from in-depth knowledge; after decades in the industry MacGregor is regularly called upon for its professional view, often with regard to safety

In the same way that MacGregor looks to expand its knowledge through an open collaborative approach, the industry often turns to MacGregor for its professional opinion. “There is no substitute for experience,” says **Mikko Sinivaara**, Technical Manager, Cargo Stowage and Securing Competence Centre, MacGregor. “As a company we have extensive knowledge in cargo handling and as individuals, many of us also bring decades of our own expertise in the same field. This is valued by the industry when access to greater technical understanding is required.

“For example, we try to ensure that classification rules are relevant, not too strict, but at the same time not too lenient, or impossible to achieve,” Mr Sinivaara

adds. “Based on our lengthy experience we can offer safety guidance, advising relevant parties on how to avoid accidents and/or business losses.”

## Assisting marine insurers

The Swedish Club recently sought MacGregor’s expert opinion as part of a collaborative report, Wet Damage on Bulk Carriers, aimed at tackling costly wet damage claims. The leading marine insurer credits MacGregor for its assistance in compiling the report and extends its particular thanks to Mr Sinivaara.

Prepared with MacGregor and DNV GL, the report urges bulk carrier owners to pay attention to basic maintenance. It highlights that 34 percent of all insured

“Based on our lengthy experience we can offer safety guidance, advising relevant parties on how to avoid accidents and/or business losses”

Mikko Sinivaara

bulk carriers suffered a cargo claim in 2017, which represents an increase of 75 percent since 2014. Heavy weather and leaking hatch covers were cited as the most common and costliest cause of bulk carrier claims between 2008 and 2017; with the average cost for a wet damage cargo claim close to USD 110,000.

Drawing on his wealth of experience in hatch cover repair and maintenance for the report, Mr Sinivaara says that: “Many elements combine to produce a safe cargo handling system, including important factors such as hatch cover strength and weathertightness. Hatch covers, and crucially their sealing systems, must be properly maintained to avoid the risk of seawater entering cargo holds.”

## Tailoring training packages

MacGregor is also often called upon to deliver specialist training packages. Mr Sinivaara recently conducted a tailored customer training event in Poland for Cyprus-based Intership Navigation. Attending deck officers were able to gain expert knowledge that only comes from decades of experience. ■

Mikko Sinivaara: “There is no substitute for experience”

# Contacts



**MacGregor**  
macgregor@macgregor.com  
[www.macgregor.com](http://www.macgregor.com)

**Head Office**  
MacGregor Pte Ltd  
15 Tukang Innovation Drive  
Singapore 618299  
Tel: 65-6597 3888

## MERCHANT SHIPS

**Cargo Handling**  
MacGregor Sweden AB  
Sjögatan 4 G  
SE-891 85 Örnsköldsvik  
Sweden  
Tel: +46-660-294 000  
crasales@macgregor.com

MacGregor Finland Oy  
Hallimestarinkatu 6  
FI-20780 Kaarina  
Finland  
Tel: +358-20-777 4500  
drycargosales@macgregor.com

MacGregor Germany GmbH  
Reichsbahnstrasse 72  
DE-22525 Hamburg  
Germany  
Tel: +49-40-25 444 0  
lashingsalesorder@macgregor.com

**Deck Machinery**  
MacGregor Germany GmbH & Co. KG  
Tornescher Weg 5-7  
25436 Uetersen  
Germany  
Tel: +49-4122-7110  
• +49-172-981 3292  
hatlapa.info@macgregor.com

**Bulk Selfunloaders**  
MacGregor Sweden AB  
Linbanegatan 12  
SE-745 25 Enköping  
Sweden  
Tel: +46-171-232 00  
crasales@macgregor.com

MacGregor Pte Ltd  
No 15 Tukang Innovation Drive  
618299 Singapore  
Tel: +65-6597 3888  
lashingsalesorder@macgregor.com

**RoRo**  
MacGregor Sweden AB  
J A Wettergrensgata 5  
SE-421 30 Västra Frölunda  
Sweden  
Tel: +46 31 85 07 00  
rorosales@macgregor.com  
roroconversion@macgregor.com

## OFFSHORE

**Advanced Offshore Solutions**  
MacGregor Norway AS  
Shibåsen 33 H  
NO-4636 Kristiansand  
Norway  
Tel: +47-91-686 000  
ofssales@macgregor.com

MacGregor Norway AS  
Kystveien 18, Barbubukt  
NO-4841 Arendal  
Norway  
Tel: +47-370-873 00  
pusnes@macgregor.com

**Deck Machinery**  
MacGregor Pte Ltd  
15 Tukang Innovation Drive,  
Singapore 618299  
Tel: +65-6597 3888  
ofs.sgp.salesmfg@macgregor.com

**Triplex Products**  
Triplex AS  
Henda  
NO-6530 Averøy  
Norway  
Tel: +47-71-513 900  
post@triplex.no

**Rapp Marine Products**  
Rapp Marine AS  
Nordstrandveien 41,  
NO-8012 Bodø  
Norway  
Tel: +47-75-550 100  
rapp.office.no@macgregor.com

## GLOBAL LIFECYCLE SUPPORT (service offices)

**AUSTRALIA**  
**Sydney Office:**  
Tel: +61-2-4647 4149  
• +61-408-494 777  
michael.stacey@macgregor.com

**BELGIUM**  
**Antwerp Office:**  
Tel: +32-3-546 4640  
• +32-3-546 4640  
macgregor.antwerp@macgregor.com

**BRAZIL**  
**Rio de Janeiro Office:**  
Tel: +55-21-3197-3844  
/ or -4442  
• +55-21-97187-7835  
pusnes.brazil@macgregor.com

**CHILE**  
**Talcahuano Office:**  
Tel: +56-41-2186620  
ignacio.andrade@macgregor.com

**CHINA**  
**Hong Kong Office:**  
Tel: +852-2394 1008  
• +852-9097 3165  
spencer.lee@macgregor.com  
**Nanjing Office:**  
Tel: +86-25-8672 0879  
hatlapa.service@macgregor.com

**Shanghai Office:**  
Tel: +86-21-2606 3000  
• +86-1380-1660 914  
frank.chen@macgregor.com  
**Shanghai Office (Hatlapa):**  
Tel: +86-21-2606 3000  
anne.wang@macgregor.com  
**Shanghai Office (Porsgrunn):**  
Tel: +86-21-2606-3000  
anne.wang@macgregor.com  
**Shanghai Office (Pusnes):**  
Tel: +86-21-2606 3000  
anne.wang@macgregor.com

**CROATIA**  
**Zagreb Office:**  
Tel: +385-1-383 7711  
• +385 98 440260  
marin.vukadinovic@macgregor.com

**CYPRUS**  
**Limassol Office:**  
Tel: +357-25-763 670  
• +357 97 888 050  
vladimir.stajduhar@macgregor.com

**DENMARK**  
**Copenhagen Office:**  
Tel: +45-44-538 484  
• +45-44-538 484  
service.cph@macgregor.com

**ESTONIA**  
**Tallinn Office:**  
Tel: +372-6-102 200  
• +372-53-018 716  
marko.maripuu@macgregor.com

**FINLAND**  
**Turku Office:**  
Tel: +358-20-777 4500  
• +358-40-5014 981  
kimmo.huhtala@macgregor.com

**FRANCE**  
**Le Havre Office:**  
Tel: +33-235-247 299  
• +33-6-8706 2164  
fra.lha.maintenance@macgregor.com  
**Marseilles Office:**  
Tel: +33-491-095 252  
• +33-6-8599 0447  
fra.mrs.maintenance@macgregor.com

**GERMANY**  
**Bremerhaven Office:**  
Tel: +49-471-78 041  
• +49-471-78 041  
volker.radau@macgregor.com  
**Hamburg Office:**  
Tel: +49-40-254 440  
• +49-40-2544 4113  
service.ham@macgregor.com  
**Schenefeld Office:**  
Tel: +49-172-3207 228  
• +49-40-8303 3191  
sales.interschalt@macgregor.com  
**Schwerin and Uetersen Offices:**  
Tel: +49-4122 7110  
• +49-172-9813 292  
hatlapa.service@macgregor.com

**GREECE**  
**Piraeus Office:**  
Tel: +30-210-4283 838  
• +30-6974-300 550  
athena.kanellatou@macgregor.com

**INDIA**  
**Mumbai Office:**  
Tel: +91-22-6773 6666  
• +91-998-7034 773  
marine.india@macgregor.com

**ITALY**  
**Genoa Office:**  
Tel: +39-010-254 631  
• +39-335-1394 779  
ita.service.macgregor@macgregor.com

**JAPAN**  
**Kobe Office:**  
Tel: +81-78-846 3220  
• +81-90-4387 9992  
masashi.tarui@macgregor.com  
**Tokyo Office:**  
Tel: +81-3-6671 8347  
• +81-90-3103-7110  
yuko.mizumi@macgregor.com

**KOREA**  
**Busan Office:**  
Tel: +82-51-709-3705  
• +82-10-6225 0121  
paul.moon@macgregor.com  
**Busan Office (Hatlapa):**  
Tel: +82-51-972 9269  
hee-kyung.han@macgregor.com

**LITHUANIA**  
**Klaipeda Office:**  
Tel: +370-46-469 855  
• +370-698-58 505  
tomas.bagdonas@macgregor.com

**MALAYSIA**  
**Kuala Lumpur Office:**  
Tel: +60-3-8959316  
• +60-19-2615316  
melvin.go@macgregor.com

**THE NETHERLANDS**  
**Rotterdam Office:**  
Tel: +31-10-2832 121  
• +31-10-2832 121  
macgregor.rotterdam@macgregor.com

**NORWAY**  
**Arendal Office:**  
Tel: +47-370-873 00  
• +47-900-53 924  
**Service:**  
pusnes.service@macgregor.com  
**Averøy office:**  
Tel: +47-71-513 900  
asgeir.ellingvag@macgregor.com  
**Bergen and Oslo Offices:**  
Tel: +47-56-313 300  
• +47-56-313 300  
service.bgo@macgregor.com  
**Bodo office:**  
Tel: +47 755 50 100  
• +47 918 12 999  
rapp.service.no@macgregor.com  
**Kristiansand Office:**  
Tel: +47-91-686 000  
• +47-91-689 751  
krs.service@macgregor.com  
**Porsgrunn Office:**  
Tel: +47-4640 2473  
Psg.Service.Porsgrunn@macgregor.com

**POLAND**  
**Gdynia Office:**  
Tel: +48-58-7855 110  
• +48-602-725 088  
gdynia.poland@macgregor.com

**QATAR**  
**Doha Office:**  
Tel: +974-6-6560 720  
• +971-50-6508753  
sales.qatar@macgregor.com

**RUSSIA**  
**Representative office in St. Petersburg:**  
Tel: +7-812-9380 498  
• +7-812-8380 498  
sviatoslav.chetyrkin@macgregor.com

**SINGAPORE**  
**Singapore Office:**  
Tel: +65-6597 3888  
**Merchant ships:**  
• +65-6261 0367  
marineservice.sgp@macgregor.com  
**Offshore:**  
• +65-6861 3922  
ofs.sgp.aftersales@macgregor.com

**Singapore Office (Hatlapa):**  
hatlata@macgregor.com  
**Singapore Office (Pusnes):**  
pusnes.singapore@macgregor.com

**SWEDEN**  
**Enköping Office:**  
Tel: +46-171-232 00  
aftersales.enk@macgregor.com  
**Gothenburg Office:**  
Tel: +46-31 85 07 00  
• +46-31 85 07 00  
service.got@macgregor.com

**UNITED ARAB EMIRATES**  
**Abu Dhabi Office:**  
Tel: +971-2-554 1690  
• +971 50 6408 823  
sales.uae@macgregor.com  
**Dubai Office:**  
Tel: +971-4-4562 863  
• +971 50 6408 823  
sales.uae@macgregor.com  
**Fujairah Office:**  
Tel: +971 9 228 2338  
• +971 50 6408 823  
sales.uae@macgregor.com

**UNITED KINGDOM**  
**Aberdeen Office:**  
Tel: +44-1224-347 050  
• +44-7921-473 427  
service.abn@macgregor.com  
**Newcastle Office:**  
Tel: +44-191-406 5100  
• +44-7768-334 419  
prt.service@macgregor.com  
**Peterhead Office (Rapp Marine):**  
Tel: +44-1779-490 044  
rapp.office.uk@macgregor.com  
**Portsmouth Office:**  
Tel: +44-2392-210 703  
• +44-7768-334 419  
prt.service@macgregor.com

**UNITED STATES**  
**Chesapeake Office:**  
Tel: +1-757-558-4583  
• +1-757-558-4580  
malcolm.hodges@macgregor.com  
**Dutch Harbour Office:**  
Tel: +1-907-581-2502  
rapp.dutchoffice@macgregor.com  
**Houston Office:**  
Tel: +1-346-888 2030  
• +47-90-053-924  
pusnes.houston@macgregor.com  
**Seattle Office:**  
Tel: +1-206-286-8162  
rapp.office.us@macgregor.com

Updated: 31 July 2018

Note • = 24-hour service numbers



# Creating value for you through digital solutions

Developed from decades of experience, MacGregor digital solutions create real-term value for your operations by capturing advances in efficiency, performance, reliability and safety.

Intelligent cargo handling solutions that benefit you now and in the future.

[www.macgregor.com](http://www.macgregor.com)

 **MACGREGOR**  
Designed to perform with the sea