

Horizons



June 2016 · Issue 46



Gas technology and markets



Shaping cyber shipping



Focus on Greece

Shaping the future,
delivering solutions today



LR shaping the future of cyber in shipping

Lloyd's Register (LR) is working on the details to help ensure the industry is able to cope, and benefit from, a more connected world that will offer a range of operating models and differing levels of crew and shoreside involvement and interaction. Changes will be necessary in training and skill sets:

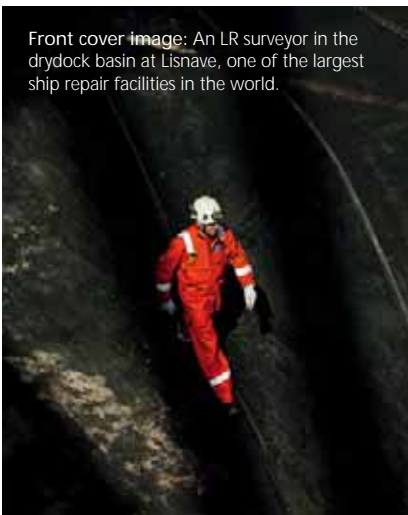
"While the human role will evolve, a ship may remain fully controlled from on board, but changes will be necessary to the skillsets of crew members as systems are increasingly ruled by software," says Luis Benito, LR's Global Marketing Manager, Marine & Offshore.

"Increasingly affordable connectivity will change the shipping industry, according to LR's Luis Benito," commented one of the leading industry publications in March.



Read about LR's guidance for cyber-enabled ships on page 3

Front cover image: An LR surveyor in the drydock basin at Lisnave, one of the largest ship repair facilities in the world.



Our ship surveyors – delivering solutions today, and every day

While new technology and innovation are key areas of activity for LR, our day-in day-out focus is our traditional role of surveying ships to help ensure safety and provide the operational support that owners need.

We can expect this to continue and for our surveyors to provide the added value for which LR is

known – our surveyors are about much more than compliance. Every surveyor, when on a ship, in a dock or at a manufacturing facility, is the representative of LR in its entirety – our CEO, our Directors, our Chief Technology Officer, and all our operational support – who all work for our surveyors so that they can best serve the industry.

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Greek owners continue on growth course

Nick Brown, Lloyd's Register's Marine & Offshore Director

Given the importance of Greece to shipping, and shipping to Greece, we read the Greek marine press every week.

One article in particular, in a recent Newsfront, caught my attention: "Tax issues and economic woes at home and abroad have failed to slow the growth of the Greek controlled fleet and today the armada and its carrying capacity is larger than ever and seems to be on a growth course."

Greek shipping is a vital and powerful force. This is despite a challenging domestic background and challenging times in shipping. The article goes on to reference the London-based Greek Shipping Co-operation Committee (GSCC) annual survey of the Greek fleet. Greek owners hold a market position as strong as ever: "The size of the Greek-owned fleet from March 2015 to February 2016, rose to 4,092 vessels of 321m dwt, a growth of 6.1m dwt in carrying capacity and 2% in ship numbers, including 347 vessels of various types and 36.5m dwt on order at the world's shipyards. The share of the world's fleet in the hands of Greek owners remained virtually identical to last year."

Greek shipping is also vital to LR. The article confirms that "Lloyd's Register has the biggest number of Greek controlled ships on its books, 856 (830 ships in 2015)."

Greece has always been important to LR and, despite today's challenges, is growing in importance. Our Piraeus office, a key regional centre, is one of our largest and today LR has over 150 Greek colleagues in positions around the world, reflecting recognition that Greek maritime engineering and management experience are critical in our global operations – not just in Greece. In Asia's new construction centres, in the UK, and in many other offices, Greek colleagues are present.

And while Greek ownership remains strong in the traditional bulk and tanker sectors, ten years ago we might have been surprised to know that by 2016 Greek owners would control 11.4% of liquefied gas carrier tonnage. This significant market share explains why we held our first Greek gas event in Piraeus on 11 May, focused on the LPG sector – we brought together the technical issues with the commercial aspects of the business. Greek owners have also become significant container ship operators.

Whatever sector we are supporting, whatever ships our valued Greek owners operate, we are always aware of the different needs and priorities – affected by market conditions – and we will continue to evolve to support Greek shipping. Piraeus and Greece, led by Theodosios Stamatellos and his team, are at the centre of a newly expanded management area for LR (see articles on



pages 8-17) and Greek owners and all in the supply chain are at the forefront of our minds. This is whether we are advising on new generations of gas ship technologies, surveying bulk carriers and tankers worldwide or collaborating in important projects like PoseidonMed.

Short sea shipping opportunities are also important elsewhere in the South Europe area, including our strong passenger ship focus in Italy and exciting new projects like the suezmax tankers under construction in Spain.

On the occasion of Posidonia 2016, I can confirm that we will continue to invest to better support the Greek shipping sector on which world trade is so dependent.

A handwritten signature in black ink, appearing to read 'Nick Brown', written in a cursive style.

NEWS

Danish Royal Yacht DANNEBROG enters into LR classification

The Danish Royal Yacht *DANNEBROG* has entered LR classification. Danish Defence wished to have *DANNEBROG*, never previously in class, entered into a fixed survey classification scheme, and chose Lloyd's Register.

A ceremony to mark the entry into LR class took place on board *DANNEBROG* in April. LR's Marine Client Manager, Flemming Kjeldsen and LR Senior Surveyor, Ole Back-Svendsen, presented the Entry into Classification Certificate to Captain of Her Majesty the Queen's Naval Household and Commanding Officer of The Royal Yacht, Captain (navy) Christian A. Nørgaard.

The 78m *DANNEBROG* is a motor yacht with a cruising range of 3,600 nautical miles. Built in 1931-32 at the Naval Dockyard in Copenhagen, she serves as the official and private residence for the Danish Royal Couple and other members of the Royal Family when they are on official visits overseas or when on summer cruises in home waters. *DANNEBROG* has now travelled more than 400,000 nautical miles, visiting most ports in Denmark, Greenland and the Faroe Islands, and over the years also ports in the US and in Europe, including the Mediterranean.

"We are very proud that Royal Danish Navy has chosen LR to class this very special, historical and beautiful ship," said Flemming Kjeldsen.



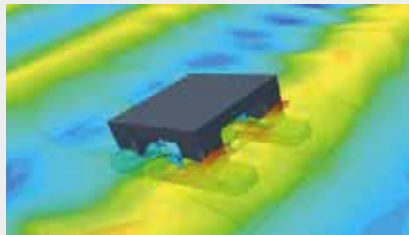
Flemming Kjeldsen (left) presenting the Entry into Classification Certificate to Captain Christian A. Nørgaard



Danish Royal Yacht *DANNEBROG*

LR and Keppel collaborate to enhance semi-submersible designs

LR's Global Technology Centre in Singapore and Keppel Offshore & Marine Technology Centre (KOMtech) have engaged in a joint research and development project (JDP) to develop advanced numerical simulation capabilities, using high-performance computing, to predict semi-submersible behaviour in waves.

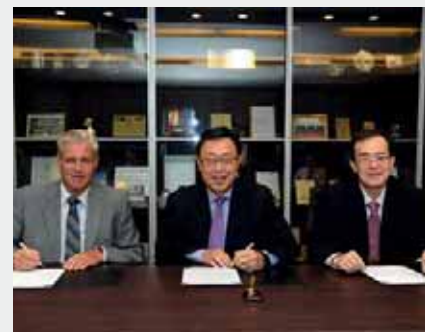


Co-funded by the Maritime and Port Authority of Singapore, the project will use LR's 'NewWave' simulation tool and Keppel's in-house semi-submersible model test data to develop 'Numerical Wave Basin' in order to improve both safety and performance of new semi-submersible designs.

LR has developed a numerical tool using 'NewWave', which has been applied on fixed offshore structures to simulate wave-in-deck loading. Adapting this tool with KOMtech's deepwater know-how and both parties' strength in computational fluid

dynamics (CFD), the JDP aims to build advanced capability in the prediction of semi-submersible behaviour in extreme waves through development of 'Numerical Wave Basin'. KOMtech's deepwater know-how and extensive in-house data from model tests carried out on semi-submersibles will be used to benchmark and validate this newly developed technology.

The accurate prediction of motion and air gap requirements, between maximum wave height and the underside of a platform deck, for the design of deep water semi-submersible platforms for operations in harsh environments and extreme weather conditions is crucial. This is especially the case for operations in areas such as the Arctic, North Sea and Western Australia and other deep sea frontiers.



From left: Piet Mast (Regional Marine Manager, LR); Michael Chia (Managing Director – Keppel Offshore & Marine); Toh Ah Cheong (Technology Director, MPA Singapore)

NEWS



The signing ceremony for the joint development project between GE, HHI and LR

GE, HHI and LR sign project to develop gas turbine-powered, electrically driven, 14K container ship design

With LNG-fuelled gas turbines and electric motors, the design will be a clean-powered ship with maximum efficiency and operational speed flexibility.

The joint development project was signed on 15 March, 2016 in Seoul by General Electric (GE), Hyundai Heavy Industries (HHI) and LR, and is the latest step in the development of gas turbine-powered ship designs suitable for deep sea, commercial applications.

This project further develops HHI and LR's work on maximised and safe container loading and continues GE's collaboration with LR on the COGES (COmbined Gas turbine, Electric and Steam) propulsion and power system technology.

While gas turbines are a proven technology and have been used at sea in naval ships and high-speed craft, as well as in passenger ships, the benefits of gas turbines have not yet been applied to mainstream cargo shipping. This project will develop a design to safely maximise the potential operational benefits of gas turbine systems. Lloyd's Register and GE have worked together on a number of joint development projects related to gas turbines; notably on a design for

a gas turbine-powered LNG carrier introduced to the market in 2013, for which LR Approval in Principle (AiP) was issued in December 2015.

LR and ABS join forces to deliver new industry-standard software

Common Structural Rules Software LLC, a joint venture company formed by LR and ABS, has launched next-generation software to simplify meeting the requirements of the IACS Common Structural Rules (CSR) with reliability and consistency

Developed from the technical strengths of LR and ABS, version 2.5 of the CSR Prescriptive Analysis and the new CSR Finite Element (FE) Analysis software, allow assessment of whole vessel structures, including new bulk carrier and oil tanker designs. Both class societies will use these new tools to evaluate new designs to the CSR.

The CSR Prescriptive Analysis software requires only that the user inputs the appropriate data. All of the outputs are clear, straightforward and easy to read. A summary report provides required and offered scantlings with graphic representation of any deficiencies. An intermediate report summarises dominate criteria for each structure and a detailed report provides data for every parameter value. In conjunction with CSR FE

Analysis, this complete tool makes verifying compliance with CSR possible with minimal effort.

The software has quickly become popular with users. Nearly 500 licenses were issued before the production release. This release will be followed with regular updates for additional structural coverage and functionality and to address ongoing CSR changes.

Detailed information on structural areas and functionality covered by this release can be found in the Release Notes and User Guide bundled with the software installation.



The software can be downloaded at www.csrules.com

Cyber shipping – LR issues technical guidance for ship design in a digital age

LR's new guidance provides the shipping industry with a route map to understanding the implications of digital technology. As a trusted provider of safety assurance to the marine industry, LR is ready to help all stakeholders in the cyber-enabled ship market ensure that Information and communications technology (ICT) is deployed safely. This is the first edition of LR's guidance to clients on cyber-enabled ships and is the result of detailed work and consultation with industry and academia.

"This is about the potential for the industry to embrace the safety and performance benefits that technology now offers. This is about much more than cyber security," said Luis Benito, LR's Marine Marketing Director.

A cyber-enabled ship will consist of multiple, interconnected systems. Due to the rapid pace of technology development, prescriptive approaches to risk management are not suitable. Instead, a 'total systems' approach is required, taking into account all systems on board and – critically – on shore; how they are designed and

NEWS

installed, how they connect, and how they will be managed.

LR explains what is meant by cyber systems and looks at their impact on shipping. The guidance describes six key areas of risk that need to be considered and addressed in order to assure safety and dependability: systems, human-systems, software, network and communications, data assurance, and cyber-security.

The guidance illustrates LR's risk-based assurance process, which culminates in system appraisal and, ultimately, issue of approval in principle (AiP).



Download LR's guidance on cyber-enabled ships now at www.lr.org/cyber

LR releases guidance notes for inspection with unmanned aircraft systems

New guidance approach supports industry in the safe and effective deployment of next generation drone and unmanned aircraft systems (UAS) technology that can significantly improve productivity gains through reducing risk exposure, survey times and in-service inspection costs of offshore, marine and onshore infrastructure

'Eyes in the sky' technology opens the way to rapid, safe and repeatable inspections that will lead to long-term benefits for marine and energy operators seeking high levels of integrity, compliance and commercial advantage.

"We are developing these guidance notes to provide a consistent approach to risk in UAS and drone deployment, offering practical operational

considerations relating to regulations, personnel, quality, safety, hardware, software and operations," said LR's Chief Technology Officer, Nial McCollam.

UAS, commonly known as drones, provide an effective alternative to traditional methods of in-service operational assessment and survey, especially structures and assets at significant heights, difficult to access locations and hazardous environments.

McCollam highlights: "Technology and innovation in the area of digital data, sensing technologies, unmanned systems and robotics are here to stay. We see an exciting and important journey ahead, and anticipate our efforts to increase and continue."

Our guidance notes will be updated regularly to provide industry with the latest practical information on issues such as how best to use UAS for inspection in confined spaces which is particularly relevant in energy and marine applications where Class surveys are needed, and which also improves safety for human life.



Find out more and download the guidance notes at www.lr.org/uas_guidance

LR and UK P&I Club launch Life-Saving Appliances pocket checklist app

The Life-Saving Appliances pocket checklist app completes the series of pocket checklists apps which have now been downloaded more than 75,000 times.

The new app helps to ensure that ship personnel are trained in how to inspect, maintain and operate life-saving equipment, and that equipment is ready for use at all times.

The app also includes a list of common deficiencies to help ensure compliance with regulatory requirements and help reduce the risk of port state control detentions.

The full series of six pocket checklist apps, consisting of: ILO MLC, ISM & ISPS, Marine Fire Safety, Marine Pollution Prevention Port State Inspections, and now Life-Saving Appliances, are all available on iPhone, iPad and Android devices.

The apps include functionality that enable ships' crews and their managers to easily view necessary legislative and regulatory requirements, save multiple checklists, check off completed activities, add essential notes/images and send completed checklists via email.

Robert Brindle, LR's Principal Specialist on Port State Control, commented: "Today's seafarers have demonstrated the need for portable, interactive and paperless solutions to onboard safety-related issues.

The success of this series of apps helps to reinforce LR as one of the highest performing recognised organisations in the Paris and Tokyo MOU regions. LR's aspiration is to continue to provide software solutions such as the apps, helping to ensure compliance with the latest regulations."



The iOS apps can be downloaded from the App Store at <http://apple.co/24qXbJA>



The android apps can be downloaded from the Google Play Store at <http://bit.ly/LSAGooglePlay>

NEWS



David Barrow appointed as Director of Innovation, Marketing & Sales

Dave is now responsible for the global market-facing activities of LR's Marine & Offshore business, driving innovation and leading LR in demonstrating LR's value and standards of service to clients and stakeholders.

Dave's most recent role was Europe Regional Marine Manager. Before this, Dave was Area Manager for United Kingdom and South West Europe from 2011 to 2013; Country Manager for Turkey, based in Istanbul, from 2008 to 2011; Business Development Manager, based in Athens, from 2004 to 2008; and Business Manager for the UK, based in London, from 2003 to 2004.

Dave commented: "As Director of Innovation, Marketing & Sales, I am very excited to drive forward our approach in an ever more demanding and fast-paced dynamic environment.

The new teams that I will lead will work to ensure that LR is recognised for the value it can offer clients through innovative solutions, understanding and implementing new technologies and, vitally, through our technical support centres and our work in surveying ships worldwide. I am committed to ensuring that we respond quickly to changing market needs and bringing products and services to the market more quickly."



Iain Wilson appointed as Chief Surveyor

This new role brings together all LR's technical governance activities, including the LR Rules, Fleet Services, Regulatory Affairs and Business Change.

Already the foundation of LR's business, the application, interpretation and development of our Rules will be given greater focus to support the challenges we are already facing as ship technology evolves at pace.

Iain joined LR as a trainee ship surveyor on the graduate scheme in London, and then worked as a surveyor in Singapore, Trinidad, Hong Kong and Korea before being promoted to Senior Surveyor then Surveyor in Charge.

Iain then transferred to China as the Principal Ship Surveyor and Area Manager for Central China; this was quickly followed by a promotion to Marine Manager for China. Iain then returned to Korea and was appointed as the Marine and Country Manager.

Iain was then appointed Fleet Services Manager in London before returning to Asia in 2011 as Regional Marine Manager, and in 2014 took on additional responsibility for the Middle East and Africa. In September 2015 Iain returned to the UK and was appointed Business Systems Improvement Director before taking up the role of Chief Surveyor in March 2016.



Fumio Kure appointed as General Manager of Japan for Marine & Offshore

Fumio joins LR from Mitsubishi Heavy Industries (MHI) and will start his new role on 1 July, 2016, as the successor of Kazuaki Yuasa.

He graduated from the University of Tokyo in 1980 and completed his Masters in 1982 at the same university. He joined MHI in April 1982 and has been working there for 34 years.

Fumio had various roles at MHI; more recently he was Technical Advisor during the build of a drill ship at ECOVIX in Brazil and has been Deputy General Manager of MHI Kobe Shipyard and Machinery Works. Fumio's latest appointment was as Senior Chief Engineer in the Shipbuilding & Ocean Development Division.

Current General Manager of Japan, Kazuaki Yuasa, said: "Fumio brings with him years of experience in the maritime industry and we look forward to expanding our business in the future with the support of our clients and LR colleagues globally. I am confident that Kure san's appointment will enable us to provide a seamless service to our clients and I'm sure he will provide strong leadership for LR."

New Global Technical Helpdesk Network launched

Get the technical answers you need – when you need them

LR has expanded its client care and response capability with a global network of Technical Helpdesks. The helpdesks provide an 'always available' support system and provide an efficient and local service for client technical queries.

The new global network will provide fast, trusted responses to all technical questions. The helpdesk

will consistently and accurately inform and advise the marine and offshore technical community on the application of both classification and statutory requirements.

LR's Regional Technical Performance Manager, Tom Dalling, commented: "With our network of geographically positioned Technical Helpdesks we will be able to provide quick and easy

access to the multitude of technical experts within LR, who will provide technical solutions for our clients, whether they be superintendents, ship managers, fleet directors, chief engineers or Masters."

The Technical Helpdesk and contact details will be launched at Posidonia on June 6, 2016.



"We will be able to provide quick and easy access to the multitude of technical experts within LR, who will provide technical solutions for our clients."

Tom Dalling, LR's Regional Technical Performance Manager

Lloyd's Register around the world

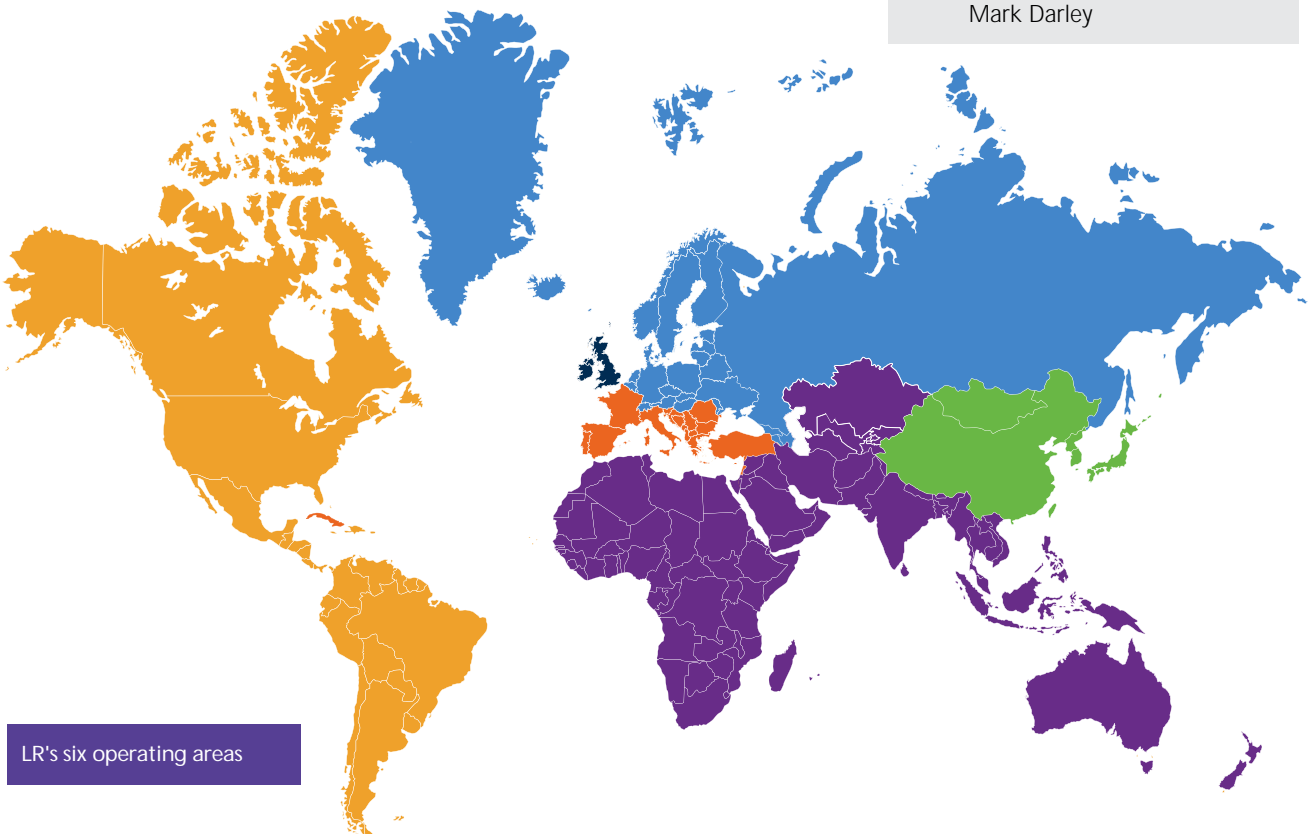
Effective 1 July, 2016, LR will operate with a group-wide, six-area structure across all business streams and support functions – UK & Ireland, North Europe, South Europe, Americas, North Asia, and South Asia & Middle East

" Our area structure provides the client and operational focus that we need. The quality of our service delivery and responsiveness are our priorities and this structure gives us the capabilities and leadership in the right places all around the world to put our clients first."

Dave Barrow, Director of Innovation,
Marketing & Sales, Marine & Offshore

Marine & Offshore area managers

- North Asia
Jim Smith
- South Asia & Middle East
Piet Mast
- South Europe
Theodosios Stamatellos
- North Europe
Thomas Aschert
- UK&I
Joanna Pohorski
- Americas
Mark Darley



Greek shipping - today and tomorrow

The teams in LR's Greek office and around the world are very much focused on delivering solutions today, and helping shape the future of Greek shipping.

As well as day-to-day support in ship survey activity around the world, one of the most vital areas for us is supporting clients in their newbuilding projects.

We provide a strong liaison between Piraeus and newbuilding countries worldwide but, particularly, of course, China, Korea and Japan. Our network of surveyors and senior managers in newbuild areas, a significant number of whom are Greek, are a real strength for us. Providing excellent on-site service is also based on excellent capabilities and receptiveness here in Piraeus and across the rest of the region.

In Italy we have now put our passenger ship lead manager into Trieste, providing cruise ship newbuilding focus and capability.

And in the Eastern Mediterranean as a whole, we are involved in vital projects such as PoseidonMed, now in its second stage, to bring LNG-fuelled infrastructure and shipping to the Adriatic and Aegean Seas.

But above all, doing business in a refreshed way is leading to fresh approaches. We have younger team members, developed at LR, bringing new perspectives in client facing and

specialist roles, and this is providing us with new opportunities, insights and, more opportunities to add value and help drive both safety and performance in the industry.

Working with key or leading partners on innovation projects where we are looking at implementation of technology from a practical perspective is creating change.

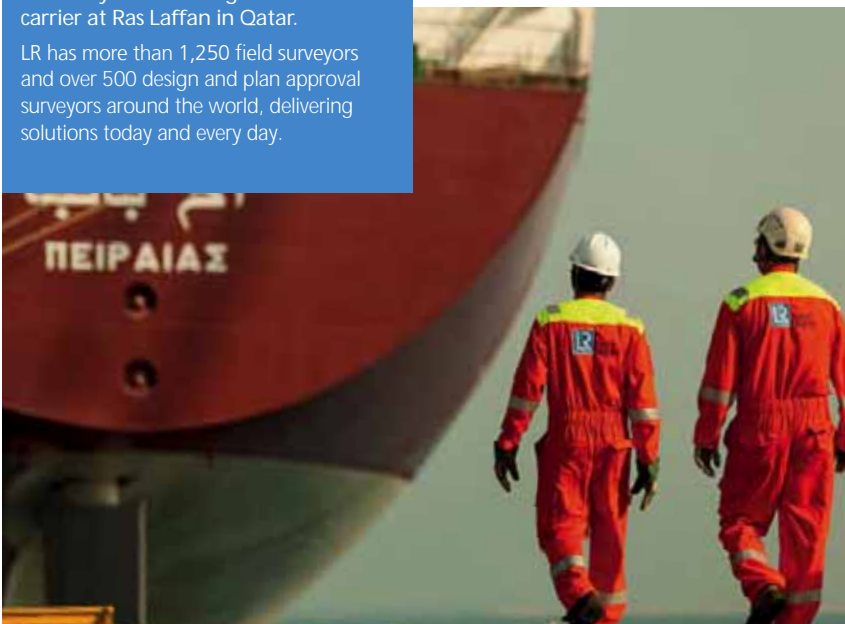
We are very optimistic about the future for safer, cleaner shipping in the Mediterranean basin and worldwide. Our people are able to contribute to a more sustainable marine and offshore sector developing local capability for global application. There is great potential for a revival of shipbuilding, machinery and equipment manufacturing and the development of better marine infrastructure, including small-scale LNG supply. These will benefit society.

Society is important to us at LR. Here in Greece our Foundation has been supporting students and research into the important areas of shipping – we will continue to do this (see page 28). We are supporting Education at all levels, talking to schools, higher level institutions, universities and academies about marine opportunities and careers.

Above all, it is in listening more to our clients and understanding their challenges – trying to live every day in our customer's lives – that we can make a difference as we seek to find

LR surveyors attending a Greek LNG carrier at Ras Laffan in Qatar.

LR has more than 1,250 field surveyors and over 500 design and plan approval surveyors around the world, delivering solutions today and every day.





Lloyd's Register has been working in Greece for over 180 years

Greek-owned ships were being classed by LR as early as the 1830s. D Graham was appointed as LR's first surveyor in Piraeus in 1888. Before this, any surveys in Greece were completed by surveyors based in Constantinople.



"We provide the best technical insight to help shipowners make the best commercial and operational decisions."

Theodosios Stamatellos, Marine & Offshore Area Manager, South Europe

manageable, practical, commercial solutions. By providing the best technical insight we can help clients make the best commercial decisions.

We are looking across the whole marine and offshore cluster in Southern Europe:

- supporting short sea shipping;
- working with Greek manufacturers;
- working with the supply chain in Italy – for example in the cruise ship sector;
- working with ship management companies in Greece, Cyprus and Monaco;
- supporting our market leading position in mega yachts – especially in Italy and Turkey;
- maintaining a strong local support and presence in Turkey, Bulgaria and Romania, all important for ship repair; and
- supporting new construction in Croatia, Turkey and Romania.

These are all important countries in the marine cluster and perhaps have not yet been given enough recognition – but we recognise their importance in



Elina Papageorgiou (left), Business Development Manager East Mediterranean and Anthi Miliou, Business Development Manager, Greece and Cyprus

repair work and in building what are often highly specialised ships.

Anthi Miliou is Business Development Manager, Greece and Cyprus. She is responsible for the teams that work with clients to develop new business.

“Our clients need to make commercial decisions and our job is to provide confidence that the technical aspects of any decision they make have been thought through. Classification is a highly competitive business today but we are always looking to add long

term value to our clients. So we have a difficult balancing act.”

Elina Papageorgiou is Anthi's counterpart for the rest of the South European area. Her area stretches from the Black Sea to Spain and covers important ship repair, passenger ship construction and other operations.

There is a huge amount of variety across this area and now, with suezmax tankers under construction at Navantia in Puerto Real near Cadiz, there is added variety.



Siokouros Zacharias, Marine & Offshore Business Manager, Cyprus

Cyprus is important

The Cyprus Ship Registry has the third largest merchant fleet within the European Union.

The detection of carbonate layers in the southern part of Cyprus' Exclusive Economic Zone (EEZ), which could hold pockets of natural gas, is driving the development of offshore services in Cyprus.

As a major ship management centre, Cyprus is an important place for LR. Siokouros Zacharias is well known in the market. An industry veteran and Cyprus local, he is well placed to support owners' and managers' requirements.

LR's Hellenic sphere of influence

As well as in Greece, many of our Greek surveyors, specialists and executives work worldwide. The biggest Greek LR community outside of Greece is based in our Global Technology Centre (GTC) in Southampton (see picture bottom right), where 16 Hellenes work in a wide variety of specialist roles.

Their jobs include plan approval in our technical support office, roles in the classification department, research, regulatory affairs and,

one of the most important, PA to the Marine & Offshore Director.

Additionally, the GTC regularly hosts students or recent graduates from Greece who are building up experience before entering the industry.

LR's Operations Manager in China, Nikos Skaribas, is Greek while the key operational role in the Middle East is held by Adrianos Zaphiropoulos (both pictured bottom left).



Nikos Skaribas



Adrianos Zaphiropoulos



LR's Greek community in Southampton

Quality and experience – Vassilis Manouras and George Maglaras

When you talk about the glue that binds a company together, it's tough to look further than Vassilis and George.

Vassilis and his dedicated team provide non-stop technical marine support to all Greek and Cyprus-based clients, including co-ordinating Transfer of Class surveys. Vassilis, a member of the Piraeus devolved classification

executive (DCE), also leads selected LR seminars and supervises the Fleet Quality Management Process (FQMP) for Greece and Cyprus.

George Maglaras, in his capacity as Client Care Manager for Greece and Cyprus, is responsible for, and dedicated to, supervising clients with plan approval, the technical helpdesk and small craft.

George (left) and Vassilis

PoseidonMed: Update from Anna Apostolopoulou

Now in phase II, LR has been involved in the PoseidonMed project from the start.

In March the first phase of PoseidonMed was closed at a seminar and ceremony in Brussels, with the active participation of members of the EU Parliament, emphasising the important contribution of the project, promoting innovation, energy efficiency and economic opportunities as well as the development of a lower marine emission profile for the motorway of the East Mediterranean sea.

At the same time, PoseidonMed II started. The second phase is examining several aspects under the scope of the adoption of LNG as fuel, and creating a base for LNG bunkering operations in the Eastern Mediterranean. This is all based on the technical reports from the initial phase of the project. The PoseidonMed II technical team is thoroughly assessing the key findings, incorporating them into the detailed studies for vessels and initially involved ports, like Piraeus and Limassol.

A risk assessment methodology, solutions scenarios and tools and hazard identification have already started to be examined and assessed for implementation for the ports Igoumenitsa, Patras and Heraklion to ensure they meet the high safety standards for LNG bunkering procedures and operations.

Revithoussa LNG terminal, a key strategic asset for Greece – and very well positioned to offer LNG marine fuel capacities with its ongoing significant upgrade – offers one of the main practical solutions towards the adoption of LNG as an alternative fuel for the shipping industry, while also contributing to the development of small-scale LNG applications.





LR's PoseidonMed team

A comment from Panos Mitrou

Everything started about three years ago; with an avalanche of forthcoming legislation approaching fast, Mediterranean shipping seemed to be on the ropes.

It was at that time that we envisioned how innovation and the experience gained in Northern Europe could support growth, cohesion and competitiveness in the shipping sector in the area. LR pioneered the project, along with a number of ambitious Hellenic entities, developing the first shipping oriented project under the EU's TEN-T MoS in the area.

PoseidonMed stirred the waters of the Eastern Mediterranean, leading to a €60 million investment towards the adoption of LNG as fuel. Today we tangibly support the renewal of the Mediterranean short sea fleet with the application of modern, standardised green designs under the Europa Ship Plan. Tomorrow we aspire to introduce electrification and zero emission solutions in the Eastern Mediterranean under the ELEMED project proposal. And more is yet to come; Blue Growth, hybrid vessels, offshore development.

The societal impact of this effort was emphatically apparent in the PoseidonMed ceremony which took place in Brussels earlier this year. Members of the European parliament from three member states (Greece, Italy and Cyprus) evaluated the outcomes of the first phase and highlighted the important contribution this could have on the economy and the shipping sector. The project partners committed to a very ambitious second phase and raised the stakes with detailed preparation for more than 10 vessel conversions to LNG and the construction of an LNG small-scale carrier to serve bunkering and other needs.

With the technical deliverables of the first phase already submitted to the European Commission, work now gets into the detail in both ports and operations. Igoumenitsa port has been the most recent subject of study with a HAZID workshop and concept analysis performed on site while Patras and Heraklion are to follow at the beginning of summer. LR will also complete a gap analysis on candidate shipyards for LNG and LNG as fuel works before the end of this summer.

What is PoseidonMed?

PoseidonMed is the LNG bunkering initiative from fellow EU countries in the Eastern Mediterranean and Adriatic Sea. Its ultimate objective is to prepare in detail a global solution of infrastructure development in the Mediterranean area so that LNG can be embraced as the marine fuel of the future.



Panos Mitrou, Technology & Innovation Manager, South Europe, Marine & Offshore and LR's PoseidonMed Project Manager



Leading the way in fuel quality advisory services

Tightening environmental legislation has always set the pace for change in marine fuel quality.

The industry has witnessed step changes in forthcoming statutory requirements, causing turmoil in the marine fuel landscape.

New fuel types and new fuel characteristics fulfilling the new fuel statutory requirements are forcing vessel operators to comply.

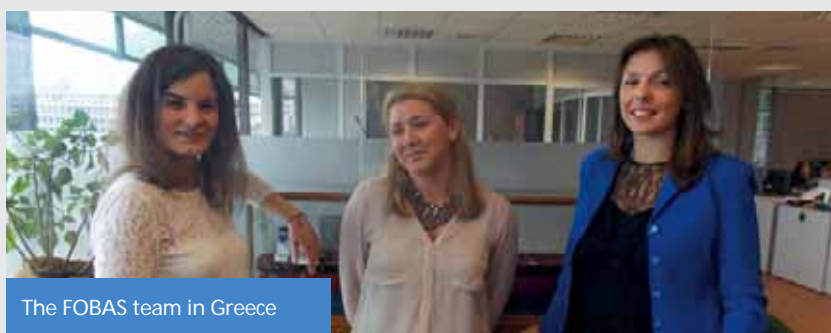
The changing fuel quality landscape is creating the need for an integrated fuel process, far beyond the one-dimensional approach of analysis results evaluation.

LR's FOBAS team provides fuel quality advisory services and has over 30 years of experience in fuel testing, backed up with a wealth of technical expertise. FOBAS is best placed to lead and perform a holistic approach to fuel management in this wider

context. Needs-based, tailored fuel management plans are developed to ensure:

1. procurement of correct fuel followed by effective storage and onboard handling
2. environmental compliance
3. risk mitigation on a commercial, technical and operational level
4. fuel system and engine performance systematic monitoring for minimal wear and optimised fuel consumption.

Following a long history of working together with LR, the well-established ship manager Euronav Ship Management (based in Greece) has chosen FOBAS to work with, for the development of an integrated



The FOBAS team in Greece



The client management team in Piraeus

Teamwork: opening new horizons in Greek shipping, across South Europe and the world.

From new construction support to fuel oil advisory services and new technologies, the client teams in Piraeus provide the support that clients and stakeholders need today and tomorrow.

Fuel Management Plan aiming to promote safe and efficient fuel handling on board Euronav ships.

The Fuel Management Plan is a user friendly, systematic compilation of the processes covering areas such as regulatory requirements, bunkering operations and managing problematic fuels.

In line with Euronav's technology-led philosophy, a tailored computer application has also been developed, along with the Fuel Management Plan, to enhance the company's data intelligence with reference to fuel management.



New client relationship managers (left to right): Yiannis Roustanis and Petros Alafasos are new to LR, while Nikos Vaporis takes up a CRM role having returned from Shanghai.



Left to right: Diamantis Gkiziotis, Anastasia Perikleous, Yiota Apostolopoulou, Marmo Notara, Nikos Bougiouris, Maria Kalamatianou, Hara Fasianou

Our in-service client support team

The client facing office (CFO) team in Piraeus provides non-stop support to all Greek and Cyprus-based in-service clients.

This includes: dealing with survey requests for all vessels under the Greece CFO, co-ordination of Transfer of Class surveys, the technical helpdesk function, issuance of confirmation of class, and examination of records requests.

Gas technology and markets

In May 2016 LR held an LPG gas technology and markets forum at the Laskarides Foundation in Piraeus



To learn more about the Laskarides Foundation, its activities, its library, and its amazing collections of Nelson memorabilia and other marine collections go to www.laskaridou.gr/en/

'Gas shipping – shaping the future' was an LR event that combined presentations and discussion of technical and commercial issues.

The programme was focused on essential technologies and commercial opportunities in the LPG sector, a market where LR has the leading share of the orderbook both in Greece and worldwide. The day concluded with a look at broader gas market opportunities provided in a presentation by Dr. Jonathan Gaylor of Affinity Shipbrokers.

LPG containment systems, including a GTT presentation on the potential transfer of membrane systems into LPG applications, were one area



Left to right: Giorgos Plevrakis, MAN, George Paul Perantzakis, Naftomar, Diamantis Andriotis, StealthGas and Antonis Georgantzis, Consolidated Marine Management (CMM)



Above (left to right): Market outlook panel discussion between Costas Vlachos, CMM, Alexander Hadjipateras, Dorian LPG, Harry Vafias, StealthGas, Jonathan Gaylor, Affinity and Nikolaos Ioannou, Benelux

Left: Nick Brown, LR's Brand and External Relations Manager, moderating the panel

of focus. Other technology and equipment makers presentations included MAN Diesel, Wärtsilä, LGE, Babcock International, TGE, M.E.S. and Jiangnan Shipyard. Shipowners' perspectives on technology, innovation and markets were provided by CMM, Stealth Maritime, Benelux and Dorian LPG.

LR's Anthi Miliou commented: "Our role is to help shipowners and technology providers make the best decisions based on the best technical insight and share LR's 50+ years of experience with gas. Bridging the technical and the commercial gap today, I think we developed a useful dialogue with the Greek market and with engine makers, containment and gas handling technology providers, shipyards and owners."

Alexander Hadjipateras of Dorian, commented: "It's good to mix the technical with the commercial," while CMM's Costas Vlachos said: "The gas sector is special and complex – real know-how is demanded." Anthi Milou concluded: "We are trying to help the market navigate that complexity and working hard to provide the necessary know-how."



Anthi Miliou



Reproduced courtesy of TradeWinds

Three cruise ships, three owners, three yards, one LR

LR in Italy has successfully delivered three cruise ships for three different cruise brands in three different shipyards in 2016

Viking Sea with her sister ship *Viking Star* in Santorini

This is no coincidence, these builds have been supported by many people within LR.

Local site teams, regional management, Trieste Technical Support Office, Southampton Marine Technology & Engineering Services, LR Consulting, LR Norway, LR North America, Materials and NDE, UK Marine Business Team and the Passenger Ship Support Centre have all been involved at some point with these projects; be it in the initial stages, during construction, supporting the shipyard or in assisting the ships into service with the operators.

As an indication of the effort put in to these three ships: the technical support offices worked 10,682 hours, and the three site teams 13,262 hours.

LR's graduate training scheme – developing the next generation of marine surveyors

LR graduate trainee Richard Welch (pictured right) had the opportunity to spend several months in two of the yards to see the final stages of build and witness the deliveries of both *Koningsdam* and *Carnival Vista* as part of LR's graduate training programme.

Speaking of the experience, Richard said: "Thanks to the flexibility of the scheme, we were able to arrange my training placement to coincide with the two delivery dates, allowing me to see the delivery of a wide range of complex systems, as well as major build milestones like sea trials.



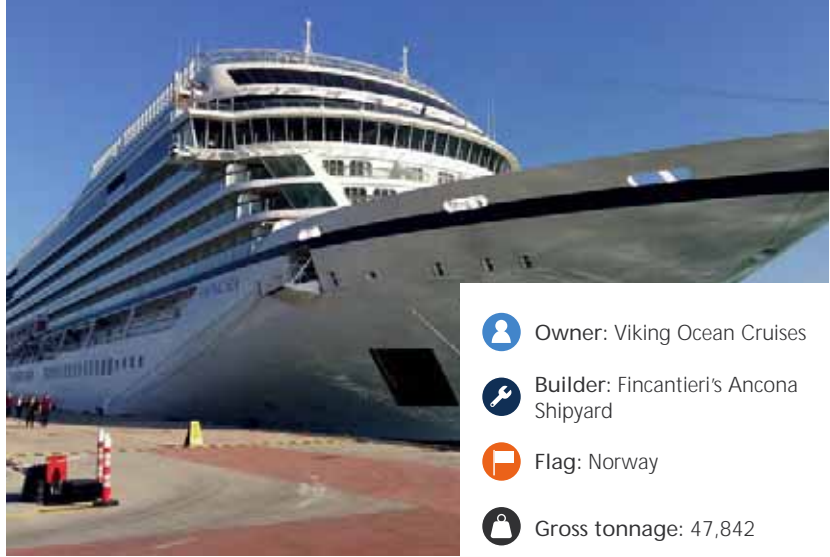
The experience gained from this placement will be invaluable."

In addition to this, Gareth Hughes, an LR graduate on the last year of the training scheme, attended the electrical and control engineering surveys of *Viking Sea*.

Viking Sea

Viking Sea, delivered on 24 March, 2016, is the second ship in its series, the first of which was the *Viking Star*, delivered on 31 March, 2015, from Fincantieri's Marghera shipyard. The yard still has at least four more ships in the series to deliver.

The ship uses a number of 'alternative design arrangements' as per SOLAS. This allows the designer more flexibility when designing the ship, rather than designing to what the prescriptive rules allow.



-  Owner: Viking Ocean Cruises
-  Builder: Fincantieri's Ancona Shipyard
-  Flag: Norway
-  Gross tonnage: 47,842





Koningsdam

Koningsdam is the first of Holland America's *Pinnacle Series* ships to be launched; she was delivered on 31 March, 2016.

The ship extends the long relationship between LR, Holland America and Fincantieri's Marghera shipyard, as she is the 12th ship to be delivered as part of this relationship.



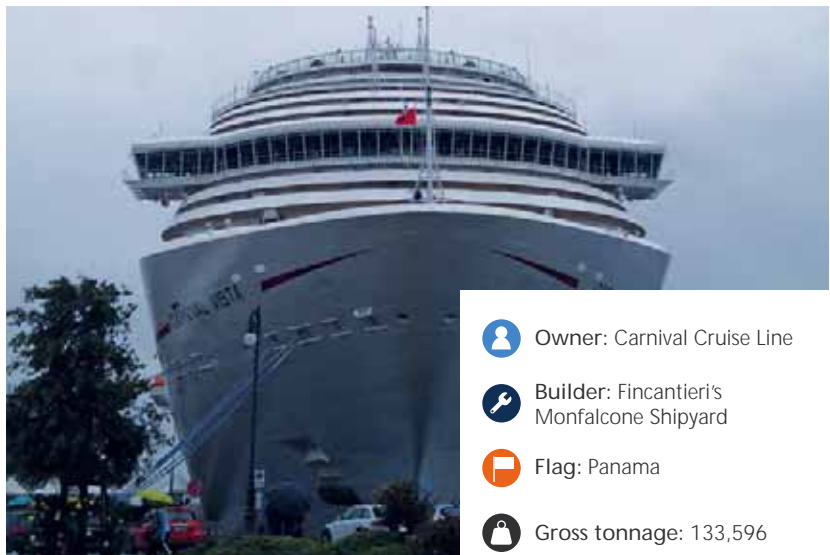
The LR team on the bridge





-  Owner: Holland America Line, part of Carnival Corporation
-  Builder: Fincantieri's Marghera Shipyard
-  Flag: Netherlands
-  Gross tonnage: 99,836

Carnival Vista

Carnival Vista is the first ship in Carnival's latest series, and was delivered on 29 April, 2016. She is the largest ship in the Carnival Cruise Line's fleet.

She is the 11th Carnival ship built in Fincantieri's Monfalcone Yard; the first was *Carnival Destiny* (now renamed *Carnival Sunshine*) in 1996, which was the first cruise ship over 100,000 gt.



-  Owner: Carnival Cruise Line
-  Builder: Fincantieri's Monfalcone Shipyard
-  Flag: Panama
-  Gross tonnage: 133,596

How will the Ballast Water Management Convention affect you?

We have an in-depth understanding of the regulation and the compliance options available, including all types of treatment technology

We use this strength and breadth of knowledge to enable our customers to make the right decisions based on the best technical insight.

LR has been part of the ballast water management discussion since day one. We have classification rules in place for the approval and installation of systems which are already being used and we already have LR classed vessels with treatment systems installed operating globally.

To share our knowledge and experience we often host free seminars that offer insight on the latest technical, safety and regulatory developments; ballast water is a hot topic at the moment and this offers the perfect forum for discussion.

Here's a summary of your most frequently asked questions:

When will the IMO Ballast Water Management Convention be ratified?

The BWM Convention is currently ratified by 49 states (30 required) representing 34.79% of the world merchant tonnage (35% is required).

Unfortunately, we can't predict the future so we don't know exactly when the convention will be ratified. The entry into force criteria should be met by ratification by a medium-sized member state.

Are there any US Coast Guard (USCG) Type Approved treatment systems?

There are no systems on the market with USCG Type Approval, although there are several systems currently going through the approval process.

If you want to trade in the United States, there are other compliance options; you can apply for an extension, you can install a ballast water treatment system that has achieved the 'Alternate Management System' (AMS) status or use another option, such as reception facilities.

Why are UV treatment systems being rejected by the USCG?

It is not the UV systems themselves that are being rejected by the USCG, it is the method used to test the effectiveness of the system. The method, known as the MPN method, does not adequately demonstrate that organisms are killed – a requirement of the USCG regulations.

There are other test methods available and there are systems (including UV) that are using these in ongoing applications.

What does this mean if I already have a UV system installed?

Several UV ballast water treatment system manufacturers are legally appealing for the MPN method to

be accepted. If they are not successful, they are confident that UV systems can be adapted to meet the USCG requirements for approval (either by increasing the UV dose rate or reducing the flow rate).

If a ballast water treatment system has IMO Type Approval, is it also a USCG approved Alternative Management System?

The short answer is no. Not all IMO approved systems are accepted by the USCG as an AMS. Similarly, not all AMSs are approved by the IMO.



If you have a question or need support in deciding how you should proceed please contact us at bwm@lr.org or visit our website which is full of useful resources, including our complete guide to services – www.lr.org/bwm

An update following IMO MEPC 69

- MEPC 69 reviewed a proposal on the possible extension of the deadline for installing a treatment system. They disagreed to the proposal and agreed to keep the deadline as the first IOPP renewal survey after entry into force.
 - The committee reviewed the revision of the G8 Guidelines for Approval of Ballast Water Management Systems, which raised a number of discussion points.
- MEPC 69 agreed to the establishment of an intersessional working group to review the revised guidelines in October 2016.
- An idea of 'upgrading' systems already installed in accordance with future revised G8 approval guidelines was not agreed as this would be against the decision from MEPC 68 relating to 'non-penalisation' of first movers.



Photo credit: IMO Flickr under Creative Commons license

Providing ERMA FIRST with the assurance of Type Approval

Their challenge

Piraeus-based ballast water treatment system manufacturer, ERMA FIRST, wanted to demonstrate to their customers that their systems will meet the rigorous demands of onboard operations.

Why Lloyd's Register?

LR successfully provided ERMA FIRST with their IMO statutory Type Approval in 2010. Going beyond this, to further prove their system is fully fit for purpose, they wanted to work with a company with extensive experience of ballast water treatment technologies and trusted assurance services.

Our solution

Using our in-depth technical knowledge and assuring compliance with our rules for ballast water treatment systems and their installation, ERMA FIRST are able to demonstrate that their treatment system is a safe and low-risk option for their customers in meeting the demands of the BWM Convention.

The outcome

The ERMA FIRST ballast water treatment system is now both IMO and LR Type Approved and can be used for vessels classed by LR. The system is a proven viable option for shipowners when making decisions about their ballast water management compliance strategy.

“This has been a really demanding project for us. We agreed to carry out a rigid risk assessment process in order to ensure that the operation of the system was free of any risks for the safe installation on board ships.”

Konstantinos Stampedakis,
Managing Director, ERMA FIRST



The ERMA FIRST ballast water treatment system

Recent LNG projects – new ships in the water

UECC launches dual-fuel LNG pure car and truck carrier



United European Car Carriers (UECC) have launched TBN AUTO ECO, a dual-fuel LNG pure car and truck carrier (PCTC), built to LR class. This vessel is the first of its kind ordered with an LNG fuel propulsion system.

A formal launching ceremony for *TBN AUTO ECO* took place at NACKS shipyard in Nantong, China, on 14 April. This is the first of two LR classed dual-fuel LNG PCTCs with 1A Super Finnish/Swedish ice class.

Glenn Edvardsen, CEO of UECC, commented: "It is such a magnificent moment seeing *TBN AUTO ECO* afloat. We have all been looking forward to this day to see her on the water for the first time. I am extremely proud and grateful for the dedication and hard work put in by the entire team to make this happen, especially on schedule.

"It is a privilege to be present here at NACKS today to witness the launching of one of the finest and most

technically advanced PCTC vessels ever built," he added.

The next milestones for the ship will be sea trials and gas trials, where her dual-fuel capabilities will be put to the test and her engines will run solely on LNG. *TBN AUTO ECO* is then scheduled to be delivered to UECC on 28 September, 2016 in Nantong, China.

UECC is jointly owned by Nippon Yusen Kabushiki Kaisha (NYK) and Wallenius Line.



LNG-fuelled *MV Ireland* launched

Ferus Smit launched the second of two LR classed LNG-diesel dual-fuel cement carriers – *MV Ireland* – at its Westerbroek yard in the Netherlands in March. Three weeks later the Wärtsilä 34DF-powered ship received its first LNG, from the CryoTek Services unit of Cryonorm Systems. *MV Ireland* is the second LNG ship for JT Cement, a joint venture of Sweden's Erik Thun and Norway's KG Jebsen Cement.

First LNG-fuelled icebreaker begins sea trials

The LR classed LNG-powered icebreaker, *Polaris*, left on her first sea trial from Arctech Helsinki Shipyard on 22 April. The trial will assure the functionality of the vessel before delivery to the Finnish Transport Agency.

The main purposes of the vessel will be icebreaking and assisting vessels in ice conditions, but she will also be able to perform oil spill response operations, emergency towing and rescue operations in demanding conditions in open sea.

The icebreaker will use both low sulphur diesel and LNG as its fuel, which will cut emissions and operation costs. *Polaris* will be the most environmentally friendly icebreaker in the world.



Photo courtesy of Arctech Helsinki Shipyard

The rising popularity of recreational submarines

LR has recently signed a contract with DeepFlight to provide certification services for their personal submarines in accordance with our Rules for the Construction and Classification of Submersibles and Diving Systems

Submersibles have been used for scientific research for decades. However conventional submersibles are so large, heavy and complex to operate that only a handful of research institutions own them.

Recently, DeepFlight has pioneered submarines that are lighter, smaller and so intuitive to use that private individuals now own and operate their

personal submarines from yacht or shore bases.

DeepFlight has completely re-designed the concept of a personal submarine for underwater adventure and exploration through its innovative use of composite materials, and by applying the dynamics of underwater flight. Their submarines are lighter and faster with a longer range than

others on the market, and they also offer the extraordinary experience of underwater flight.

The company has also optimised its submarines for resort operations, and has a submarine in constant tourism operation at Laucala Island Resort in Fiji (pictured below), with more locations to come.

Photo courtesy of Laucala Island Resort



Photos courtesy of David Bush for DeepFlight



DeepFlight Dragon specifications

(pictured left)

Length: 5.0 m (16 ft 5 in)

Width: 1.9 m (6 ft 3 in)

Height: 1.1 m (3 ft 7 in)

Weight: 1,800 Kg (4,000 lbs)

Operating Depth: 120 m (400 ft)

Payload: 250 Kg (550 lbs)



DeepFlight Super Falcon specifications

(pictured left)

Length: 5.9 m (19 ft 4 in)

Width: 1.9 m (6 ft 3 in) wings deployed,

1.4 m (4 ft 7 in) wings folded

Height: 1.6 m (5 ft 3 in)

Weight: 1,800 Kg (4000 lbs)

Operating Depth: 120 m (400 ft)

Payload: 250 Kg (550 lbs)


Adam Wright, CEO of DeepFlight said: "We are delighted to be working with Lloyd's Register to class our DeepFlight submarines. This partnership validates our efforts to join the automobile, aviation and other industries, in using composite materials to make safer craft. We see our work with LR as a great leap forward in allowing us to innovate submarines to open the oceans for personal exploration."

Photo courtesy of Laucala Island Resort



DeepFlight Super Falcon at Laucala Island resort

New technically advanced hovercraft certified by LR



British hovercraft designer and manufacturer, Griffon Hoverwork, has built two new craft for Hovertravel – the operators of the world's only year-round passenger hovercraft service

Image courtesy of Hovertravel Ltd

Designed and built to comply with LR's Special Service Craft Rules, the new craft – named *Solent Flyer* and *Island Flyer* – will be the most technically advanced and modern hovercraft available today. These are the first new passenger hovercraft to be built and used in the UK for a decade.

Solent Flyer is currently on sea trials and both craft are planned to go into operation with Hovertravel, soaring between Ryde and Southsea, in the coming months. They will replace two 30-year-old hovercraft – *Freedom 90* and *Island Express*.

Stephen Smith, LR's team leader for the project, commented: "The new design and fabrication concepts moved away from previous Griffon designed craft and for LR the challenge was assessing a new design for compliance with our new Rules for Air Cushion Vehicles, an additional section of LR's Special Service Craft Rules.

A brief history of the hovercraft

A British invention by Sir Christopher Cockerell; the hovercraft was a revolution in sea travel. In 1955 Cockerell tested out his idea for a floating/flying craft by putting a cat food tin inside a coffee tin. To test his 'hover' theory the inventor then blew a jet of air through the gap between the two tins to create a cushion of air and the idea of hovercraft was born.

After fine-tuning his designs, he secured funding to build a hovercraft. It took eight months to build the 20 foot craft which first took to the water on 25 July, 1959, crossing the English Channel from Calais to Dover in two hours, with Cockerell onboard.

In the 1960s many hovercraft were flying passengers across the English Channel and The Solent. But the industry was hit badly by the rise in fuel prices in the 1970s and the Hovertravel service between Southsea and Ryde is now the only passenger hovercraft service remaining.

“There is very little up-to-date experience in the manufacture and certification of new build high speed passenger vessels in the UK, let alone hovercraft. In pioneering this new product, Griffon Hoverwork have benefitted from the commitment of Lloyd’s Register to maintaining their position as the expert classification society and their close working relationship with the flag authority.”

Adrian Went, Managing Director, Griffon Hoverwork

Specifications

Length hovering: 22 m

Beam hovering: 10 m

Passengers (excluding crew): 80

Minimum crew: three for passenger, two for cargo craft

Maximum payload: 12 tonnes

Normal endurance: five hours

Maximum speed at full payload: 45 knots

Engine type: two MAN (diesel)

Hull material: marine grade aluminium



Initial trials and training period indicate that all expectations of a lighter, quieter, more efficient yet faster craft than the existing ones have been met.”

The technological advancements in these new hovercraft have considerably reduced fuel consumption. The new craft use only two engines; the older designs had four. The engines are non-marine MAN Diesel engines, as the hovercraft also travel on land, but Griffon adapted these to meet all marine regulations. Griffon also designed mixed flow lift fans that give 25% fuel consumption savings, and the lightweight materials used throughout the craft also add to the efficiencies.



Research in Greece connects the micro and the mega

In 2007 Vaughan Pomeroy, the then Technical Director of LR, and Professor Nikolaos Kyrtatos, of the National Technical University of Athens (NTUA), discussed the challenge of combining the study of specific shipping industry engineering challenges with global generic challenges of trade and logistics.

By 2008 a project was up and running to investigate the chain of connections from combustion inside an engine cylinder to global trade, funded by the LR Educational Trust, whose obligations were taken on by the Lloyd's Register Foundation in 2013.

The Foundation and the NTUA's Centre of Excellence in Ship Total Energy-Emissions-Economy have developed a close relationship since then. The goal of the Centre of Excellence is to connect engineering with the emerging emissions requirements and the realities and needs of world trade in two strands of work – components and ship energy systems; and the broader picture of

how best to operate a ship or fleet. Eight years later, a great deal has been achieved by the Marine Engineering and Maritime Transport labs at the NTUA.

"The truth is there are still mysteries inside the internal combustion engine and, in addition, emissions are very difficult to measure accurately," comments Prof. Kyrtatos. "Our work has been like throwing stones into a pond – you get ripples and when they interact with other ripples you learn things, but the picture can also get very complicated."

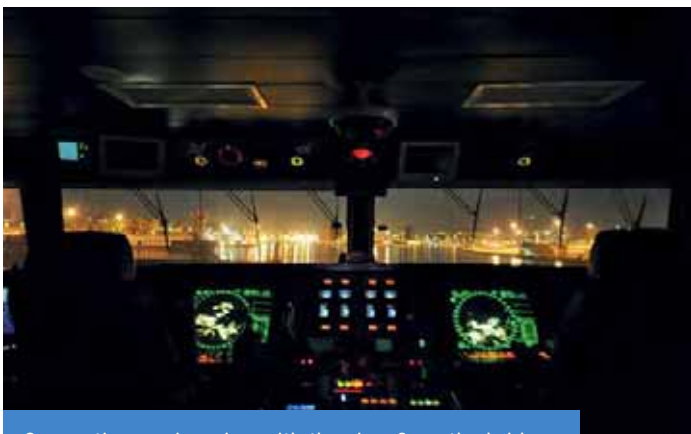
One thing that they feel will have a big impact in the future is virtual sensors in process analysis. These sensors are essentially systems that estimate responses (such as emissions from ship engines) by measuring the things that are easy to measure accurately, and then calculating the more difficult ones. Other areas that they feel are key to efficiencies are hybrid propulsion systems and continuous process evaluation and improvements.

"The truth is there are still mysteries inside the internal combustion engine and the consequence is that emissions are very hard to measure."

Professor Nikolaos Kyrtatos
National Technical University
of Athens

Kyrtatos: "There's no such thing as magic. We are not going to find immediate game-changers but we are looking for step changes. This takes hard work."

Find out more about the
Lloyd's Register Foundation at
www.lrfoundation.org.uk



Connecting engineering with the view from the bridge



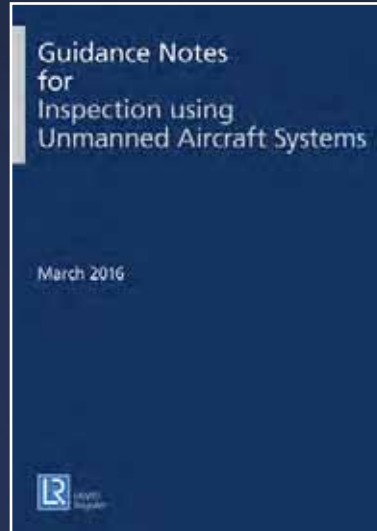
Cyber-enabled ships guidance

February 2016

Our cyber-enabled ships guidance provides the industry with a route map to understanding the implications of digital technology. The guidance describes six key areas of risk that need to be considered and addressed in order to assure safety and dependability: systems, human-systems, software, network and communications, data assurance, and cyber-security.



Read more
on page 3



Guidance Notes for Inspection using UAS

March 2016

New guidance notes support industry in the safe and effective deployment of next generation drone and unmanned aircraft systems (UAS) technology that can significantly improve productivity gains through reducing risk exposure, survey times and in-service inspection costs of offshore, marine and onshore infrastructure.



Read more
on page 4




FLNG whitepaper

June 2016

Offshore floating liquefied natural gas (FLNG) units are being designed for service lives of up to 50 years. This introduces greater risks, challenges and uncertainties that the conventional oil and gas and marine industries have not seen before. It will also mean that these units may outlive their designers. This paper aims to describe possible strategies to overcome these risks.



Download at
www.lr.org/flng



LR Surveyor, Dan Lawson, attends unmanned aerial system live testing with HD Solution AS on an oil tanker in Lisnave shipyard in Setúbal, Portugal.

www.lr.org

From our origins in a London coffee house in 1760, Lloyd's Register now has 9,000 employees throughout the world. We are engineers, and more: we've evolved from the original classification society supporting the shipping industry to a multi-industry compliance, assurance, risk and technical consultancy services organisation. With a truly global reach we can adapt our service offerings to suit businesses wherever needed.

Our only shareholder is the Lloyd's Register Foundation, but our stakeholders are many.

We exist to help make the world a safer place.

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