

MacGregor **News**

Customer magazine Issue 170 Autumn 2015

In focus: Improved customer service through lifecycle support

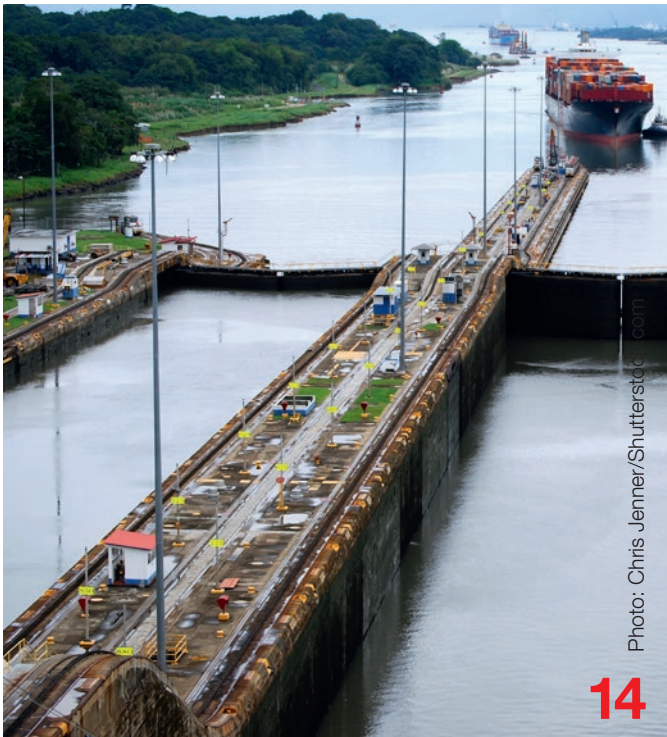
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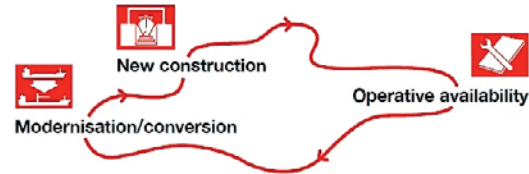
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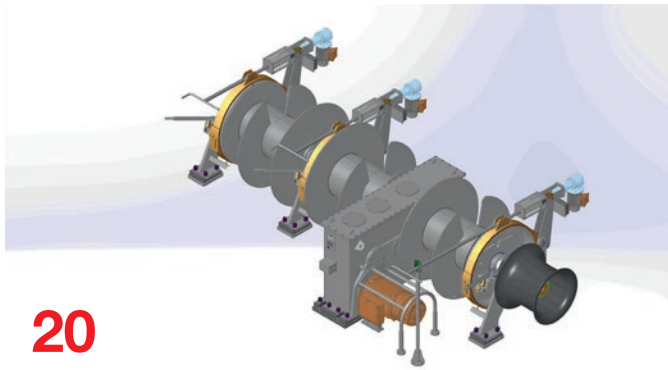
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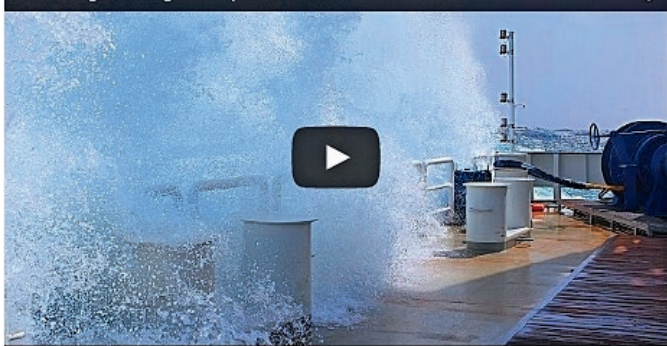


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MacGregor, Designed to perform with the sea



Watch our story: MacGregor is a family of innovators. By offering engineering solutions and services for handling marine cargoes and offshore loads we make the sea more accessible, safe and reliable for those whose livelihood depends on the changing conditions of the sea



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MACGREGOR

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MacGregor shapes the offshore and marine industries by offering world-leading engineering solutions and services with a strong portfolio of MacGregor, Hatlapa, Porsgrunn, Pusnes and Triplex brands. Shipbuilders, owners and operators are able to optimise the lifetime profitability, safety, reliability and environmental sustainability of their operations by working in close cooperation with MacGregor. MacGregor solutions and services for handling marine cargoes, vessel operations, offshore loads, crude/LNG transfer and offshore mooring are all *designed to perform with the sea*. www.macgregor.com

Editorial

Strong focus on service excellence, come hell or high water

MacGregor really wants to serve its customers under all circumstances, whenever and wherever needed. This is a mindset that comes naturally for the more than 2,500 global MacGregor employees and has underpinned the company's position as a leader and innovator in our industry for well over a century. We are also committed to a solution-oriented mindset; we solve problems for our customers. This journey begins by understanding the business and the needs and challenges of our customers. Our experts work closely with customers, maintaining an open dialogue and learning about each business and their value drivers.

MacGregor personnel do not work in ivory towers, but are very closely connected with our customers. Our aim is to make customers more productive and more competitive in their markets. We achieve this by delivering value-creating solutions. A notable example is our MacGregor PlusPartner concept (page 9). When these solutions are sold, this is not the end of the story, it is merely the beginning of a journey where we engage with customers throughout the lifecycle of the solution. This is when our service capabilities start to become even more evident. This issue of *MacGregor News* highlights our Global Lifecycle Support division, which is dedicated to improving MacGregor's service activities and its commitment to offering more comprehensive packages and boosting the development of new shiptype-specific solutions. It also enables MacGregor customers to benefit from the scale and capabilities of the whole MacGregor organisation. Please read more about these exciting developments in an article with John Carnall, who heads the service operations (page 6).

Since August 2015 I have had the privilege to serve as President of MacGregor. I am still new to the company, and surrounded by experts who



have worked here for decades, but I am not a novice in the maritime industry. I look forward to getting to know you and contributing to your success alongside the global MacGregor team. In December, MacGregor will be present at the Marintec China exhibition in Shanghai and together with our growing local team, we welcome you to come and discuss your needs with our experts.

But for now, I hope you enjoy reading this issue and especially learning how our Global Lifecycle Support can serve you, come hell or high water!

Michel van Roozendaal,
President, MacGregor

Michel van Roozendaal (M.Sc. Aerospace Engineering; MBA INSEAD, Fontainebleau) took up the position of President of MacGregor in August 2015. He joined MacGregor from Ingersoll-Rand where he headed the Thermo King Global Marine, Rail and Bus businesses. Prior to this he has held global general management roles with companies such as United Technologies, Danaher and Honeywell. With over 25 years in technology businesses, continuously exposed to product development, manufacturing and sales, Mr van Roozendaal has been responsible for delivering integrated solutions to customers in a variety of different fields.

Efficiency key for UASC's ULCCs

United Arab Shipping Company's first ultra-large container vessel has entered service equipped with a MacGregor high-efficiency cargo handling system designed to maximise payload potential and operational efficiency, while reducing environmental impact.

Delivered by Hyundai Samho Heavy Industries' (HSHI) Mokpo shipyard, *Barzan* is the first in a series of six 18,800 TEU container carriers for United Arab Shipping Company (UASC), designed to set new standards in fuel and energy efficiency.

Barzan's optimised MacGregor cargo handling system comprises hatch covers, a comprehensive lashing system and its

Lashmate software programme. The vessel also benefits from MacGregor's support service in making use of the full potential of the cargo system, including a compatibility check of all equipment and software and training for the personnel to use the equipment correctly. Further, a five-year extended MacGregor Onboard Care (MOC) agreement is included.

A fundamental element of delivering vessels with optimised payload potential is that the cargo system design steps in at an early stage of the ship project, before any restrictive decisions have been made.

"MacGregor is striving to elevate the status of the cargo handling system so that it is at the forefront of modern shipbuilding

processes," says **Tommi Keskilohko**, Director, Customer Solutions, MacGregor. "Our work with UASC demonstrates that substantial improvements to a ship and its cargo system design can be achieved with an open dialogue and close cooperation between all parties at a very early stage.

"Personnel at all levels must understand the system for it to be effective. We supported UASC through a pre-delivery training programme, and training will continue with the vessel in operation."

In addition to the six ULCCs, UASC has ordered eleven 15,000 TEU vessels also benefiting from optimised MacGregor cargo handling systems.

Zhengyu Li (Frank) appointed as Vice President, Head of China Business

MacGregor is developing operations in China and strengthens its organisation by appointing **Zhengyu Li (Frank)** as Vice President, Head of China as of 1 October 2015. Mr Li is driving the development of MacGregor business in the most important market in the marine industry. He will be a member of the MacGregor Group Executive Team and based in Shanghai.

Mr Li has over 25 years of international business experience, during which he has held various leadership positions in successful global companies like General Electric and Caterpillar in the Asia Pacific region. He joins MacGregor from Caterpillar, where his last role has been Innovation Director.



Package order for Chinese bulk carrier pair

Intensified focus on ship type business has resulted in an order for a comprehensive MacGregor equipment package for two 38,000 dwt bulk carriers to be built in China. The order includes the design and key components for hatch covers, deck cranes, electric deck machinery, steering gear and air compressors.

"Customers can benefit from MacGregor's extended portfolio, which now includes deck machinery, steering gear and air compressors from our Hatlapa range," says **Sönke Tanz**, Area Sales Manager, Auxiliary and Machinery Systems at MacGregor.

MacGregor's increased ship types focus, comprehensive product portfolio and lifecycle support through its global service organisation adds value to ship owners and operators throughout the vessels lifetime. Selecting MacGregor as partner means not only world class leading products and support by experts during the new building phase, but a life time commitment that follows the vessel.

GRIMALDI CAR CARRIERS CALL FOR RORO ACCESS SYSTEMS

MacGregor will deliver comprehensive RoRo access equipment packages for five post-Panamax 7,800 CEU pure car/truck carriers (PCTCs) for Grimaldi Group. The 200m vessels will be among the world's largest car carriers and they are being built by Chinese shipbuilding group Yangfan. The order, which includes options for seven more ships, is part of Grimaldi's fleet expansion and modernisation programme.

Each MacGregor RoRo access equipment package will comprise a quarter ramp, side ramp, internal ramps, bulkhead doors and four levels of liftable car decks. The gross weight of the equipment is about 2,400 tonnes per ship.

"We have a proven record of reliable deliveries and excellent support during the construction process," says **Mattias Gunnarsson**, Director of Sales and Marketing, MacGregor RoRo. "In

addition, our ability to meet the challenging delivery schedule was a major factor in winning this important contract.

"MacGregor has a long and successful working relationship with Grimaldi. Following delivery, MacGregor will continue to support Grimaldi, working with the owner to deliver the best possible lifecycle costs."

The vessels are expected to enter into service in 2017.



RCI's cruise passengers enjoying panoramic views with North Star

Passengers onboard Royal Caribbean International's (RCI) cruise ships *Quantum of the Seas* and *Anthem of the Seas* can enjoy the views of the ship, sea and ports of call from the gondola called North Star. Not only is North Star a unique concept in the world of cruise ships, but also in the marine crane industry. MacGregor is the first crane supplier involved in this kind of a project for a cruise ship.

Customer touchpoint

MacGregor Global Lifecycle Support is a new division given responsibility for aftersales support activities group-wide

Reflecting the continuing priority being given to through-life equipment support, MacGregor created a new dedicated division – Global Lifecycle Support at the beginning of 2015. With 850 employees focused on aftersales, MacGregor brings new focus to activities that include not only MacGregor’s own service business, but also the acquired well-known brands.

The MacGregor portfolio has grown significantly through acquisitions to include Hatlapa, Porsgrunn, Pusnes, Triplex and Woodfield products, and its divisions already work together in marketing, sales, sourcing, R&D and engineering. Leveraging the scale and capabilities of the whole MacGregor

organisation offers a clear customer benefit, and that same capability should be available to customers throughout the life of the equipment they buy. Global Lifecycle Support is now one of seven MacGregor business divisions, and its creation demonstrates not only dedication to improved customer service throughout the equipment lifecycle, but also a commitment to offering more comprehensive packages and boosting the development of new shiptype-specific solutions. It is a business unit that has common objectives group-wide. As a division, it is present in around 50 locations worldwide offering 24/7 service.

88% of survey respondents identified availability of spare parts as the most important issue determining the state of the relationship between the supplier and the end-user

Harmonising the customer interface and internal processes will be the key to safely providing the fastest possible supply of spare parts, maintenance activities and technical support for customers in the marine and offshore cargo handling industry wherever they operate. The sentiments are those of **John Carnall**, who has been appointed head of the Global Lifecycle Support division, and who brings a wealth of aftersales and service support experience to MacGregor (the box story). “Considering the equipment’s full lifecycle offers a better assessment of its value to the customer and the supplier,” he says.

In safe hands

Already, there are a series of service initiatives that highlight MacGregor’s ‘customer enabling’ strategy. Through 2015, MacGregor has committed itself to developing value-added activities, developing local technical competence and focusing on spare parts delivery. In 2016, the focus will switch to selective investments in inventory and warehousing. Further initiatives are laid out for 2017-2018, targeting sales excellence and the integration of aftersales activities with newbuilding deliveries.

“Safety is a differentiator and should be at the top of the agenda whenever we engage with our customers

John Carnall

During his few months in the job, Mr Carnall has been able to draw on a customer survey that was performed across the MacGregor marine and offshore businesses, whose results are helping to fine-tune the division’s strategy going forward.

Highlighting the timeliness of the division’s creation, 88% of survey respondents identified availability of spare parts as the most important issue determining the state of the relationship between the supplier and the end-user.

“MacGregor actually outperformed three near competitors but the percentage figure shows that, even if we were able to claim 100% customer satisfaction, nobody could afford to put their feet up,” he says. “For MacGregor to achieve its twin objectives of being a world-class service organisation that also drives profitable growth at group level, our focus needs to be external as well as internal; frontline experience

and understanding key customer touch-points will be critical.”

“Often, it is about having the logistics vision to serve the supply chain. Customers may want spare parts in a day, a week, or a year, and our task is to deliver parts on the requested date. In the same way, the term ‘available’ should mean the part is on the shelf, not that it can be ordered.”

Having a dedicated business unit represents a change of focus, not a change in direction, Mr Carnall says. “We will be offering a three-part value proposition: to achieve service excellence; to make MacGregor easier to do business with; and for MacGregor to deliver exactly what customers want, rather than basing it on industry standards.”

Expert advice

Around half of the division’s personnel are service engineers working in the field, and Mr Carnall says part of his vision is to develop all of them as “experts who act as consultants, rather than simply being technical support staff”.

“For example, the marine and offshore sector is one where safety, regulation, certification, permits and training are everyday concerns for our customers,” he

says. “In fact, safety is a differentiator and should be at the top of the agenda whenever we engage with our customers. One of my first tasks will be to bring together records tracking the safety performance of marine and offshore equipment supplied from across the organisation.”

Harmonising the service agreements MacGregor offers will be a key building block for success. “There are a lot of different offers out there; some of our agreements are really inspection and consultancy services, while others include performance targets and have penalties attached,” Mr Carnall says.

Marine equipment suppliers often remark that most customers undervalue the potential savings available to them when entering service agreements. Some shipowners see service agreements as being a form of extended warranty, while some ship managers see them purely as a way of bargaining a discount.

“What we need to do is provide good data to all of the stakeholders, and show them the value these agreements bring – demonstrating how they avoid the equipment downtime that risks costly vessel off-hire,” Mr Carnall emphasises.

“IT developments will also be central to enhancing the customer experience,

“As an individual supplier, our role should be ensuring that the equipment is enabled for connectivity when the time comes”

John Carnall

Mr Carnall says. He has identified “pockets of excellence” within MacGregor involving the performance tracking of specific equipment types. Best practice will offer the guidance to develop a coordinated equipment performance tracking system before the end of 2016.

Smarter working

“For example, engineers equipped with up-to-date smart devices will be able to access parts lists, inventory and training modules, and this will convert into expertise that is available to customers. We will commit more investment to the development of applications to support the devices in the hands of engineers before the end of 2016.”

As well as improving through-life equipment performance tracking, IT has a bearing

on other ‘touchpoints’ that include more transparent documentation, better branding and packaging, and web portal service development. “These are all ways of making MacGregor easy to do business with.”

“Today around 90% of the spare parts MacGregor supplies still involve a direct transaction between supplier and end-user. However, this is likely to change fast, and we have to be an agent of change,” Mr Carnall says.

“As someone with industrial, mining and hydraulic engineering sectoral experience, I can tell you that all of those sectors said there would be no substitute for the direct supplier-customer relationship, and then suddenly there was. At the end of the day, the end-user will find dealing with 10-20 shipboard equipment suppliers unsatisfactory when it comes to tracking and maintaining shipboard equipment performance.

“Ultimately, a common interface will emerge, with an interface provider operating between the supplier and the customer in many cases. The answer is to invest in developing open source protocols. As an individual supplier, our role should be ensuring that the equipment is enabled for connectivity when the time comes.” ■



Leading Global Lifecycle Support

John Carnall, Senior Vice President for MacGregor Global Lifecycle Support, has held senior management aftersales roles around the world in the mining, and oil and gas sectors, but also has a decade of frontline service engineering experience to draw on.

He joined MacGregor from Danfoss Power Solutions, where his mission was to investigate the opportunity for a new aftersales division with responsibility for the complete value chain from suppliers to customers.

Previous roles have included Vice President Marketing & Sales, Mining & Rock Excavation Service Division (MRS) Atlas Copco, Vice President Parts & Services Drilling Solutions, Aftermarket Product Manager Oil Free Air Division Belgium, and Aftermarket Business Line Manager, Atlas Copco Compressors Canada. Based in MacGregor's Newcastle office in UK, Mr Carnall's new post sees him return to his native North-East, which is also close to the spot where Joseph and Robert MacGregor developed their first steel hatch cover.

Shipbuilding and sea transportation redefined – who will benefit in the future?

A proactive approach and ongoing dialogue between all parties during the entire shipbuilding process help ensure that both the ship and its cargo handling system meet the shipowner's needs



The demand for increased operational efficiencies while minimising environmental impact is driving major shifts in the shipping industry and its uptake of new technologies and ideas. Digitalisation has smoothed out overall transportation processes and put the focus on efficiency on every front. Software programmes are being used to help pack containers as efficiently as possible; anticipated cargoes are filed in systems well ahead of loading time; and in best case scenarios ships load and unload containers in sequences carefully calculated by cargo optimisation tools. However, the software currently used in port may also at times disregard revenues, which can mean that the 'best-paying' containers are not necessarily loaded.

In turn, the complexity of current technological solutions requires a high level of cooperation between companies during shipbuilding. Lacking coordination can too often lead to a mismatch between a ship's nominal and actual capacity, i.e. the ship will not be able to accommodate the payload of containers in certain positions due to weight, stability or other container arrangement restrictions.

Previously, interaction during the ship design phase mainly occurred between the design office and the future shipowner. However, in order for the shipowner to benefit from the systems installed on the ship, the suppliers of these systems should be brought into the dialogue in the early stages of ship design. Enhanced cooperation between all the parties involved in the shipbuilding process will allow decisions to be made based on the actual operating conditions of the vessel and industrial needs, with the ship equipped with systems which enable it to reach its full capacity, thus ensuring profitability in the long-term. During a ship's operation the level of efficiency boils down to the cargo system design and the knowledge level of the people using the system on board and in port. ■



“The shift to an efficient shipping industry can occur only by implementing a new approach to building ships”

Kim Wikström

MacGregor News had a chance to interview Professor **Kim Wikström**, Åbo Akademi University, on the current and future state of shipping industry

WHAT IS THE CURRENT STATE OF THE SHIPPING INDUSTRY AND HOW COULD IT BE IMPROVED?

“As you might know, 90% of world trade is carried through sea logistics. Therefore the shipping industry has a major impact on global economic wealth. The current situation of the international shipping industry is characterised by transactional, cost-oriented shipbuilding, which diminishes its effectiveness. The shift to an efficient shipping industry can occur only by implementing a new approach to building ships, where not only capital costs are relevant, but also low operating costs, high revenue potential and 'market match' are considered during design, maintenance and operations.”

HOW SHOULD THE INDUSTRY'S LOGIC BE CHANGED? WHAT SOLUTIONS COULD IMPROVE THE SITUATION IN THE INDUSTRY?

“First and foremost, a ship should be seen as a set of guaranteed functions and not as mere components. These functions include, for example, cost- and environmentally-efficient operations, maximised availability, and high earning potential. Consequently, system suppliers should be seen as the core providers of these functions and be involved in the shipbuilding process at an early phase in order to tailor their offerings in such a way that it enables the ship to be compatible with market needs. The function providers should focus on delivering innovative solutions based on an in-depth understanding of the market and the value the customer is seeking, engaging in a dialogue both with the customer and other parties involved in the shipbuilding process.”

WHAT IS MACGREGOR'S ROLE IN DEVELOPING THE SHIPPING INDUSTRY?

“We have been collaborating with MacGregor for a few years now within the framework of the FIMECC Rebus programme, which is oriented towards adopting boundary-spanning business models that are focused on high level cooperation between the partners in a project and development of new innovative solutions. During recent years, MacGregor has been implementing a new, value-oriented approach to their business operations and I can surely say that the company is at the forefront of developing new thinking in the shipping industry. Being in a leading position comes with a lot of responsibility and I believe that MacGregor is handling this role perfectly!”

MacGregor – riding the waves of change

MacGregor introduces its PlusPartner concept – a relational way to build better ship investment cases through a combination of optimised cargo systems and utilisation support



MacGregor’s responsibility as a market leader is to provide its extensive expertise on cargo efficiency issues and to make sure that the industry can benefit from onboard cargo systems that match today’s requirements. MacGregor’s in-depth understanding of the shipping industry ensures that essential benefits can be achieved by fully utilising customised cargo systems for container ships. These benefits include enhanced ship utilisation rates, improved fuel efficiency and subsequently reduced emissions per carried payload container. The delivery of these enhanced benefits to customers depends on the fundamental shift in the importance of the cargo handling system at a ship’s design phase. Therefore, MacGregor is striving to elevate the status of the cargo handling system so that it is at the forefront of the modern shipbuilding process.

This elevated status is achieved through a forward-thinking approach and dialogues with the shipowner at the early stages of a ship’s design, before any restrictive decisions have been made. Tight collaboration with the customer from the very beginning of the shipbuilding process enables us to analyse the impact of different loading requirements

on individual components of the cargo handling system and align the system with the ship’s hull design.

MacGregor also encourages the customer to adopt a holistic point of view on the cargo handling system, by considering all the parts of the cargo handling system as a whole during the ship design. When all parts of the cargo system are designed and delivered by one responsible party, and the ship’s hull matches the system requirements, there are much fewer interfaces to control, the administration is easier and the schedules are easier to keep.

The result of this approach is MacGregor PlusPartner, a cargo system solution, whose various parts can be optimised in terms of strength and weight so that they work as one entity to accommodate the maximum payload space for the anticipated cargoes. With a system optimised for the anticipated cargoes, there are fewer unpleasant surprises in the anticipated revenue streams during ship operation. Furthermore, when the cargo system performance is known in advance, it makes the decision process for the investment more transparent and reduces the investment risks. The MacGregor PlusPartner consists of elements such as Pre-build Inspection, Smooth Introduction, Productivity Care

and Cargo Boost Factory. Here is what they comprise:

PRE-BUILD INSPECTION:

The Pre-build Inspection is a feasibility study, the purpose of which is to create an understanding of the customer’s business and fleet. This is a study carried out at an early stage of ship and cargo system design together with the customer and it defines the benefits that MacGregor PlusPartner can create for the customer’s business.

SMOOTH INTRODUCTION:

Smooth Introduction supports the ship in taking into use the full potential of the cargo system from day one of its operation. This is done by a compatibility check of all equipment and software and by training the different user groups to use the equipment correctly, both on board and on land. The training includes items such as stowage arrangements, which have not been part of traditional handover processes, and literally walking through the cargo system from bow to stern

PRODUCTIVITY CARE:

Productivity Care is a service which continues from where the Smooth Introduction left off. The service

includes monitoring and follow-up service for the ship’s cargo system based on onboard data analysis combined with follow-up training and guidance. Through Productivity Care, MacGregor can guarantee increased cash flow for the sailing fleet.

CARGO BOOST FACTORY:

Cargo Boost Factory is a concept for the sailing cargo fleet designed to improve the vessel’s performance and cash flow through a cargo system upgrade and related services. It is based on close cooperation with the ship’s owner and comprises of a Pre-build Inspection, a detailed implementation plan, the actual project execution and—most importantly—a Productivity Care service.

LIFETIME PERFORMANCE PLATFORM:

Lifetime Performance is a research and development platform focusing on traditional research and development but also on the generation of business models. The purpose of this platform is to bring new content to services and products and to come up with tangible solutions that have real value for our customers. With the help of Lifetime Performance platform MacGregor can ensure that new innovative ways to improve cashflow are continuously generated for the marine industry ecosystem.

Each MacGregor PlusPartner package is developed together with the customer,

making sure that it includes the elements that have a value for that specific customer. With PlusPartner, MacGregor can guarantee that the vessel can carry the agreed number of PAYLOAD containers. Conducting cargo system design and delivery in such a holistic way is new in the industry and so are the negotiation processes and contract models. The main differences are the timing, the high level of interaction with the customer and the in-depth understanding of customer needs. It is not an “order to delivery” process, but a deeper relational process where all parties co-operate and make commitments in co-operation to give birth to a ship with the highest possible payload capacity, thus increasing profitability and reducing emissions per carried payload ton. In addition to the benefits that MacGregor’s approach brings to its direct customer (shipowner), it also provides benefits to other players engaged in the shipbuilding process. For example, it allows shipyards to sell payload capacity rather than just selling ships, which adds value to the shipyards’ offerings to shipowners.

To conclude, in order to succeed in today’s highly competitive environment players in the shipbuilding industry should not simply consider technical aspects when building a ship, but rather think in terms of “How to build a good ship investment case?” ■

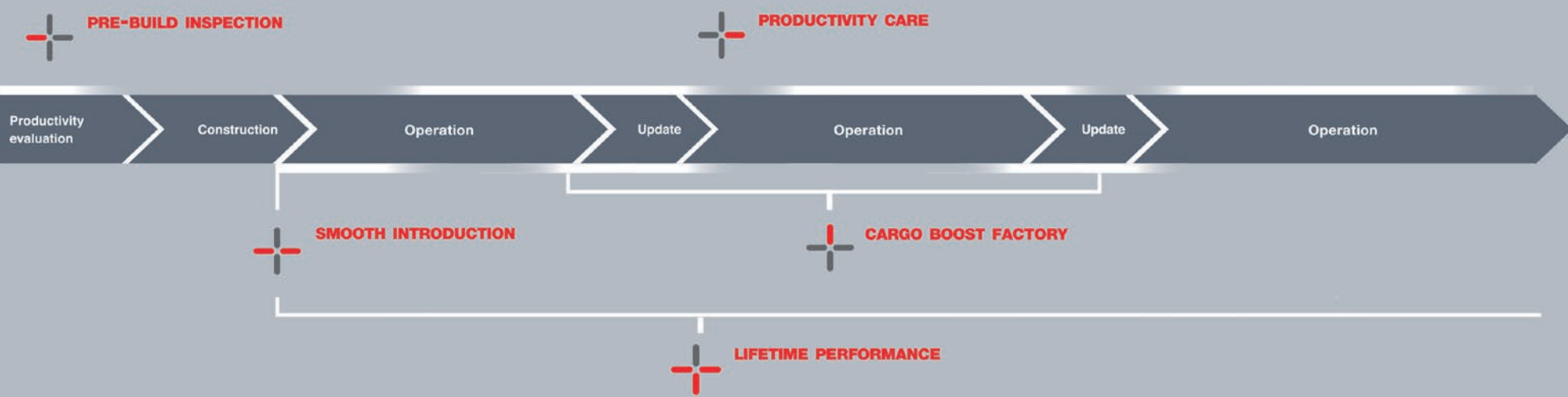
MacGregor delivers optimised cargo handling systems for five container ships

MacGregor has received an order worth USD 21 million for optimised cargo handling systems for five 10,500 TEU container vessels from South Korean shipyard Hyundai Samho Heavy Industries. The ships are built for Hapag-Lloyd and will be deployed primarily on South American routes.

“Cargo system flexibility at loading and unloading, together with its actual payload capacity are crucial for the ship’s revenue and long-term profitability. Such efficiency can only be achieved when all parts of the cargo system are designed as one integrated element at an early stage of the project, before any restrictive decisions have been made. MacGregor is pleased and excited to work together with Hapag Lloyd and Hyundai Samho Heavy Industries in this new project. Its relatively tight schedule would actually not have been feasible without this forward-thinking approach and seamless co-operation between all parties.” says **Tommi Keskilohko**, Director at MacGregor’s Customer Solutions.

The MacGregor cargo handling system for this new series of container ships comprises the hatch covers, lashing bridges and container fittings with related software and a lifecycle support package. MacGregor will also supply loose lashing system, support Hapag-Lloyd in taking into use the full cargo system potential through a training programme for on-board and land-based personnel, a cargo system performance analysis and guidance. MacGregor markets its optimised full cargo system solutions for container ships under the name MacGregor PlusPartner.

MACGREGOR PLUS PARTNER



It is not an “order to delivery” process, but a deeper relational process



Panamax payload problem solver

To be a viable investment, widening the ships that become surplus to requirements after the new Panama Canal locks open for business next year will require a little help from the ‘MacGregor Cargo Boost’

Doubling the capacity of the waterway connecting the Atlantic and Pacific oceans will doubtless change the way shipping does its business, but the \$5.25 billion Panama Canal project comes with a challenge: what to do with the relatively narrow ships that have so far been required to squeeze through the existing locks?.

When the new locks open – scheduled for April 2016 - they will be able to accommodate vessels with nearly three times the container capacity that is possible for the ships transiting the Canal today. Amid the expected fanfare bolstering Panama’s strategic position as a transshipment hub for much of Central and South America, the fate of these older ships should not be overlooked. After all, one man’s junk is another man’s treasure.

The earlier generation of Panamax ships were optimised not only for the restrictions of the Canal: they also largely predate container shipping’s quest for fuel savings through the adoption of slow steaming. Built for speed,

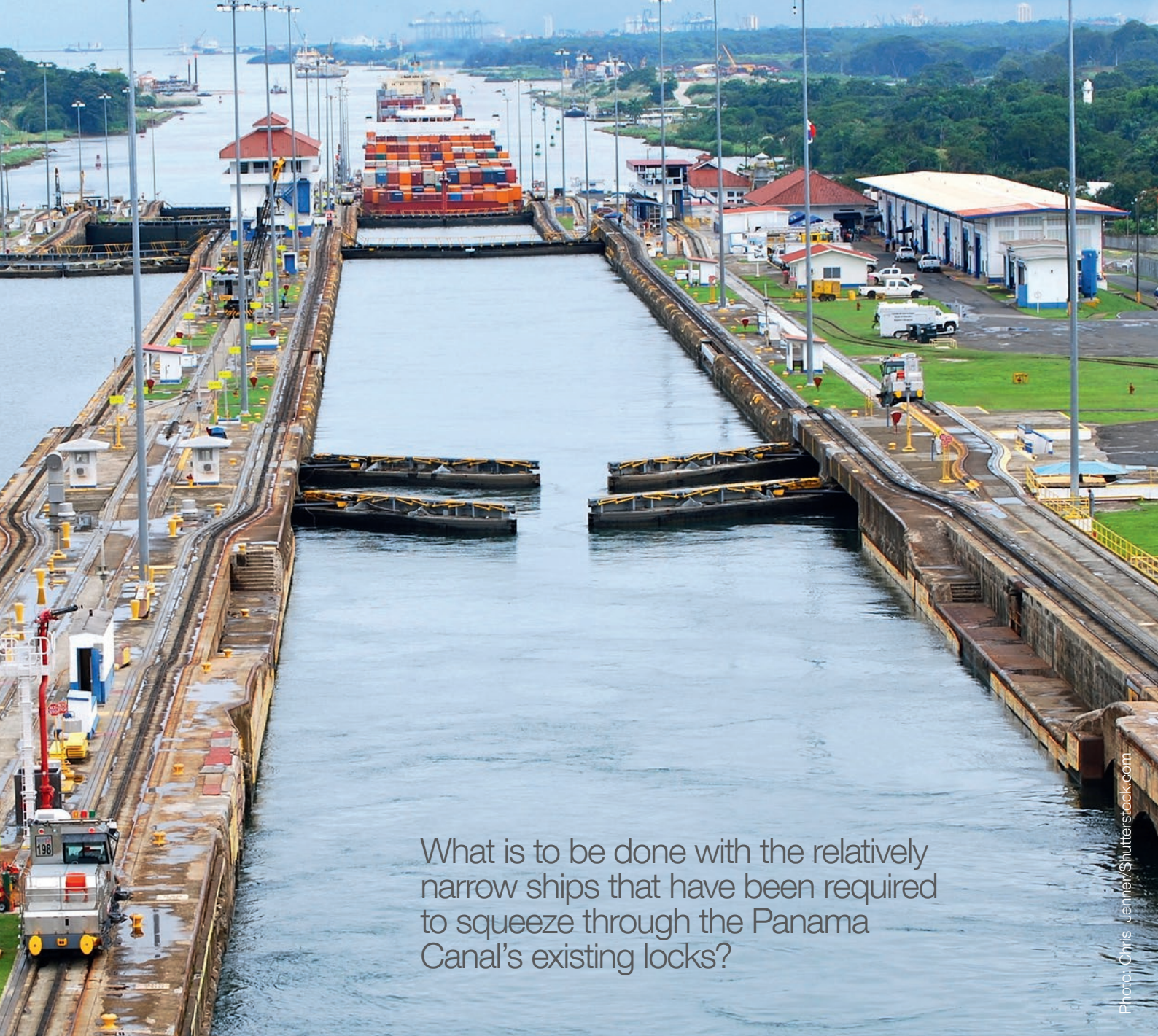
these long, narrow-hulled ships also feature disproportionately large marine engines when compared to the box ships being built today.

Finding a continued use for existing Panamax ships will be challenging, because their narrow design results in poor stability, requiring them to carry large volumes of ballast water, notes **Janne Suominen**, Manager, Cargo System Development at MacGregor. “Furthermore, their large engines are not suited to the current need for slow steaming. Powerful engines designed to be used at high power outputs do not perform well at sustained low speeds,” he says.

A wider view

One potential solution is a widening conversion. This would involve cutting the hull along its length and adding a new longitudinal mid-section. Widening the beam in this way would also demand the rebuilding of the bow section, resulting in a small increase in vessel length.

Cargo Boosts increase the payload capacity of Panamax vessels - widening the vessel would be augmented by a new container arrangement onboard



What is to be done with the relatively narrow ships that have been required to squeeze through the Panama Canal's existing locks?

"This would produce a better proportioned vessel in terms of length and breadth, resulting in improved stability, which would in turn increase the actual capacity due to the reduced amount of ballast water," says Suominen.

Viktor Sundholm, a researcher at Åbo Akademi University, has been working with Suominen on a project looking into the practicalities of vessel widening, and considering the variables that could make up the mind of the thoughtful investor.

"When a ship is widened, the increase

in hull size means that the existing engines are then suitable for slow steaming. In addition to solving the problems related to the obsolete design, the lifecycle revenue potential for the ship is increased through the added capacity in the larger hull size," says Sundholm.

The availability of older Panamax ships for conversion presents an ideal opportunity for the deployment of the MacGregor Cargo Boost solution, and in fact may hold the key as to whether such projects are viable at all.

Cargo Boosts are designed to increase the payload capacity of container ships and, for Panamax vessels, so that widening the vessel would be augmented by a new container arrangement onboard.

As well as increasing the number of rows onboard, widening conversion provides the opportunity to boost capacity by raising the maximum stack height on the ship, in turn raising the height of the navigation bridge and lashing bridges (Figure 1). Without widening, these long, narrow structures would not be stable enough for the stack to

be raised. In addition, though, when the lashing bridges are raised to the second tier, a separate possible benefit would be available by switching the lashing arrangement from internal to external lashing: this allows for a further increase in the payload capacity due to reduced lashing force limitations.

Flexible solution

New container arrangements could also be introduced by removing the lashing gangway between the twenty-foot containers through modifications to the hatch cover. Following this alteration, it would be possible for 20ft containers to be positioned end-to-end, allowing the mixed stowage of 20ft and 40ft containers and delivering greater container loading flexibility on deck. This will also enable stowage that delivers a lower centre of gravity for deck containers, which acts as a boost to vessel stability.

"By working together with Technolog GmbH in Hamburg, which has proven record of such widening project, MacGregor can take care of the complete vessel widening and Cargo Boost project," says Suominen.

Sundholm says that the cumulative effects of raising the stack height, improving the lashing system, as well as widening add up to feasible investment, due the higher revenue potential from the increased payload capacity.

MacGregor's calculations are based on the assumption that a widened – but 'unboosted' – vessel's nominal capacity is increased from 4,600 TEU to 6,000 TEU and its actual capacity is increased from 3,680 TEU to 4,800 TEU respectively. For an un-boosted vessel, sailing four round-trips per year between Asia and America, this increase in actual capacity of 1,120 TEU would mean an additional annual revenue income of USD3.6 million, when the freight rate is USD800 per TEU. The maximum payload capacity is calculated as 80 percent of the registered capacity.

“Whenever a Panamax container ship widening conversion is planned, considering an additional payload capacity increase using Cargo Boost should be a ‘no brainer’”

Janne Suominen

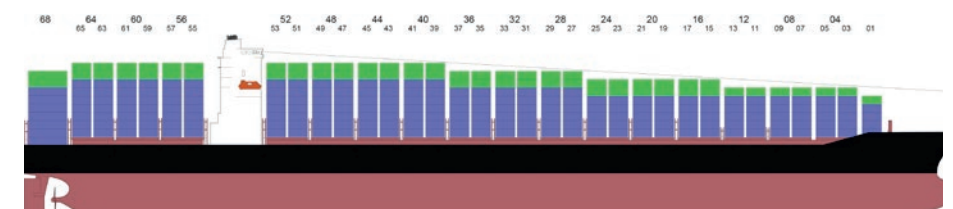
By adding the cargo boost, actual payload capacity can be further increased to 5,400 TEU, which adds capacity of 600 TEU to the vessel. At the same freight rate, this would mean a further annual revenue increase of USD1.9 million; taking the total to around USD5.5 million a year in additional revenue. The maximum payload capacity of a 'boosted' vessel is calculated as 90 percent of the registered capacity.

In both examples, the calculations are based on the East-bound route only, as the return trip is unlikely to require the additional capacity and so is not relevant to increased revenue calculations.

"With the cost of the conversion estimated to be at least USD10 million and the cost of the Cargo Boost around USD3 million, MacGregor estimates that the additional cost of raising the navigation bridge and the lashing bridges will be paid back in less than a year and a half," says Suominen. "Both structures undergo modifications in a widening conversion anyway, so raising them is for the most part covered by the widening conversion."

Figure 1

A widening conversion provides the opportunity to boost capacity by raising the maximum stack height on the ship.



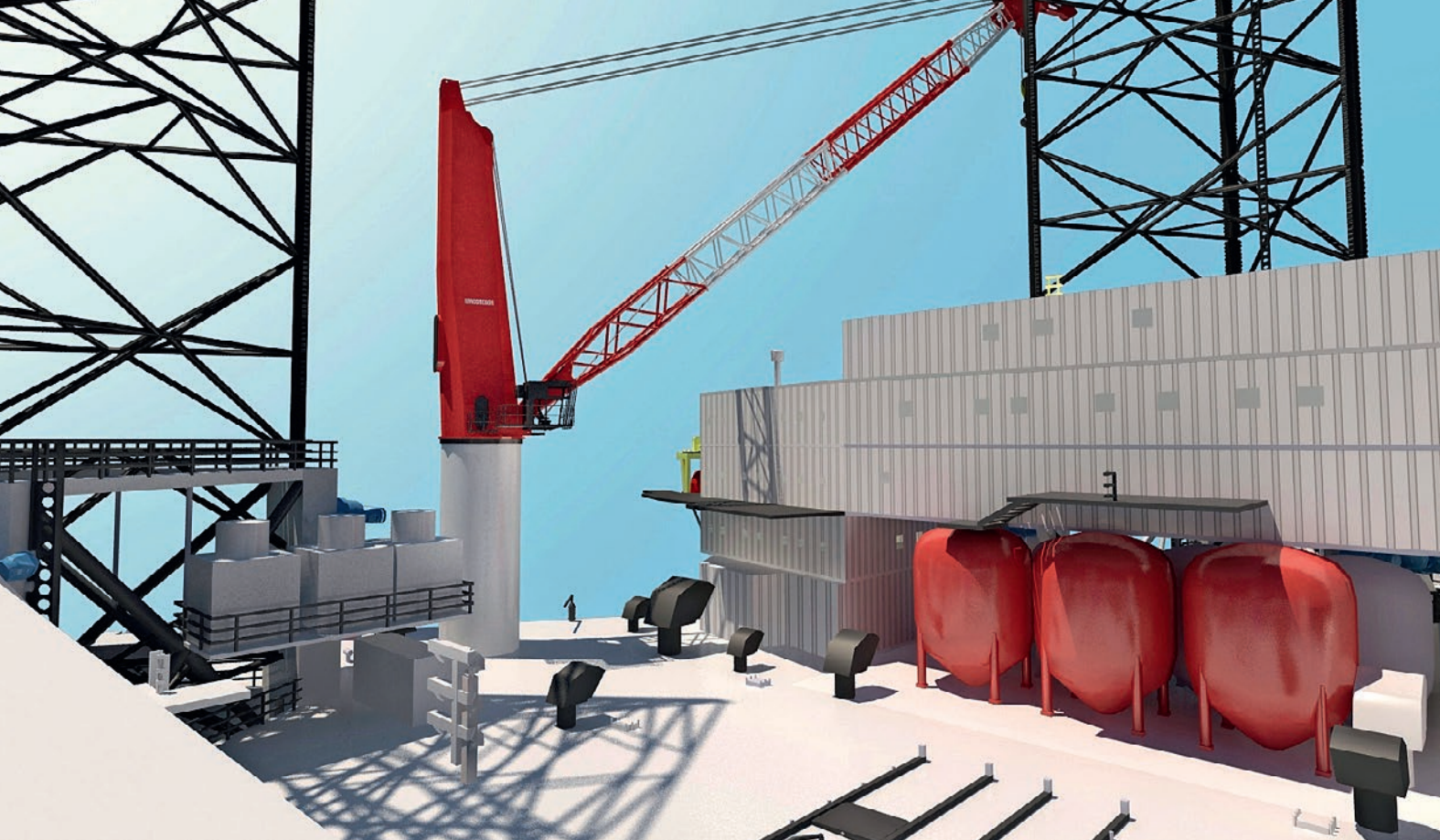
Investment evaluation

If a ship has a lashing bridge before the conversion, the foundations and other related structures need to be evaluated for their ability to carry the proposed cargo profile from a strength and stability perspective. Any necessary strengthening or modifications need to be carried out accordingly. If there is no existing lashing bridge, and depending on the available space, two-tier lashing bridges can be added, provided that the hatch cover and hull strengths allow for the increased payload weight. This increases the payload capacity even more.

"Widening conversions go a long way towards solving the problems presented by Panamax container ships built to an outdated design," says Suominen. "Adding a MacGregor Cargo Boost to the widening conversion significantly increases the benefits in terms of maximum payload capacity, which in turn delivers a more feasible investment."

Whenever a Panamax container ship widening conversion is planned, considering an additional payload capacity increase using Cargo Boost should be a 'no brainer', he says.

Sundholm concludes by observing: "It is worth noting that every new vessel with the same beam as a widened Panamax ship is equipped with lashing bridges; if a widening project does not include lashing bridges, the vessel will be disadvantaged by not having a cargo system as productive as its newer competitors." ■



Lattice Boom makes offshore connection

50 years of experience with shipboard and offshore cranes has resulted in the development of MacGregor's range of lattice boom cranes

MacGregor's decision to launch a range of lattice boom cranes (LBC) has been vindicated with the announcement of the contract from Mekers Offshore. The order was secured on the back of MacGregor's in-depth

knowledge of the offshore market, allied with the technical capabilities of the new LBC.

"We have a long-standing reputation for delivering robust and reliable offshore equipment and this played a key part in winning this contract," says **Mattias Sundstrom**, Sales and Marketing Director, LBC. "The order was secured with the assistance of Singapore-based Marine Commerce, and our longstanding relationship with them was another important factor in the negotiations reaching a successful outcome."

The Mekers order consists of four LBCs for two offshore maintenance liftboats, each equipped with 80m jack-up legs, which are being built at Jiangsu Dajin

Heavy Industries in China, a division of the Shanghai Bestway group.

The cranes will each have a safe working load (SWL) of 200 tonnes at 15m outreach, or 60 tonnes at 45m and will be designed to meet the requirements of the American Petroleum Institute API-2C standard, which governs the design and construction of offshore pedestal mounted cranes.

Responding to offshore demands

MacGregor developed its LBCs in response to growing demand in the offshore sector. The company drew on over 50 years of experience with shipboard and offshore cranes, with the resulting LBC representing an evolution, based on

tried-and-tested solutions developed with the latest technology.

MacGregor's LBC range is designed for floating or fixed offshore installations and can be supplied with a hoisting capacity of between 50 and 300 tonnes SWL, and with an outreach up to 50m.

Safe operation in harsh conditions

The LBC range has been specifically designed to meet the rigours of operating in demanding offshore conditions. MacGregor has incorporated a number of features that will ensure a high degree of safety and reliability.

Sophisticated stepless speed controls ensure smooth changes in hoisting, luffing and slewing movements. These three crane movements are all hydraulically driven and can be undertaken simultaneously at maximum SWL, without any reduction in speed.

Tough, efficient and quiet

Furthermore, the new LBC range comes with CC3000, an in-house designed control system developed for use in tough marine environments. The system has been fitted to MacGregor shipboard cranes for over ten years and has a proven track record of safety and stability, while delivering high levels of performance. The CC3000 has a user interface that provides operators, and the MacGregor engineering service team, the data needed to ensure safe and efficient operations as well as to minimise downtime (see right).

The cabin display has the MacGregor MacHeavyvisor software system which enables the operator to see and log real time information including weight and outreach data. ■

CC3000 control in first position

The first K4 shipboard grab cranes to feature MacGregor's advanced CC3000 crane control system technology are now in operation for Oldendorff Carriers

Advanced CC3000 crane control systems are being put through their paces with German shipowner Oldendorff Carriers. The Oldendorff contract represented a breakthrough for CC3000 control, with an initial order for three 50-tonne capacity K5036-4HD cranes.

The K4 cranes, with eccentric platforms, were fitted on board the owner's 94,000 dwt transloading vessel *Alfred Oldendorff*, which entered service in March this year and was followed by sistership *Antonie Oldendorff*, which also has three CC3000-controlled K4-class cranes.

Both ships will be engaged in long-term transshipment contracts with various clients in the Middle East Gulf, primarily involving lightering of Capesize bulkers.

Operational benefits

The incorporation of CC3000 technology has enabled new safety and productivity features to be installed on the already market-leading K4 cranes. Active pendulation control (APC), for example, minimises unintentional movements of the grab, meaning the operator can position the grab more easily and increase operational speeds.

APC also reduces unnecessary stress in the bearings, wires and sheaves, reducing the risk of downtime and the need for maintenance and repair.

Per Strandberg, R&D Manager for MacGregor Cranes, says: "With APC, the operator can achieve faster operations as the APC-system minimises unnecessary grab movements. Less experienced drivers

in particular can benefit from the extra precision and faster positioning of the grab permitted by APC."

The Oldendorff K4 cranes' CC3000 units also incorporate an enhanced anti-collision system that protects the bridge, other static obstacles on deck and other cranes. "The system significantly reduces the risk of severe damage to cranes and vessels due to collision," notes Mr Strandberg. "Operational flexibility is still maintained because the dynamic safety area moves with the crane and this minimises the need to limit the operational area of the cranes."

Controlled data

CC3000 control is a microprocessor-based control system for electric and hydraulic cranes. The system reduces the spare parts burden, while interfacing with wide variety of sensors to support better monitoring and repair practices. Safety critical functions are backed up through an extra safety processor.

The crane operator can access a range of data through cabin display screens, providing the information needed to improve performance and maintain high levels of operational safety. The same information can be seen on-line on the bridge via the 'Ships Office' function.

CC3000 can be delivered with an optional power limitation function allowing the operator to set maximum genset outputs to conserve energy, with crane speeds reduced once the limits are reached.

The CC3000 is type approved by DNV GL, which tested critical hardware and software components. ■

Deck equipment dealing with extremes

Russia's Yamal LNG project involves one of the most demanding logistics supply chains imaginable. Technical innovation means Hatlapa deck machinery is ready for the challenge

Located in the Russian Arctic at the estuary of the Ob River in ice bound conditions for 9 months of the year, Yamal LNG will use a fleet of highly specialised LNG carriers to move its production to Asia and Europe. The dedicated ships, which will each have a cargo capacity of 172,600 cubic metres and very high Arctic ice class Arc 7 rating, are under construction at the Daewoo Shipbuilding and Marine Engineering yard in South Korea, for

delivery in 2017 and 2018.

MacGregor's ability to deliver solutions that meet extreme day-to-day temperatures has been reflected through a contract to supply a Hatlapa deck machinery package for 15 of these very special LNG carriers. This will include shipsets of electrically-driven windlass and mooring winches.

MacGregor believes that demand for shipboard equipment capable of working in extremely low temperatures will

increase, and that its unique combination of new materials, variable frequency drive equipment and remote control capability is a major step forward for the industry. "With these winches we have set a new benchmark in terms of technology," says **Dieter Kleen**, Product Line Manager, deck machinery, MacGregor Hatlapa. "This has put us in an ideal position to meet future market demand for marine equipment of this type."



Technology performs beyond limits

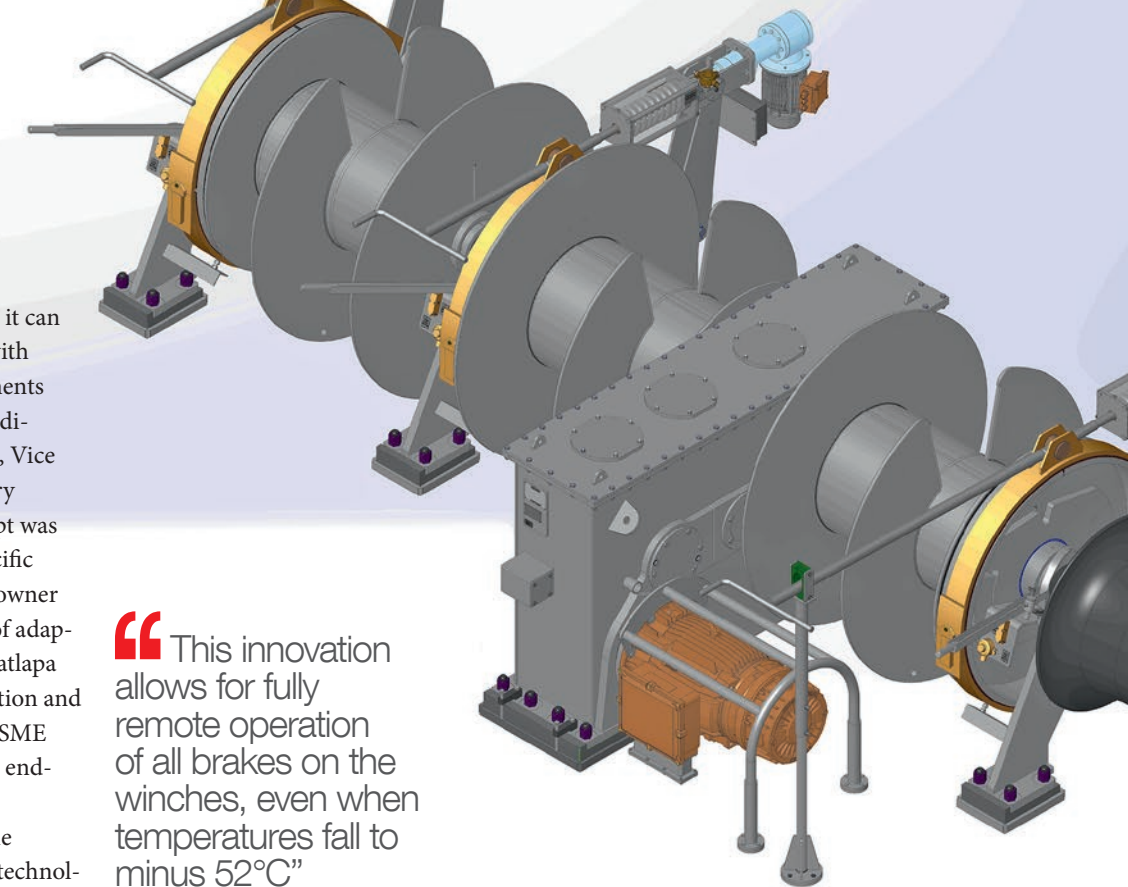
"MacGregor is demonstrating that it can deliver equipment that complies with the demanding technical requirements of operating in extremely cold conditions," says **Alexander Nürnberg**, Vice President, Auxiliary and Machinery Systems. "While the overall concept was based on existing designs, the specific requirements of the yard and shipowner meant we had to make a number of adaptations and changes to standard Hatlapa equipment. Our excellent cooperation and understanding with shipbuilder DSME was a pivotal factor in meeting the end-user's needs."

In fact, the project prompted the development of a completely new technology, which is suitable for use in ambient temperatures as low as minus 52°C. The solution demanded the use of special steel plates and shafts, but also the development of new sealing materials, and grease and gearbox oils, suitable for the extremes of nature.

MacGregor worked with its suppliers and other technical partners to identify the materials and parts for harsh and low temperature environments and, where none were available, conceived new solutions of its own. Results included special lifting gear for the electrically-driven brakes and heated electrically-driven motors incorporating special fail-safe functions.

According to Mr Kleen: "The completely electrically-driven brakes for the mooring drums and the anchor chain lifter are unique on the market. This innovation allows for fully remote operation of all brakes on the winches, even when temperatures fall to minus 52°C."

One of the main challenges in fulfilling this contract was in finding the raw materials which could both withstand the low temperatures and were approved for use by the Russian Maritime Register



“This innovation allows for fully remote operation of all brakes on the winches, even when temperatures fall to minus 52°C”

Dieter Kleen

of Shipping (RMRS). Mr Kleen says: "To meet RMRS class rules, all raw materials had to be tested at minus 10°C below the maximum ambient temperature of minus 52°C, requiring Charpy ductility tests to be carried out at minus 62°C." The impact tests were carried out by MacGregor and verified by an RMRS surveyor.

Other design challenges from the owner mean that the anchor winch has to be able to retrieve the anchor when the entire 385m long chain is suspended. Standard Hatlapa winches are designed to retrieve 83m of anchor chain. To meet the significantly higher forces, MacGregor has designed a very powerful driving winch, and fitted a gearbox with two motors.

The new winches also had to be tested on a new test bench that was much bigger than those used previously, and which itself was specifically designed to handle these higher loads. All of the functions and loads of the winches have now been successfully simulated and tested on the new bench, in the presence of RMRS, the shipowner and the shipyard.

The electrical equipment used for the winches has also been tailored for this particular shipboard application. The programming of the variable frequency drive had to be specially developed in cooperation with the supplier, for example while MacGregor also had to develop fail-safe, redundant heating systems to ensure that all equipment functions could be guaranteed to work under any circumstances.

Mr Kleen adds: "Since the vessels will be operating under very harsh ice conditions, safety has to be the top priority. Consequently, we had to ensure the reliability of all systems are guaranteed, by incorporating additional safety features. In particular we have incorporated redundant systems where necessary to add an extra safety layer."

Developing the deck equipment for the Yamal LNG carriers took around a year to complete. MacGregor will now be closely involved with the actual commissioning of the equipment onboard the vessels during the shipbuilding phase in South Korea, as well as final sea and ice trials. ■

State-of-the-art electrical ramps serve new car carrier duo

Gram's new car carriers feature a unique electrically-driven MacGregor RoRo equipment package that delivers commercial, efficiency and environmental advantages

The latest vessels delivered to Oslo-based Gram Car Carriers, *Viking Adventure* and *Viking Bravery*, feature a significant advance in internal access ramp technology that is not immediately visible to the naked eye.

Pure Car and Truck Carrier (PCTC) operators face particular challenges due

to the value and carrying arrangements of their cargo. Any hydraulic oil – even a small drop – that leaks from internal ramp systems can cause damage to the cars on board. A relatively minor incident of oil leaking can be very expensive to address.

This is one reason why PCTC operators are increasingly opting for

electrically-operated cargo access solutions. MacGregor has a long track record of promoting electrically-driven equipment on RoRo vessels, including car carriers.

“The ships for Gram are very special, as all of their internal ramps are electrically-operated,” says **Mattias Gunnarsson**,

MacGregor Sales and Marketing Director, RoRo. “Some of the technology on board has never been delivered before, with the entire package representing a state-of-the-art solution in terms of electrically-driven RoRo equipment.”

Delivered by China's Jinling Shipyard in January and April this year respectively, the 6,700-car capacity vessels *Viking Adventure* and *Viking Bravery* are now operating under charter within the global fleet of Hoegh Autoliners. After six months of trading for the first ship, feedback from both the owner and the operator has been very positive.

Børre Mathisen, General Manager, Gram Car Carriers AS, says: “Our damage ratio is in general very low. We have had some instances of hydraulic oil leakages in cargo holds on vessels with hydraulic installations. The choice of electric RoRo equipment is primarily an effort to mitigate risk of oil leakages, and thereby support our customer's damage prevention initiatives.”

Electric-driven RoRo equipment is easy to operate, without the fear of hydraulic leakage, says Mr Mathisen. “We do not have any general policy against hydraulic oils, but obviously want to minimise risk of damage to the environment as well as to cargo. A change from hydraulic to electric installations supports both our environmental and damage prevention efforts. After a few minor challenges in the initial phase, the performance of the electric installations has been as reliable as any hydraulic installation.”

Mr Gunnarsson says one of the benefits that is increasingly hitting home with

owners is that electrically-driven equipment is an environmentally responsible solution. “Hydraulic oil spills can cause severe problems, and owners and operators are looking at ways they can mitigate this risk,” he says.

“Our ability to develop equipment that not only meets numerous performance requirements but also protects the environment demonstrates our commitment to operating in a responsible manner and taking environmental considerations into account.”

Safety first at higher capacity

The MacGregor package of equipment on board the 60,600gt *Viking Adventure* and its sistership includes eight hoistable

internal ramps, all of which are electrically operated and can be secured flush with the deck. A number of the internal ramps have capacities of up to 45 tonnes.

“This is a much higher capacity than we have previously supplied as part of electrical internal access ramp solutions, and demonstrates the robust capabilities of the

technology we have developed for these two car carriers,” notes Mr Gunnarsson.

He also highlights the ground-breaking nature of the design and product development work that was involved in outfitting these ships. “Normally when we equip RoRo vessels it is primarily a matter of optimising the geometry, tailoring existing systems to adapt to the specific features of

the ship concerned. For these two new-buildings, we have adopted completely new design principles.”

The new technology onboard includes electrical actuators, which power a screw jack arrangement to hoist and lower the internal ramps. A high degree of safety has also been ensured throughout by installing a MacGregor control systems especially adapted for electrically-operated equipment.

In safe hands

“Gram Car Carriers was pleased to see that installations were carried out as agreed, and completed well in time for vessel delivery,” says Mr Mathisen. “Throughout the process, the cooperation with MacGregor at the yard was solution-oriented and efficient.”

With reliability now on a par with hydraulics, and its green credentials well accepted, the demand for electrically-driven ramp technology from RoRo vessel owners is only likely to grow, Mr Gunnarsson believes. “We can give ship-owners a complete portfolio of electrically-operated access equipment for car carriers and other RoRo ships, MacGregor is, we believe, the only one who can offer this.”

For Gram Car Carriers, the intention is to continue expanding its presence in the car carrier sector, and Mr Mathisen says the company is already “considering further newbuilding orders”.

“Given our numerous deliveries of vessels with MacGregor RoRo equipment in the recent years, they remain a very likely candidate for further cooperation,” he adds. From a high profile carrier like Gram Car Carriers, which is showing continuing trust in the technical solutions offered by MacGregor, this is welcome news indeed. ■

“The ships for Gram are very special. Some of the technology on board has never been delivered before and the entire package represents a state-of-the-art solution”

Mattias Gunnarsson

Photo courtesy: Gram Car Carriers

Electrical access to cruise ship market

MacGregor is drawing on its RoRo expertise to mount a persuasive case for the way electrically-driven access equipment can improve passenger flows and cargo handling efficiency for cruise ship owners

Mainstream cruising is an experience where the increasing size of ships also increases expectations when it comes to the attractions aboard. The increasing scale of the vessels therefore calls for continuous design innovation, while owners also need to demonstrate that the giants of the cruise ship world are environmentally responsible.

New environmental regulations are inevitably a factor, but owners also feel

the scrutiny of cruisers themselves, whose affluence often brings with it a zero tolerance attitude to perceived environmental shortcomings. Today, cruise owners are keenly aware that investments in environmentally-friendly technology can be converted to competitive advantage.

Drawing on over a decade of references pioneering the use of environmentally-friendly electric access equipment in the shortsea RoRo ferry, ro-pax ship and large PCTC car carrier sectors,

MacGregor is once more setting the 'green' agenda by pressing the advantages of electrical solutions for cruise ships.

"We have learned many lessons over the years and we can draw on the wealth of knowledge we have built up in supplying electrical drives to more than 50 RoRo ships to provide state-of-the-art solutions for cruise ships," says **Mattias Gunnarsson**, Director, Sales and Marketing, MacGregor RoRo.

Electrically powered argument

Like any other ship owning group, the cruise industry puts equipment reliability, user friendliness and through life costs high on its priorities list when it comes to access equipment. Drawing on the design expertise team that has delivered these attributes to the RoRo market, MacGregor has identified key elements of day-to-day cruise ship operations where electrical drives offer significant benefits over their hydraulically-actuated counterparts.

There is no reason beyond convention why side-hinged and top-hinged shell doors should not be operated through an electric actuator, for example, MacGregor points out. Typically, these doors are operated hydraulically in the cruise market, which requires a separate power pack. This is a technology that is well proven, but what is also proven is that hydraulic oil spillage is a clear environmental risk.

Shell doors are essentially a part of the ship's hull, but they are also the access and exiting route for passengers and crew. Being prepared to tolerate a leakage risk here is certainly a bold decision, even setting aside real but less visible risks of hydraulic oil leaking into the ocean.

Electrical systems are also less noisy than hydraulics, which is an important

consideration on passenger vessels. "Owners, and particularly cruise ship owners, simply do not want their guests disturbed while in their cabins, or in restaurants, by the noisy background hum of hydraulic power packs," observes **Lars Öberg**, Sales Manager, MacGregor RoRo.

MacGregor has also developed both tender and lifting platform designs specifically for the cruise industry that feature electric drive technology. In this case, platforms are typically operated while cruise vessels are in ports which have likely been especially selected for their attractiveness to tourists. Any leakage of oils into the ocean is unacceptable, but even inadvertent hydraulic oil spillage here is unlikely to receive a sympathetic hearing from law enforcers.

Real cost gains

However, owners can expect more than reputational benefits from electrical systems. Compared with hydraulic alternatives, electrical systems feature fewer components to be installed during the newbuilding phase, because there is no need for a separate power pack, or hydraulic piping, for example. This is reflected in less work for the shipyard, because pressure testing is not necessary and cabling work is easier than installing pipework, and a direct reduction in installation costs. In service, vessels will

Drawing on over a decade of references pioneering the use of environmentally-friendly electric access equipment in various RoRo sectors, MacGregor is now offering the advantages of electrical solutions for cruise ships

also benefit from reduced maintenance and repair requirements, reducing operational costs overall.

Crew members can also easily disconnect cables and replace actuators when necessary, an operational advantage when compared to hydraulic repairs that generally require a specialist contractor.

The focus on a range of electrical side doors and lifting platforms is just the beginning. MacGregor is now examining how its broader electrical solutions experience and expertise in the RoRo sector can benefit cruise ship owners more fully.

Electrical drives that are easier to install, perform better, are more cost effective and more environmentally-friendly would appear to be the access equipment solution that the cruise industry has been waiting for. ■



New cargo handling system on PSVs

The Triplex MDH 22 cargo handling system secures its first order for Platform Supply Vessels (PSVs) after a major breakthrough in Brazil

The world's first remotely operated gantry cranes for platform supply vessels (PSVs) are coming from MacGregor's Triplex portfolio. The breakthrough order for three identical systems for Brazil's offshore market, crowns almost four years of work by the MacGregor Triplex team advancing the arguments for the Multi Deck Handler (MDH) system in a pure cargo handling function offshore. The first crane was successfully installed this summer and the next two systems will be installed on vessels currently under construction.

Triplex is a worldwide brand recognised for innovations, which revolutionised the deck handling operations on anchor handling vessels in the early 1980s, and features on hundreds of anchor handling vessels (AHTS). However, the load handling operations for PSVs has up to now been a port-based business.

William Storvik, MacGregor Marketing Manager for the Triplex

products, explains that the Triplex MDH 22 Gantry Crane's breakthrough for PSVs has come after close consultation with the oil industry. "Both the technical system specification and performance requirements were developed in close collaboration with both shipowners and operators", he says.

Advanced cargo handling system

The MDH cargo handling system is an advanced gantry crane with a robotic multi-tool which slides along and across the vessel. The system has a total lifting capacity of 22 tons and is able to cover the whole deck area. However, the main advantage is its ability to reach far beyond the shipside and execute load handling in port. It is also fitted with camera systems, floodlights and an operator's cabin, as well as benefiting from two dedicated winches.

The system enables vessels to bypass port bottlenecks and handle ship/shore transfers directly. The need for vessels to wait outside Brazilian ports for an available berth and the shortage of shoreside infrastructure once they get there are two main negative influences on the efficiency of Brazil's offshore sector.

"Over the years, offshore shipowners worldwide have considered the benefits of minimising reliance on shoreside equipment for cargo handling, but the obstacles to convert the idea into reality have seemed too great," says Mr Storvik.

However, the case for PSV installation of the Triplex MDH 22 was cumulative, as operators, brokers, designers, shipyards, and even port companies identified potential efficiency gains – for ROV-, oil recovery-, and workboat operations.

Brazilian Success

The breakthrough in Brazil came after the Brazilian oil company Petrobras decided to include the system in the new building tenders for a PSV 4500 General Cargo vessel in 2012.

"All of the Brazilian participants who contributed in the process of developing the Triplex MDH system for the PSV 4500 tender were aware of the challenges posed to PSV operations by logistics and port congestion in Brazil," says Mr Storvik. "Laying out how a dedicated cargo handling system onboard could deliver a massive increase in vessel turnaround and allow vessels to re-stow containers at sea to enhance logistics proved pivotal.

"Installing the MDH means that the vessel can shift and store containers on deck, utilise the whole deck area and increase the back-load capacity offshore, while also loading and unloading itself in port. In addition, the MDH can work ROVs, Oil Skimmers and serve as a rescue drop zone for helicopters and is the ideal solution for a multi-role supply vessel and for stand-by duties."

The crane can also load and unload containers on both sides and at the aft

"Installing the MDH means that the vessel can shift and store containers on deck, utilise the whole deck area and increase the back-load capacity offshore, while also loading and unloading itself in port"

William Storvik

of the vessel and perform tandem lifts of heavy and large items like pipes and sub-sea templates on deck.

Rig market can profit

"We were able to support the case for the potential impact of these capabilities by providing analysis of the full operational, economical and greater cargo handling benefits of the Triplex MDH 22 crane," Mr Storvik adds. "The system represents increased backload capacity offshore which provides greater flexibility and enables the vessel to serve more oil rigs. Another important advantage is the ability to shift the deck cargo quickly according

to the weather conditions. This will reduce well-known 'waiting for weather' delays considerably. These factors proved particularly compelling, because not only do they save a great deal of time, but they bring considerable reductions in the vessel's fuel consumption.

"As well as lower handling time in port, having the Triplex gantry onboard means waiting time to be served in port is also minimised. For a PSV, reduced time in port also represents a fuel saving. In total, we calculated that the savings from reduced fuel consumption alone would pay back on the crane investment over the terms of the charter agreement."

Having the Triplex crane onboard also means that the vessel can maintain a greater safety distance to the oil rig while performing the cargo handling operations, which reduces the risk of major accidents, Storvik concludes.

"I think the strengths of the crane lie in its inherent flexibility. It can be remotely controlled from an operator's cabin or from a safe location on deck and delivered with both reach and lifting capacity to suit each individual vessel. The list of technical innovations is a long one, but, for the customer, the advantages are all about the functionality." ■

"Another important advantage is the ability to shift the deck cargo quickly according to the weather conditions. This will reduce well-known 'waiting for weather' delays considerably"

William Storvik



MacGregor makes subsea mining debut

The world's first dedicated mining vessel will come complete with two subsea knuckle boom cranes from MacGregor

Canadian seafloor exploration and development company Nautilus Minerals is leading the world in the quest to develop seafloor mineral deposits, with work focused on massive copper- and gold-rich

sulphide discoveries in the Southwest Pacific. Seafloor Massive Sulphide (SMS) deposits are the result of superheated water carrying metals from deep in the earth then mixing with cold seawater to be deposited on the ocean floor as metal-rich minerals.

Nautilus Minerals has envisaged first production work by 2018 at Solwara 1, in the territorial waters of Papua New Guinea, prompting construction of the world's first dedicated mining vessel. On completion, the 227m length, 40m beam production support vessel will meet the requirements of the Special Purpose Ship Code.

MacGregor is participating in the groundbreaking project via a contract for one 200t active heave-compensation (AHC) subsea crane and one 100t crane, supporting seafloor resource production at depths up to 2500m and onboard storage of ore. The subsea crane order was booked into first quarter 2015 under a contract with Fujian Mawei Shipbuilding Limited.

"We are very pleased to have such a world class supplier providing key equipment for use on our Production Support Vessel," says **Mike Johnston**, Nautilus' CEO. "The cranes are an essential component in ensuring operations can be performed safely across all of our large working deck areas. The 2,500m depth rated heave compensated main crane

also provides critical lifting support to our subsea operations at the mine-site."

"One of the unique features of seafloor mining is that it combines the skills of oil and gas, marine and mining to form a completely new industry," adds **Mike Howitt**, Offshore Project Manager, Nautilus Minerals. "This is exciting for all those involved, as it opens up another business opportunity for suppliers and participants alike. We welcome new players into the industry as it will see further advances in technology, skills and availability of resources."

Big prospects

Nautilus Minerals holds prospective exploration tenements covering 420,000 km², including areas off Papua New Guinea, Tonga, Solomon Islands, Fiji, Vanuatu and New Zealand. The first mining lease and environmental permit has been granted to cover deposits at the Solwara 1, in the territorial waters of Papua New Guinea.

Copper deposits sitting on the seafloor at a water depth of some 1,600m

clearly present a recovery challenge, but the potential rewards are great. "The SMS deposits at Solwara 1 are associated with high grade polymetallic sulphide systems, which are particularly rich in copper and gold," says Mr Howitt.

Other areas that look promising include Solwara 12, 25km north-west of Solwara 1, and a concession off Hawaii where Nautilus Minerals subsidiary Tonga Offshore Mining is investigating nickel, copper, cobalt and manganese.

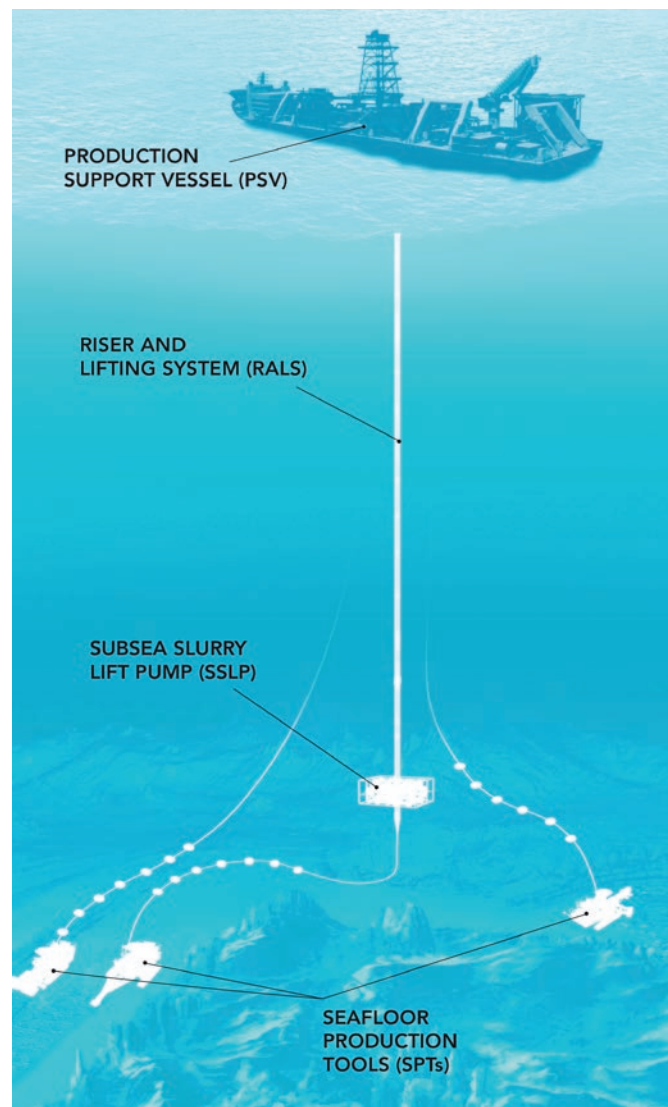
Technical distinction

Landing the potential will rely on vessels which, if not entirely revolutionary, will nonetheless be distinctive in their capabilities. The 58,000 dwt ship on order is a diesel-electric, DP2-class vessel designed by Singapore's SeaTech Solutions and built to a specification agreed between Nautilus Minerals Inc. and Dubai-based owner Marine Assets Corporation (MAC).

MAC is a returning customer for MacGregor equipment, although this is the supplier's first association with Nautilus. MAC will operate the new

"We see the offshore deepsea mining as a segment that offers considerable potential for a broad range of products that are already within MacGregor portfolio**"**

Tom Svennevig



vessel under a long-term charter arrangement, following its delivery at the end of 2017.

The vessel will support the extraction operations at Solwara 1, providing accommodation for 180 personnel. It will be able to store 45,000 tonnes of SMS ore, with storage holds arranged amidships, and feature an enclosed cargo handling system able to transfer ore to bulk carriers stationed alongside.

In many respects, the deepsea mining vessel will be similar to the larger type of offshore construction vessels that service the oil and gas industry, and particularly the subsea construction and pipeline installation markets.

Accordingly, the vessel will require significant deck space, dynamic positioning and a fairly substantial onboard power installation. "Our production activities are recovering minerals from the seafloor," says Mr Howitt. "The only real differences are that our deposits are high grade mineralized material on the seafloor rather than hydrocarbon fluids contained in reservoirs some kilometers below it."

Deep thinking

However, clear differences will be noticeable topside, where the equipment installed will feature a subsea mining spread and include ore storage holds and associated equipment. The marine equipment onboard has ultimately been specified by MAC and Fujian Mawei, with Nautilus having inputs to this process, but the final decision resting with MAC as vessel owner.

Tom Svennevig, Vice President, Offshore Load Handling, MacGregor, says the true significance of the order lies in its demonstration of just how flexible MacGregor offshore cranes can be. "The demands of offshore operations are constantly changing," he says.

"At MacGregor, we work hard to understand our customers' requirements and to ensure that we are always ready to offer exactly the right solution for the job. This is an exciting project in a fast-moving subsea industry, and of course we greatly appreciate the opportunity created for us by Nautilus Minerals to demonstrate the performance of our equipment."

New potential

Knuckle boom cranes are the preferred option for owners operating in the offshore sector due to their inherently compact dimensions and ability to reduce the effect of ship motions on suspended loads, Mr Svennevig says.

Meanwhile, the large active heave compensated crane will also be capable of deploying and recovering various items of mining equipment directly to and from the seafloor. Both cranes will be used to load stores, spares and support the maintenance of shipboard production equipment during mining operations.

"Solwara 1 lies in water depths of between 1500-1700m and this is fairly typical of other deposits which may be developed in the future," Mr Howitt explains. However, he adds: "As with the Oil and Gas industry, in the future, deposits in deeper water will no doubt be developed; for now, our spread has been designed to support operations down to 2500m."

"We see the offshore deepsea mining as a segment that offers considerable potential for a broad range of products that are already within the MacGregor portfolio," says Mr Svennevig. "Our success in Solwara 1 will be a key reference for our offshore load handling equipment systems for this new segment, including subsea and marine cranes, A-frames, moonpool systems, module handling equipment, launch and recovery systems for remote underwater vehicles, and other deck handling solutions.

"However, we also see this growing sector as an opportunity to develop new market-driven solutions that would address specific operational requirements. MacGregor has always had strong customer focus and continuously invests in R&D to offer solutions that meet emerging industry standards, regulations and environmental needs, and offer our customers a competitive edge." ■

Energy savings over a ship's lifetime

benefit efficiency and the environment

MacGregor's new active heave compensated 150-tonne semi-electric knuckle boom crane combines the excellent handling characteristics of this type of offshore crane with the environmental benefits offered by electric drive technology, such as the ability to regenerate electricity during lowering operations, which reduces a ship's overall power consumption

The new crane will be used primarily in the oil and gas industry. "We have all to gain from getting the oil from the reservoirs to the end users without expending more energy than is strictly necessary. Solutions that minimise power consumption should always be the driver for development," says **Baard Trondahl Alsaker**, Director MacGregor R&D and Technology. "I am sure the industry is ready to make the changes necessary to reduce costs, including investment in modern ships equipped with energy saving equipment like our new crane.

"The current downward adjustment in the oil price will be a major incentive. Forward looking industry players are likely to adapt by making changes that can sustain their business at a lower cost."

MacGregor is offering its new semi electric crane with a SWL of 150 tonnes because this is currently the most popular size of crane in its market segment. The technology is generic, so other cranes will become available. The size of cranes offered will be market driven, says Mr Alsaker, noting that the bigger the crane is the more you can expect to gain from the semi-electric technology, especially as ship design will focus increasingly on

integrating all power consumers in one common system to store and retrieve energy.

Regenerative capacity for lifetime savings

A major feature of the new crane is the regenerative capacity of its electric winch. Operations that involve more lowering than lifting can easily generate far more energy than they consume. But not all vessels can take full advantage of energy generated by modern electric cranes and other electrically powered equipment.

This will be very attractive to offshore operators determined to take full advantage of the energy saving potential of their new vessels. "Our clients are always concerned about minimising their operational running costs; this was a major driver in the development of our new crane. Fuel is expensive and it has a big impact on operational costs," says Mr Alsaker. "It can take less than two years to build a vessel, but that vessel will be in service for 20 to 30 years. A little more initial capital expenditure can deliver decades of reduced operational costs."

“Solutions that minimise power consumption should always be the driver for development”

Baard Trondahl Alsaker

Motor control and cooling systems are housed in a compact cabinet.



Holding down *Goliat* in the Barents Sea

After more than five years of development and construction, the world's largest and most advanced cylindrical FPSO – *Goliat* – is in position and ready for action in the unforgiving Barents Sea. The giant will be held in position by Pusnes mooring systems from MacGregor

Photo showing *Goliat* in the fjord outside Hammerfest, before it is being towed to the field

Goliat, which is planned to enter production shortly, is the first permanent oil platform to be delivered into operations in the Barents Sea, as part of the world's most northerly working offshore field development to date.

At its hub and already on site is the 100,000 barrels of oil per day floating, production, storage and offloading vessel, built by Hyundai Heavy Industries to the Sevan floating production, storage and offloading (FPSO) 1000 design from Sevan Marine.

The vessel's specifications set new industry standards on safety and performance for an offshore sector heading ever farther north. Pusnes mooring systems are holding the 64,000 tonnes, 75m high, 107m in diameter colossus in place in the demanding location.

Operator Eni Norge and its partner Statoil chose Sevan's circular facility design to meet the conditions the Barents Sea has in store. Hooked up to a subsea production system comprising 22 wells, *Goliat* introduces a new concept for full-circumference vessel offloading and new winterisation systems, and adheres to strict environmental requirements for sensitive waters.

Innovative technology developed to moor the giant

Jan Martin Grindheim, Director Sales and Business development, Offshore Mooring Systems, says involvement in the prestigious *Goliat* project is built on company experience as part of high-end mooring operations in North Sea waters, where MacGregor has a pre-existing relationship with Statoil. In fact, seven out of eight Statoil floaters in the North Sea are moored using MacGregor's Pusnes systems.

However, this is a breakthrough project for Pusnes mooring systems with ENI, and with the Sevan FPSO design. Keeping the enormous structure on station has required a mooring system distinguished by significant innovation, says Mr Grindheim, to ensure reliable power connection to shore via subsea cabling, and to minimise risk in low temperatures and prolonged darkness.

"Our overall objective must be to support the platform operating in sensitive seas throughout its 30-year lifetime, and that requires other, more global technical solutions. The mooring system must be reliable in temperatures that can get down to minus 20°C, which means that the steel plates used need to handle extreme temperatures and component parts need to be protected from the elements and heated."

Goliat is moored via 14 anchor lines, held by 14 x 84/165 mm anchor chains, whose handling equipment and locking equipment (including windlasses and fairleads) are being supplied by MacGregor. The mooring system consists of three clusters, each featuring a 5500kN (Transmission Brake Capacity) movable windlass operating the top- and installation chain of the anchor lines, and each controlled via MacGregor technology. When moored, anchor line tension rests on a subsea Eccentric Fairlead Chain Stopper (EFCS) that allows loads to be transferred directly to the strong parts of the hull structure via brackets.

Chain reaction

Mr Grindheim draws particular attention to the EFCS and its role in Barents Sea operations, highlighting the fact that

Seven out of eight Statoil floaters in the North Sea are moored using MacGregor's Pusnes systems

variations in chain direction relative to the vessel are absorbed in bearings. There is no chafing between chain and fairlead when the Chain Stopper is engaged, he says.

"The EFCS is free to move in both planes allowing the Chain Stopper to directly align itself with the mooring line, minimising chain wear and bending stresses," he says.

Project Mechanical Engineer **Björn Tore Antonsen** adds that winches onboard *Goliat* feature a chain tensioner below the windlass to tighten ropes during FPSO motions; the windlass will also be re-set periodically to take account of stretch in the lightweight fibre rope selected to connect end-chains.

Environmental sensitivity in the Barents Sea has also required close attention from MacGregor as far as the hydraulic fluids used in equipment were concerned, because mineral oils are not allowed. "In this case, we are using a water-glycol combination", says Mr Antonsen. "Using these fluids required some modification to standard components, including seals."

During the later stages of the contract leading up to equipment delivery and installation, a MacGregor project team worked over a two year period exclusively on *Goliat*, with numbers depending on the milestones reached in the project.

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Throughout the process, close coordination was required between the engineering team in Norway and fabricating teams in both Norway and Poland, with the client, and with DNV GL as the class society offering mooring system approvals.

Tight schedule

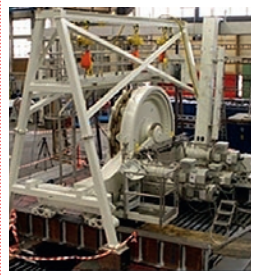
Given the project’s long lead-time (the contract for mooring equipment was signed in July, 2010 with Class approvals from DNV GL secured through 2012), it is no surprise to learn that adjustments were made to mooring specifications over time. Driven by a need to save weight and space, decisions to change chain sizes and the location of some equipment after the contract stage brought additional challenges to a project team already working on a “tight as possible” timeline, says Grindheim.

“Of course, this is a high profile project for MacGregor that has provided many man-hours for our design and engineering teams in Norway and in other MacGregor locations,” says Mr Grindheim. “However, it is also important for us that we have been involved in a cutting-edge project that challenges our people. As well as demonstrating our technical expertise, perhaps our defining achievement as a team during the *Goliat* project was that it offered an opportunity to show flexibility across the design, testing and production phases.

“Five years is a long time in project terms, but this has also been an intense job with lessons having to be learned quickly all along the way to meet the time pressures of being a small but critical part of a massive feat of engineering.” ■

The mooring system must be reliable in temperatures that can get down to minus 20°C

Photo: ENI Norge



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