THE REPORT

JUNE 2017
ISSUE 80

The Magazine of the International Institute of Marine Surveying

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THE REPORT

The Magazine of the International Institute of Marine Surveying

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Editor's Letter

Dear Member

As we reach the midpoint of the year and head towards the height of summer in the UK, I pause for reflection wondering where time goes. This edition of The Report Magazine is published just before the UK General Election, the outcome of which is likely to have a major impact on the future Brexit negotiations. I mention this only because I am being increasingly asked what does Brexit mean for the UK, for marine surveyors and the wider marine world as a whole. The simple answer is that for now idle speculation is pointless. I am mindful that IIMS is a non-political organisation, but there is no doubt what happens in the coming days and Brexit itself will mean changes. But what this means practically for marine surveyors at this stage, who knows?

With each issue of The Report Magazine, we try to broaden the range of the topics that are presented to readers. In this issue, I believe this to be very much the case. I am grateful to those who have taken time to write for this edition on a multitude of topics.

I encourage members to come and be part of the IIMS London Conference taking place on 11/12 September. Full details on page 24. Why not combine it in with London Shipping week which is also going on at that time? IIMS Australia Branch Chairman, Mick Dyer, is the subject of a Day in the Life of (page 76). Elliott Berry talks openly about the dangers of fresh water following a life threatening condition he experienced (page 68). This edition's letters to the editor make cautionary reading as does Kim Skov-Nielsen's short article on page 57 too. Surveyors take note please!

Drone technology seems to advance faster than we can keep up with it. There is no doubt that this activity can potentially transform the lives of surveyors sooner than we realise. Jess Penney from Martek Marine takes up the story in her article 'Are drones the future of marine surveying?'

Mark Brattman's article on page 45 is worth a read. Commercial ship surveyors have often been asked to sign their lives away before boarding a vessel without even knowing what they are signing. The new ASG/ITIC 10 allows the surveyor to avoid having to negotiate on the gang way of the vessel.

IIMS immediate Past President, Capt Bertrand Apperry, considers where the industry is now after the Costa Concordia disaster and assesses what we have learnt and how the future might shape up on page 46.

My thanks to IIMS member, Geoff Bowker, who has authored an article about his transformation from the Royal Navy to marine surveyor. It is not the technical issues Geoff has faced that brought a wry smile to my face, rather some of the more business orientated challenges such as organising his website. The area of business management remains for many independent marine surveyors an area of frustration. Recently I have given a couple of presentations on this very subject and have more planned!

Many members have now tried the new IIMS CPD App and have claimed their points for the year. If you have yet to try it, please do so soon. It is simple to use and the most effective way to keep your CPD up-to-date. Version two is about to launch with some new added functions and usability. Full details of the App can be found on the web site.

Hoping to see some members in Singapore between 31 July and 2 August at the special IIMS and eCMID seminars.

Survey well.

Mike Schwarz
Chief Executive Officer
International Institute of Marine Surveying

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The President's Column

Dear Member

The importance of getting and following instructions has been on my mind a lot recently.

Dinner this evening brought this to the fore. Trying to reason with a teenage daughter, fixed on a course of action, who is absolutely convinced that she knows best and that you and your wife have recently emerged from a desert island (and therefore know nothing) will do that to you!

As our business grows and matures and our work to systemise procedures and workflows matures, I find myself contemplating those times when things don't go quite as planned and clients are clearly not totally happy with the service they receive; and how I can design systems and train staff to minimise this risk.

I'm coming more and more to the view that the root cause of this rare, but important dissatisfaction stems from, and can be avoided, if the first contact a staff member has with a client is handled in a considered, competent and focussed manner, and this approach to first contact becomes standard operating procedure.

I'm not sure how the business literature would phrase this but I think the key to avoiding a down-stream unhappy client lies in the surveyor getting 'into the head' of the client at first contact. A possibly more PC way of putting it would be the surveyor investing in a pre-conditioning of the client.

In simple terms, it's my view that we should invest time to fully understand the task the client wants us to perform and make sure that we can do what they ask, in the time frame that they are looking for, and that we are the right survey practice to meet their needs.

It goes deeper than this though. We need to spend time talking to the client, gauging their level of knowledge, their understanding of the nature of the advice we will be giving and making sure they are clear in what they are going to get in terms of a report, and without putting too fine a point on it, working out if they are clients we want to work with. Quite often I find that clients actually don't know what they need or what we can do for them. This is the opportunity to gently guide them to the right landing place if this is the case.

Here is some hard truth. Some clients have a very unrealistic view of what we can do for them. Some are working to an agenda that is at odds with our business ethos, and some are just trouble with a capital 'T'- and are probably best avoided if one wishes to remain sane and in business…

These rare individuals and organisations are easily avoided if the time is taken to talk to them, and as a result ensure that every job instruction is clear and understood, and written down, thereby ensuring you go into each situation with your eyes open.

With all parties fully aware of what is being commissioned, and why, and what and when they are going to be getting their report as a result of the instruction, my view is that a survey company operating at a consistently high standard unhappy clients are going to be exceptionally rare. Remember you choose your clients and not the other way round.

Now if teenage daughters could come with an instruction manual in future all will be right in the Brancher house!

Mr Adam Brancher *President*
International Institute of Marine Surveying
Email: adambrancher@kedge.com.au

IIMS Organisation & Structure

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Marine News

US COAST GUARD ISSUES WARNING ABOUT RELIEF VALVE TESTING ON PNEUMATIC SYSTEMS

Due to a mishap from improper testing of a vapor safety relief valve on a compressed air system, the Coast Guard Office of Commercial Vessel Compliance (CG-CVC) reminds all those concerned of the risks and best practices in conducting or witnessing the testing of relief valves. While this information is based on testing compressed air systems using vapor relief valves, the guidance is also relevant to safety valves in other pressure systems, except boilers.

In summary, Marine Inspectors should be aware of the following:

1) A Marine Inspector should not allow removal or alteration of a secondary safety device to facilitate a test of the intended safety device2;

2) All systems are different, and the attending Marine Inspector should become familiar with each system and the valve settings before testing;

3) The attending Marine Inspector is observing the test only, and the appropriate vessel representative should perform all functional tests; and

4) The attending Marine Inspector should verify that all relief valves meet the design, installation, and performance criteria in 46 CFR Subchapter F.

Mishap summary:
While preparing for a test, the relief valve on the associated compressor was removed because it had a lower set-point than the relief valve on the air receiver being tested. Unfortunately, the isolation valve between the compressor and the air receiver was mistakenly left closed during the test, resulting in a dead-head situation, causing the compressor to rupture, and sending shrapnel throughout the space. Fortunately, no one was injured.

Full story: **https://www.iims.org.uk/us-coast-guard-issues-safety-bulletin-vapor-pressure-relief-valve-testing-pneumatic-systems/**

REPORT ON THE LOVE FOR LYDIA CARBON MONOXIDE DEATHS TRAGEDY PUBLISHED BY MAIB

Between 7 and 9 June 2016, the two occupants of the motor cruiser Love for Lydia died from carbon monoxide poisoning. The boat was moored alongside Wroxham Island, River Bure, Norfolk, and their bodies were found during the afternoon of 9 June in the boat's forepeak cabin.

The MAIB investigation identified that:

- The source of the carbon monoxide was exhaust fumes from the boat's eight-cylinder petrol engine, which contained high levels of the gas even when the engine was 'idling'.
- The engine was probably being run to charge the boat's 12v batteries and the occupants did not recognise the danger from the exhaust fumes.
- The carbon monoxide from the 'wet' exhaust at the stern of the boat spread under the canvas canopy on the aft deck and then into the forepeak cabin, where it quickly reached lethal concentrations.
- The boat's habitable spaces were not adequately ventilated; the forepeak cabin's deck hatch and port holes were shut.
- The boat's occupants were not alerted to the danger because a carbon monoxide alarm was not fitted.

In January 2015, the MAIB made several recommendations in an attempt to improve carbon monoxide safety on board recreational craft following its investigation into the double fatality on board the motor cruiser Arniston on Windermere. It is disappointing that a recommendation intended to require new recreational craft to be fitted with a carbon monoxide alarm was not accepted and that the action that resulted from a recommendation aimed at providing a co-ordinated and focused awareness campaign was short-lived.

MAIB statement:
The Marine Accident Investigation Branch has investigated four accidents in four years where seven people have tragically died as a result of carbon monoxide poisoning on boats. Carbon monoxide is a silent killer and there are many sources of it on boats, including engines, cookers, heaters and even barbecues.

A number of organisations continue to raise the awareness of leisure boaters to the dangers of carbon monoxide, but more needs to be done. A recommendation has been made to the Maritime and Coastguard Agency intended to re-energise various industry bodies into agreeing a co-ordinated and concerted campaign. Recommendations have also been made to the Boat Safety Scheme and British Marine which are intended to realise the mandatory fitting of carbon monoxide alarms on board new recreational craft and on board existing recreational craft using inland waterways. Marine surveyors have their part to play too and IIMS urges its members to remind vessel owners of the importance of fitting a suitable alarm.

Read the report in full: **https://www.iims.org.uk/wp-content/uploads/2017/05/MAIBInvReport9_2017.pdf**

Wärtsilä is launching its latest innovation SmartPredict

WÄRTSILÄ LAUNCHES SMARTPREDICT TO PROVIDE SAFER SHIP MANOEUVRING GUIDANCE

The technology group Wärtsilä is launching its latest innovation SmartPredict. Developed by the company's Dynamic Positioning unit, SmartPredict is designed to provide safer and more efficient vessel operations by reducing the risks associated with manoeuvring.

The system displays the vessel's predicted future position and heading, and uses proven dynamic positioning (DP) analysis algorithms to evaluate forces affecting the vessel, thereby providing advanced motion prediction. SmartPredict also features a configurable prediction time display.

Most conventional prediction systems are able to utilise only basic input parameters, and thus offer limited usability. Wärtsilä's SmartPredict software module, however, utilises all of the parameters used for automated control by the DP and adjusts them for the motion characteristics of the specific vessel. Such inputs include the vessel's current position and heading, as well as its velocity and rate of turn and all associated accelerations. Also taken into consideration are the manual commands from the coordinated control joystick, and environmental input from the onboard wind sensor(s). These factors are all continuously evaluated to provide a constant updating of the vessel's path.

"Allowing the operator to see into the future enables smarter and safer ship handling decisions to be made, thus lowering the risk of accidents occurring. We see SmartPredict as being an important step towards more automated procedures, such as docking, and eventually fully autonomous vessel manoeuvring," says Maik Stoevhase, Director, ANC & Integrated Systems, Electrical & Automation, Wärtsilä Marine Solutions.

The Wärtsilä user interfaces provide a simple, intuitive display, allowing the operator to toggle on or off the 'ghost ship' indicators for the predicted positions. This display also allows the user to configure the time steps for the predictions. Fully compatible with the Electronic Chart Display & Information System (ECDIS) overlay function, SmartPredict provides clear indications of potential dangers during ship manoeuvring, thus immediately increasing the safety and efficiency of operations.

GARD PUBLISHES INFORMATION ON WATERTIGHT DOORS

During day to day operations of a ship and particularly in situations where the ship has been damaged, it is usually assumed that all watertight doors are closed and that the vessel's internal watertight subdivision is 100% effective. On board a ship, the safety of the crew and passengers depends on the safety of the ship and this includes the safe use of such doors so that they do not pose any danger when passengers and crew pass through the doors or operate them. However, Gard's casualty statistics indicate that this is not always the case.

Root cause investigations after incidents involving power operated watertight doors have revealed that it has been common practice onboard ship to not to fully open them before passing through the doors. The door safety systems have also been found not to be in full working order during recent inspections and that some doors have not been properly maintained or tested. Most accidents involving people occurs when the doors are in a bridge control, "doors closed" mode.

Shipping losses have declined over the past decade, driven by an increasingly robust safety environment and self-regulation. However, despite the reduction in total losses, they still happen and most of them are due to foundering, grounding, fire, collision or contact damage. These initial events can result in the vessel losing stability and buoyancy, which can lead to a major incident with a potential for significant loss of life.

Gard's aim is, together with their partner in this project, DNV GL to create awareness of the correct use of and contribute to an increased competence on power operated watertight doors. Based on their analysis of cases involving watertight doors, Gard and DNV GL have produced a video and a presentation identifying the major risks, technical and operational issues, and steps the maritime industry can take to address them.

Follow this link to access the full information package: **https://www.iims.org.uk/gard-publishes-information-watertight-doors/**

Gard has released a presentation and video about watertight doors

A MARINE WARRANTY SURVEYOR SHOULD BE ENGAGED TO REDUCE CARGO SHIFTING RISK SAYS LONDON P&I CLUB

Due to a recent increase in the incidence of deck cargoes shifting in heavy weather, the London P&I Club said it supports a recommendation to appoint a marine warranty surveyor to supervise high-risk marine construction and transportation project operations where appropriate.

"In the past year, LOC has seen many deck cargoes shifting in heavy weather," Paul Walton, a director with international marine consultant LOC (Hong Kong), said.

After further investigation, it has been discovered that the stowage and securing of these cargoes "did not comply" with the ship's Cargo Securing Manual (CSM) or the practices laid down within the Code of Safe Practice for Cargo Stowage and Securing (CSS Code) or other applicable codes of safe practice, Walton added.

"Such losses have prompted the view that a suitably qualified marine warranty surveyor should be recommended to attend such load-outs. This would ensure that the port captain or supercargo carries out the operation correctly, and that the master is satisfied with the stowage, securing and tensioning requirements, as is his responsibility under SOLAS," according to Walton.

A marine warranty surveyor provides independent third-party technical review and approval of high-value and/or high-risk marine construction and transportation project operations, beginning at the planning stage. The objective of employing such a surveyor is to make reasonable endeavours to ensure that the risks associated with the specified operations are reduced to an acceptable level in accordance with best industry practice. The role of the marine warranty surveyor is independent of, and complementary to, that of the port captain / supercargo.

"By appointing an independent third-party marine warranty surveyor to review the whole operation from start to finish, carriers and charterers will reduce the high-risk factor associated with deck cargoes. The attendance of a marine warranty surveyor will ensure that the regular areas of failure within a deck stow such as poor lashing equipment, insufficient use of lashing equipment, and non-compliance with all relevant safety codes will be avoided," Walton said.

London P&I Club is calling for a marine warranty surveyor to be engaged to reduce the risk of shifting deck cargoes

OFFSHORE WIND POWER SECTOR IS SET FOR EXPONENTIAL GROWTH REVEALS NEW REPORT

Offshore wind power is on the cusp of exponential growth, with installed capacity set to nearly triple between 2015 to 2020 reveals a new joint industry report.

This growth is being accompanied by marked cost reduction, with recent auction tenders suggesting that costs have fallen by 60 percent compared to 2010 levels. As a result, a new International Energy Agency's Renewable Energy Technology Deployment report REWind Offshore highlights that industry cost targets for 2025 have been surpasses eight years ahead of schedule.

Following a year of record breaking auction prices for the offshore wind power sector in the Netherlands and Denmark, the study identifies the key success factors that have supported a burgeoning industry in Europe, drawing lessons learned for both policy makers and industry players.

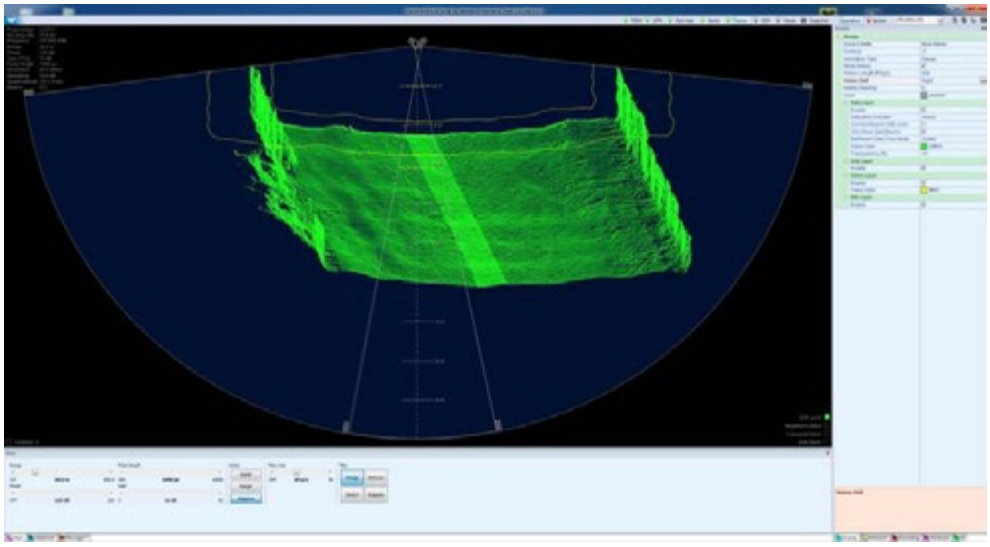
The report, delivered through a collaboration between the Carbon Trust, Mott MacDonald and Green Giraffe, identifies several examples of best practice, underpinned by the need for political stability and visibility of market scale and support mechanisms. Notable recent policy trends include the introduction of competitive auctions and centralized development models, in which government bodies take on a greater role in the development process.

The trends in the offshore wind power sector are seen to be having a considerable impact on the risk profile for developers, with increased allocation and price risk countered by reduced development and technical risk. This is resulting in lower perceived risks from the finance community due to growing confidence in the ability of developers and the supply chain, with offshore wind increasingly considered an attractive investment opportunity for a more diverse range of actors.

Having been pioneered in a small handful of European countries, offshore wind power is set to expand geographically, with considerable market growth forecast both within and outside Europe, particularly in East Asia and North America.

However, while the European offshore wind power market may be demonstrating signs of maturity, emerging markets outside Europe are at a much earlier stage. The European market has benefited from clustering around the North Sea region, which has a rich background in offshore engineering and maritime sector activities, so more isolated emerging markets are expected to encounter greater challenges. Lower cumulative market size and a lack of established suppliers are likely to require greater government intervention to reduce investor risk, states the report.

AIMEX CALLS FOR LEGISLATION CHANGES FOR AUSTRALIAN SUPERYACHT INDUSTRY



AIMEX, the Australian organisation that supports and promotes Australian marine exporters to succeed in global markets has called on the Federal Government to change restrictive legislation holding back Australia's superyacht industry after an economic impact study revealed its high value to the Australian economy.

The AEC Group study found the Australian superyacht industry contributed a total of A$1.97 billion ($1.5 billion) to gross domestic product (GDP) in the 2016 financial year.

An Australian first, the economic impact study found the superyacht industry to be a high value niche sector, held back by restrictive policy. If relaxed, the industry could contribute an additional estimated A$1.12 billion to GDP by 2021 for a total contribution of A$3.34 billion.

MaryAnne Edwards, AIMEX Chief Executive, said: "We're calling for the Australian government to fix our legislation, so foreign superyachts have freedom to charter here, like they do in New Zealand. This would boost our local superyacht industry substantially. We could see an extra 8,100 local jobs making a total of 24,400 jobs by 2021."

Currently, very few international superyachts come to Australia because the current legislation makes charting in Australian waters unviable. A superyacht must be fully imported and pay 10 percent Goods and Services Tax on its value.

https://www.iims.org.uk/aimex-calls-legislation-changes-australian-superyacht-industry/

HAMBURG PORT AUTHORITY ADDS A DUAL HEAD MULTIBEAM SURVEY SYSTEM TO ITS RANGE OF HYDROGRAPHIC SURVEY EQUIPMENT

Conducting around 900 surveys per year in the port of Hamburg, Hamburg Port Authority (HPA) requires high-end products for their multi-sensor systems and survey vessels.

The vessel 'Deepenschriewer IV' is the smallest survey vessel of HPA and intended to carry out multibeam surveys for depth control and documenting in shallow water areas. For this purpose, MBT, MacArtney Germany, has done supply, installation, and setting-to-work of a dual head multibeam echo sounder system suitable for hydrographic survey applications.

This solution includes the following products: high-resolution multibeam echo sounder Teledyne RESON SeaBat® T20-R, a Valeport SWiFT soundtrace profiler and a Valeport UltraSV.

Scope of supply:
The dual head Teledyne RESON SeaBat® T20-R multibeam echo sounder configuration provides uncompro-mising survey data in a highly compact package designed for small vessel use. It is an all-in-one, fully flexible and fully integrated survey system for fast mobilization, minimal interfacing and low space requirements.

The Valeport SWiFT is a high-performance, low-cost and high-speed. The Valeport UltraSV offers ultra-fast, ultra-compact and ultra-dependable. The scope of the invention relates to a method and apparatus for the determination of the temperature.

Quality testing to meet the most demanding standards and the best way to achieve the best results.

The units are intended for coastal, harbour and inland hydrographic survey use. Featuring superior acoustic quality and high accuracy, this dual head survey system enables easy and quick downloading and sharing of data relevant in relation to hydrographic surveying.

The first two 105HT superyachts have been delivered by Turkish yard Numarine

NUMARINE DELIVERS ITS FIRST TWO 105HT SUPERYACHTS

Hull one, also known as Dolce Vita, was delivered to a European client and hull two was delivered to Hong Kong says Turkish superyacht builder Numarine. Both interior and exterior design for the hulls were delivered by Can Yalman and featured a distinctive sporty exterior.

Speaking about the hardtop design, Yalman commented, "The Numarine HT design language involves gill shaped glass elements in the superstructure. Previously we have used this in the ceiling panels, but in the 105HT this has been taken to the extreme and the complete side glass has this gilled, scaled structure emphasising the power within."

The outdoor spaces on board the 105HT include a large bow lounge seating area and aft deck dinette. The main saloon can then be opened up to the aft deck using sliding doors, to connect indoor and outdoor spaces.

Naval architecture was completed for Numarine by Umberto Tagliavani. He said, "The primary aim when we designed the new 105HT was to create a high performance hull shape with maximum possible comfort, even when sea conditions are not ideal."

"The chined hull forward has a pronounced V, letting the bow pierce the waves relatively easily, giving the yacht a very comfortable ride. To improve the hull, obviously with the help of the yard, I have always taken out the yachts for trials in rough conditions to better understand how to improve handling in difficult conditions."

Accommodation is available for eight guests in three en-suite cabins, with a full-beam master stateroom. There is also crew accommodation for up to five staff.

The 105HT vessels are powered by two 1,925hp CAT C32 engines, able to reach a top speed of 31 knots, and a maximum cruising range of 500nm at 26 knots.

SURVEYS BY AMERICAN P&I CLUB SHOW NUMEROUS MACHINERY DEFICIENCIES LAST YEAR

Personnel from the American P&I Club conducted 106 condition surveys during the 2016. They say that ninety one of the surveys resulted in deficiencies but only fifteen surveys resulted in no deficiencies noted at all. 46% of the surveys were conducted on dry cargo vessels, whilst tankers accounted for 35% of the surveys that were conducted.

American P&I Club reveals that tankers were found to have the most deficiencies per survey with just under 10 per survey. Dry cargo vessels (excluding container ships) were found to have just over 7 deficiencies per survey. Out of the 873 deficiencies noted, the most frequent individual category of deficiency found was related to the condition of machinery spaces. The most frequent deficiencies overall were related to the conditions and functions of cargo systems, particularly related to bulk carriers.

The American P&I Club notes that machinery related deficiencies were found to be the second most frequent deficiency (120), accounting for 14.3% of all deficiencies observed during these surveys.

Furthermore, another 49 deficiencies observed had to do with the machinery systems associated with cargo systems, fire safety and pollution prevention. When combined with the other machinery deficiencies, this accounts for 19.2% of the sum total of all deficiencies found.

Taking all of the machinery related deficiencies into account, machinery integrity deficiencies were found to be most frequent. The two most frequent machinery related deficiencies were:
– cleanliness of engine compartments including bilges being clean, tidy and free of combustible materials; and
– engine integrity related deficiencies that include the conditions of main & auxiliary engines, engine monitoring systems and insufficient spare parts.

Furthermore, fire system related deficiencies were also significant in number. These deficiencies include poor conditions in fixed fire and extinguishing systems, main and emergency fire pumps and fixed gas detention and monitoring systems.

NEW BIOFOULING REQUIREMENTS POISED TO ENTER FORCE IN NEW ZEALAND FROM MAY 2018

The New Zealand Ministry for Primary Industries (MPI) has issued a notice announcing that all vessels arriving in New Zealand must have clean hulls from May 2018 as new biofouling regulations are set to become law. The Craft Risk Management Standard (CRMS) has been developed to provide guidance regarding compliance.

From May 2018, vessels must arrive in New Zealand with a clean hull. Vessels staying up to 20 days and only visiting designated ports (places of first arrival) will be allowed a slight amount of biofouling. Vessels staying longer and visiting other places will only be allowed a slime layer and goose barnacles.

Complying with new biofouling requirements

You will be able to meet the new clean hull requirements by doing one of the following:

- cleaning the vessel hull before arrival in New Zealand (less than 30 days before arrival)
- doing continual maintenance on the hull
- treating organisms on the hull (for example, with heat or chemicals) to kill them or make them sterile.

What is continual maintenance?
Continual maintenance involves ongoing management, including:

- having a biofouling management plan specific to the vessel
- coating the hull with antifouling paint to prevent or minimise biofouling
- regularly inspecting and cleaning the hull
- keeping records to show how the process is managed.

MAIB CONTRACTS WITH BMT SHIP & COASTAL DYNAMICS FOR THEIR REMBRANDT SIMULATOR

BMT Ship & Coastal Dynamics (BMT), a subsidiary of BMT Group Ltd, has announced a new contract with the UK's Marine Accident Investigation Branch (MAIB), acknowledged as a world leader in ship electronic evidence gathering, including VDR data recovery and interpretation. BMT has installed its industry leading marine navigation and manoeuvring REMBRANDT simulator and will provide ongoing specialised training, to allow MAIB personnel to benefit from its unique attributes.

Richard North, Technical Manager at MAIB comments: "REMBRANDT simulator is a well-regarded and trusted solution, widely used by a broad spectrum of stakeholders including pilot organisations, shipping companies on-board and ashore, naval architects, civil marine engineers and port authorities, therefore it was a natural choice for us. A key and unique attribute of REMBRANDT is its ability to automatically input a broad range of VDR data including 3D, Radar and bridge audio to deliver a more enhanced and accurate visual reconstruction. This is a critical for the thorough investigation of marine accidents involving UK vessels worldwide and all vessels in UK territorial waters."

As well as installation of the technology, BMT experts have provided training on the technical aspects and fundamentals of the REMBRANDT simulator for MAIB personnel. This has allowed them to understand the process of rapid model deployment and to perform simulations for both visual reconstruction, root cause analysis and lessons-learned.

Phil Thompson, Managing Director at BMT Ship & Coastal Dynamics explains: "REMBRANDT is a scaleable, skilled system which can be used via a desktop, laptop or as a full mission-based simulator and comprises a database of hundreds of validated ship models that underpins the validity of one or more ships in a seaway. REMBRANDT continues to be widely used in many markets well beyond shipping, including high value, high risk sectors such as floating oil and gas infrastructure – a further testimony to its accuracy and robustness."

Finland's oldest ferry goes all electric with Visedo Power

FINLAND'S OLDEST FERRY GOES ALL-ELECTRIC

From steam to diesel and now electricity: the oldest operating ferry in Finland has become the nation's first all-electric passenger vessel after being fitted with Visedo power.

The City of Turku has seen the historic Föri ferry relaunched, complete with a new zero-emission electric drivetrain that will deliver greater efficiency, less noise and reduced operating costs.

The Föri initially entered service in 1904 after the City of Turku commissioned local shipyards Aktiebolaget Vulcan to build a city commuter ferry to take passengers across the Aura River to Åbo.

Since then the distinctive little orange boat – named after the Swedish word for ferry, färja – has traversed its route nonstop back and forth across the river for more than a century to become a beloved transport icon for the city.

Turku commissioned local boatyards Mobimar to complete the upgrade, where the vessel was dry-docked in March this year. Mobimar oversaw the removal of the boat's diesel-powered hydraulic motor and the old control system. The new installed system was eight tons lighter; consisting of two Visedo permanent magnet motor drives and two Visedo DC/DC converters which control the ferry's DC grid.

The new vessel draws power from batteries that are charged overnight, with the new power system simultaneously improving redundancy and making it possible to run on one or two motors – particularly important during icy conditions. This also allows future motor maintenance to be done in shifts, with no interruption to vessel operation.

The DC/DC converters serve to increase the battery voltage to a level that is more suitable for the motor drives. This minimises losses while maximising performance and reliability.

Visedo Project Engineer Heikki Sallinen said: "The Föri ferry is a national treasure but with its old diesel engine, fuel consumption and emissions were high and overall efficiency poor. Visedo power brings the 100-year-old vessel into the 21st century without changing its character and delivers zero-emission transport for Turku.

"The revolution to electrify the world's diesel transport is already underway. After powering Asia's first hybrid electric ferry in Taiwan and continuing to work on the project to power the world's biggest E-ferry in Denmark, at home Visedo is proud to help transform Finland's oldest ferry into its first all-electric vessel."

Members' News

IIMS BIDS A FOND FAREWELL TO STALWART MEMBER CAPT DAVID (DAVE) GREEN, MASTER MARINER

It was with great sadness that IIMS learned of the passing of Capt David (Dave) Green peacefully at home on Sunday 26th March. Long standing member, Dave, was recognised for his significant contribution to the Institute with Honorary Membership.

Capt Ian Wilkins MM FNI HonMIIMS, pays tribute to his friend and has written this fitting obituary.

The first thing to say about Dave is that he was a "seaman". That may seem a strange thing to say but there are many people who go to sea and call themselves sailors or seafarers – even seaman – nothing wrong with that, but Dave was a real "SEAMAN" and he really did know the ropes. All of them!

Below is an actual quote from his first nautical college report before he went to sea.

"Keenly interested in practical seamanship and will make a good seaman".

They were not wrong there!

After attending nautical college Dave started his career at sea with Bank Line in 1956 "tramping "around the world. In the sixties he took a break from the sea during which time he took on many varied jobs from lorry driving to running a taxi business. But the lure of the sea saw Dave back on board in the early seventies joining Stag Line of North Shields where he advanced his sea going career and qualifications, obtaining his Masters Foreign Going Certificate in 1984. He progressed through the ranks until deciding to "swallow the anchor" and come ashore for good.

Dave joined Alfred H Knights, an independent provider of inspection and testing services based in St Helens, as a cargo/commodity superintendent.

It was at this time that Dave became involved with the IIMS shortly after its foundation. The Institute was going through a difficult time but with his enthusiasm, ideas and support it survived and prospered to become what it is today.

Draught surveying was Dave's passion and over many years he wrote about it, debated it and on many occasions argued with the best in the world about it. Rarely, if at all, did Dave lose an argument in draught surveying disputes. He developed the first Excel computer programme for generating draught survey reports – a programme which is still used today.

Dave was the "go to man" for all things "draught surveying". His knowledge, experience and expertise were sought after by P&I clubs, shippers and ship owners on a global basis.

This lead Dave to write teaching modules, presenting at marine educational seminars as well as being an assessor for the IIMS BTEC Marine Surveying qualification. We are lucky his teaching modules and other publications he worked on are, and will be forever, available and so his work will carry on being used and Dave will continue to be remembered through his work.

He was a great supporter of the Institute, its aims and objectives. For his contribution to the educational work of the IIMS he was elected an Honorary Member.

After retiring from Alfred H Knights, Dave set up what became a very successful surveying company, DG Marine, and he continued surveying until ill health slowed him down. But Dave, being a true professional, battled on to the point that even during short spells in hospital he could be found organising surveys all over the country from his hospital bed.

There were other sides to Dave's life which many will be unaware of. He was a very good musician playing the guitar in folk groups around the north west. He was a keen model maker building large scale model aeroplanes and flying them at events on many occasions. And last but not least he was an avid cricket fan with his beloved Lancashire close to his heart. He was not just a spectator – his statistical knowledge was equally something to behold.

Dave will be sadly missed, but affectionately remembered by all his merchant navy, surveying and maritime industry friends and colleagues. His musician friends, model club fans and of course his close group of loyal Lancashire cricket club fans will also miss him dearly.

Our thoughts go out to Dave's wife Linda, his daughters, grandchildren and great grandchildren.

Keep on sailing Dave.

With fair winds and following seas.

Capt Ian Wilkins
MM FNI HonMIIMS

IIMS CHECKS IN FOR SINGAPORE SEMINARS 31 JULY TO 2 AUGUST

IIMS has planned and organised a three day programme of events taking place in Singapore from 31 July to 2 August 2017.

Venue: Hotel Jen Tanglin Singapore by Shangri-la 1A Cuscaden Road, Orchard, 249716 Singapore

Day 1 International Institute of Marine Surveying Seminar

10.00 Mike Schwarz, Chief Executive Officer, International Institute of Marine Surveying: 'Update on the activities of the IIMS followed by the importance of surveyor standards'
10.45 Zarir Irani (topic to be confirmed)
11.30 Coffee
12.00 Rama Chandran, Head of Marine, QBE, Singapore: 'What we need from marine surveyors in a challenging hull insurance landscape'
12.45 Lunch
14.00 Mike Wall: 'The Technical Library - An Essential Tool for Marine Surveyors'
14.45 Capt Hari Subramaniam, Loss Prevention Manager, Shipowners P&I Club: 'Marine Surveying: Today and Tomorrow'
15.30 Panel discussion
16.00 Close

Cost for attending Day 1 only to include refreshments, lunch and conference pack: 250 SGD Singapore Dollars

Day 2 eCMID Accredited Vessel Inspector seminar

In April 2017, Marine Surveying Academy (an IIMS subsidiary that runs and manages the eCMID programme on behalf of IMCA) ran the inaugural Accredited Vessel Inspector Conference in Amsterdam. Such was the success of the day and given the high number of AVIs in the Far East, it has been decided to run a similar such event.

09.30 Mike Schwarz, Chief Executive Officer, International Institute of Marine Surveying: 'Background to the eCMID AVI accreditation scheme and update on its progress'
10.15 Chris Baldwin, Technical Advisor and IMCA eCMID Project Manager: 'eCMID/ MISW Now and the Future'
10.40 Coffee
11.00 Capt Ian Coates, Lead Tutor: 'Accredited vessel inspector - the way ahead'
11.45 Joe McWilliam: 'A basic introduction to the International Safety Management (ISM) Code'
13.00 Lunch
14.00 Capt Mike Meade: 'Marine guidance for safe offshore marine operations and the importance of CMID and AVI in the process'
14.45 Ken Livingstone, Course Tutor (topic to be confirmed)
15.30 Panel discussion
16.00 Close

Existing eCMID AVIs are encouraged to attend but you do not have to be an eCMID inspector to take part in this training. Cost for attending Day 2 only to include refreshments, lunch and conference pack: 250 SGD Singapore Dollars

Cost for attending Day 1 and 2 discounted to 450 SGD Singapore Dollars include refreshments, lunch on both days and two conference packs.

Day 3 eCMID AVI Accreditation Course

Your tutor for the day is Ken Livingstone

09.00 – 09.15 Registration
09.15 – 10.00 Module 1
Introduction to CMID v9 and MISW v3. The principles of the CMID inspection process, structure of the new version and use of photos.
10.00 – 10.15 Break
10.15 – 12.30 Module 2
eCMID database. New functions. Report production and upload. Amendments. Utility for SMS auditing.
12.30 – 13.00 Lunch
13.00 – 14.00 Module 3
IMO updates to SOLAS/MARPOL/ MLC, ISM code, ISO 19011, UK MCA Small Workboat code. AVI Code of conduct. IMCA and IIMS structures.
14.00 – 14.30 Module 4
Revision of key points
14.30 – 15.00 Consolidation Multiple Choice Test (multiple choice 20 questions)
15.00 – 15.20 Break
15.20 – 16.00 De-brief and Course Feedback
16.00 Course ends

The cost for the eCMID AVI Accreditation course only is 800 Singapore Dollars

To register your place go online at: **https://www.iims.org.uk/iims-ecmid-singapore-seminars-2017/** Or call + 44 (0) 23 9238 5223, or **email info@iims.org.uk**

IIMS CPD APP VERSION 2 LAUNCHED

Following the successful launch of the IIMS CPD App earlier this year, IIMS member, Capt Ruchin Dayal, and his team in Goa have released Version 2. The second edition has some new functionality and features. Dozens of members have now used the App and are doing so regularly to claim their CPD points in real time.

If you have yet to test the CPD App, make a point of doing so soon. Versions are available for both iOS and Android. There is also a web based version readily available too.

Remember you have a responsibility to yourself to keep your CPD points up-to-date. And with only 10 points required in a 12 month calendar year period, it is not onerous to achieve the target.

BOOK REVIEW

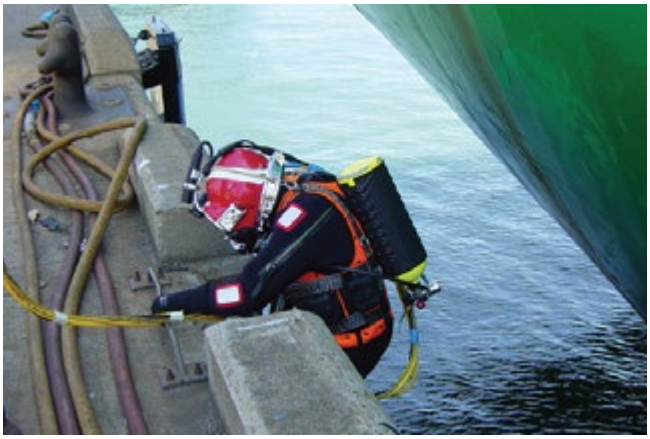
Marine Surveying and Consultancy - An Introduction written by Mike Wall

There have been many books written on marine surveying, but none quite like this latest book by Mike Wall. This is just one book of four produced by this author, but gives the would-be surveyor a good insight into the surveying profession. The book is a must have for the surveyor's personal library, if only as a reference guide. The range of information covers in detail the areas of specialism in all categories of surveying from Yacht & Small Craft through to Expert Witness requirements. There is a clear description of the definitions of the role of a surveyor and a consultant and what is expected in each category.

Mike has been a surveyor and consultant in the industry for over 30 years and has extensive knowledge and experience both ashore and at sea. The knowledge he has gained is carefully explained in this book, which would be useful to anyone contemplating a career in the marine industry, or for a surveyor looking for a way to expand his area of specialism.

The book is available direct from the author at **mikewallassociates@gmail.com**

Review by John Kilhams.



ONLINE SEMINARS IN JUNE

The IIMS online seminars are proving to be popular. With half a dozen now completed in 2017, the team is looking to release a plan for a range of autumn seminars. Check the web site for details, or watch your email inbox for information nearer the time.

Two further 90 minute seminars have been announced for June as follows:

Marine surveyors and inwater surveys – What you need to know will be presented by Capt Andrew Korek on 5 June at 15.00 London UK time. In this seminar Drew will cover:

- Types of inwater surveys and inspection
- Criteria for selecting a suitable and qualified diving contractor
- Inspection diver interview and briefing prior the survey
- Safety issues and risk assessment
- Best working practice and techniques
- Reporting
- Equipment
- Video and photography in underwater application
- Permanent and temporary repairs
- Maintenance

On 20 June at 10.00 London UK time, IIMS CEO, Mike Schwarz presents practical tips and advice for business success. Drawing on his business experience of 30 plus years, Mike will deliver three short presentations as follows:

Looking good on the web. Arguably your web site says more about you than anything else. It is the modern day equivalent of your business card. Many people think that building and maintaining a web site and presence is expensive and a challenge. It need not be so. Mike will give some pointers on how to make your site look good and what component parts you need for web site success.

Basic marketing tips. Having spent many years in marketing, Mike will offer 15 common sense marketing tips that do not cost the earth, but which could help to propel your business forward to the next level once implemented.

19 tips for business success. Mike will share 19 thought provoking 'smart tips' that he hopes will help you to become a more focused and successful business person.

Reserve your place for these and future seminars online at: **https://www.iims.org.uk/education/online-seminars/**

SMALL CRAFT SURVEYORS FORUM PROGRAMME AT SEAWORK ANNOUNCED

The Small Craft Surveyors Forum, comprising of RINA, IMarEST, IIMS, SCMS, NI and YDSA, is pleased to announce its speaker programme for its annual Seawork Exhibition Seminar.

The seminar will be held within the show onboard the 'Ocean Scene' vessel in the marina from 13.00 to 16.30 on Wednesday 14 June.

The event is free to attend, but you are required to register your attendance so that the organisers can comply with health and safety requirements, catering and seating.

Speaker Programme:

13.15	Introduction by John Wills, IMarEST
13.20	'Metals in Marine Environments: Corrosion Behaviour and How to Spot it' by Mark Tur, Technical Consultant at the Copper Development Association.
14.00	'International standards and their use in the commercial sector' by Ross Wombwell, BSc, Technical Manager, British Marine.
14.40	Tea/coffee break
14.55	'Thermal imaging, an increasingly used technique – a look at using it correctly and understanding the findings' by Roby Scalvini, MYDSA, NDE Solutions, Palma.
15.35	'Stability – a look at freeboard including its importance to SCV coding' by David Greening, MRINA, MYDSA
16.15	Conclusion and Close

Register your place by following this link: **https://form.jotformeu.com/70334127551348**

IIMS CERTIFYING AUTHORITY SPRING TRAINING DAY

Mike Barnett, an IIMS member, coding surveyor and ex MCA employee, gave a comprehensive three hour presentation on MLC 2006. Previously he had been responsible for training MCA staff in the area of MLC 2006. This most comples of legislation is challenging, especially when it is applied to vessels below 24 metres. Furthermore, vessel operators need to be aware of and understand the importance of complying and the ramifications of not doing so too. The surveyor has a clear role to play in this area.

Mike's audience comprised a dozen surveyors in the room with more delegates joining to take the content live via an online feed. Many questions were posed to Mike, which he was able to answer calling on his experience in this field.

IIMS STAFF GO MARINE SURVEYING

Cam Robertson, Dave Parsons and Craig Williams took off for half a days training under the close scrutiny and guidance of Paul Homer. Heading for Shamrock Quay, Southampton, on a chilly May morning the group met Paul under the hull of a thirty year old Trader motor cruiser. Reality soon dawned that the vessel had some issues with it and part of the fun was looking to see what faults the three could find.

With Cam and Dave being new to the organisation, this was the perfect opportunity for them to 'get their hands dirty' and to understand and make them much more knowledgeable about the work of a yacht and small craft surveyor.

On the subject of the head office team, there have been a couple of changes to report. Elly Bryant has moved into a full time accounting role and will support Financial Controller, Vicky Lawrence, with both IIMS and MSA functions as the workload continues to grow significantly.

As part of this reshuffle, Dave Parsons has joined IIMS as Administrative, Services and Social Media Co-ordinator. Dave's role is a varied one. He will be the first point of email contact for many contacting the Institute. He will also take responsibility for processing tonnages. As part of his role, Dave will become involved with the IIMS social media output and channels. We wish Dave all the best in his new role.

IIMS is pleased to welcome back Elle Hardham from her three month sabbatical. Elle formerly resumed her duties running the IIMS distance learning education programme on 2 May.

DISCOVERING THE INNER WORKINGS OF THE ROYAL HUISMAN SUPERYACHT YARD

IIMS arranged a visit for a dozen members and non-members to the Royal Huisman superyacht yard in Vollenove, Netherlands on 6 and 7 April, followed by half a day's training on day two.

The yard visit, which had been planned for some months, was hailed a great success by those who attended. To see and understand at first hand the challenges and high skills required to produce these iconic craft was a privilege indeed.

Sadly the group had missed the launch of the stunning 58 metre Ngoni just the previous week. But this was more than compensated for when the group came face to face with another new build vessel in the shed of approximately 60 metres, perhaps 75% complete. Once on board and able to view at first hand the complex build, it was hard to pull the group away and all were enthused by what they had seen.

IIMS would particularly like to thank Sjoukje Russchen, PA to the Directors, for acting as the 'go between' to ensure the visit a success and Roemer Boogaard, Managing Director, for agreeing to the event; and for their hospitality and the time given up by other employees at the company. The group was treated to a lengthy and unfettered behind the scenes tour of the extensive facility and as well as seeing the new build project, also spent time viewing two refit projects.

After a delightul supper at local Restaurant Seidel (to be recommended) the group reconvened at the lovely old Hotel Landgoed Oldruitenborgh, close to the Royal Huisman yard itself. Mike Schwarz kicked off with a presentation on tips for business success. He was followed by Paul de Roock who spoke about the challenges of projecting managing from the surveyor's perspective. Ron Kleverlaan, a qualified Registered marine Coatings Inspector, gave a thoroughly insightful presentation on how to handle coatings surveys and inspections. The morning's proceedings were brought to an end by Prof. dr. Albert ten Busschen who spoke passionately about the re-use of end-of-life thermoset yacht building composites and the exciting work going on in this area.

REPORT ON LYSCWG PALMA TRAINING

A group of 15 IIMS members and non-members came together for the two day IIMS Western Mediterranean LYSCWG training event – something of an annual gathering these days. Despite inclement weather on the first morning, the group followed a classroom session about NDT testing gauges by going under several vessels made of different materials to test the kit. Thanks to Jon Sharland from Tritex NDT for bringing his gear over from the UK.

Ian Lewis gave an insight into cold cure products manufactured and marketed by Wencon. Those present were genuinely impressed to see examples of applications that had been carried out to effect repairs. After lunch, the group were guests of the Global Yachting Group and toured their facility by Palma airport, where they learnt more about the Pinmar painting standard, how the groups operates, its ethins and so on. IIMS is immensely grateful to Peter Brown, COO, for giving up his time, giving a presentation to the group and making the visit possible.

The second day saw the group gather inside the Palma Superyacht Show. Mike Schwarz and John Excell hosted an informal session talking about IIMS news to open the day before the group headed out to explore what is an increasingly interesting and strategically important show.

After lunch, Mike continued his business management series of presentations. He was followed to the podium by Capt Phil Duffy, who spoke at great length with authority about the considerable challenges thrown up when planning and conducting large yacht sea trials. John brought the day to a close when he presented a refresher on report writing.

IIMS would like to thanks John Walker for his assistance locally, ably assisted by Francisco.

INAUGURAL ECMID CONFERENCE REPORT

IIMS in conjunction with Marine Surveying Academy delivered a hugely successful first eCMID one day Conference, which took place in Amsterdam by Schiphol Airport on 25 April.

The feedback from the event, which drew around 40 delegates, was extraordinarily positive. On behalf of IMCA, Chris Baldwin said how delighted he was with the number of Accredited Vessel Inspectors that have already come forward to join and be accepted on the scheme. He praised IIMS for their delivery of the programme and its robustness.

eCMID AVIs play a key role inspecting and auditing offshore vessels in the oil and gas and renewables sectors. The Conference was a chance for some of them to come together to network with other AVIs and to learn abut the programme and its constituent components.

In his opening address and presentation, IIMS CEO, Mike Schwarz, gave some background to the early stage development of the scheme as well as sharing his thoughts and hopes on its future.

Chris Baldwin gave an update from IMCAs perspective and looked forward to the changes from 1 January 2018 when only accredited AVIs will be able to access the online eCMID database.

Capt Ian Coates, IIMS member and lead eCMID AVI tutor, spoke about some of the learnings from the courses that have seen over 200 people attend across the world.

IMCA eCMID database controller, Ryan Foley, joined the meeting remotely from London. He gave a list of some of the most frequently asked questions with answers and took some questions from the audience too.

Capt Mike Vanstone, representing Vattenfall, a large vessel operator, used his presentation to explain their operation as well as stressing what he wanted from an AVI and that it is their intention, wherever possible, to use only those accredited under the scheme.

Capt Anders Boman, CEO Northern Offshore Services, provoked some debate when he spoke about the unregulated area that is vessels below 500 gross tonnes and in particular fast crew transfer craft and the significant challenges they face.

Ursula Smith and Sujit Viswanathan, both experienced AVIs, gave expert and in depth presentations on the DP and Heavy Lift supplements contained within the eCMID, before the day concluded with a panel discussion and debate.

Mike Schwarz said, "I am delighted at the positive delegate feedback. I think we pitched the first conference at the right level and attracted some excellent speakers."

He added, "Being involved with the eCMID scheme right from the outset has given me huge pleasure, especially knowing that our actions are having a direct and positive impact on cleaning up an area of the industry that was unregulated. In this day and age it is vital to know that an inspector boarding a vessel is competent to do so."

IIMS PUBLISHES ITS THIRTEENTH HANDY GUIDE

IIMS has released for publication a new handy guide entitled What a Marine Surveyor needs to know about surveying metal craft. This brings the total number of publications in the What a Marine Surveyor needs to know about handy guide series to thirteen. More manuscripts are in the pipeline too and will be published as the year goes by.

Steel boats may be made of a variety of metals. Very old vessels may be built of iron. Ordinary carbon steel, usually called mild steel, is commonly used. Shipbuilding quality steel is not used as much as it is not easy to source. Cor-Ten steel is sold as a low rust product, but there is no universal opinion about this special formula.

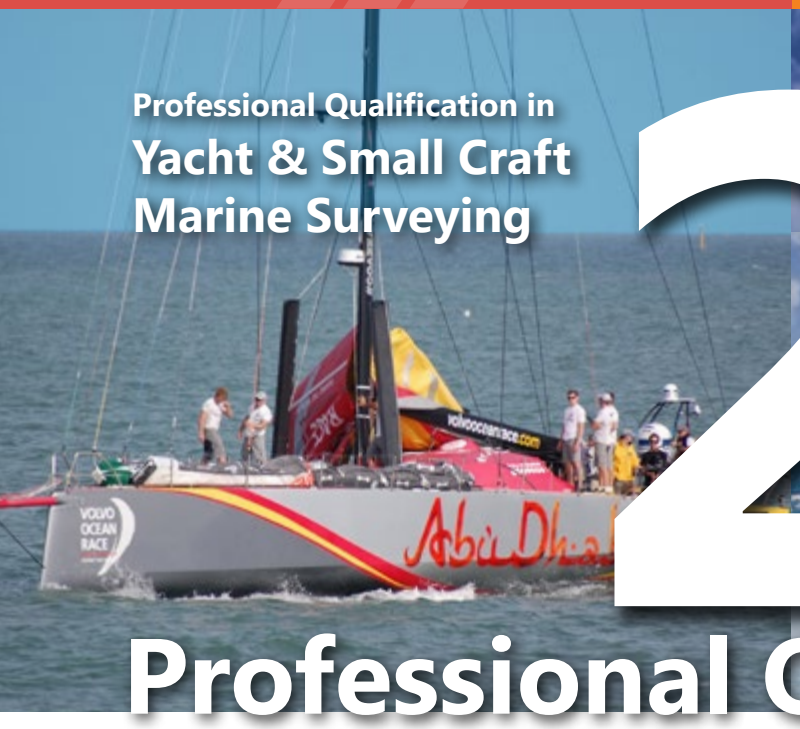
In this handy guide on surveying metal craft, written by the doyen of marine surveyors, Ian Nicolson draws on some comparisons:
Surveyors are detectives, looking for clues. When they find them, they have to deduce what caused such things as discolouration, dents or broken fastenings. Surveying is also like veterinary work, as both practitioners cannot get answers to questions asked. Good eyesight, excellent lighting and an enquiring mind which never falters on the job are what surveyors need.

Surveyors look for defects as they work. They peer into every space, crawl through the bilge, sometimes go up the mast, shine their torch under and round the machinery. Cracks, dents, rust, discolouration, corrosion, broken parts are all put down in their report.

Ian's expertly, beautifully hand-drawn sketches and diagrams add to the overall appeal and usefulness of this guide.

Author: Ian Nicolson
ISBN 978-1-911058-12-0
Size: 68 pages
Price: £25
plus postage and packing

This and the other handy guides can be purchased via the IIMs web site: **https://www.iims.org.uk/education/buy-iims-handy-guides/**



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LETTERS TO THE EDITOR

The Editor,
THE REPORT,
The International Institute of Marine Surveying,
Murrills House,
48, East Street,
PORTCHESTER,
PO16 9XS

Dear Sir

The Dangers of Overplating

Following Alan Broomfield's informative article on the above subject, your readers may be interested in the following: -

The vessel concerned was a steel narrow boat. It had been purchased on the strength of a statement by the owner that he, not a marine surveyor, had carried out a number of thickness measurements on the hull and had found them satisfactory. Where, on the hull, the measurements had been taken was not known. The new owner had jumped down into the forward cockpit for some reason and had found as a result, the 6mm thick bottom plate leaking badly. The vessel was dry docked and a marine surveyor had carried out some thickness readings on the bottom forward and had found it badly corroded and holed. A hammer test had discovered that the plate was, in fact, virtually non-existent. The corroded area was cropped out and a new plate scarphed in. The photograph of part of the cropped out damaged plate, taken on a white cloth, shows the extent of the corrosion and two apparently satisfactory thickness readings some 250mm apart. The plate clear of the obvious hole is also badly pitted by galvanic action, many of the pits going right through the plate.

Had the corrosion been discovered before the purchase mentioned above, doubtless the area would have been overplated. Clearly a bodge as the corrosion would have continued unabated. Doubling is NOT a repair. It merely hides the damage and also carries a number of down side points that are very rarely mentioned. The marine surveyor should at all times remember the law of unintended consequences. The corrosion would not have been discovered by a UTS test as the above experience clearly shows. It is an often unacknowledged point that I have mentioned to colleagues on numerous occasions that a UTS test is not the final means of determining whether or not a vessel is in good condition. The UTS test is an addendum to not a replacement for a hammer test.

Yours faithfully,

Eur. Ing. Jeffrey N. Casciani-Wood. C.Eng., Hon F.I.I.M.S.

The Editor,
THE REPORT,
The International Institute of Marine Surveying,
Murrills House,
48 East Street,
PORTCHESTER,
PO16 9XS

Technical Advice

Propeller Shafts – Rope Cutters

Dear fellow Surveyors, I have recently come across some marine aftersales equipment which may result in a serious failure of the propulsion of a vessel. I feel that I should share my observations with you in the hope that I can focus your Surveying eyes towards the avoidance of a potential catastrophic failure of a propeller shaft.

I am a Large vessel ship surveyor (existing ships and new building) these include VLCC, LNGC etc and have been a Principal Surveyor with Lloyd's Register and DNV so I am drawing on my knowledge and experience from this environment. The information I am advising you of is based on my experience about the design calculations that should be applied to a propeller shaft, intermediate shafting and bearings. I know that smaller craft shaft design is often carried out by the engine manufacturer and that they normally include high factors of safety.

I now find that there are aftersales devices which are fitted to the propeller shafts of yachts, pleasure craft and smaller commercial craft that could cause accelerated corrosion, high stress concentration and fatigue cracking.

I would like to start by introducing the complex design theory (in a nut shell) for the design of a propeller shaft.

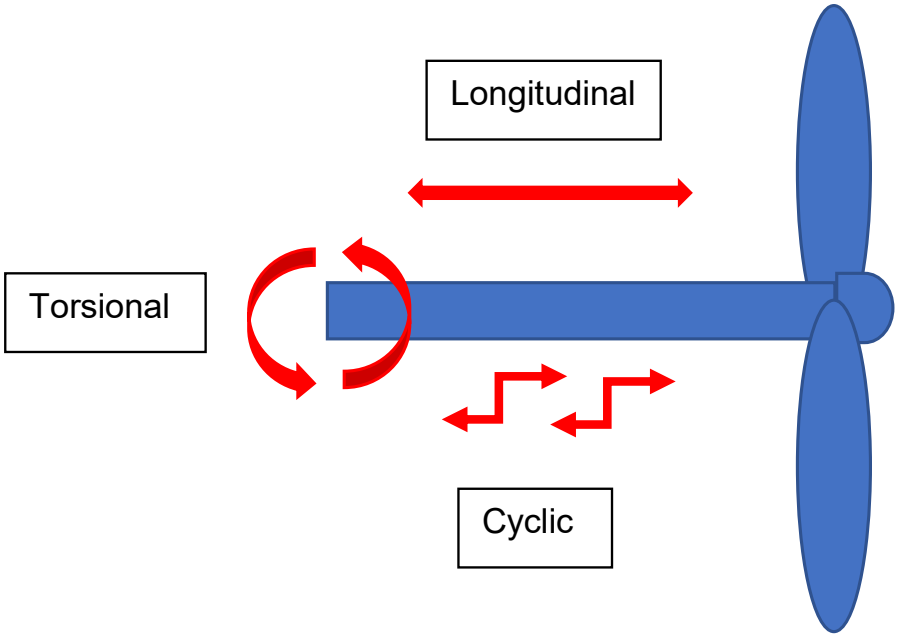
First, we must consider the torque that needs to be transmitted through the shaft line, from the engine to the propeller. This is a 'Torsional' force acting the entire length of the shaft.

Second, we must consider the force transmitted longitudinally through the shaft line. This is 'Longitudinal' force. Most of the longitudinal force is taken up by a thrust bearing either in the engine, or external to the engine, in bigger vessels. The longitudinal force is that which is derived from the rotating propeller in the water and drives the vessel.

Both the Torsional and Longitudinal forces in the shaft line can be considered as applying 'Stress' to the shaft material.

Additionally, there is a third force which is a compounded force which is applied to a shaft line and that is cyclic loading (cyclic stress). The propeller is working in a non-homogeneous medium, water, with air bubbles entrained (Cavitation) at different depths (Density) at different speeds (Force). Therefore, most shafts are designed with high factors of safety to compensate for these variables.

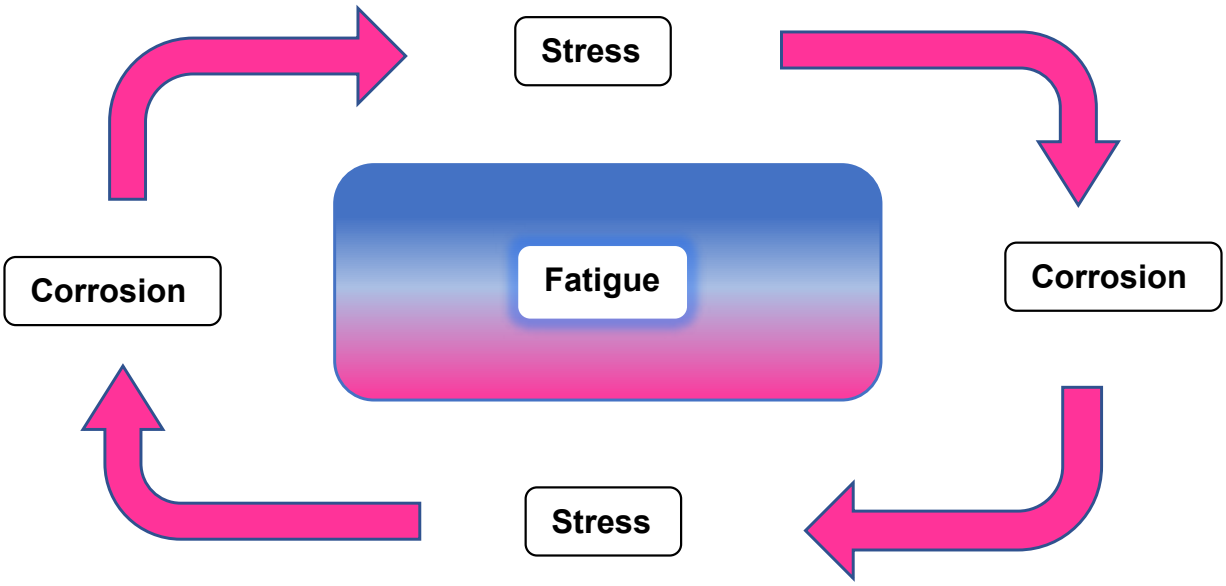
Diagram to show the forces applied to a Propeller Shaft



When a shaft is designed, it should have 'smooth transitions' of section. Which means 'no sharp corners'. This is to allow 'Stress' to be transmitted evenly, without interruptions, through the material of the shaft. If we introduce a sharp corner then we have an 'interruption' in the flow of stress and a resultant 'Stress Raiser'. The Stress Raised will be a point of focus for all Stress and can result in 'Fatigue Cracking' and early failure of the shaft.

Another factor effecting the stress in a shaft line is 'Corrosion'. Corrosion can result from various different sources, but if it is coupled with 'Stress' it can cause accelerated' Fatigue' and… 'Catastrophic Failure'.

The Corrosion and Stress Fatigue cycle



Let us now consider **ROPE CUTTERS:**

There are a number of Rope Cutters or Net Cutters on the market and I am not going to mention any brands or types, but only express a general view on potential hazards for the propeller shaft.

The principal of a rope cutter or net cutter is that it is fitted onto the shaft, between the propeller and the aft stern tube seal. The idea being that if the propeller gets entangled in a rope or net the interaction between some rotating blades and some fixed blades will cut through the rope or net and prevent the propeller from becoming fouled. Some designs have blades attached to the forward side of the propeller which rotate with the shaft and interact with fixed blades fitted to the aft end of the stern tube. Other designs have a rotating sharp blade disc attached to the shaft.

The attachment to the shaft is the critical point I want to make to you all.

We need to consider how the 'Cutter' is attached to the shaft.

If the attachment of the cutter to the shaft requires the shaft to be drilled in any way, then we have to consider that the integrity of the shaft is compromised. If the shaft is drilled in any way then 'we' are introducing a 'Stress Raiser' point. Even if there is a small 'Notch' drilled to accept a grub screw or locating screw, then this must be considered as a 'Stress Raiser'.

We must also consider the implication of dissimilar metals and electrolytic corrosion. The propeller shaft is working in Salt Water (Electrolyte). The propeller is probably made from a Bronze Alloy. The propeller Shaft is made from a Carbon Steel. Now we are introducing another material into the equation. We have a very effective electrolytic 'cell'. The cutter may be made from a high grade Stainless Steel, which is good, but what about the securing bolts and grub screws? What material are they made from?

Now perhaps you can see where I am going with this?

By adding a rope cutter or net cutter you 'may' be:

1. Adding a 'Stress Raiser' to the propeller shaft.
2. Adding to the electrolytic action around the shaft and propeller.
3. Setting up accelerated corrosion at a localised point in the shaft line.

All the above 'could' result in early failure of the propeller shaft.

ADVICE:

If you are surveying a vessel that has a Rope Cutter or Net Cutter fitted, ask the owner to remove it so that you can inspect the shaft.

1. If there are any drillings into the shaft I would suggest that you apply either MPI or Dye Penetrant NDE methods to see if there are any cracks propagation from the holes.
2. If not already applied – any hole drilled into or through the shaft should have smooth ground edges and no sharp corners.
3. Observe if there is any active corrosion or electrolytic activity in or about the localised position of the cutter on the shaft.
4. Finally, I would suggest that you try and establish from the shaft designer / engine manufacturer, if they approve of the application of an after sales attachment to the shaft line.

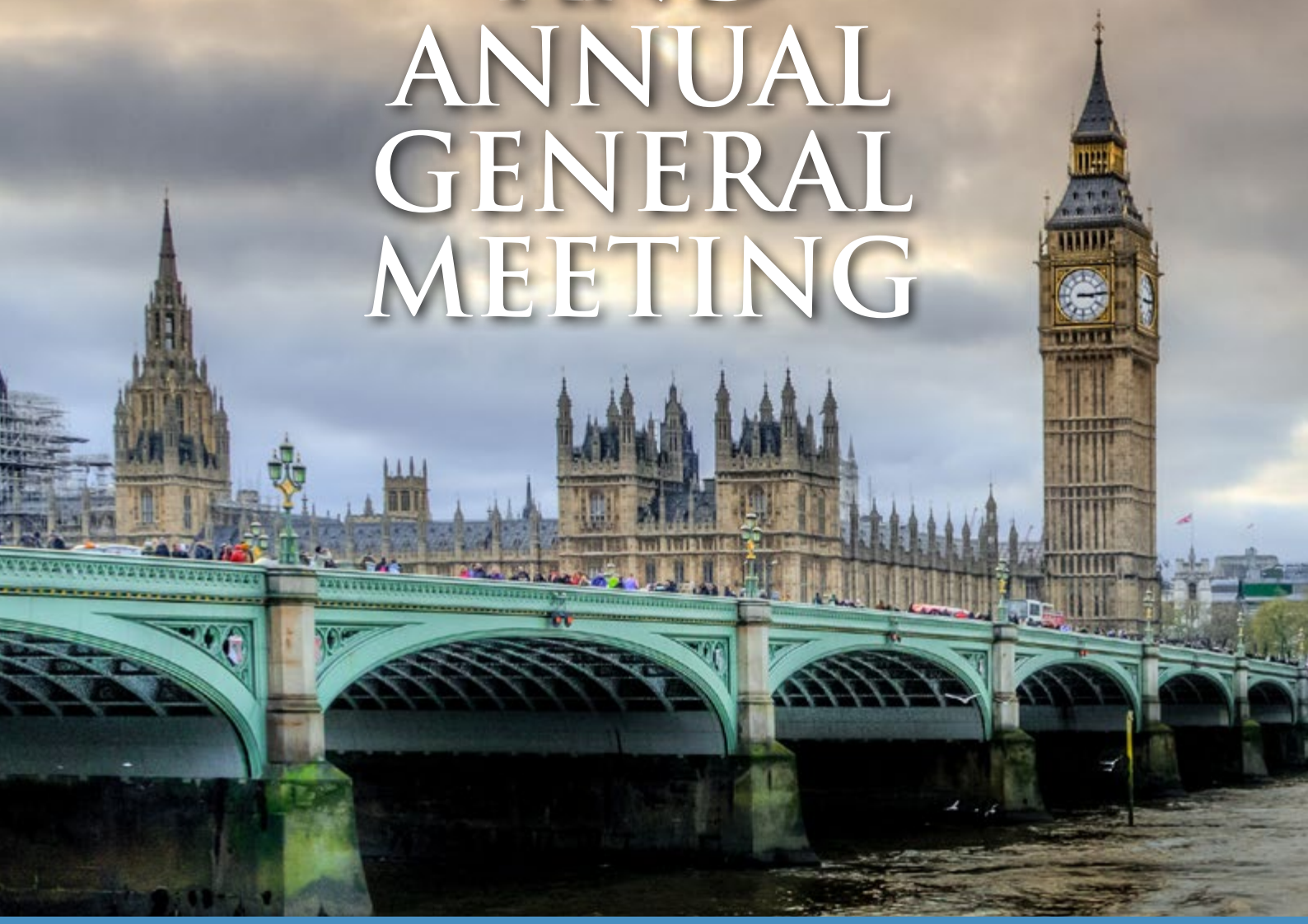
(This may negate any future insurance claim on behalf of the owner if they have a shaft 'problem').
I offer the forgoing only as advice with no preconception, with no legal implications and without prejudice.

Please take a closer look at the propeller shaft next time you conduct a Survey, if a rope or net cutter is fitted.

Any feedback welcome: e-mail: **peter@broadreachmarine.com**

The International Institute of Marine Surveying invites you to the

LONDON CONFERENCE AND ANNUAL GENERAL MEETING



Monday 11th and Tuesday 12th September 2017

IIMS is returning to Regent's University to hold its London Conference, a venue that was very much enjoyed by all last year. The dates have been chosen to coincide with the start of London Shipping week.

Dinner will be held on Monday 11 September at the Churchill Cabinet War Rooms (near Westminster and Big Ben).

The Annual General Meeting will be held at Regent's University on Tuesday 12 September from 14:00.

Schedule subject to change...

Day One
Monday 11 September
Herringham Hall
Regent's University London

09:30 Welcome from IIMS President, Mr Adam Brancher

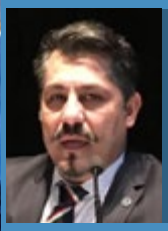
09:40 The state of the Institute by Mike Schwarz, CEO. Mike will bring members up to date with the state of the organisation. This year there have been a number of exciting developments and innovations. Mike looks forward to informing delegates about what's been going on at IIMS during 2017.

10:15 Gathering, interpreting and using data by Jennefer Tobin

11:00 Coffee

11:20 Simulation technology for the investigation of navigation incidents by Phil Thompson, BMT Ship & Coastal Dynamics

12:05 Flag state inspections – an important instrument for commercial gains by Capt Zarir Irani



Capt Zarir Irani, known to many IIMS members and a future President of the Institute, is an experienced surveyor operating from offices in Dubai.

12:50 Lunch

14:00 Disruptive drone technology and the marine surveyor by Paul Luen, Martek Marine

14:45 Rotor sail propulsion technology by Jukka Kuuskoski, Norsepower

15:30 Coffee

15:45 Winter & Co represented by Richard Ellis (topic tbc)

16:25 Panel discussion

16:50 Close

IIMS Conference Dinner
Monday 11 September
from 19:00 hrs
Churchill War Rooms

Nearest tube station: Westminster

Address: Clive Steps, King Charles Street, London SW1A 2AQ

IIMS has chosen a very special and iconic venue in which to meet and dine this year. The Churchill Cabinet War Rooms reveal the stories hidden beneath the streets of Westminster. Explore the underground bunker that protected the staff and secrets at the heart of Britain's government during the Second World War as Winston Churchill and his inner circle plotted the route to Allied victory. Walk in the footsteps of Churchill and glimpse what life would have been like during the tense days and nights of the Second World War. See where Churchill and his War Cabinet met and step back in time in the Map Room, which has remained exactly as it was left on the day the lights were switched off in 1945. Arrive early and take the opportunity to wander around this amazing venue before dinner.

Schedule subject to change...

Day Two
Tuesday 12 September
Regent's University London

Tuke Common Room

09:15 Report writing refresher for yacht and small craft surveyors by John Excell FIIMS

10:15 The challenges of surveying wind farm vessels by Mike Proudlove MIIMS

11:15 Coffee

11:30 Mike Lewus, Stainless Steel Association

12:30 Networking followed by lunch

13:00 Lunch

Tuke Cinema

09:15 19 tips for business success by Mike Schwarz

09:45 Raising the floating dock Mediterraneo in Livorno, Italy by Alessio Gnecco MIIMS

10:15 From GA to finished coating and what is the responsibility of the inspector by Richard Jennings

11:15 Coffee

11:30 Surveying vessels with a dynamic positioning system by Peter Solvang

12:30 Networking followed by lunch

13:00 Lunch

14:00 Annual General Meeting

To reserve your place at the IIMS London Conference 2017 go to https://www.iims.org.uk/whats-on/iims-london-conference-2017/ and complete the online reservation form.

Or call IIMS head office on **+44 (0) 23 9238 5223** to book your place.

Or email your reservation to **info@iims.org.uk**

BOOKING INFORMATION

1

Option 1:
Day one Conference only at Regent's University on Monday 11 September, including luncheon.

IIMS member:	£140 + VAT
Non member:	£150 + VAT
Student:	£120 + VAT

2

Option 2:
Gala Dinner only on the evening of Monday 11 September at the Churchill Cabinet War Rooms.

IIMS member:	£100 + VAT
Non member:	£110 + VAT
Student:	£90 + VAT

3

Option 3:
Day two Conference and Technical Workshops only at Regent's University on Tuesday 12 September, including luncheon.

IIMS member:	£110 + VAT
Non member:	£120 + VAT
Student:	£100 + VAT

4

Option 4 (Full Package):
Attend all of the above events: Day one and Day two at Regent's University and the Gala Dinner.

IIMS member:	£350 + VAT **discounted to £325 + VAT**
Non member:	£380 + VAT **discounted to £355 + VAT**
Student:	£310 + VAT **discounted to £295 + VAT**

NATURAL GAS INNOVATION MEANS GREEN BOATING POWER THAT PAYS FOR ITSELF

BY **MIGUEL GUERREIRO**

When Miguel Guerreiro, a former NASA engineer and keen fisherman, founded his company to search for an alternative and green solution to high cost marine fuel, little could he have known what an impact his innovation would make in such a short time. His 'disruptive technological solution' to this issue is changing the face of boating in the US and now wider afield too. Miguel takes up the story.

Blue Gas Marine, Inc. (BGM) disrupted the marine industry when it was founded in 2012 as a technology company that powers boats with natural gas. BGM creates on-board natural gas systems that can run independently or as a dual fuel mode for existing gasoline and diesel marine engines. The Company has patented technology that allows an engine to switch between the two fuels seamlessly, even while under power at any speed.

The BGM Natural Gas Hybrid Fuel System, the first of its kind, allows boaters to take advantage of the many benefits of running on Compressed Natural Gas (CNG) or Liquefied Natural Gas(LNG). In the US, CNG is 70% cheaper than gasoline or diesel for the same amount of energy. In most countries around the world, Natural Gas is even cheaper relative to traditional marine fuels. "We have a lot of case studies from our customers in other countries where Natural Gas can fuel a diesel ship for only 10% of the price of marine diesel fuel costs. Obviously, this translates into massive savings that pay for the BGM on-board Natural Gas system in less than 9 months. After that period the profitability of these operators increases by a significant margin," says Miguel Guerreiro, President and CEO of Blue Gas Marine. The company currently offers its systems for existing boats, as retrofit installations and works with several boat manufacturers and shipyards to provide new vessels already equipped with the technology from factory. See picture 1 below.

Natural Gas fuel extends engine life and reduces pollution by 70% for gasoline engines and 90% for diesel engines. It also reduces the costly economic and environmental impact of traditional fuel spills from normal fueling operations and from accidents. Natural Gas powered ships eliminate all water contamination from spills, since Natural Gas is lighter than air and it does not mix with water. Professional operators know that one of their insurance costs is the Environmental Clean Up of a fuel spill and those can happen from regular operations and sporadic accidents. This cost is normally included in one of the insurance policies that make up a boater's liability insurance. Running a ship with Natural Gas can also eliminate this insurance cost.

It becomes obvious that the environmental benefits from air and water pollution reduction are staggering and this plays well with the environmental sustainability efforts that larger operators already strive to achieve. The environment wins, regardless of the reason used for the adoption of the technology: economic savings, or pollution reduction. They both go hand-in-hand and this is great for the marine industry and the natural resources we depend on.

We wanted to show you how the performance and economics of deploying a BGM Hybrid Natural Gas system work, first for a small gasoline boat and then for a larger diesel ship.

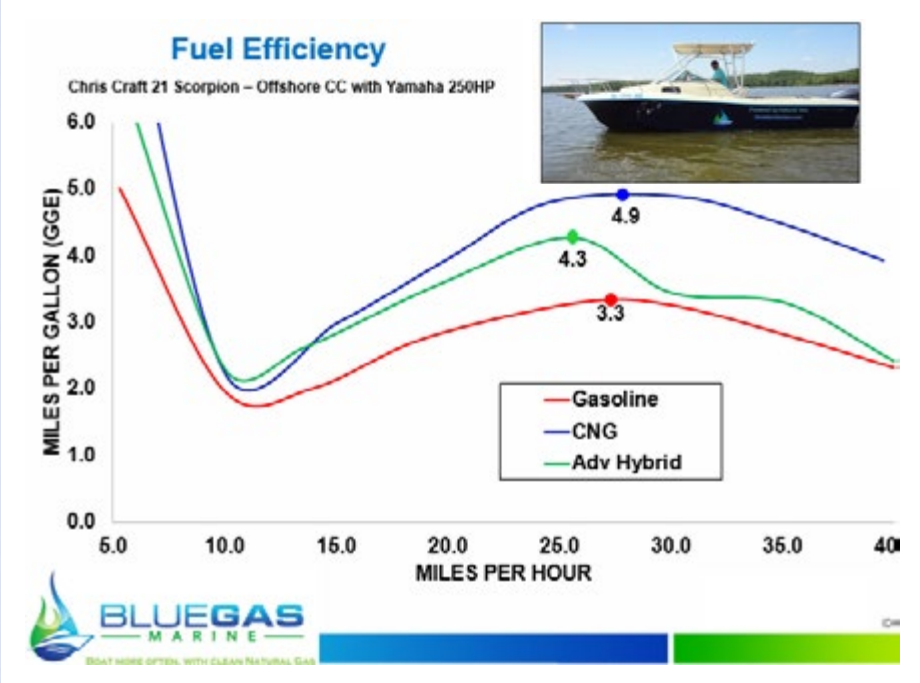
It is important to note that the BGM System is not a conversion. It is an add-on system that goes on top of a stock engine and the engine is not modified. This is important because you retain the original performance of the engine. This is also important for warranty matters on new engines, although it also benefits engines out of warranty, since the add-on can be quickly removed and the engine sold for use with just the traditional fuel, thus preserving its resale value.

Picture 1 - Dusky 252 CNG-Hybrid

As such, the BGM system for gasoline provides a boater with three modes of operation: Gasoline-only, CNG-Only, and Advanced Hybrid. The Gasoline mode is the traditional mode of operation; CNG is the Natural Gas mode where only Compressed Natural Gas is used to power the engine; Advanced Hybrid is a dual-fuel mode that mixes Natural Gas with Gasoline at a variable rate, but it is primarily Natural Gas with a small amount of gasoline.

The following chart shows the Fuel Efficiency of a 21-foot long Chris Craft Scorpion 215 offshore fishing boat equipped with a single Yamaha Outboard F250 3.3L engine (250 Horse Power) and the second generation BGM Advanced Hybrid CNG System (right):

Picture 2



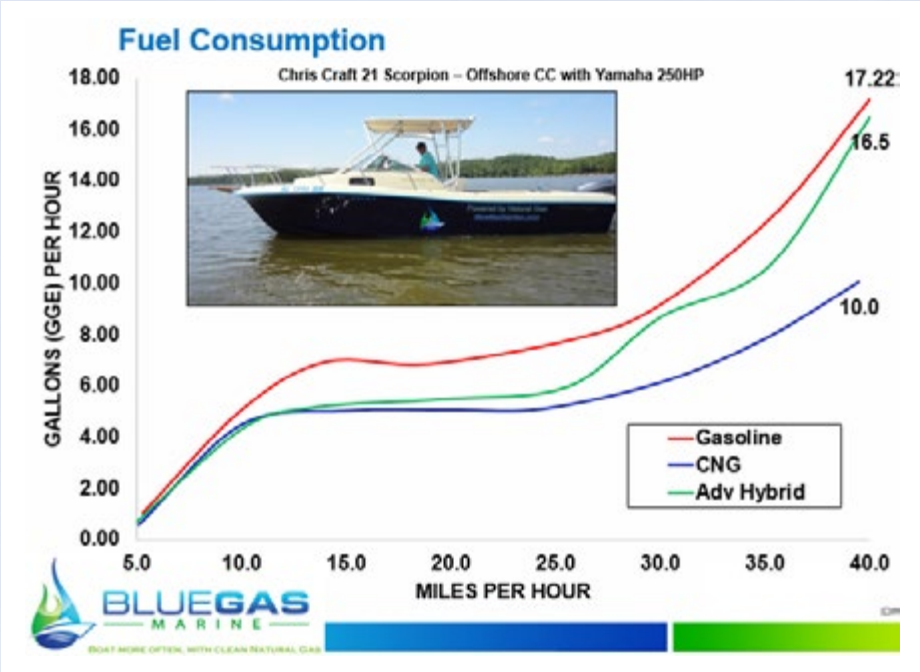
The fuel efficiency is displayed for each one of the modes of operation and the most efficient point highlighted with the display of its maximum efficiency. As expected, all three modes of operation reach maximum efficacy between speed and fuel consumption at a speed of 28 miles per hour. The interesting fact is the gasoline's maximum efficacy is 3.3 miles for every gallon burned, but if the boat is run at the same speed under the CNG mode, the efficiency gets much higher to 4.9 miles for every gallon equivalent of compressed natural gas. This represents an increase of efficiency of 48% which means you are spending a lot less fuel to go at the same speed. The efficiency of the Advanced Hybrid mode is 4.3 miles per gallon, which is better than gasoline but not as good as pure CNG. This is expected since it uses primarily natural gas, but it starts using more gasoline after beyond cruise speeds.

CNG mode gives you maximum efficiency and maximum economy but it is a couple seconds slower to the boat on plane. This is primarily used by ferries, towing, salvage and fishing boats. The Advanced Hybrid gives you good efficiency and the same acceleration as pure gasoline, so it is a compromise between the best of both worlds and it is a favorite of first responders and patrol boats that require quick reaction time but can still take advantage of CNG.

The operator can switch between any of the three modes of operation at any speed and the engines can be started on any mode as well. This is a feature that gives boats great safety on the water, because if there is a problem with the gasoline system, the operator can switch to CNG mode, start the engine and continue to operate (or return home). This is possible because the BGM add-on system is completely independent from the gasoline system and does not share any components with it.

On the next chart you will find the fuel consumption comparison of running the same boat in each one of the three modes of operation.

Picture 3



In summary, the CNG mode is always much more efficient than the other two at any speed, so the boat consumes the least amount of fuel in this mode. For example, at top speed, under gasoline mode this boat is consuming 17.22 gallons per hour, but only 10 gallons when run on CNG mode.

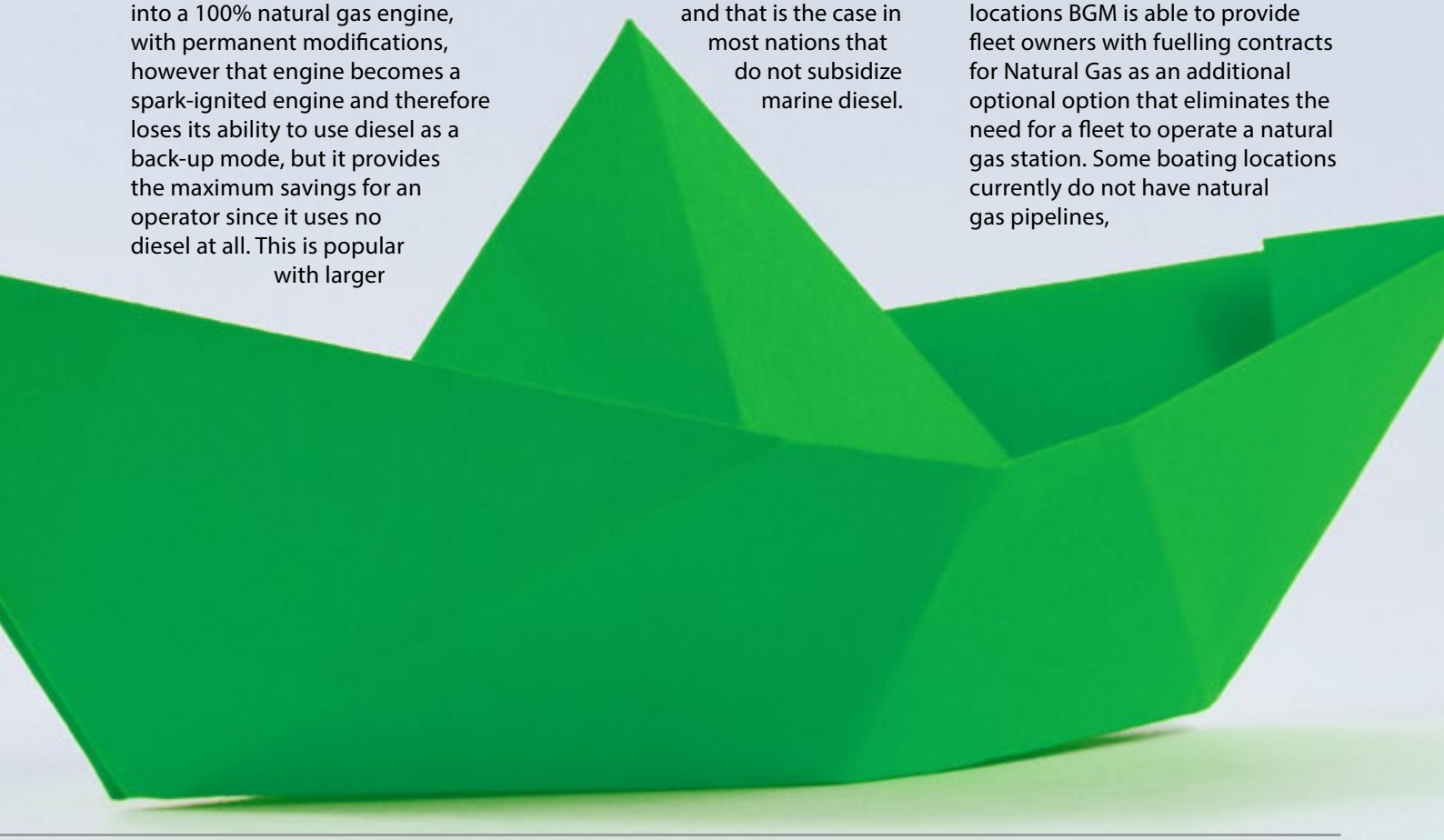
If we assume that the boat runs on ethanol-free gasoline, which retails for $4 in the largest boating markets in the US and fuels up with CNG for $2 per GGE (gasoline gallon equivalent). This means that at the top speed of 40 miles-per-hour under gasoline-mode the cost to operate this boat is $69 per hour, but only $20 per hour under CNG, a fuel cost savings of 72%.

The diesel version of the BGM system is also an add-on, which has two modes of operation: pure-diesel and Advanced Hybrid. The diesel mode is the traditional mode of operation and uses 100% diesel. The Advanced Hybrid is a dual-fuel mode where Natural Gas replaces 50% to 89% of diesel. The operator can change between modes at any time and at any speed. BGM can also turn a diesel engine into a 100% natural gas engine, with permanent modifications, however that engine becomes a spark-ignited engine and therefore loses its ability to use diesel as a back-up mode, but it provides the maximum savings for an operator since it uses no diesel at all. This is popular with larger fleets of vessels that serve fixed routes like ferries.

BGM finds that most diesel vessel operators request to install the add-on system that provides the two-mode operation, since it allows them to keep diesel onboard as a back-up, but enjoy the savings of replacing most of it with natural gas. Picture 4 on the following page is an example of a 25-ton harbor tug boat operated in the US to bring larger ships into port and take them out to deeper water, which typically consumes 300,000 gallons of diesel per year with 2,000 combined horse power from two diesel propulsion engines. When the same vessel is operated primarily on the BGM Advanced Hybrid mode, it achieves savings of $250,000 per year, recouping the investment in the BGM system in less than 2 years. The same vessel when operated in Europe can have savings greater than $750,000 per year due to diesel being several times more expensive there than in the US, so the payback period in Europe is usually less than 12 months. Natural Gas is always much cheaper than the traditional fuel it replaces because it is so abundant and that is the case in most nations that do not subsidize marine diesel. This is forecasted to remain the case as most nations strive to become self-sufficient from their own natural gas domestic production.

The savings get even better when a fleet purchases a CNG station from BGM, which allows for its vessels to run on 50-cents per GGE and take advantage of the green incentives that exist in the US and many other countries. This is possible because unlike traditional fuels (gasoline and diesel) Natural Gas is very abundant around the world, but petroleum is scarce and expensive to produce. BGM designs and sells CNG fixed-stations for marinas, individual fleets and even small personal stations for recreational users to install at home which start at $6,000 and can go to $5 Million for a large station that can fuel dozens of ferries. Each is tailored to the fuelling capacities and frequency of the boats that fill-up there.

In the US and several other countries, BGM has partnered with Natural Gas utilities and Natural Gas distributors to make Natural Gas available for boaters on the water, which means that in some locations BGM is able to provide fleet owners with fuelling contracts for Natural Gas as an additional optional option that eliminates the need for a fleet to operate a natural gas station. Some boating locations currently do not have natural gas pipelines,



so for those locations BGM developed mobile gas stations that are full turn-key filling stations packaged in a trailer that can be pulled by a light duty vehicle. This allows CNG to be transported and dispensed at any location not currently served by pipelines. Boats equipped with LNG (Liquefied Natural Gas) can also be filled up directly from a tanker truck since LNG is not transported by pipeline.

Recreational boats that are transported via trailer and not usually kept on the water can also take advantage of the 3,000 public CNG stations available in the US.

BGM is working with customers in the United States (US) and around the world that have requested the on-board fuel systems and also provides Natural Gas fueling stations to some of these customers. The company supports the technical efforts of marine service centers and shipyards in the US, which install the natural gas systems locally. The company is also very customer friendly and offers to certify your local favorite marine service center with the first few customers at that location.

BGM manufacturers its products in North Carolina (USA) and ships them to marine service centers in the US that are certified by BGM and directly to international customers. Outside the USA, Blue Gas Marine is meeting the need in many areas of Europe, Asia, Australia, the Middle East and South America where the need is great to reduce operating cost and move to a greener alternative fuel to control pollution and emissions.

"In the last year we have seen an exponential international interest. It is also great to see that our original vision of truly changing lives and making a global contribution to reducing marine pollution is being realized. It's exciting and we know that as we move into larger ships, ferries and workboats the positive impact that clean natural gas brings to the environment can be even greater," Miguel Guerreiro, President and CEO said.

The company has a mission to allow boaters to boat more often with clean, affordable natural gas and has been recognized in as the pioneer in natural gas power technology in the marine industry. The Company has received national and international recognition for the technology starting in 2015 with Best Product in Boating Industry, 2015 Innovation Award from IBEX, and the 2016 International Boat Builders Award for Environmental Initiative. Additionally, the company President/CEO Miguel Guerreiro was named as a Mover and Shaker in the marine industry by Boating Industry 2016.

The system is available and applicable to heavy usage boaters like: towing and salvage, Houseboats, First Responders, Pontoons, Professional/Recreational Fishermen/Charters, Military and Law Enforcement, Ferries, Workboats and others. The system is compatible with gasoline inboard, outboard 4-stroke with known brands such as Mercury, Mercruiser, Suzuki, Yamaha, and on Diesel engines with Caterpillar, Volvo, Cummins and Detroit diesel engines as a few popular examples. The company also provides the fuel where it is needed.

All of this came about as a result of the innovative thinking of the company founder Miguel Guerreiro. He is an avid saltwater recreational fisherman and recognized that the high cost of marine fuel was a barrier to boating and fishing more often, he then set out to find a cheaper and more affordable alternative which is also more environmentally friendly. It also helped that he was a NASA engineer and that experience in creating solutions for complex problems helped the technology succeed in the early days of the company.

As a surveyor, you are in the unique position to influence the evolution of the marine industry and to recommend newer more efficient technology and cleaner ways to operate marine vessels to your customers, so BGM invites you to contact them and influence how its products evolve and show you how they can be applied to customers in your area. The company can be contacted via email to:

Sales@BlueGasMarine.com or via phone at +1 (919) 238-3427 or through the website at www.BlueGasMarine.com

Picture 4 - BGM Diesel Tug Boat

WHAT A **MARINE SURVEYOR** NEEDS TO KNOW ABOUT

The growing series of IIMS self help handy guides

"What a marine surveyor needs to know about..." include the titles: Marine Surveying - An Introduction | Imaging Techniques Small Craft Metal Hulls and Ultrasonics | Working In Enclosed Spaces | Surveying Wood Craft | Small Craft, Ship and Boat-Building Terminology Yacht and Small Craft Report Writing | Knowledge Management | Dynamicaly Positioned Vessels | Business Management Skills Small Craft and Superyacht Valuations | Small Craft Engine Surveys | Surveying Metal Craft

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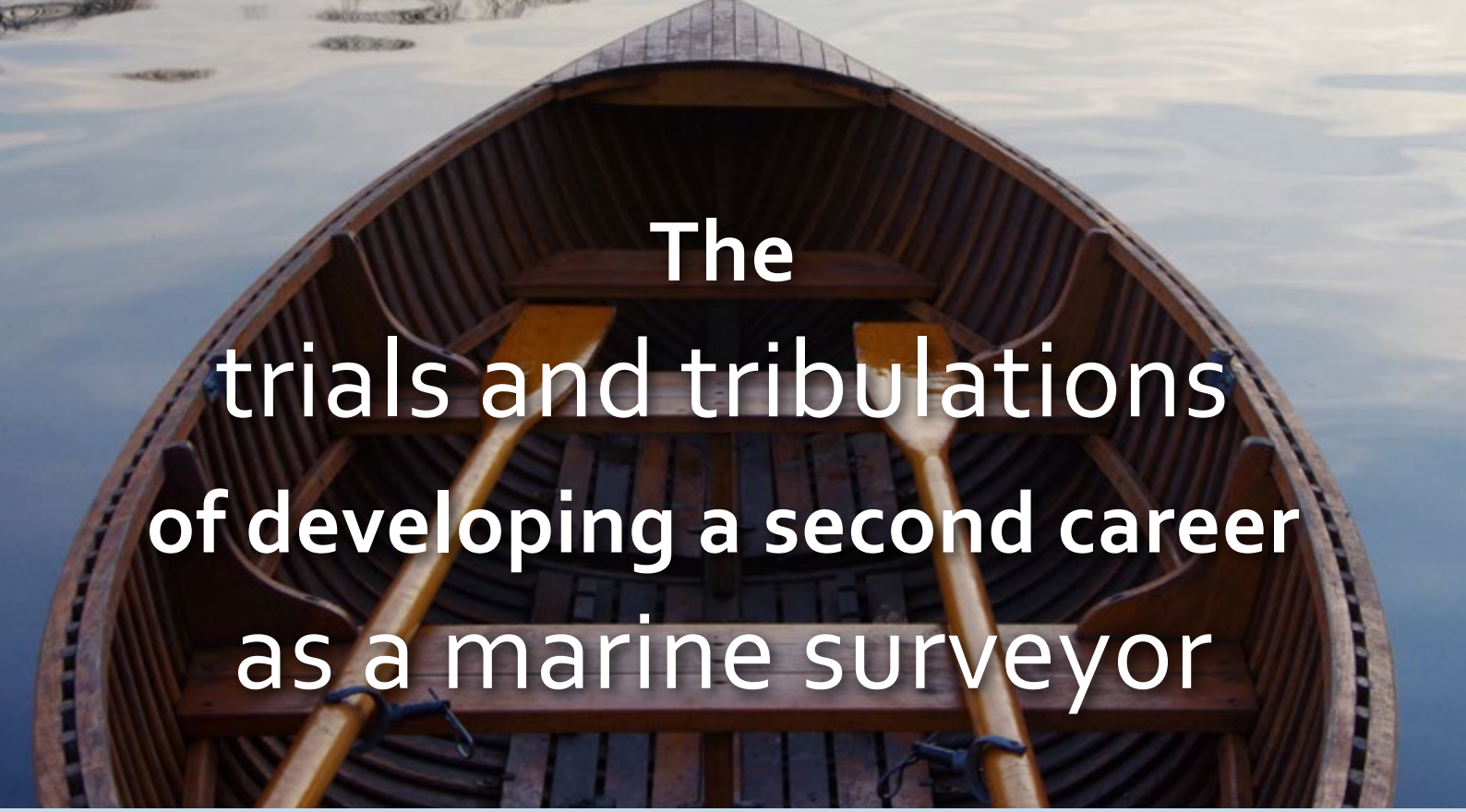


The trials and tribulations of developing a second career as a marine surveyor

IIMS member, Geoff Bowker AssocIIMS, reflects on his transition from a long career with the Royal Navy to marine surveyor over the past couple of years. He shares his passion and inspiration from being around wooden boats, despite their potential challenges. Having undertaken some appropriate theoretical and practical studying Geoff is candid about some of the issues he has faced, including handling the development of a web presence, the bane of many a surveyor's life!

BY **GEOFFREY BOWKER**
ASSOCIIMS

Having had a life around boats of all shapes and sizes and my Royal Navy (RN) career coming to its natural end after 35 years, I was seeking a second career. I came quickly and enthusiastically to the conclusion that yacht and small craft surveying was a very desirable direction in which to go. Before leaving the RN, I studied for the IIMS Diploma in Yacht & Small Craft Surveying followed by the Diploma in Marine Surveying Practice. The support from the training provider and IIMS at every stage of the qualifications was excellent, so I was all set for a future as a marine surveyor.

I had a lifelong passion for woodworking and using some of the Armed Forces resettlement package, I attended a one week Traditional Boatbuilding taster course at the Boat Building Academy (BBA) at Lyme Regis. This ignited a real spark and I subsequently found myself on the BBA flagship 38 week Boat Building, Maintenance and Support course from which I graduated in summer 2015, with a City and Guilds 2463 Level 3 Diploma in Marine Construction, Systems Engineering and Maintenance, as well as the industry wide recognised BBA Certificate. The BBA course was an extraordinary experience and one I recommend most strongly for anyone with a passion for wooden boats and woodworking.

On conclusion of the boat building course I had still not ruled out moving further into yacht and small craft surveying; while wood was covered in the surveying training to date, it was an area I would have avoided due to my limited experience of wooden boats and the huge potential for problems and issues hidden within the wood itself. I was much more comfortable with glassfibre vessels.

I have since set up a one man traditional boatbuilding, restoration and repair business with a workshop near Dorchester in Dorset and despite being on top of a hill which is generally windy, often wet and in the winter finger numbingly freezing, I am as happy as a 'whatchacall in doodah'. Setting up a Limited Liability Partnership (LLP) was very straightforward and so was finding free business banking. Much more of a challenge was finding an insurer who understood what I was doing and what Professional Indemnity (PI), Public Liability (PL) and tool insurance cover I needed. Such specialist insurers do exist but take some tracking down.

Managing a website has also been problematic. The free website builders I found utterly confusing and the managed ones hugely expensive. After trial and error with different free websites, I managed to find an easy to manage website for a couple of pounds Sterling a month. This site will not get me to the top of a Google search, but once potential customers have been directed to the site it is proving useful for contact details and showing a gallery of previous projects. See www.bowkermarineservices.co.uk. Of course the IIMS has a website offer that is really worth a look at.

I try very hard to stay up to date with surveying issues and the yachting and boating world. I subscribe to boating magazines, such as Professional Boatbuilder, Practical Boat Owner, Classic Boat and Classic Sailor, Watercraft and get out on the water as much as possible on as many different craft as I possibly can. I am very lucky that I have access to power, sail and paddle. I also keep my IIMS Continuous Professional Development up to date and thoroughly enjoy attending the training events, particularly the Yacht & Small Craft Working Group Training Days, at which there is always something new to learn and the valuable opportunity to meet likeminded, supportive and professional folk.

Since setting up on my own I have been involved in some really interesting projects. My first job was to make a wooden ensign staff for a yacht kept in Sardinia. The UK owner sent me a picture of an ensign staff and said he wanted one exactly the same but different. So I laminated some thin pieces of Mahogany which I rounded off for the staff and added a bobbin made from Ash. I have built an 8ft clinker pram dinghy from scratch from a Table of Offsets and lofting, with Mahogany planks and Oak keel, timbers and thwarts, which is for sale and of course Recreational Craft Directive compliant! I have also built a pair of 17ft sea kayaks made from marine ply and fashioned a Greenland paddle from some Cedar left over from the pram dinghy sole boards.

I spent a short time working for the Atlantic Challenge charity on one of the Bantry Bag gigs that are used for international youth seamanship competitions. One job I was given was to make the scarf joint on the very visible top strakes, so I had to get that right. These boats are copies of a French Navy Admiral's gig that was driven ashore on Bere Island in southwest Ireland in 1796. This boat remains in Ireland and is the oldest surviving vessel in the French Navy. The extraordinary gigs are 38' 2" long x 6'9" beam and draw 14". They are rowed with ten oars, 5 of which are over 18' long. There are 2 masts and the sails have dipping lugs. Fourteen countries have Bantry Bay gigs and participate in friendly contests of seamanship, sportsmanship and style.

A larger project found me working on a 1950s Watson Class lifeboat. Areas of the half inch Mahogany double diagonal planking had to be removed to attend to some galvanic corrosion issues and the planking replaced, all made slightly more difficult as due to the internal air tanks work could only be done from the outside of the hull. The half round rubbing strake also had to be replaced and approximately 100 feet of new oak rub rail was made from 4m long oak boards, routed to shape and scarfed together so no joins are visible. A significant difficulty was removing the old brass screws which tended to crumble as soon as the screwdriver touched them. When the boat was in RNLI service it would have been overhauled regularly and items like brass screws would have been replaced routinely so such corrosion is unlikely to have been a problem. But when decommissioned RNLI boats enter the leisure world they unfortunately do not get the deep maintenance attention they once did and require.

Another interesting job involved replacing a number of larch planks and 3 thwart knees in a 'Berry Boat', built near Weymouth probably 50+ years ago, and used as a fishing boat, even being winched up and over Chesil Beach for fishing in Lyme Bay.

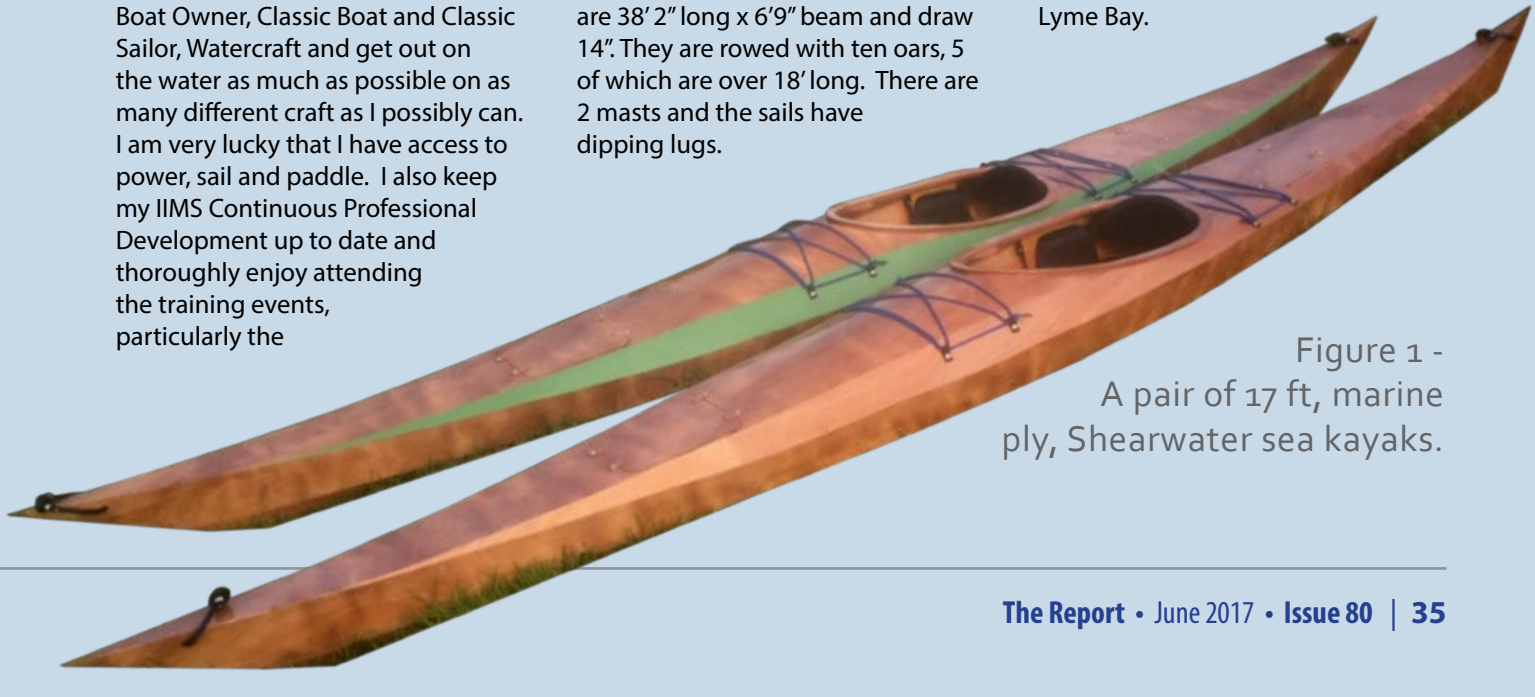


Figure 1 - A pair of 17 ft, marine ply, Shearwater sea kayaks.

Nine planks required attention, 2 of which needed complete replacement as they had split mostly along the line of rivets. I was able to get the planks out mostly whole, so they became templates for the replacement strake. I procured some larch boards from which I made the new planks using a bandsaw and planer thicknesser. The repair was as contemporary to the original build as possible so I ensured the new planks were a really good fit particularly at the land where adjacent planks overlap, a feeler gauge quickly reveals where the join is good, or needs fettling. The planks were fixed together using the traditional copper nail and rove peened over into a rivet. And the process is made much easier with a helper to hold the dolly! The boat was coated in the traditional way with a heady mix of turpentine and linseed oil. This concoction forms a really protective layer but turns the wood black and the odour is very persistent.

So what for the future? Thankfully there is a fairly steady stream of work and it is rare that I have had any gaps in work. As the work on the clinker fishing boat completes I have picked up a job to replace a teak capping rail on a Francis 26 yacht. This is probably a week's work and will involve a lot of machining – watching expensive wood chips and dust falling to the workshop floor is always quite distressing. I am anticipating being able to remove the old and broken capping rail to make templates.

After that I have become involved in the preparation for the restoration of the historic yacht, Dolly Varden. Dolly is one of the oldest vessels on the National Historic Ships Register, and her owner is seeking funding to restore her to her 1888 configuration and ultimately involve her in the historic racing scene. The project is extremely exciting and if the money can be found then the restoration will require a significant amount of work, but will be incredibly rewarding. For the restoration there will be lots of surveying matters to consider, including the likely involvement of a naval architect, finding a marine surveyor to oversee the restoration and depending on the vessel's eventual use, Coding and RCD considerations.

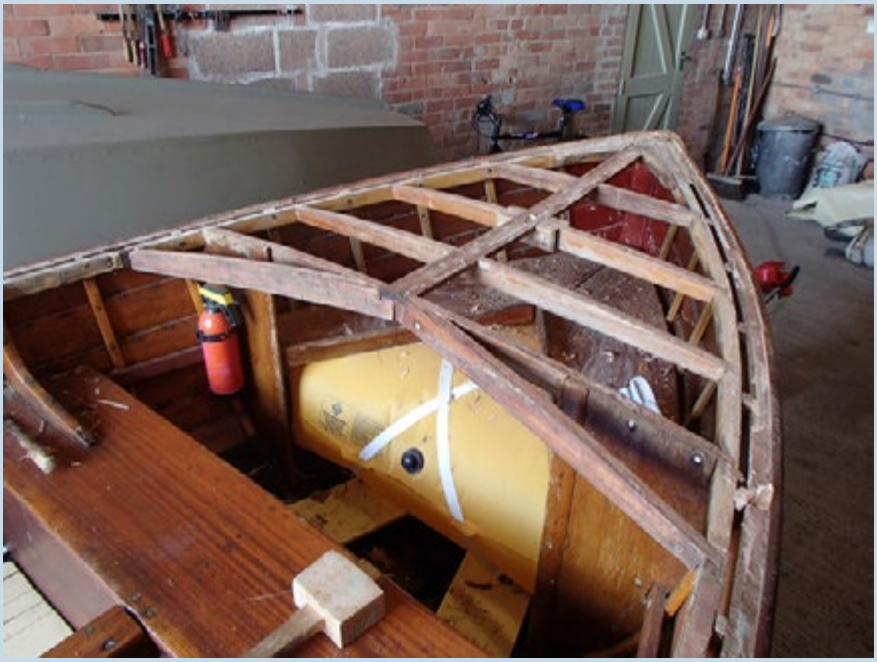


Figure 2 - Deck beam repairs

At the time of writing Dolly is being positioned in a dedicated workshop, needing a cradle to be built, to get access and lift her up and down to fit a new 6 tonne lead keel. My first task will be to conduct a full condition survey of what we have got for our own internal uses. I have already taken a section out of a garboard to have a peek at the keel beneath. A millimetre or so beneath the rough surface I was into extremely hard elm and once through to the keel, and 2 blunted chisels later, the keel wood was just as good. This all bodes well we hope. We also have to try and identify, catalogue and store the

Figure 3 - Bantry Bay gig, Integrite

huge pile of bits that came with the boat and others that are being kindly sent in from the wider yachty world. See **www.dollyvarden.co.uk** for details about the vessel and future plans.

So what lies ahead? I am thoroughly enjoying learning about marine surveying and am exhaustively enjoying practical wooden boatbuilding. There is always a chance that I will move into surveying more fully and with greater experience with traditional boats, who knows I may then have the wherewithal to tackle wooden boats, as well as the clearly inferior plastic boats!

Figure 5 - Dolly Varden arrives at the workshop, with a 16 ft clinker fishing boat under repair

Figure 6 - Watson Class lifeboat with repair to double diagonal mahogany planking

Figure 4 - Gartside design 8 foot pram dinghy nears completion

Figure 7 - Plank removed from clinker fishing boat. The removed section was used as a template to make the replacement strake

AN INTRODUCTION TO LUBRICANT SAMPLING, ANALYSIS AND TEST IN PREDICTIVE MAINTENANCE

PART 2

BY **JEFFREY CASCIANI-WOOD** HONFIIMS

Lubricants are the life blood of all machinery and as an important element of predictive maintenance technologies, in service oil sampling, analysis and test can provide, inter alia, trace information about machine wear condition, lubricant contamination and general condition. Marine surveyors, using oil test analysis results, can make important maintenance decisions among which are the immediate benefits of avoiding the mixing of oils, contamination control, condition based maintenance and failure prediction.

Condition Caused Contamination:

There are three major Condition Caused Contaminations that are formed within the lubricating oil during normal use and these are:

- **acid,**
- **oxidation,**
- **nitration.**

ACID:

These contaminants are formed when solid and moisture contamination are present and certain operating conditions exist within the engine. They can be controlled by the use of additional filtration and adding new make up oil at the service of the UF by-pass filter. In most forms of fuel for internal combustion engines, trace amounts of sulphur are present. Sulphuric acid is formed within the lubricating oil when sulphur molecules react with oxygen in the combustion chamber to form sulphur oxides. These are then blown past the rings and enter the oil. Here the sulphur oxides mix with moisture to form the highly corrosive sulphuric acid. It is next to impossible to remove trace amounts of sulphur from fuels by filtration. However, it takes two components to make the sulphuric acid, sulphur oxides and water. By using UF By-Pass filters that utilize absorbent type filter media, such as cellulose (paper) or cotton, the TBN (Total Base Number) of the oil stays up and the TAN (Total Acid Number) remains low.

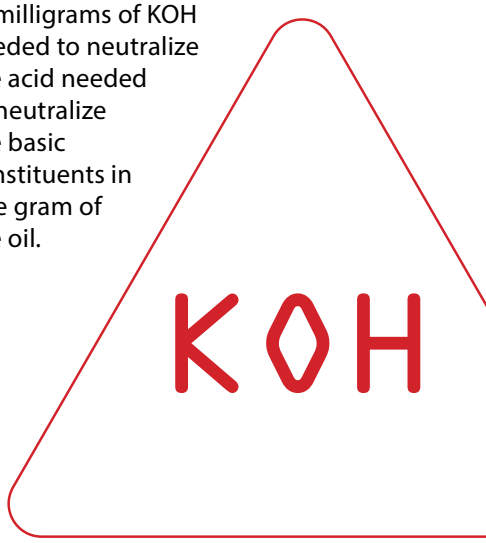
The combustion by-products formed by burning diesel fuel, sulphur oxides and water, readily combine to form sulphur based acids. The bulk of these corrosive acids is removed as part of the engine's exhaust but some remain

and escape into the engine cavity in blow-by gas where they are neutralized by additives in the oil or proceed to attack the thin oil films providing lubrication for piston rings and cylinder liners. The sulphate index from infrared analysis is a measurement of the amount of sulphur based acids that have reacted with the oil and reflect the amount of sulphation that has occurred. If fuel sulphur levels remain constant, the sulphate index would be expected to increase continuously with use until the oil reaches the end of its useful service life, for which the sulphation level or sulphate index can be an important determinant. At normal operating temperatures, acids remain in a gaseous state in the blow by gas with minimal contact with reactive surfaces. However, when an engine experiences lower than normal operating temperatures (such as just after start up, at shutdown or when a faulty cooling system results in continuous overcooling) the acids condense and come in contact with the oil in the sump causing the oil to film on exposed metal surfaces. This places an extra burden on the lubricant because it must neutralize more acid than would be expected during normal operation. Thus, high sulphation early in the oil's life often indicates abnormally low operating temperatures.

The measurement of the Acid Number (AN) involves a titration where the total acid content of the oil dissolved in a mixed solvent is completely neutralized by the gradual addition of an alcoholic solution of potassium hydroxide (KOH). A colorimetric method of determining the end point is effected by the use of a chemical indicator that changes colour as soon as the acid is completely neutralized. Alternatively, a potentiometric method may also be used. The AN test is performed on non engine oil samples and is used to quantify the acid build up in the oils. An increased AN is a result of oxidation of the oil, perhaps caused by overheating, overextended oil service or water or air contamination. Components within refrigeration systems are particularly susceptible to acid attack. This can occur when air containing water vapour enters the system, or alternatively when the system is subjected to excessive heat and the refrigerant drier releases retained water. When this happens, acids created by the reaction of the air, water, refrigerant and oil cause iron components in the system to become plated with copper which can cause bearing failure due to copper plating. In refrigerant systems, the acid content of the oil, moisture content and copper level need to be regularly monitored to indicate incipient problems. AN limits vary enormously and depend both on OEM specifications and on the oil itself. In some cases, an acid number exceeding 0.05 is unacceptable while, in others, ANs of 4.00 and higher remain acceptable. As with all other readings, trend analysis is the best indication of the health of both the oil and the machine.

The measurement of the Base Number (BN) involves a complex potentiometric titration where the total alkaline reserve of one gram of oil dissolved in a mixed solvent is reacted with the gradual addition of a known excess of an acid solution. The reaction is monitored using a reference and a measuring electrode and a graph of voltage (mV) against acid added (ml) is then plotted. The end point is detected from a point of inflection on the graph or, in the case of badly degraded oils, from a predetermined millivolt reading. This test applies only to engine oil samples because such lubricants are deliberately formulated to contain a reserve alkalinity that enables them to neutralize the corrosive acidic by products of the combustion process. The BN of an oil is a direct measurement of its alkaline reserve. Every engine oil has an initial BN that gradually reduces during use. Typical starting values for compression ignition oil engine oils are between 8 and 12. A general rule of thumb is to discard the oil when the BN drops below half its initial value. While it may seem logical to assume that oils formulated to have a high BN would be most desirable, that is not always the case because some engines may suffer burnt valves if such an oil is used. This results from the high ash content of the oil and high valve temperatures causing fusion of the valve seats. Using a lubricant specifically formulated for diesel combustion in a petrol engine could also prove detrimental, highlighting the importance of adhering to equipment manufacturers' lubricant specifications. BN measurements are performed only on samples from infrared results flagged for analysis. A BN can be predicted through the infrared data and, where this prediction is below the specified limit, a BN test is requested to confirm the degree of degradation evident in the infrared data. All samples having a predicted BN exceeding a safe limit are reported as having a BN of +6 while the actual result is reported for samples selected for the test.

The units of BN and AN can be somewhat confusing. Although they are different tests, the results are both expressed in the same units: milligrams of potassium hydroxide per gram of oil, represented as mg KOH/g. The AN of an oil is defined as the number of milligrams of KOH needed to neutralize the acid constituents in one gram of the oil. The BN of an oil is the number of milligrams of KOH needed to neutralize the acid needed to neutralize the basic constituents in one gram of the oil.



OXIDATION:

Oxidation occurs when the hydrocarbon constituents (and other products) of lubricating oil combine chemically with oxygen. Lubricating oil in engines will combine with available oxygen under certain conditions to form a wide variety of oxidation products. Many of these direct or primary oxidation products combine with other materials such as wear metals, solid contamination and moisture to form second and third derivative products. As with most chemical reactions, oil oxidation is accelerated by heat and pressure. Heat in particular will speed up the oxidation process. Various studies have shown that lubricating oxidation (with many variables such as the type lubricant and additive package in the lubricant) that the oxidation rate can be doubled for every 15 to 20 degrees increase over 180 degrees F. Also, engine load, which will dictate the levels of oxygen and pressure within the engine, can be seen in the form of accelerated acid formation, corrosion, oil thickening, deposit formation and accelerated wear.

As oil oxidizes, its ability to lubricate diminishes and, in cases of severe oxidation, noticeable changes occur as the oil becomes darker and emits odour; varnishes, lacquers and resins are formed; and in the advanced stages viscosity increases, often rapidly. Fortunately, the chemical reaction between oxygen and lubricant molecules at room temperature is slow and oxidative degradation is not an issue under these conditions. The situation changes when reaction conditions are altered to favour a more rapid reaction rate. Engine lubricants are formulated with a hostile environment in mind. Many conditions promoting accelerated oxidation co-exist in an engine, such as high temperatures, high pressures, a good air supply, agitation, the presence of metal catalysts and thin film exposure. The most significant of these conditions is the operating temperature because rate of oxidation doubles for every 10°C increase in temperature. Excessively high operating temperature (overheating) is generally accompanied by increased wear (lead, copper, tin and iron) and increased baseline viscosity. Sometimes overheating leads to the evaporation of volatile fractions in the oil, making regular top-ups necessary. In such case, the sump oil will exhibit increased additive levels (concentration of non-volatile components) and an increased viscosity as a direct result of light end loss. As the lost oil is replaced with fresh oil, the antioxidants are replaced and oxidation is often not immediately evident. Results should be compared with acid number and possibly viscosity for confirmation.

All top quality lubricating oils have an additive package that contains oxidation inhibitors to slow the oxidation process and alkaline detergents that will neutralize acids formed by oxidation. Normally these additives will only last a certain length of time before they are depleted and the oil must be drained. Oxidation is greatly stimulated by the contamination solids and moisture. Solids tend to hold heat, thereby increasing the lubricating oil temperature around the solid contamination. This condition acts to accelerate oxidation. Combine this effect with the presence of moisture (H_2O) from normal condensation and the oxidation process accelerates even faster. When moisture is present in the lubrication system, the level of oxygen available to mix with hydrocarbons in the lubricating oil is raised dramatically. The presence of normal solid and moisture contamination, combined with maximum operating load of the equipment, will produce high oil oxidation rates, even with normal oil temperatures. By-pass filtration products that can control the levels of moisture, wear metals and other solid contamination are recommended. By removing this contamination, the oil will offer a better seal between the rings and liners and therefore reduce the amount of blow by during the combustion process. Blow by contributes to the amount of oxygen and moisture within the engine.

Once the contamination which acts as catalyst to accelerate the oxidation process has been removed and a cleaner oil offered to seal the engine, then only minimal oxidation is left for the additive package of the oil to contend with. The engine will use a certain amount of oil each operating day. Combine this amount of new oil with the amount added at the time the By-Pass Filter is serviced and the engine will maintain a sufficient amount of active additives to keep oxidation in check indefinitely.

NITRATION:

The combustion chambers of engines provide one of the few environments where there is sufficient heat and pressure to break the atmospheric nitrogen molecule down to two atoms that can react with oxygen to form nitrous oxides (NOx). When nitrogen oxide products enter the lubricating oil through normal blow by, they react with moisture present in the lubricating and become very acidic and rapidly accelerate the oxidation rate of the oil. Proper By-pass filters can control the effects of nitration in the same ways it controls oxidation. By delivering cleaner oil to offer as a seal between the ring and liner, blow by of NO_x components are kept to a minimum. Also, the filter keeps the oil chemically dry and prevents the mixing of NO_x and moisture and this controls NO*x* acid formation and accelerated oxidation of the oil.

As with sulphation, nitration is the reaction of the oil with combustion by products of nitrogen. These reactions tend to become more pronounced at higher temperatures. Therefore, increased nitration is often an indication of increased blow by as the hot combustion gases react with the oil. Nitration is rarely mentioned

because other problems such as high top end wear associated with blow by will manifest themselves first. Nitration in industrial oil samples is an indication of a thermal breakdown of the oil. This can occur when the oil comes into contact with extremely hot surfaces or where excessive aeration, particularly in hydraulic systems, leads to microdieselling. Though not often seen, an increase in nitration should be taken seriously.

Gas chromatography (GC) is a separation technique used to analyse used engine oils for evidence of fuel dilution. The technique as applied to fuel dilution measurements is used to separate and measure two volatile fractions of specified boiling ranges from used engine oil samples. The first volatile fraction of interest has a boiling range similar to that specified for gasoline, while the second fraction has a boiling range similar to diesel oil. The instrument is calibrated and measurements are reported as a percentage contamination by mass. The fuel dilution test is typically performed either when a significant drop in sample viscosity is measured, or when the flash point test has failed. It is important that the oil brand and grade are correctly described to the laboratory if problematic samples are to be detected. Special care is necessary in interpreting results because many factors can influence their interpretation. Fuels are complex mixtures of organic compounds that are classified into products based largely on distillation ranges rather than specific chemical data. There are also significant overlaps between various product specifications, making it sometimes difficult to accurately separate and quantify fuel mixtures.

It is frequently found that high sodium and copper in the analysis may indicate a leaking oil cooler. A leak in the oil cooler puts water into the sump oil which very quickly forms a foamy green sludge which can be seen on the dipstick or inside the rocker cover. Intercoolers, if fitted, are a different issue. When there is an internal leak in an intercooler then there will be salt water in the cooling system, not in the oil system. Engine oil pressure is many times higher than either sea water or engine coolant pressure. If the intercooler is bad, then sea water would be injected into the cylinders which would result in a locked up engine. If the oil cooler is bad, there would be a visible oil loss then a milk shake after cooling off. If the manifolds or risers are leaking there would be a loss of compression and an eventual engine lock up resulting in bent connecting rods. What sea going engineers call a hydraulicking. When a small amount of salt water enters the hot oil, the water evaporates and the salt remains in the oil. That results in no emulsified water and probably no further damage. If high sodium and copper values are found, therefore, the marine surveyor should consider recommending the opening up of the coolers and have them inspected/tested but he will find that many people disregard such preventative maintenance. He should also know that it takes very, very little water to cloud the oil and, therefore, even minor leaks are usually apparent. It is also true that sodium values do not necessarily mean the presence of salt water. Depending upon the engine, pulling a valve cover may be a hands on method of seeing if there is an issue with residual water in the engine.

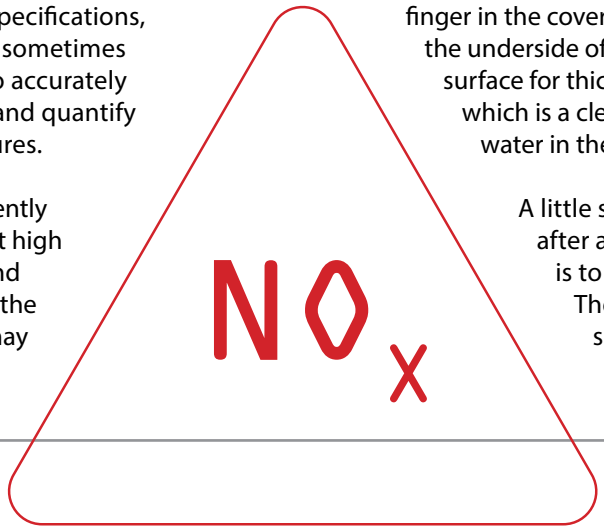
One old school approach is to push the marine surveyor's index finger in the cover and to feel the underside of the upper surface for thick sludge which is a clear tell-tale for water in the engine.

A little salt in the oil after a cheap repair is to be expected. The marine surveyor should check to see if the engine's air intake is baffled to separate the rain or sea spray from the intake air. After a riser failure, the engine should be filled and flushed with diesel fuel while turning it over by hand to remove residual contaminants.

The most common sources of sodium are seawater, coolant and dirt the first two being most likely in a marine application. Other elements present in the oil analysis will give clues as to the source of the water. If the analysis shows silicon and phosphorus then the probability is that the defect lies in the coolant and, if not, it is most likely seawater.

The marine surveyor should know that simply determining whether coolant or sea water was the cause of saltation based on one oil sample may be misleading. The ppm of the metal components will indicate if premature wear and tear exists. Assuming regular oil changes, an engine should have very low ppm for the metal components. For a coolant leak there should also be high levels of boron due to the presence of antifreeze. A mixture of antifreeze and oil will cause premature wear and tear.

If salt is found, then the cooling and oil systems should be drained and flushed out with distilled water. The cooling system should then be filled water and a new oil filter added to the engine. The engine should then be run until it is hot enough to remove all the crud i.e. for about 45 minutes. Then another oil and filter and coolant with the correct mixture of antifreeze change should then be carried out. That should leave reasonably clean systems as a starting point. After a further ten hours of running another oil sample should be taken and analysed. If the engine is showing signs of wear and tear then increasing the frequency of the oil and filter change with a good grade oil will help to keep it going. Maintaining coolant condition avoids corrosion and elevates the boiling point level.



Lubricating Oil on Site Tests

The marine surveyor should pull out the dipstick and check that there is sufficient oil in the sump by reading the oil level against the marks on the dipstick. It should be noted that lubricating oil in a compression ignition engine is always black and, in a petrol engine, a dull yellowy-brown colour. He can then make some simple on board tests to check the quality of the lubricating oil in the sump. There are three of these tests: -

- **the feel test,**
- **the drop test,**
- **the crackle test.**

THE FEEL TEST:

For this test, he should rub the sample on the end of the dipstick between thumb and forefinger. The oil should feel smooth to the touch. If there is anything wrong with the lubricating oil this will be instantly discovered as the oil then will feel gritty.

THE DROP TEST:

If he feels this grittiness between his thumb and fore finger, the marine surveyor should then see if the oil requires further analysis by making a simple drop or dispersions test. The drop test provides quick and accurate visual confirmation that it is time to change a lubricant. Further, if the results of such a test are compared at regular intervals, oil change cycles can be determined for the particular engine, brand of oil and their use, all of which affect oil degradation. This is done by stretching a filter paper tightly over the top of a convenient tin or other receptacle and held in place by means of an elastic band and then dropping a blob of the oil onto the filter paper and leaving it to spread. Over a short period of time the oil slowly spreads out over the surface of the paper and drips through leaving any contamination behind as a series of coloured, concentric rings. A fresh sample of oil should be dropped onto the paper at the same time as the sample being tested for comparison purposes. The procedure is simple: -

- Withdraw the engine or gearbox dipstick and allow a generous drop to form on the end. Deposit the oil drop on the test sheet by lightly touching the end of the dipstick on the medium.
- Leave the test sheet in a horizontal position for a few minutes and then compare the sample to a sample of clean unused oil similarly treated.
- Backlighting samples enhances the sample results. This is done by simply holding the sheet up to a light or the sky.

THE CRACKLE TEST:

This test has been used as a reliable indicator of emulsified water, a go/no-go test. However, with practice and keen eyes and ears, the procedure can be advanced considerably and made more quantitative. Rather than simply listening for the crackle (which is due to scintillation), by adding visual observation of vapour bubbles, a rough indication of the amount of moisture present can be obtained. The revised method is referred to as the visual crackle. Success in using the procedure depends on practice with varying moisture concentrations in different common fluids. A laboratory syringe and a paint shaker can help create the experimental suspensions. While the visual crackle does not replace the need for other more precise techniques, it does provide vital information when and where it is needed. Simple, inexpensive on site tests such as this can make a real difference in the effectiveness of oil analysis and contamination control.

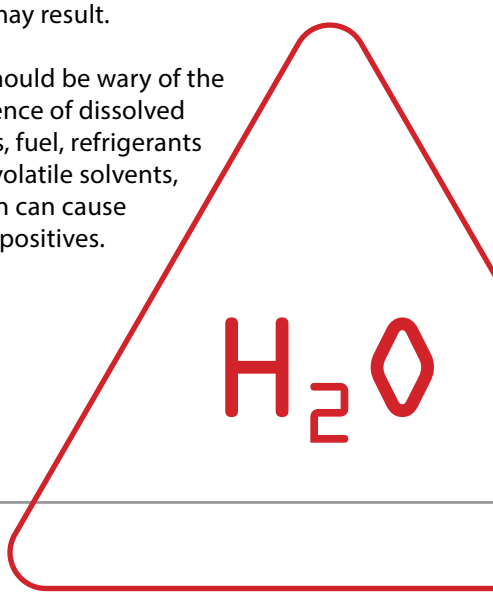
The hot plate crackle test is a simple test to identify the presence of free and emulsified water suspended in the oil, provided a few simple rules are followed.

1. Raise the hot plate temperature to 320°F (160°C). Always use the same temperature.
2. Violently agitate the oil sample to achieve an homogenous suspension of water in the oil.
3. Using a clean dropper, place a drop of agitated oil on the hot plate.

The marine surveyor should look for the following:

1. If no crackling or vapour bubbles are produced after a few seconds, no free or emulsified water is present.
2. If very small bubbles (0.5 mm diameter) are produced but disappear quickly, approximately 0.05 to 0.10 percent water is present.
3. If bubbles of about approximately 2 mm diameter are produced, gather to the centre of the oil spot, enlarge to about 4 mm, then disappear, approximately 0.1 to 0.2 percent water is present.
4. For moisture levels above 0.2 percent, bubbles may start out about 2 to 3 mm then grow to 4 mm with the process repeating once or twice. For even higher moisture levels, violent bubbling and audible crackling may result.

He should be wary of the presence of dissolved gases, fuel, refrigerants and volatile solvents, which can cause false positives.



Although generally applicable, the crackle test does have some limitations.

1. The method is non-quantitative.

2. Hot plate temperatures above 320°F (160°C) induce rapid scintillation that may be undetectable.

3. The method does not measure the presence of chemically dissolved water.

The crackle test can be performed with a minimum of investment using the following equipment: -

1. A hot plate capable of achieving and maintaining 320°F (160°C) surface temperature.

2. A paint shaker (or equivalent) for oil agitation.

3. An oil dropper tube or laboratory syringe.

WARNINGS

The marine surveyor should know that all oil has to be considered as hazardous and he should avoid oil contact with his skin, eyes and mouth and a sample should never be taken from an engine that is running.

He must exercise extreme caution when performing the crackle test on oils that might contain hazardous gases or low boiling point volatiles which might produce fumes and vapours that present inhalation and/or serious skin or eye injury upon contact. When evaluating these oils, the hot plate should remain under a vent hood that allows the analyst to conduct the test without coming into contact with fumes or vapours.

The analyst must wear protective eye goggles, gloves and a long sleeved overall. The test must be performed in a well ventilated area.

Because different types of mechanical components tend to have various oil related issues, different oil analysis techniques might be applied. For example, reciprocating engines tend to generate fine wear particles. Coolant leak, soot build up and fuel dilution are common problems in lubricants. On the other hand, rotating machinery such as gear boxes tend to generate large wear particles. Acidity increase and moisture contamination are among common parameters monitoring lubricant condition to prevent corrosion. In almost all cases, monitoring and maintaining lubricant viscosity within specification is critical to ensure mechanical components are well lubricated. Table 2 shows typical oil analysis parameters and how they relate to problems by equipment types.

Common Oil Analysis Practices

There are several ways to perform in-service oil analysis. The most common ones are outsourcing to an off-site laboratory, using an onsite laboratory or performing route based oil analysis using portable tools.

Outsourcing oil analysis to an off-site oil laboratory is probably the oldest and most common approach in industry. Every year millions of oil samples are analysed by laboratories worldwide. A typical process flow involves a user collecting oil samples from equipment and shipping them to a lab, lab technicians performing requested oil analysis tests and an analyst reviewing the data and providing recommendations. The report is then sent to the management team for review and if needed, maintenance actions are performed.

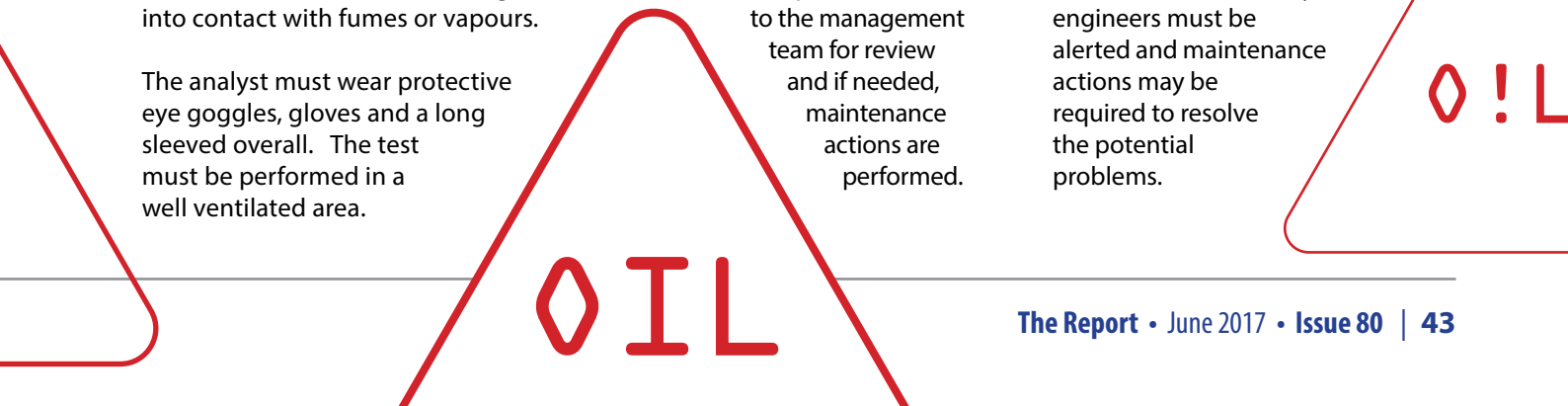
Avoid Oil Mix Up

The old sayings that "Oil is oil" and "when in doubt, put engine oil in," really highlights the under-education on the subject of lubricating oils and the importance of optimized lubrication. Oil mix up is one of the most common lubrication problems contributing to machinery failure. Putting the right lubricating oil in the equipment is one of the simplest tasks to improve equipment reliability. Checking the viscosity, brand and grade of incoming new oil and checking any contamination of alien fluids help reduce the chances of oil mix up and keeps the machine operating.

Contamination Control Solid contamination (sand and dirt) accelerates the generation of abrasive wear. Liquid contamination such as moisture in oil accelerates machine corrosion. Fuel or coolant dilution in engine oil will decrease the viscosity therefore generating more adhesive wear (rubbing wear). It is critical to keep the lubricating oil clean and dry all the time which requires that cleanliness limits are set and monitoring the contamination continued during the machine's operation.

OIL CONDITION BASED MAINTENANCE:

A well balanced oil analysis program can monitor machine wear condition, oil contamination and oil degradation at the same time. Key parameters should be continuously tested and trending of those parameters monitored. If a change of rate is accelerated or if a parameter exceeds an alarm limit, reliability engineers must be alerted and maintenance actions may be required to resolve the potential problems.



FAILURE ANALYSIS:

A comprehensive oil analysis suite may include tests such as Ferrography, or SEM/EDX which are both time consuming and expensive. However, such tests provide detailed and definitive information about machinery wear, such as what the wear particles are made of, where they come from and how severe they are. Such information provides reliability professionals with information on a past or imminent failure.

Table 2
Different oil analysis parameters by machine applications:

CATEGORY	COMPRESSION IGNITION OIL ENGINE	GEAR SYSTEMS	HYDRAULIC SYSTEMS
Elemental	Wear, contaminants, additives Viscosity – contamination from soot, or fuel	Gear boxes generate all sorts of wear, but the levels can sometimes get confusing	Will often validate or clarify particle count; added value for additives and contamination
Particle Count			Quantitative, somewhat holistic
Ferrography		Tracks the large iron laden particles for Analytical Ferrography trigger	
FTIR	Oxidation, nitration combustion by products, glycol contamination	Oxidation, base stock integrity	Oxidation, base stock integrity
Viscosity	Contamination from soot, or fuel	Always useful and worthwhile	Always useful and worthwhile
TAN		Contamination or degradation	Contamination / degradation
TBN	Reserve alkalinity, detergency		
Water	Mostly to identify	To validate the sample	Any detectable amount is probably abnormal or critical need particle count validity check
Fuel Dilution	Excessive idling or mechanical issue, such as a nozzle dribbling or leaking injector seal Fuel		
Soot	Combustion cycle indicator, Air fuel ratio		

Don't sign away your rights!

Mark Brattman is a Director and Legal Advisor of ITIC, one of the leading mutual insurers of marine surveyors.

Mark is a solicitor and joined ITIC in 2004. He qualified at Shaw and Croft (now part of Gately LLP) in 2000 and then spent three years at Beaumont and Son (now part of Clyde & Co LLP).

BY **MARK BRATTMAN**

ITIC has assisted the marine surveyors it insures by renegotiating onerous indemnities they are asked to sign before joining a vessel.

When a surveyor is appointed to attend a vessel, whether by a P&I Club on behalf of owners or by charterers, cargo interests or insurers, they are invariably asked to sign a waiver and indemnity by the master of the vessel before they are given approval to board.

The waiver and indemnity provided by the master of the vessel will no doubt be detrimental to the surveyor. It will usually state that the surveyor will waive all their rights to make a claim against the owner and the vessel should the surveyor suffer any personal injury or should they suffer loss or damage to their equipment, even if these events are caused by the owner. They will conversely state that that the surveyor must indemnify the owner if any of the vessel's crew is killed or suffers from a personal injury or if there is any damage to the vessel itself or its equipment. Occasionally the indemnity will even extend as far as to claims made against the owner by third parties.

These waivers and indemnities are usually presented to the surveyor as they are climbing aboard the vessel, often after a long journey has been made. Therefore, they do not have any realistic opportunity to read the document, let alone negotiate a better wording. Often, it is simply signed without it even being read as the surveyor feels they have no choice but to sign if they want access to the vessel to perform their job.

ITIC has seen a number of such wordings over the years and they are always unfavourable to the surveyor. A good example of when a particularly one sided waiver and indemnity was presented to surveyors was following a fire on a containership. ITIC received calls from numerous surveyor members who were concerned about what they were being asked to sign. The indemnity stated that the surveyor would hold harmless and indemnify the owner "in respect of all claims against them arising from any injury, death, loss or damage for whatever reason, including the owner's wrongful acts or omission, breach of contract or breach of any express or implied warranties suffered by the surveyor or any person arsing as a result, direct or indirect, of the survey or the attendance of the vessel". It is easy to see why a surveyor would be wary, as their potential liability to the owner is extremely wide.

On behalf of ITIC's surveying membership, we made contact with the Admiralty Solicitors Group (ASG) who already had their own surveyor's indemnity wording – the ASG 10. This was a better document than most surveyors were being handed directly by owners, but both ITIC and the ASG felt that it could be further improved as far as the surveyor was concerned. As a result, ITIC and the ASG agreed a new wording which is currently referred to as the "ASG/ITIC 10".

The premise behind the new wording is that the owner will have the usual responsibilities of an occupier to visitors, unless the vessel is considered "unsafe to board". If the vessel is "unsafe to board" the surveyor will acknowledge that the master cannot guarantee the safety of visitors, and the owner's liability will be restricted to where the loss is specifically caused by or contributed to by the causative negligence, recklessness or wilful misconduct of the owner. Whether or not the vessel is "unsafe to board" is defined in the ASG/ITIC 10 notes that accompany the form. Whether the vessel is "unsafe to board" can be discussed after the event, if it is not agreed at the time. The new "ASG/ITIC 10" allows the surveyor to avoid having to negotiate on the gang way of the vessel.

APRES COSTA CONCORDIA où en sommes nous?

par le Cdt Bertrand APPERRY

AFTER the COSTA CONCORDIA disaster where are we?

by Capt Bertrand APPERRY

IIMS immediate Past President, CAPT BERTRAND APPERRY, considers where the industry is now after the Costa Concordia disaster, what it has learnt and how new rules and regulations may help in the future.

Une NOUVELLE FORMATION pour tout le PERSONNEL des NAVIRES à PASSAGERS, applicable au Ier Juillet 2018, vient d'être rendue obligatoire par l'OMI…

Dans le rapport de la commission d'enquête sur le naufrage du COSTA CONCORDIA, en plus des erreurs de son Capitaine, la formation du personnel avait été stigmatisée.

En effet, sur ce navire l'inadéquation des familiarisations et formations du personnel en charge de la sécurité des passagers étaient des défauts importants ayant amené lors du naufrage des initiatives individuelles au plan d'urgence qui ont contribué à une véritable « pagaille » aux conséquences malheureuses que l'on connaît… et ce serait un cas général!

L'OMI vient donc de boucler l'introduction d'une nouvelle formation de familiarisation aux situations d'urgence pour tous les membres du personnel servant à bord des navires à passagers qui s'ajoute aux autres déjà existantes (nouveau sigle : STCW V/2-1). Il s'agit bien de tout le personnel du navire qui doit avoir acquis certaines aptitudes nouvelles qui correspondent à leurs tâches et leurs responsabilités.

Rappel: Les précisions suivantes sont importantes:

1 - To decide which courses are necessary, you must study your muster list instead of the Minimum Save Manning list which is more restrictive.

2 - La « contribution » des membres d'équipage au plan de secours varie en fonction de leur fonction à bord.

A new training course for all personnel working on board passenger ships, coming into force from 1st of July 2018, has been introduced in STCW by IMO during the last safety committee in December 2016.

In the enquiry report of the COSTA CONCORDIA's disaster, in addition to the mistakes of her Captain, the level of training of all personnel on board has been strongly criticised.

Indeed on this ship the poor provision of training and familiarisation of personnel in charge of the safety of passengers provoked individual actions outside of the agreed emergency plan. These mistakes have contributed to a crazy situation with the subsequent loss of 32 lives.

So, IMO has finalised a new training course which is compulsory for all members of the ship's personnel from Master to the lowest rating member of staff in the galley. These new competencies for passenger care in case of emergency are supplementary to all other previously existing V/2 training courses (4). There is a new title for all personnel who need a new specific ability corresponding to their duties and responsibilities.

NB: The following remarks are important:

1 - To decide which courses are necessary, you must study your muster list instead of the Minimum Save Manning list which is more restrictive.

2 - The contribution of the personnel varies depending on their job on board ship.

3 - Tous les membres d'équipage doivent pouvoir prouver qu'ils ont atteint le niveau de compétence requis.

4 - le Capitaine du navire est toujours responsable de la formation idoine de son équipage: brevets à jour, formation continue à bord, évaluation de la préparation de son équipage à répondre aux situations d'urgence.

Qui donc doit être formé ? Tout le personnel, du Capitaine au dernier aide de cuisine! Le délai est très court… une seule solution: commencer tout de suite !

De quoi s'agit-il ? Préparer l'équipage à « contribuer » à la gestion des situations d'urgence… selon sa fonction dans le plan de secours.

Quelle contribution?
Familiarisation avec :

- *les caractéristiques générales du navire en matière de sécurité.*
- *l'emplacement du matériel de sécurité et d'urgence essentiel y compris les engins de sauvetage*
- *l'importance du comportement personnel dans une situation d'urgence*
- *les limitations relatives à l'utilisation des ascenseurs en situation d'urgence…*

3 - All crew members must be able to prove their competency in their mandatory tasks.

4 - The master is always responsible for appropriate training and competency of his crew members which includes up dated certificates, shipboard continuous training, assessment of crew preparedness for emergencies and so on…

Who should be trained? All personnel from the master to the last galley waiter. The deadline is very close and there is only one solution… start rapidly and now!

What exactly are we talking about? To prepare the crew to contribute to the management of emergency situations depending on their responsibility level on board.

Which contribution?
Familiarisation with :

- General safety features aboard ship
- Location of essential safety and emergency equipment including life-saving appliances
- The importance of personal behaviour during an emergency
- Restrictions on the use of elevators during emergencies

de plus, aptitude à :

- *communiquer avec les passagers dans la langue de travail du navire*
- *communiquer d'une manière non verbale des renseignements ayant trait à la sécurité*
- *Comprendre au moins l'une des langues dans les quelles les annonces sécurité peuvent être diffusées à bord lors d'une situation d'urgence ou d'un exercice*

Avec notre expérience, nous pouvons déjà extrapoler et envisager de lier cette nouvelle formation à d'autres déjà obligatoires comme la « formation en matière de sécurité à l'intention du personnel assurant directement un service aux passagers dans les locaux réservés aux passagers » (STCW V/2-2 – nouveau sigle).

On n'oubliera pas que la conformité avec STCW pour les navires à passagers opérant à l'international ne supporte pas des formations allégées comme il peut se pratiquer pour le transport des passagers au niveau national. NB- Cette différence a toujours étonné le marin: la vie des passagers qui traversent la rade serait-elle moins importante que celle des autres qui voyagent d'un port du pavillon à un port étranger?

D'autre part, on ne peut pas reprocher aux Italiens et aux autres pavillons leur désinvolture dans leur préparation, d'un côté et de l'autre se contenter d'une formation « allégée » uniquement parce qu'on a peut-être pas les professeurs nécessaires !

Ces cours de formation comportent des « jeux de rôle » qui ne supportent pas encore une formation à distance. Comme pour la formation des ressources humaines à la passerelle ou à la machine déjà obligatoires, la formation à distance ne peut donc pas être envisagée ici, même si les techniques de « communication » correspondantes se sont considérablement améliorées.

In addition : Contribute to communication with passengers during emergencies, so in addition:

- *communicate with passengers in the working language of the ship*
- *Communicate in a non verbal manner for safety information Understand one of the languages in which emergency announcements may be broadcasted on the ship during an emergency or drill*

With our experience we can already integrate this new course to those already compulsory such as the safety training course for personnel providing direct service to passengers in passenger spaces (STCW V/2-2 new name).

We must remember that conformity with international rules will not tolerate «light » training courses such as we see frequently for national trade. This difference has always surprised me; are the lives of tourists visiting the local areas less important than those visiting a foreign port. Strange isn't it?

In this way, we cannot criticize the Italians or other flags for their casual attitude to their emergency preparation on the one hand and accept a « weak training » only because we could not get competent trainers on the other hand.

Indeed, these specific courses include role plays which cannot be carried out yet by distance or computer or e-learning courses. As for training on human resources management on bridge or in engine room, the present new training course could not be carried out as a distance learning programme even though communication techniques have improved a lot.

Eyes Wide Open

Rolls-Royce's new "Intelligent Awareness System" aims to make shipping safer.

As technology gets ever more complex and challenging to understand for the surveyor, Rolls-Royce engineers and software developers have upped the ante still further. Their eye catching, newly created Intelligent Awareness System looks likely to make a significant impact on the safer operation of vessels possible.

Rolls-Royce has created what it believes to be the world's first Intelligent Awareness System, designed to help seafarers operate vessels more safely and efficiently. Combining multiple sensors and clever software the system provides the Bridge with a better understanding of the ship's surroundings than ever before.

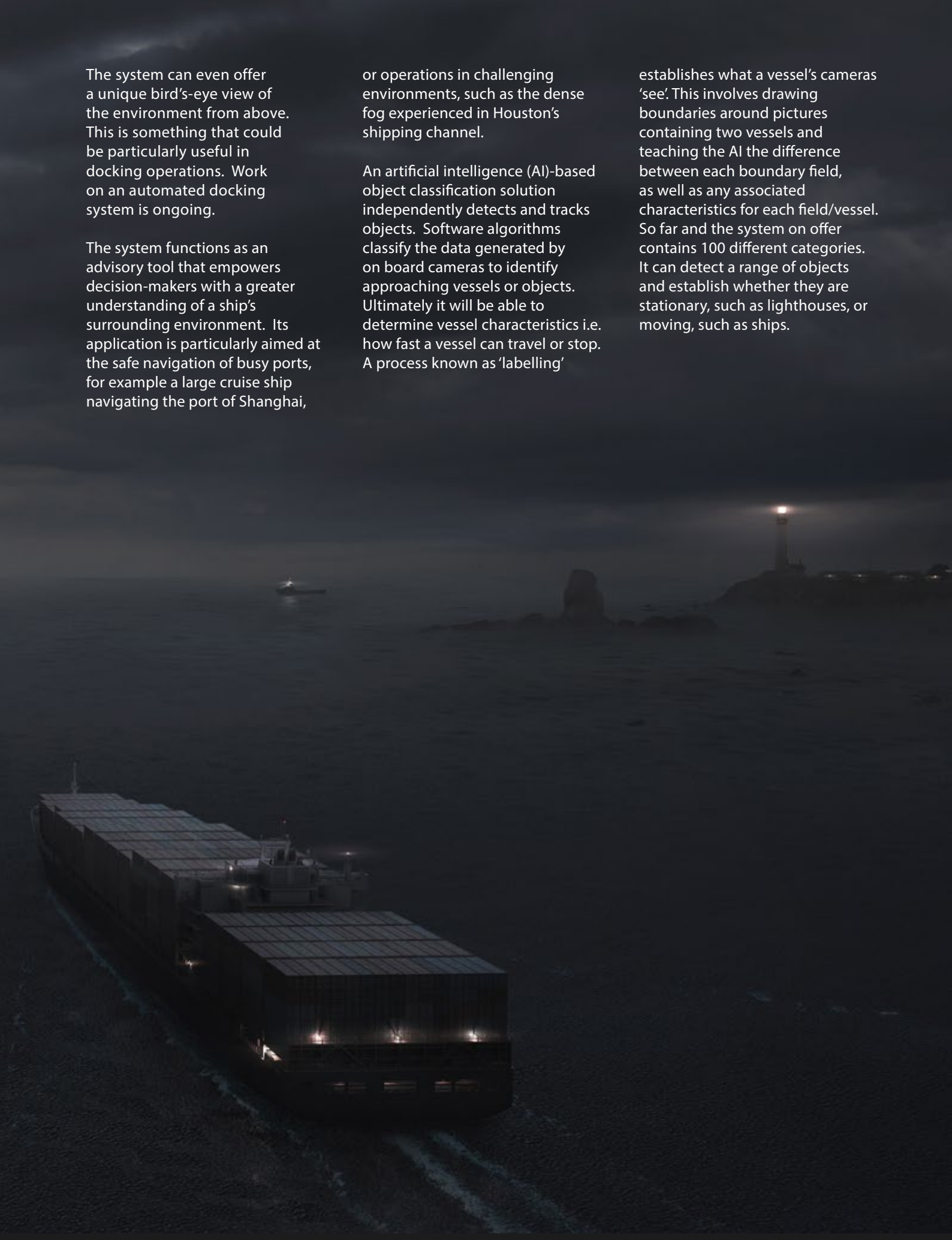
Iiro Lindborg, general manager of remote and autonomous operations, Rolls-Royce, explains; "the Intelligent Awareness Systems use multiple sensors, including high definition cameras, night vision, radar, LIDARs and AIS data, and integrates the different data sets to give the crew on board a wider range of perspectives on their situation."

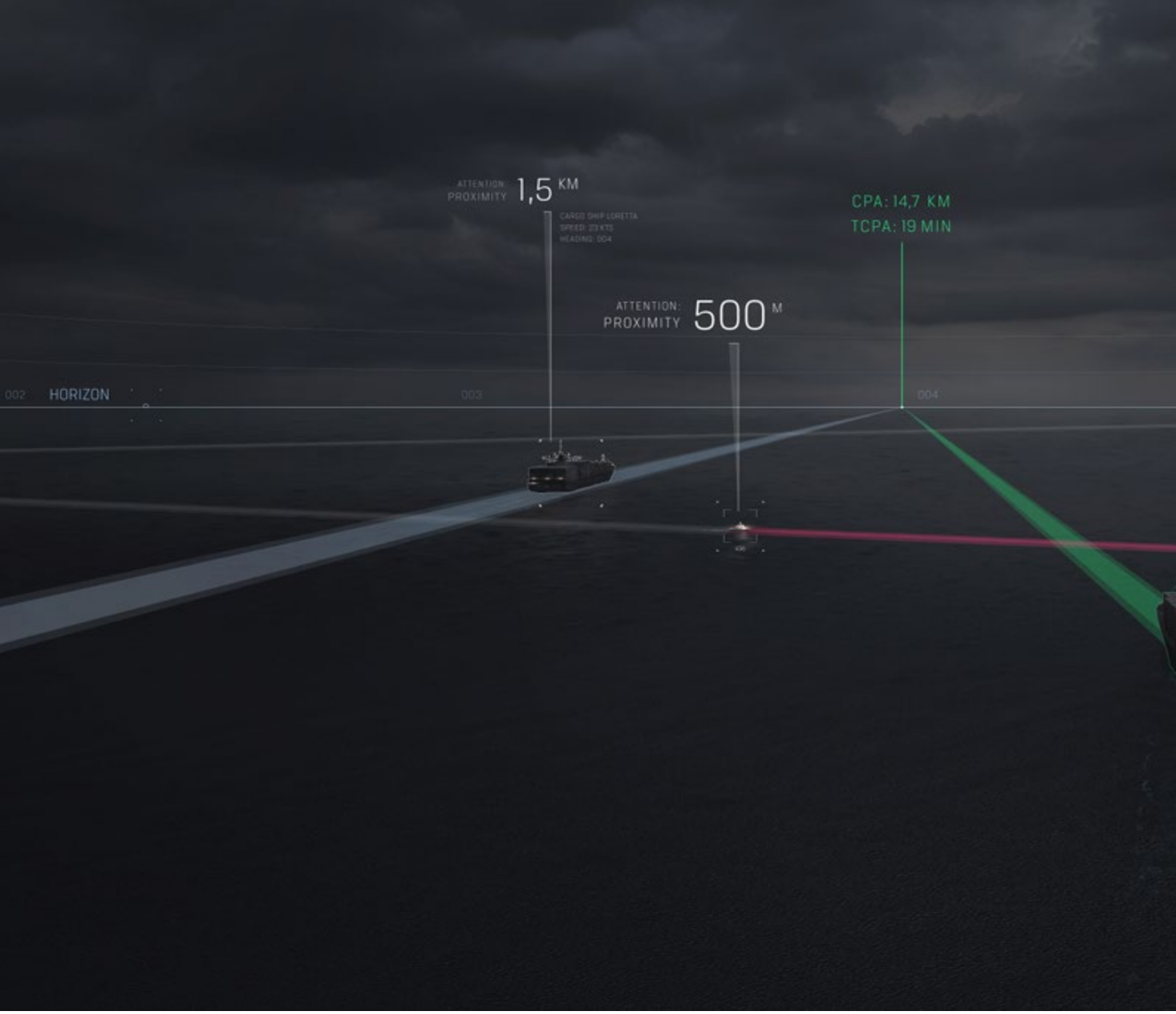
Using what he calls "data fusion" the sensors offer interchangeable layers of insight. Crewmen can switch, for example, between a 3D map rendered by LIDAR, a radar overlay or a topography that shows the ocean bed. In a very recent innovation the system has incorporated fog horn detection; that can map the distance between two vessels based on acoustic information.

The system can even offer a unique bird's-eye view of the environment from above. This is something that could be particularly useful in docking operations. Work on an automated docking system is ongoing.

The system functions as an advisory tool that empowers decision-makers with a greater understanding of a ship's surrounding environment. Its application is particularly aimed at the safe navigation of busy ports, for example a large cruise ship navigating the port of Shanghai, or operations in challenging environments, such as the dense fog experienced in Houston's shipping channel.

An artificial intelligence (AI)-based object classification solution independently detects and tracks objects. Software algorithms classify the data generated by on board cameras to identify approaching vessels or objects. Ultimately it will be able to determine vessel characteristics i.e. how fast a vessel can travel or stop. A process known as 'labelling' establishes what a vessel's cameras 'see'. This involves drawing boundaries around pictures containing two vessels and teaching the AI the difference between each boundary field, as well as any associated characteristics for each field/vessel. So far and the system on offer contains 100 different categories. It can detect a range of objects and establish whether they are stationary, such as lighthouses, or moving, such as ships.





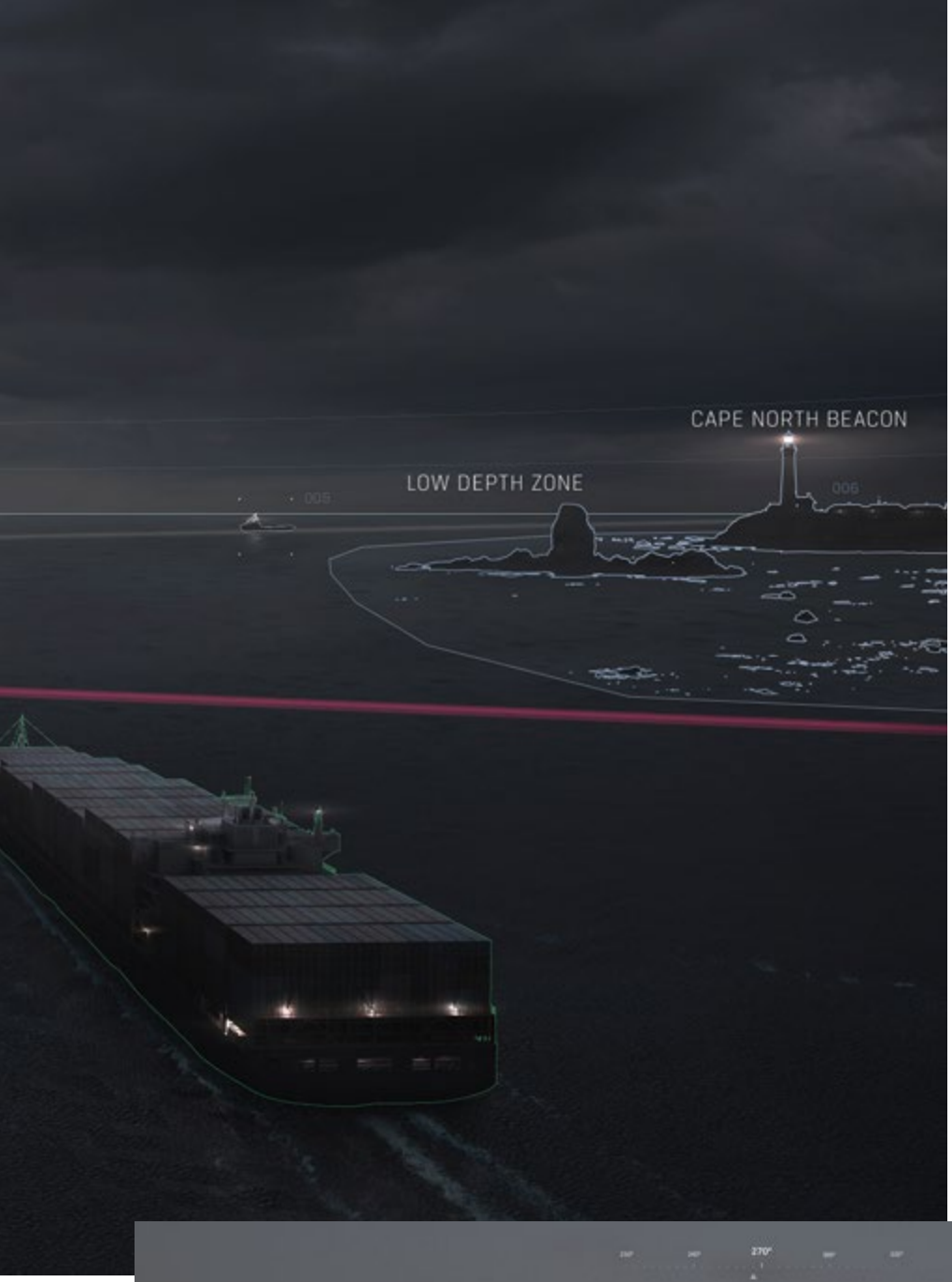
Rolls-Royce controls the templates the system functions on and as the user base expands the product will benefit from machine learning continuing to develop based on its constantly growing data pool.

LIDAR has been a particularly useful component, Lindborg says. LIDAR is already in use in autonomous cars. In the marine sector it is being linked to GPS data to create 3D environments which allow crews to "see" what the human eye cannot. According to Lindborg in foggy conditions LIDAR can provide a view that is four times better than the human eye.

LIDAR works by creating a "point cloud," firing beams of light from a laser and then measuring when a beam is reflected. Rolls-Royce says approximately 300,000 beams are pulsed to render a 3D map of the world around a vessel. In this way a vessel is able to map its environment and provide new insight for those on the bridge, such as a view from above.

The system is the result of more than six months of testing on AAWA's test vessel Stella, a 65m ferry owned by Finferries. Further development is being undertaken with Swedish ferry company Stena Line AB and other partners are sought.

Harry Robertsson, Technical Director at Stena Teknik, expert technical advisors to the Swedish ferry company, said: "Stena Teknik continuously conducts research and development in the marine technology sector. This project gives us an opportunity to explore how new technologies can be integrated with the systems we already have on-board and provide a more informed view of a vessel's surroundings in an accessible and user friendly way. This will give our crew an enhanced decision



support tool increasing the safety of our vessels."

Lindborg stresses that while the system will help to facilitate an autonomous future, the project aims to benefit real crews right now. "There is not much extra equipment to install on board, we want to improve the use of existing tech, integrating LIDARS and cameras and increasing the usability of data already available, not create more. "

With the focus on safety, cruise ship owners have shown significant early interest. But owners of other ship types, including cargo vessels, have been discussing the new system with Rolls-Royce. The company has carried out studies into the requirements of a number of different vessel types.

"Systems can be tailored to each ship's needs based on the requirements of the shipowner," says Lindborg. "We look at a vessel's current capabilities before moving on to discuss how the technology can be installed to provide the optimum solution for the vessel in question."

Rotor Sail Technology

for auxiliary wind propulsion of ships

Many years after wind power became overtaken and redundant as the primary method of ship propulsion, it is ironic to see it making a return now. Driven by the search for clean fuel, an improved environment and lower running costs, many organisations are now looking afresh at wind as an effective and efficient means of propelling, or assisting to propel ships. The Report magazine commissioned Norsepower Oy Ltd and asked them to give an overview of their activity in this field. Senior Vice President, Sales and Marketing, Jukka Kuuskovski takes up the story.

BY **JUKKA KUUSKOSKI**,
SVP, Sales and Marketing,
Norsepower Oy Ltd

INTRODUCTION

The Shipping industry is challenged with increasing demands to reduce the environmental impact of shipping operations. Wind-assisted propulsion provides significant potential for the reduction of fuel consumption, exhaust gas emissions and operational costs of ships.

Norsepower was established in 2012 with the ambitious target of developing a modernised version of the Flettner rotor, an invention dating back to the 1920s. The challenge was to design a Rotor Sail solution which is economically justifiable as an investment. Currently, the financial incentive to install auxiliary wind propulsion is fuel cost savings, however, the reduction of CO_2 and other emissions will also play a significant role as shipping strives to play its part towards achieving a lower carbon economy.

When considering the most important requirements for a successful product, Norsepower focused on ease of use and low life cycle costs. Moreover, extensive tests and practical experience onboard the pilot project *M/S Estraden* have confirmed that Norsepower has succeeded in developing a technically and economically sound Rotor Sail solution. Thrust producing performance and reliability of the Rotor Sails are according to expectations. Most importantly, the shipowner and crew are very satisfied with the technology onboard. The experience has encouraged Norsepower to develop larger Rotor Sail designs to provide auxiliary wind propulsion for a range of different sized vessels.

HOW DOES A ROTOR SAIL PRODUCE THRUST

The Norsepower Rotor Sail Solution is a modernised version of the Flettner rotor – a spinning cylinder that uses the Magnus effect to harness wind power to propel a ship. The Magnus effect is described using Figure 1, while Figure 2 visualises the wind direction and thrust produced at an angle of 90 degrees to the wind direction. An example of how the thrust (expressed as main-engine equivalent propulsion power) produced by the Rotor Sail changes with the true wind speed and direction can be seen in Figure 3 (the polar diagram). As can be seen on the polar diagram, the Rotor Sails are able to start saving fuel at a 20 degrees true wind angle, when the true wind speed is at least 7 m/s. The savings are maximised when the true wind angle is circa 120 degrees, and when the true wind speed is at least 20 m/s or more.

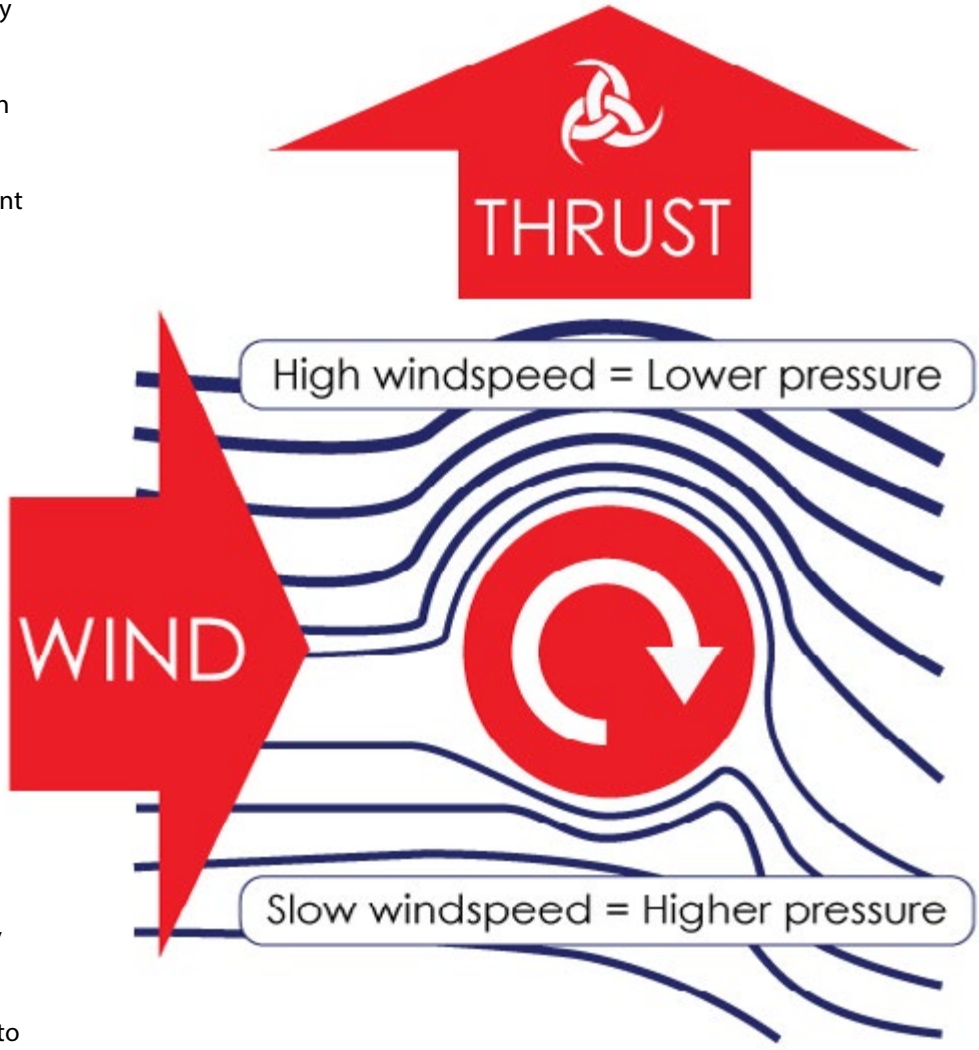


Figure 1. The Magnus effect is caused by a thin layer of air which rotates along the rotor surface and meets the wind on opposite sides of the rotor. On the high (accelerated) wind speed side the air pressure is reduced and on the low (decelerated) wind speed side the air pressure is increased. The pressure difference creates the lift (thrust).

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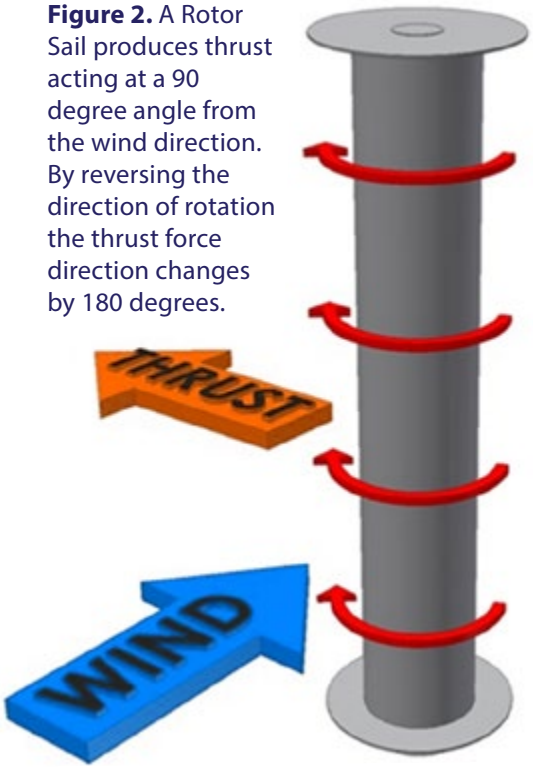


Figure 2. A Rotor Sail produces thrust acting at a 90 degree angle from the wind direction. By reversing the direction of rotation the thrust force direction changes by 180 degrees.

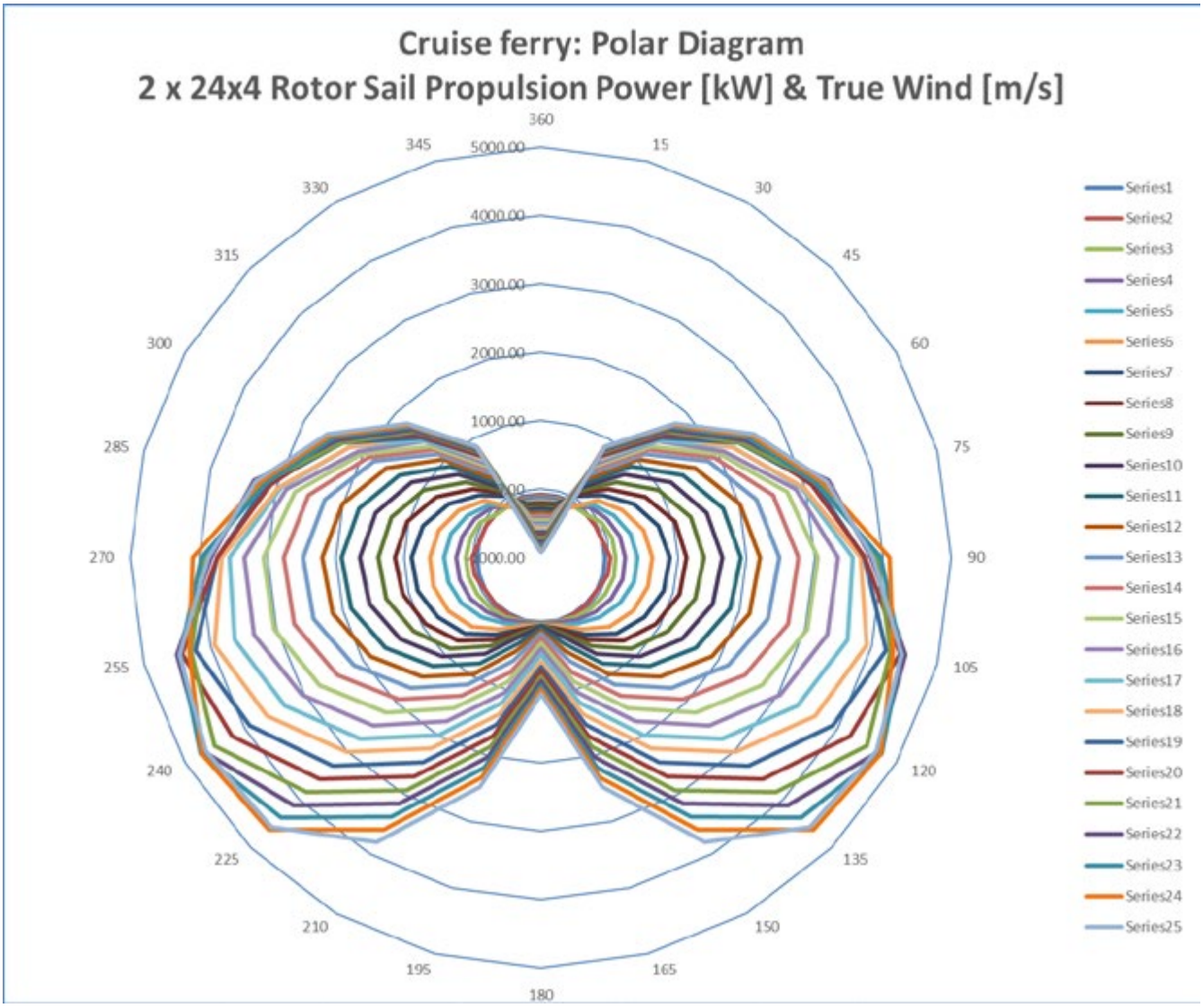
WHAT KINDS OF SHIPS CAN BENEFIT FROM ROTOR SAILS?

Norsepower Rotor Sails are suitable for installation on a variety of ship types and installation is possible for both newbuilds and retrofit projects. Suitable vessel types include ro-ro ships, tankers, bulk carriers, car carriers, ferries and cruise passenger vessels.

The main technical requirements for installing a Rotor Sail on a vessel are:

- Available deck space starting from approximately 6 m x 6 m
- Sufficient size of the vessel to carry the weight and maintain the stability requirements

Figure 3. A typical polar diagram representing the main-engine equivalent power produced by two Rotor Sails for different true wind speeds and a ship speed of 17 kn (the number of each coloured line represents the corresponding true wind speed in m/s). The power produced by the rotor is given in radial direction, the angle from vertical is the true wind angle.



When those two requirements are fulfilled, the focus is on evaluating the economic feasibility. Norsepower has developed a simulation software which provides a good basis for evaluation of the economic feasibility of a Rotor Sail installation. The following aspects are analysed:

- Wind conditions on the ship's operating route. The wind conditions determine the potential for delivering sufficient thrust which will translate into fuel savings. The higher the wind speed and the more likely the wind direction is from the beam of the ship, the more thrust a Rotor Sail can produce. Norsepower simulates a ship's operation and utilises long term global wind statistics to estimate the propulsion power and fuel consumption savings potential for a specific vessel.
- The ship's operating profile. A high ratio of time at sea compared to time in port will produce higher savings.
- Sensitivity analysis of pay-back period and ROI is done with different fuel price scenarios.

For an existing vessel's retrofit project, the steel structure will require some modification to accommodate the foundation block, as well as carry the loads to be transferred from the Rotor Sail to the ship's hull. Cost estimates are case specific and should be done together with the shipowner.

A good estimate of the feasibility of a Rotor Sail installation can be made by carrying out the above evaluations.

A ROTOR SAIL GENERAL ARRANGEMENT

Norsepower Rotor Sails are available in three sizes with different Rotor Sail heights of 18, 24, or 30 metres and corresponding rotor diameters of 3, 4, or 5 metres respectively.

The Norsepower Rotor Sails are installed on the deck of the vessel with vessel-tailored foundations, which are installed during a yard stay. The rotors are installed on the foundations with a bolt connection. When the installation of the foundations has been completed, the rotors can be lifted on the vessel and attached to the foundations during a normal harbour stay.

Figure 4 describes the layout and interfaces with the ship.

PILOT PROJECT M/S ESTRADEN

A vital part of developing new technological solutions for marine applications is extensive full scale testing and operation in the actual operating environment. Norsepower was very fortunate to have Bore as the first shipowner who was prepared to install a Rotor Sail unit onboard their roro-vessel *M/S Estraden*. The first 18 m tall and 3 m diameter Rotor Sail was installed in the autumn of 2014. After less than a year in operation, Bore decided to install another Rotor Sail unit to further improve the fuel savings and gain more benefit of wind assisted propulsion. The two Rotor Sail units have been thoroughly tested and measurements made to verify the performance and integrity of the design.

The average fuel savings achieved with two Rotor Sails in the North Sea traffic has been approximately 6% – equating to circa 400 tonnes per year in reduced fuel, and roughly $180,000 per year in reduced fuel costs (based upon Rotterdam April 2017 MGO price). This saving has been measured and independently verified by NAPA, the leading maritime data analysis, software and services provider.

The results have given confidence to proceed with scaling the Rotor Sail designs to two larger models, the 24 m high and 4 m diameter and 30 m high and 5 m diameter Rotor Sails. The first deliveries of both new models will take place in 2018.

VIKING GRACE

The 57,565 GT *M/S Viking Grace* currently operates in the archipelago between Turku (Finland) and Stockholm (Sweden), and is already one of the most environmentally-friendly cruise ferries in the global maritime industry. With

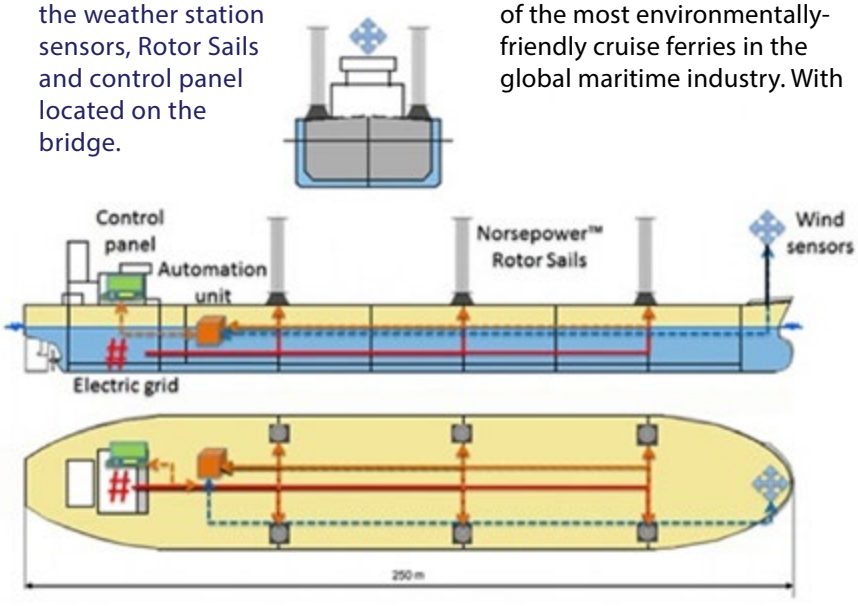


Figure 4. The Rotor Sail foundation blocks are welded and integrated to the ship's steel structure. Cabling from the low voltage switchboard provides the required auxiliary power for the Rotor Sails and automation cabling connects the weather station sensors, Rotor Sails and control panel located on the bridge.

the addition of Norsepower's technology, the vessel will further reduce its emissions, fuel burn, and fuel costs; reducing carbon emissions by circa 900 tonnes annually; equivalent to cutting 300 tonnes of LNG fuel per year.

Preparations for the retrofit are underway, with the installation scheduled to take place during Q2 of 2018. *Viking Grace* is set to be retrofitted with one medium-sized Norsepower Rotor Sail unit that is 24m in height and 4m in diameter.

Figure 5. Illustration of Viking Grace with one 24x4 Norsepower Rotor Sail

Figure 6. Maersk P-Class illustration with two 30x5 Norsepower Rotor Sails

MAERSK P-CLASS TANKER

In a project co-funded by a consortium including Maersk, Shell, and the UK's Energy Technologies Institute (ETI), a Maersk P-class 109,647 deadweight tonne (DWT) oil products tanker, will be retrofitted with two 30m tall and 5m diameter Norsepower Rotor Sails, which combined are projected to reduce average fuel consumption on typical global shipping routes by more than 10%.

This project is an important break-through for the tanker market which is considered to be one of the major markets where Rotor Sails provide a competitive solution for improving the energy efficiency during operation.

FUTURE VISION

Norsepower sees an excellent potential for the growth of the Rotor Sail market. The company has been extremely satisfied with the fuel savings results achieved to date. Going forward, Norsepower plans to ensure continuous optimisation of its technology in order to further cut fuel consumption, and in so doing deliver greater fuel cost savings. In addition, pending sulphur regulations in 2020 – which are highly anticipated to see fuel costs rise – Norsepower's technology will further enhance savings in dollars and cents terms.

CONCLUSION

Norsepower is proud to be the first company to utilise renewable energy on a large commercial vessel while it is in motion. As the company continues to expand commercially, it will be able to develop larger Rotor Sails which will equate to more fuel savings for shipowners and cargo owners paying for the fuel. The ability to harness the wind as an additional power source to enable a reduction in fuel consumption is a natural next step for the maritime transport industry as it seeks to remain cost-efficient and meet environmental regulations.

DISINTEGRATING LAMINATE

BY **KIM SKOV-NIELSEN** MIIMS

It was during a standard pre-purchase condition survey on a 72' motor yacht. The vessel was placed ashore on the Friday and I went along to inspect the underwater hull on the Monday – giving her some time to dry out over the weekend.

It is common amongst some boat builders to pass air-conditioning gas through an underwater heat-exchanger array. Usually a couple of pipes in a double-U configuration on the outside of the hull just below waterline on the upright surface.

In this case the heat-exchange function had been deleted some years previously but the piping left in place.

The shipyards all round the Western Med where she was cleaned off and re-anti-fouled on a yearly, or even twice-yearly basis, could not know that the array had been deleted so they still cleaned it diligently every time the boat was lifted.

And in Spain we all know what that means – after initial spray-off, the shipyard workers come along with a box of 12 x 1-litre bottles of Hydrochloric Acid (a.k.a. Agua Fuerte) and start to pour/spray it all over the props, shafts, rudders and any other underwater metalwork – like the calcified array below. Regardless of cutlass bearings or rudder bearings! And they don't skimp on the acid – so stand back!

<< Concretion on the cooling array

The first sign of trouble was a large bubble which I immediately pierced with my spatula only to see liquid *pour* out – see picture below.

I sniffed it and tested it but it was not vinegary. It was just sea-water. Great, but not great – seawater in the laminate makes you scratch your head a bit. It really shouldn't be there. So you go looking further.

So, after receiving the vendor's permission, I carefully probed the area with my pocketknife. The laminate, not just the thin gelcoat on the outside but the *actual* laminate started coming away in great chunks. See below the porous-looking chunks which disintegrated to dust as they dried out over the next 24 hours:

Several layers of laminate could be easily lifted away – see pictures below – until there were just big holes:

It appears that while the heat exchangers were operative the heat generated accelerated some osmotic action in this area. However, the most damaging action appears to have been the standard Spanish shipyard practice of repeatedly using Hydrochloric Acid (*Agua Fuerte* - readily available in supermarkets here) to clean calcified crustaceans, or concretion, off underwater metalwork; together with the high-pressure washing-off nozzle right up against the hull forcing acid under high pressure into the laminate.

This caused irreparable damage to the laminate and led to a situation where the boat was millimetres away from sinking and no-one had any idea what was going on, or even where to look for water ingress.

When ground back to solid laminate, the depth and extent of the damage was quite shocking.

The original boat builders initially created an interior inset into the hull laminate (which is a vacuum-bagged, foam-sandwich & E-Glass construct some 40mm thick) to allow for these gas pipes to be led to the outside of the hull, resulting in a patch of hull with only external laminate (no foam, no inner layer, no sandwich) some 10mm thick, with gelcoat on the outside.

The exterior damage was been repaired thus:

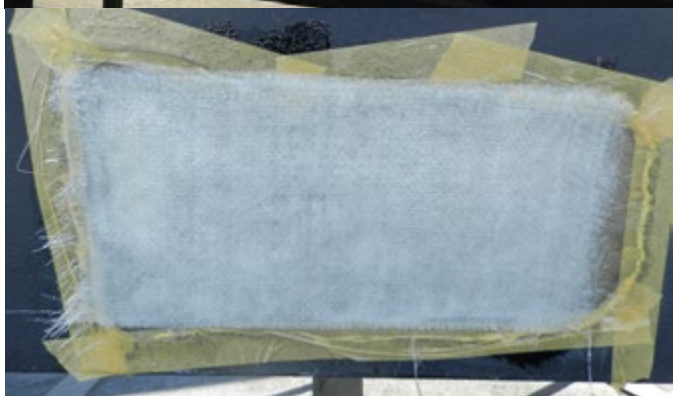
In the inset interior to this there has been added a 28mm block of closed-cell PVC foam and several layers of fibreglass to restore the sandwich and tie it all in together.

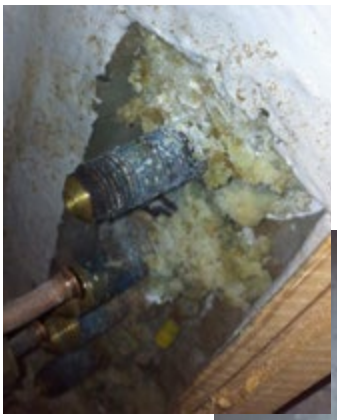
Care was taken to add the new interior PVC foam while the exterior lay-up was still wet ensuring cohesion between the layers thus creating a solid sandwich box. Finally the interior was painted with gelcoat while the exterior was sanded, primed and antifouled and the boat was launched for sea-trials.

In conclusion: It is clear that the yearly (sometimes twice yearly) intense high-pressure injection of acid caused the breakdown of the laminate. In fact, it turned the fibreglass to dust – the porous-looking granules pictured are the remainder of the laminate and even these crumbled to a fine powder as they dried out over the next 24 hours. (I was going to keep some but I ended up with a small pile of dust).

I have never seen, or even heard, of this happening ever before. It is quite incredible and is a salutary warning to all about the dangers of using acid on fibreglass of any kind – gelcoat and laminate clearly both just crumbled under the acid onslaught here.

In future I will look much more closely at such arrays and will perhaps suggest they should be painted with high-speed propeller anti-fouling to limit the calcification/concretion and thereby (perhaps) the shipyards' inclination to use acid.





BEFORE

AFTER

Are drones the future of marine surveying?

The world of marine surveying is becoming ever more susceptible to disruptive changes as new technological developments hasten the rate of progress, making things that once seemed unthinkable not only possible, but also highly likely.

Drone technology is one such area that is expected to significantly alter the way a marine surveyor will work in the future and it is only just around the next corner.

The Report Magazine commissioned Martek Marine, a UK based specialist in this field, to write an article on the likely future impact of drone technology on the life of the marine surveyor. Jess Penney from Martek Marine has authored this feature.

Improving safety, cutting costs, speeding up processes, making access challenges a breeze… just some of the benefits to Remotely Piloted Aircraft Systems (RPAS), more commonly known as drones.

For these reasons, drones are quickly becoming a staple of the maritime industry and whilst drones were initially developed for government and military operations, over the next five years, growth in the commercial and civilian market of the drone industry is generally predicted to surpass that of the defence industry. As the development of drone technology gathers momentum, we are likely to see them used in more maritime applications than ever before.

In January this year, the European Maritime Safety Agency (EMSA) issued the largest ever civilian maritime drone contact, valued at €67M. Under the contract, drones will be used to assist with border control activities, search and rescue operations and monitoring of pollution, as well as the detection of illegal fishing and drug and people trafficking. Drones in the maritime industry are clearly big business, but to what extent are drones being used in marine surveying and what does the future hold for the drone surveying industry?

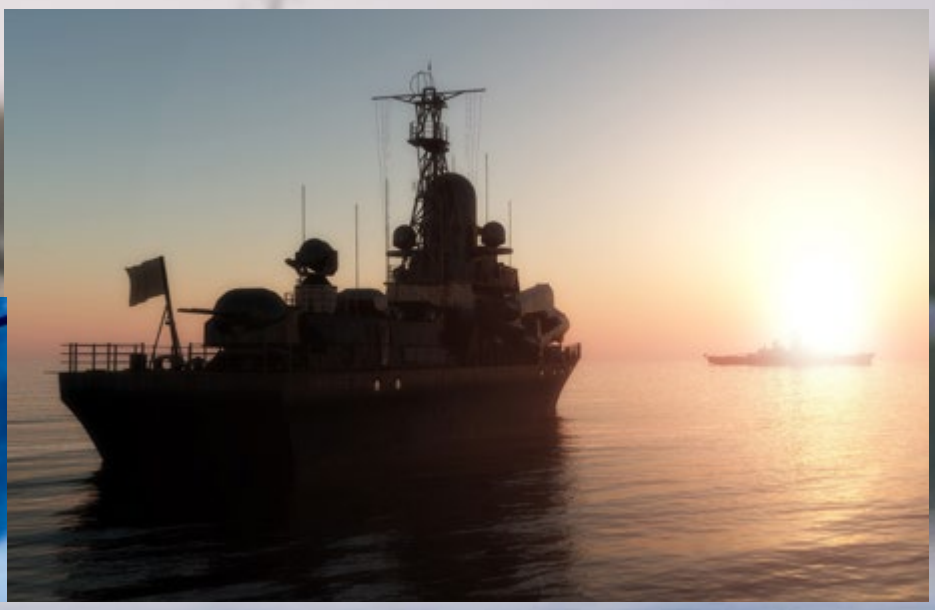
EXTERNAL VESSEL INSPECTIONS

Big names in the maritime industry such as DNV-GL, Lloyds Register and Maersk have all shown strategic intent to revolutionise their operations by embracing drone technology and many maritime operators are now following suit.

All shipowners know that traditional methods of external vessel inspection can be a costly affair. Now that high definition, camera-equipped drones are widely available and affordable, using them for external vessel inspections to assess that the structural condition remains effective, is becoming more common. Identifying substantial corrosion, significant deformation, fractures, damage, or other structural deterioration can be done quickly, easily and cost-effectively using drones.

External inspection typically involves an initial screening of the vessel by the drone. This identifies any areas that require closer inspection, without the need for any access equipment. To do this, the drone is flown over the surface of the vessel using an automatic flight control system controlled by a human pilot. The drone automatically captures survey data, such as video and high resolution images automatically during the flight. The survey data, in addition to payload data, is then transmitted to the system user, who then reviews the information to check for defects on the vessel's exterior, such as peeling paintwork and dents.

The benefits of drone surveys and inspections are unmatched: acquiring data for external inspections takes a fraction of the time when compared against traditional methods and vessel downtime for inspection is greatly reduced.



TANK INSPECTIONS

The visual inspection of cargo tanks was traditionally performed by workers suspended on ropes to inspect the tank structure. Inspections, which are required on a regular basis, focus on areas of high stress such as stiffeners, brackets, bracing, webs and stringers and assess the coating condition and check for corrosion and damage within the tank. The sheer size of modern-day vessels however, means that access methods including staging, rafting and climbing are often used by surveyors to access tanks in order to carry out their observations.

Traditional approaches to tank surveys therefore have three main drawbacks: high set-up costs, lengthy inspection times and a high level of personal danger for the worker. For the surveyor, the task typically involves high rope access, working within a confined space, often for extended periods of time. In contrast, drone surveys require no human access to the tank and since no access equipment is required, there are no setup costs and inspections can be completed within a quicker timeframe. For a survey of critical components of a tank, it's not unusual for shipowners to see a reduction in survey times from three or four days, to completion within one day.

Another key advantage to shipowners, is that by using a drone over conventional staging inside the tank, the risk of damage to the coating from staging is eliminated. Thanks to these benefits, tank surveys using drones are becoming increasingly popular and drone surveys are offered on all large internal tanks, on vessels such as Floating Production, Storage and Offloading (**FPSO**) units, bulk carriers and tankers.

BATHYMETRIC SURVEY VIA ADAPTED LIDAR

Accurate and reliable information on the features of water bodies and their shorelines is vital to navigational safety. Bathymetric surveys gather this information that is then published for use on nautical charts, meaning it's absolutely vital that this information remains up to date.

Bathymetric Light Detection and Ranging (LIDAR) is used to determine water depth by measuring the time delay between the transmission of a pulse and its return signal. Analysis of these pulses is used to establish water depths and shoreline elevations. Bathymetric LIDAR is also used to acquire data in areas with complex and rugged shorelines, where surface vessels cannot operate efficiently or safely because of rocks, kelp or breaking surf.

It's not all that long ago that surveyors determined soundings positions by using a three-point sextant, fixed to mapped reference points on shore. The process was labour intensive and time-consuming and whilst the measured depths were accurate, they were often limited in number. Information between the soundings was missing, meaning mariners would often be unaware of features on the bottom and would not have the depth information necessary for safe navigation.

In more recent years, Bathymetric surveys come at a high price. A LIDAR system will typically cost around € 880,000 and that doesn't include the fixed wing aeroplane or helicopter to fly it. Bathymetric sensors developed for drones are an emerging technology, allowing this type of survey to be carried out flexibly and at a fraction of the cost. Accurate data concerning bathymetry as well as environmental conditions in shallow waters, can now be acquired using these specialist sensors integrated into drones. To operate effectively in the harsh maritime environment, the technology has been developed to withstand storm force wind and heavy rain, snow and salt spray and as technology advances, so does the flight time available on drones, meaning more area can be covered in a quicker timeframe. Drone technology is therefore revolutionising bathymetric surveys. Faster turnaround times and advanced data is offering more detailed nautical charts, improving global maritime safety.

FLARE TIP INSPECTIONS ON FLOATING PRODUCTION FACILITIES

Drone surveys typically exist to provide close visual and thermal inspections of high, live or difficult to access structures offshore and there's nothing more challenging to access than a flare tip, 70 metres above water, on a floating production facility.

The latest drone survey inspection techniques for flare tips, remove the need for a shutdown to inspect the flare and provide the necessary survey data required to reduce, delay or better plan a turnaround. Drone surveys offer reduced costs when compared to traditional and expensive aerial surveys carried out by helicopter or plane. With no shutdown required, maximum efficiency is maintained and thanks to detailed survey data, the performance of the flare system can be assured.

OFFSHORE WIND ENERGY SECTOR: AN EMERGING MARKET

The wind energy sector is a growing fast. There are currently more than 270,000 wind turbines operating globally and recent research carried out by market researchers Navigant, has suggested that the cumulative global revenue for wind turbine UAV sales and inspection services is expected to reach nearly $6 billion by 2024. The emerging wind turbine UAV market is being driven by the vast number of blades that need to be inspected for deterioration and for pre-end-of-warranty inspections.

Storm force winds, erosion, lightning strikes and even a build-up of insects can have an impact on turbines. Although they are relatively cheap to repair, the average costs being around 3-5% of the turbine's price per year, the key to optimum efficiency is knowing where the issue lies.

Surveying wind turbines has always been a challenging job. To inspect the blades, technicians have traditionally had to scale the turbines with the help of ropes and cables and this type of work at height can be very dangerous.

About Martek Marine Ltd

Martek Marine is a world authority on maritime drone applications, offering 'best in class' platforms, payloads and software to deliver complete disruptive drone solutions.

The company is currently working with a number of major classification societies, flag administrations and major ship operators helping them develop and refine their own drone strategies to revolutionise their businesses and disrupt the market.

The company has been awarded a ground breaking 2-year Remotely Piloted Aircraft Services (RPAS) contract from the European Maritime Safety Agency (EMSA). The services offered will fulfil part of the world's largest ever civilian maritime drone contract.

Martek's continued contractual success follows the company being awarded a previous €10M contract by EMSA for ship engine emission monitoring using RPAS in November 2016. Martek's sister company COPTRZ provided consultancy on both contracts.

For further information visit: **www.martek-marine.com**

As a maritime company, Martek is used to surveying and inspecting all manner of structures on land and out at sea, anywhere in the world. The company uses a drone fleet that's specifically designed for turbine blade inspections onshore or offshore, and it outperforms the leading inspection drone. Martek has surveying wind turbines down to a fine art, with qualified and trained pilots quickly and accurately identifying and assessing faults. Traditional surveying requires turbines to be offline for two hours up to a day, but Martek's inspection process has reduced that time down to just 45 minutes, which is up to 13 times faster than traditional methods, achieving a minimum of 10 turbines a day.

Following the inspection, the client can access the data through Martek's secure, cloud-based asset management portal where they can download a detailed PDF report, as well as access raw survey data. Because Martek uses trained blade experts with significant experience in assessing and repairing turbine blades, survey findings are always accurate and actionable. Indeed, we can report on up to 25 turbines a day.

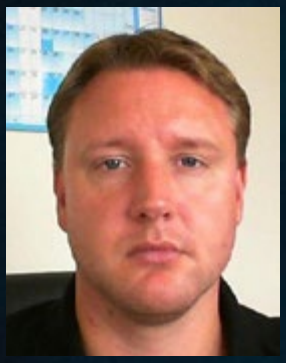
The benefits of using drones for blade inspections are wide-ranging. In addition to the obvious benefit of a quicker and more flexible mobilisation, more accurate results are available in a quicker timeframe, and of course there is also a significant reduction in risk. Technicians only need to access the assets that require attention following the survey, eliminating any unnecessary working at height.

FULLY AUTONOMOUS DRONES: THE FUTURE OF MARINE SURVEYING?

As drone technology gathers momentum, leading drone experts are suggesting that fully autonomous drones are the "next big thing" coming our way when it comes to marine surveying.

When you think about it, it's not dissimilar to a commercial jet flying on autopilot! Fully autonomous drones are pre-loaded with a 3D model of the ship. This allows the drone to autonomously work its way around the vessel, stopping at points of interest to obtain more detailed video, or image data.

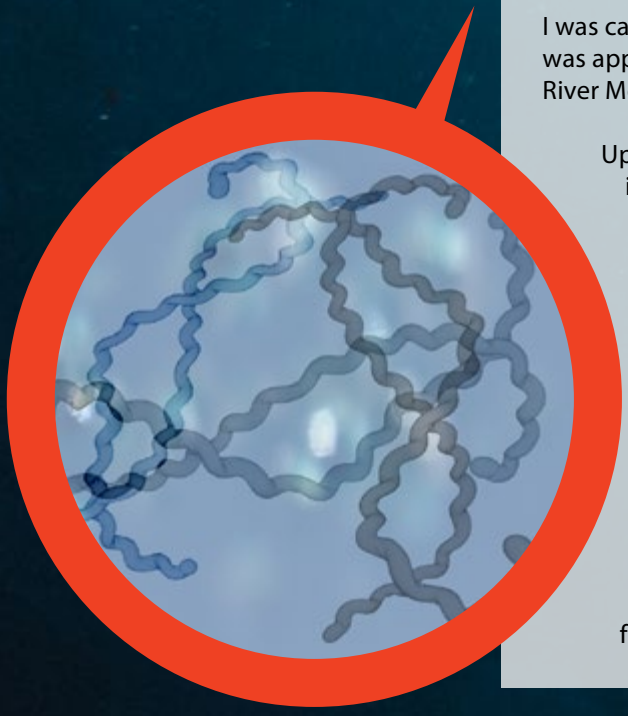
Advancing this further, it wouldn't be unrealistic to think that the drone will be designed to create its own 3D map of the vessel, before carrying out the survey independently.



A FRESH WATER WARNING AND THE ASSOCIATED DANGERS TO YOUR HEALTH

BY **ELLIOTT BERRY** MIIMS

IIMS member, Elliott Berry MIIMS, was out on a routine surveying job a couple of years ago and unwittingly picked up a bacterial infection known as leptospirosis, which is known to create symptoms in the victim similar to influenza. Now fit and healthy once more, Elliott is keen to warn other surveyors who are working in fresh water situations about the potential dangers and what to be aware of.



As some readers of the Report Magazine will know, I contracted Leptospirosis in May 2014 and although I didn't really want to write this article and elicit sympathy from anyone and have avoided writing it for three years, I felt that now was the time to tell others of the dangers, especially with the increase in the number of vessels being converted into houseboats.

I was called to a vessel that was apparently sinking in the River Medway in Kent.

Upon arrival at the scene it was clear that the vessel was in fact afloat still, but had a large volume of water in the after cabins. My first response was to ascertain whether the water was indeed from an external source i.e. river water, or from an internal source i.e. a fresh water leak.

As I had done many times previously I conducted a simple taste test and quickly ascertained that it was in fact "fresh" water. I then examined the vessel's water system and found that all piping was still well installed and properly connected and that the water tank was in good order with no sign of leaks. A mystery indeed.

I advised the owner to pump out the water and to keep the area under observation and to call me if any further water were to appear. After six or seven days I had heard nothing.

During the next couple of days, I had been doing some work in the garden at home and started to feel unwell, but initially I put that down to having overdone it.

Over the next few hours I started to feel weak and developed a serious headache. At this point I rang the doctor and made an appointment. Initially the doctor intimated that it may be meningitis but that as I had no rash or sensitivity to light that diagnosis

was quickly dismissed. The advice was to go home, drink lots of water and take paracetamol and to return in a few days if the symptoms persisted.

Unusually for me I followed the doctor's orders, but the weakness and headache became progressively worse and I developed uncontrollable shivering; and so a visit to the Accident and Emergency department ensued upon which it was decided that I had contracted hepatitis A and should go home, drink lots of water and take paracetamol.

That night my wife became increasingly concerned as I had developed a fever, so a further visit to hospital was undertaken. Upon arrival, it was clear to the doctors that something was seriously wrong and I was admitted immediately and placed on a saline drip.

The next few hours are a bit of a blur but a huge number of blood tests, CT scans and ultrasounds were carried out and initially nothing was diagnosed although the blood tests showed that my liver had extremely elevated readings.

I was given numerous antibiotics and liquid paracetamol over a 24 hour period but the 41 degree fever would not subside to the point that it was clear that my life was at risk.

A series of different medications were administered to me and, after eight days in hospital, I had recovered sufficiently to return home although at that point nothing had been officially diagnosed and the only possible suggestion to fit the symptoms was leptospirosis despite not showing up in blood tests.

After a further three weeks convalescing I was able to return to work and some investigation into what may have caused the illness was undertaken. As it turned out, the vessel in question had been converted to a houseboat some twenty years previously and the bilges were cleaned out but, instead of disposing of the contents properly, the liquid and debris were placed into one of her ballast tanks.

The tank had subsequently corroded form the inside and had deposited its contents into the aft cabin ready for an unsuspecting surveyor to taste it. Obviously, the true contents of the water are unknown, but I can assure you that I no longer undertake taste tests on water and urgently advise that no one else does the same.

In order to prevent anyone suffering the same fate as I did I thought it prudent to highlight the dangers faced when working in or around fresh water, a normal, daily occurrence for many surveyors.

INTRODUCTION TO LEPTOSPIROSIS

Leptospirosis is a bacterial infection caused by certain members of the genus *leptospira*. Most people who develop a leptospirosis infection only get mild symptoms, but a bit more serious influenza-like symptoms are also quite common. In a minority of infected persons, leptospirosis develops into the dreaded Weill's disease. Weill's disease is a serious condition that can involve liver failure, kidney failure, meningitis and sepsis. Weill's disease can be fatal.

Weill's disease is caused by *leptospira interrogans* belonging to the serogroup Icterohaemorrhagiae or Pomona. A person who develops Weill's disease will usually have gone through influenza like symptoms of leptospirosis for a week or so and seemingly be well on their way to recovery. After a short period of no symptoms or only mild symptoms, the person gets very ill with symptoms of poor liver function, poor kidney functions, meningitis and/or sepsis. The lethality for Weill's disease is 5% – 10%.

TRANSMISSION

Urine and blood from a leptospirosis infected person or animal can contain a sufficient amount of bacteria to spread the disease. A common transmission route for humans is getting urine or blood from an infected animal on damaged skin. Even a tiny skin abrasion can be enough for the bacteria to get into the body. Leptospira bacteria can also enter the body through mucous membranes, e.g. those found in the eyes, nose, mouth and genitals.

When infected blood or urine gets into water or soil, the bacteria can survive there for several months. Contract with contaminated water or soil can be enough to catch leptospirosis, e.g. if you have a small abrasion on your skin or get water/soil onto a mucous membrane. Also, keep in mind that water and soil can contaminate food and food can also be directly contaminated by urine and blood.

Many different animals can carry and transmit leptospirosis, including dogs, rodents, cattle, horses and pigs. An infected animal is often symptom free and can continue to excrete bacteria into the environment year after year.

The incubation time for leptospirosis in humans is usually one to two weeks but anywhere from 48 hours to more than a month has been reported.

SYMPTOMS

Examples of symptoms from the eyes

- Eye inflammation can occur, with reddening of the eyes and increased sensitivity to light.
- If leptospirosis bacteria causes liver inflammation with poor liver function as a result, one noticeable symptom can be the yellowing of the sclera. The sclera is the white part of the eye; the part that surrounds the iris. When the liver isn't working properly, the sclera becomes yellow due to increased levels of bilirubin in the body. In some cases, the sclera can even look greenish. Always check your eyes before you put in your contact lenses if you wear coloured lenses. If you do not you risk not seeing the symptoms of leptospirosis, liver damage and a long list of different diseases.

Examples of symptoms from the skin

- Skin rash
- If leptospirosis bacteria causes liver inflammation with poor liver function as a result, symptoms can include the yellowing of the skin due to increased levels of bilirubin. In such situations, itchy skin is also common. In severe cases, the skin can look greenish rather than yellowish.

Examples of symptoms from the digestive system

- Stomach ache
- Diarrhea
- Vomiting
- If leptospirosis bacteria causes liver inflammation with poor liver function as a result, symptoms can include pale feces and dark urine.

Examples of symptoms from the respiratory system

- Coughing up blood (caused by lung bleeding)

Examples of other symptoms

- High fever
- Chills
- Headache
- Muscle ache
- Edema

TREATMENT

Leptospira bacteria are sensitive to several different antibiotics, including well-known ones such as Penicillin and Doxycycline.

If the infection is diagnosed early and symptoms are mild, oral antibiotics are often sufficient. In more severe cases, intravenous treatment with antibiotics may be necessary. Each individual symptom can also require specific treatment. If kidney function is impaired, dialysis can be carried out.

When an MD has good reason to suspect leptospirosis in a patient, antibiotic treatment is typically started right away, without waiting for test results.

HOW QUICKLY CAN AN ILLNESS DEVELOP?

Human leptospirosis takes a while to incubate, and the normal range between exposure and illness is 3 to 14 days, although it can take up to 21 days. It's considered extremely unlikely that the illness would show earlier than 24 hours after exposure, even if the patient was otherwise unwell. In rare cases the incubation time can be very long (several weeks), but it is normally assumed that if there is no illness after 30 days then infection is either not present, or was subclinical.

Illness that develops within 12 hours of the exposure event would not be leptospiral in origin. Often infections that involve contaminated water can show illness very rapidly, caused by the effects of other unrelated bacteria and viruses in the water (such as

E.coli or cryptosporidium), or from some chemicals, and while these would not in themselves normally be life-threatening, they can mask the later symptoms of leptospirosis.

The incubation time depends on the strain of bacteria involved, as some strains reproduce faster in human blood than others, but the main factor is the size of the 'inoculum' – the dose of bacteria that entered the patient during their exposure. Although it's perfectly possible to be infected from a single bacterium, in reality the illness develops because the rate that the bacteria are reproducing is faster than the patient's immune system can control. Bacteria grow by splitting in half, so one becomes two, two become four, and so on. If the patient received a large number of bacteria from the initial contact then the numbers in their bloodstream will be larger, and increase faster – hence the illness develops sooner.

It's very difficult to predict the incubation time in a patient, but in very general terms the concentration of bacteria in the inoculum will be important (water from a large clean river will have many times less bacteria per litre than urine direct from a rat) and the volume that enters the body (infection via small cuts to the skin usually involve very small volumes of liquid, but swallowing water after a fall into a lake will of course involve far more. The balance of course is that the situations where patients suffer a high-volume intake are usually those where the liquid has a low concentration (you are unlikely to fall into a tank of rat urine).

PRECAUTIONS AGAINST INFECTION

To minimise the chances of infection, the only truly effective way is to avoid contact with contaminated water and animals, thus avoiding exposure to the bacterium. If you are in a high risk area, you should always attempt to minimise contact, as there are many hundreds of other organisms that can lurk in the water apart from Leptospira. Unless you are required to enter the water, you should stay away from it. Animals themselves present a risk while infected, as their body fluids can contain the bacteria.

WATER

The vast majority of human cases are from contaminated water, and of those the majority are occupational cases from areas of the world where agriculture and rodents mix – rice-farming, cane-growing and so forth. Recreational exposure is next, with cases amongst swimmers being the obvious top grouping. Lowest of the risk groups is occupational exposure in the developed world – water and sewer engineers, construction, pest control and so on.

Clearly there are problems in preventing exposure in the highest risk activities (rice-farming and such) and in those areas the only option is to be aware of symptoms and seek early treatment. At this time there is no universally agreed human vaccine, and the preventative use of antibiotics can only be considered for short periods.

Swimming is the greatest risk and several cases are reported each year from swimming in contaminated water (both in the developed world and in activities such as adventure racing). There is no practical way to prevent exposure as some water will always enter the mouth. For one-off activities such as expeditions there is an argument for using a preventative antibiotic (doxycycline), which can offer increased resistance to illness for a few weeks. It should never be used long-term.

Anglers and bankside/sewer workers should wear splashproof clothing and especially gloves. Anglers are at higher risk as it is reasonably common to cause minor cuts with hooks, knives and the like, and this greatly increases the ease by which the bacteria can enter the body. Fish caught from suspect areas should of course never be eaten. Whilst cooking does in theory kill any bacteria within a fish, very often the level of cooking is insufficient to guarantee safety.

Recreational exposure (swimming, skiing, sailing, caving, etc) is clearly done at the person's own risk and they must weigh up their own balance of risk vs. desire. The same preventative measures apply – minimise the risk of water entering the body by any and all means. Consider antibiotics if the risks are very high, and be aware of the symptoms and seek treatment immediately. There are no 'quick fixes' to prevent infection. Some swimmers wash their mouths with antibacterial rinse, though this has not been proved to offer any significant benefit other than keeping their teeth clean.

Scuba divers, who are particularly at risk, should opt for drysuits and try as much as possible to avoid swallowing any water when purging or changing regs. Commercial divers are required by their employment regulations and insurance to comply with strict rules when working in contaminated water, these include the use of hard-hat systems, wash-down stations and regular medical testing.

Remember that this advice applies only to those working in FRESH water environments. The risks in salt water are virtually zero.

NEW PRODUCTS

Each quarter The Report brings you an update on some of the new products and innovations to hit the boating, shipping and maritime industry.

New small diesel from Moteurs Baudouin

French diesel engine manufacturer has released the new 4W105M marine engine as part of the W105 range.

The W105 range now includes 4 and 6 cylinder engines (4.5L and 6.75L respectively) covering the range 95-185 kW.

Moteurs Baudouin is equipped with modern production facilities and the latest machining technical innovations.

New App from Digital Yacht

OutboardView is a new app from Digital Yacht designed to allow a smartphone or tablet to display engine data and calculate optimum efficiency. Fuel economy while boating is a major consideration and small changes to trim or RPM can make a big difference to the optimum economy. In addition, sea state and weather are also variables that impact the sweet spot.

OutboardView is designed to show engine parameters such as RPM, boat speed, oil temperature and pressure as well as calculating optimum fuel economy. The system can use speed data from either the boat's navigation system or from a GPS.

C-Sense has success with EcoPilot

The Eco Pilot is an efficient, easy to install, inexpensive fuel consumption monitoring system. It is made by France-headquartered C-Sense, a specialist in embedded electronics with a research and development team of highly skilled engineers.

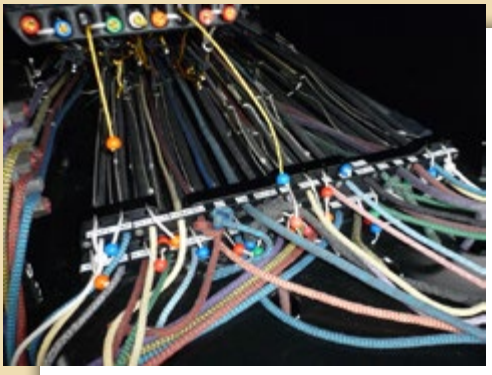
The company reports that more than 80 vessels of all kind are now equipped with the Eco Pilot and all of these companies have made substantial savings since installing the system to their vessels.

TMS and Boluda, two majors players in the towing French market, saw a real advantage equipping their vessels with the Eco Pilot.

"Even assuming the actual low price level of gasoil, we estimate a payback period of between 12 and 18 months", said Pierre-Alexis Dormegnies of C-Sense, commenting that the Eco Pilot allows users to measure fuel consumption in real time, providing options for very precise billing.

"There are many advantages to having this system to monitor fuel consumption and C-Sense offers a software application allowing the user to view and analyse the data collected, even making it possible to establish a Ship Efficiency & Energy Management Plan," he said.

For details see: **http://www.csense.fr**



Constrictor system does not crush rope

Unlike conventional clutches the Constrictor system available from SailTek does not crush rope between two metal surfaces. Instead, points out Jason Belben who heads SailTek, the loaded rope is held securely in a textile sock that is itself attached to an anchor base.

The rope runs freely through the sock in one direction, but is gripped within the sock when running out in the opposite direction with holding power increased as the load increases.

"We've been supplying a lot of these including to the Open 60 Hugo Boss," said Mr Belben. "They are filtering down to mainstream boats. A lanyard attached to the end of the sock is pulled to easily and safely release the line when it's under load.

"The Constrictor is also weight saving – it's around a third of the weight of conventional rope clutches – and is not so aggressive with the rope."

Maxwell Vetus launches new heavy duty windlass

The latest heavy duty windlass from Maxwell, a Vetus brand company, is the RC12HD that has a larger - 2000W - fan cooled 24V motor than the standard RC12 windlass.

The RC12HD is designed for use with 10mm to 13mm short link chain with 18mm to 24mm nylon rope with the motor and gearbox sized to meet typical classification society test requirements for 12.5mm U1 stud link chain.

"This design is particularly well suited to vessels requiring high service speeds such as patrol vessels as the reduced weight of rope/chain combination removes weight from the front of the vessel," explained Stephen Baker of Vetus UK.

The product is fitted with a heavy-duty fan cooled DC motor and fin cooled gearbox designed to allow running for extended periods.

The 1.5in mainshaft is manufactured in high strength, corrosion resistant 2205 Duplex stainless steel and the above deck components in AISI 316 stainless steel.

High performance racing finish coating

International marine coatings company, Pettit Marine Paint, has launched what it calls its highest-performance racing finish to date. Black Widow is a powerful dual-biocide bottom paint that provides multi-season protection in all waters.

"With the release of Black Widow, we are adding functionality to our coatings that goes well beyond bottom protection," said Don Zabransky, vice president sales & marketing, Pettit Marine Paint.

Mr Zabransky said that racing sailboats, bass boats, personal watercraft and high performance offshore powerboats can all benefit from Black Widow's four strong slickening agents, Molybdenum Disulfide, Polytetrafluoroethylene (PTFE), Graphite and Silicon.

Details:
http://www.pettitpaint.com/product.asp?id=300

New cleaning products for superyachts

Wild Group has launched a new set of cleaning products for superyachts, designed to be used on paint, gel and vinyl wrapped surfaces.

The Boatox range of products is designed to help crew clean, restore and protect exterior and interior surfaces. The product formulas are based on nano surface technology and chemical engineering that the company says out perform many products for finish and durability.

The products are biodegradable and include an everyday yacht shampoo, a heavy duty cleaner and a hydrophobic nano spray. The shampoo is pH neutral manufactured to wash boats without removing sealant or wax protection. It can be used on gel, painted and wrapped surfaces.

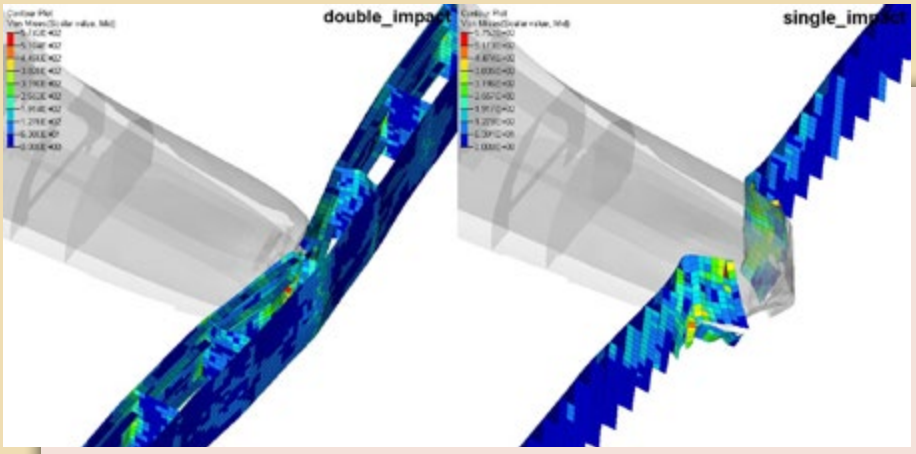
http://www.wildgroupinternational.com/boatox-latest-cleaning-technology-environmentally-friendly-biodegradable/

Safer towing for smaller vessels

Norwegian maritime safety and lifting expert H Henriksen AS has introduced a disc type towing hook for safer on-load release.

When a line is released under tension from such a hook, some of the kinetic energy of snap-back is absorbed by spinning the heavy disc from zero up to a quite high speed, almost instantly.
It is certified under DNVGL- ST- 0378 regulations and, according to Henriksen Hooks requires virtually no maintenance. After every interval of five-years the manufacturer can test and recertify the hook to ensure that it has a long working life.

According to Ole Rasmus Undrum, Sales Manager, Henriksen Hooks there are multiple vessel types that could benefit from such equipment: "The first sale has been made to a fish farm on the west coast of Norway where the movement of feed barges is a regular part of daily activity. A substantial purchase of the hooks has also been made by the Norwegian Society for Sea Rescue which expects to make frequent use of them for rescuing small craft. Outside of small workboats and towing vessels there is also some interest from concerns such as pilot boat operators, who's vessels, while not routinely engaged in towing, are quite likely to find themselves in first responder situations where towing could be required."



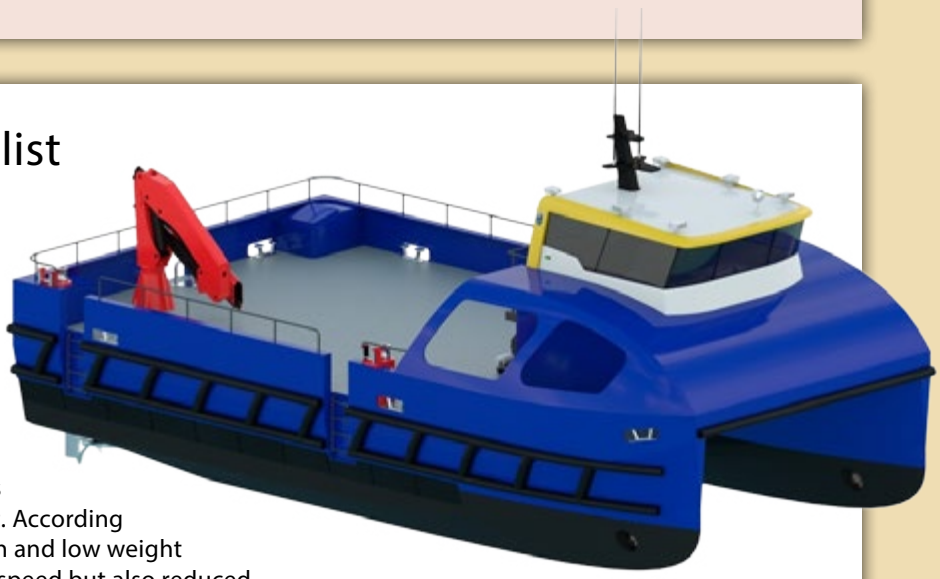
HMD and DNV GL present world's first double side hull LPG carrier

At the Gastech 2017 conference in Tokyo, DNV GL presented Hyundai Mipo Dockyard (HMD) with an approval in principle (AIP) certificate for a new double side hull LPG carrier design – LPG SAFE (Structural Advances for the Environment).

The result of a development project conducted by HMD working closely together with DNV GL, the AIP certificate confirms that the design complies with the new DNV GL rules for the classification of ships. The innovative LPG SAFE design is the first 38K LPG carrier design to provide the safety benefit of a double side hull, while offering the same cargo carrying capacity and the same construction cost as a conventional design.

LPG carriers are designed to carry liquefied gases such as propane or butane in bulk. The ships are normally equipped with cargo tanks inside the hold, with Type A independent cargo tanks arranged inside the hold, supported on insulation-bearing blocks which typically consist of wooden chocks installed on the inner bottom structure. The double side hull design of LPG SAFE offers a significant increase in protection for these tanks, especially in the event of a collision.

New fish farm specialist workboat by Tuco



Danish composite vessel specialist builder, Tuco, has introduced a new 14.99m catamaran workboat specifically for the fish farm market.

The boat's hull requires lower maintenance since it is built from composite materials, which guarantees very high strength and minimal weight. According to Tuco construction with high strength and low weight allows not only high performance and speed but also reduced operational costs. Furthermore, the ballast tank system enables the use of cranes with a capacity that exceeds the standards for this class of boats.

The boat is designed for the fish farming industry where it will serve as a platform for work and crane operations. The unique construction has been tailored to fit the tasks in the industry and allows for heavy lifting. The tasks are diverse and include for example replacement of nets, feeding, underwater inspection, research, dredging, installation, repair and maintenance of structures.

The 14.99 metre ProZero catamaran is equipped with a ballast tank system in order to supply the inherently light vessel with the weight and hence stability necessary to counter any imbalances that may occur during heavy lifts at the breeding facilities. The heavy work includes replacement of nets on smaller cages and handling of heavy equipment. By utilizing the ballast system, the weight distribution can be easily adjusted to obtain the necessary stability. The operation takes just 6 minutes and the boat is ready for lifting.

VPLP design launches Oceanwings

Drawing on extensive experience in the field of rigid sail development, France's VPLP Design has developed a two-element wingsail for commercial craft which is furlable, reefable and entirely automated. Called Oceanwings, this new automated sailing system has been tested on small sail craft but is being developed for use as a sail assistance system for shipping.

VPLP Design's interest in rigid sails started in 2010, when they were involved in the design of high performance America's Cup sailing yachts. From this the Oceanwings team acquired real design expertise, and convinced them of the bright future awaiting this type of rig for use on commercial vessels. Despite their superior aerodynamic efficiency wingsails possess a fundamental hindrance to their use on commercial vessels, their rigidity. This limits their ability to reduce the surface area, which means that they can't be reefed or furled like fabric sails.

"Oceanwings developed by VPLP Design is a practical solution for overcoming these obstacles and a significant step down the road to increasing the adoption of wingsails. We are offering a wind propulsion system that is reliable, simple and automated." commented Marc Van Peteghem of VPLP. "We have developed a reefable and furlable rigging concept which exploits the aerodynamic qualities of multi-element profiles."

VPLP Design wanted to know just how big the fuel savings could be when operating Oceanwings in conjunction with a traditional combustion-engine propulsion system. "We have developed a software solution which allowed us to make statistical predictions about energy consumption on optimized passages." said Marc Van Peteghem. "Depending on routes and vessels, we identified fuel consumption reductions of 18% to 42%. Even though wind propulsion achieves double-digit fuel savings its use must not mean carrying additional and specialist crew. In other words, automation has to be an essential feature. By integrating manufacturing considerations early in the design stage, VPLP has managed to ensure that costs are on a par with the purchase of a high-performance rig and can be quickly recovered by commercial operators.

New CTV unveiled by Umoe Mandal

Umoe Mandal in Norway has unveiled a new design, the Wavecraft, a series of high-speed, all-composite service vessels designed for fast crew transport. The company says the high-speed craft offers offshore operators "a long range economical, commercially feasible and safe alternative to helicopters."

The company says the Wavecraft "delivers substantially reduced transit time, excellent seakeeping and superior fuel economy, transferring personnel to far-from-shore installations smoothly that they arrive refreshed and immediately ready for work."

Wavecraft Voyager can be delivered in a standard or as a 'high performance' version. "Both have unmatched speed and seakeeping capabilities, and offer superior fuel economy, reducing environmental impact and downtime, and increasing overall productivity," said Umoe Mandal, noting that the Wavecraft Voyager can maintain this level of performance even in high sea states and can transport crew at sprint speed of 58+ knots.

"Utilizing an active motion damping system, Wavecraft Voyager makes it possible to reach offshore installations even when the distance from harbour is significant and weather conditions are poor," the company claimed.

New rigging company opens for business

Evolution Rigging has started trading from its base at Suffolk Yacht Harbour on the UK east coast. Headed up by Richard Odell, formerly of Oyster Yachts, the team at Evolution Rigging has more than 40 years' combined rigging and sailing experience. "Rigging and sails in particular come hand in hand, so it makes sense to ensure they are set up to complement each other rather than addressing them in isolation," he said.

"Importantly we are sailors as well as riggers, so we understand how to help customers get the most out of their boats, whether it be for cruising down the river or competitive racing," explained Mr Odell.

"No two boats are the same, so owners can find it difficult to know what is best for their rig. We understand how daunting it can be and offer customers the chance to come in and discuss their requirements with our experienced team."

Wave International has launched its oil water filter separator, MiniBOSS

MiniBOSS is a small, lightweight, low cost and easy to maintain oil water separator. The certified bilge filter system provides effective control and prevention of oily bilge water discharge. The Wave MiniBOSS separators use two Wavestream WS-C3 cartridges to attain the high efficiency and holding capacity required to meet these requirements set by the IMO.

MiniBOSS meets the Marine Pollution (MARPOL) requirements as stipulated by the Marine Environment Protection Committee (MEPC).107(49) certification.

It has been fully tested at 15ppm and 5pmm levels, gaining certification from the US Coast Guard to meet the IMO Resolution which stipulates that all shipboard oily water separator's (OWS) achieve clean bilge water under 15 ppm of type C oil or heavily emulsified oil, along with any other contaminates that may be found.

New offshore suits from Viking

Viking has introduced a new suit for those working in the offshore sector and who are exposed to more extreme conditions. This new suit, the PS4191 combines the roles of anti-exposure suit, work suit and as an immersion suit. According to Soren Hansen, the manager for Viking Global Products embracing Personal Protection Equipment (PPE), the new suit is highly breathable, thus minimising the risk of heat stress and condensation build-up.

The suit when fitted with the fully integrated inflatable buoyancy and various lining choices is both an ISO and SOLAS approved suit. Viking claims that it is a viable replacement for three individual pieces of PPE such as the summer suit, the winter suit and a lifejacket which are typically worn in the industry. "The PS4191 is feature-packed and ergonomically enhanced unlike any suit seen before and compared with what people usually wear out there, it is a huge upgrade" said Hansen.

See web site for details:
https://www.viking-life.com/en

Fifty Shades of Insurance: Chapter 13

Passion and Fury - Dash to the Rescue

We are passionate about our business, insurance broking - our service, our writing, our training; are you passionate about yours?

And one of our great passions is punctuation. An occasional little "dash" - a much maligned mark - can work wonders. So here we will join the growing number of defenders to consider the use of the "dash"!

It has been said that the dash is "the most exciting and dramatic punctuation mark of them all".

So let's consider its use against other punctuation marks:

Example:

BRACKETS

It was (not unexpected) in poor condition being a fifty year old yacht

COMMAS

It was, not unexpected, in poor condition being a fifty year old yacht

SEMICOLONS

It was; not unexpected; in poor condition being a fifty year old yacht

DASHES

It was - not unexpected - in poor condition being a fifty year old yacht

Which example is the strongest and most dramatic?

Dashes have other uses – to parenthesise a statement:

Example:

The bolts were too old and rusted – they were over 50 years old – so as expected we could not remove them.

Are you as versatile as the "Dash"

Dashes can be used as:

- A linking device
- As a pause
- Signalling surprise or paradox
- Indicating disruption and interruption
- Separating lists
- After thoughts

Some others use dashes to introduce subjects - some people refuse to use them at all - and others are infuriated at their use. The simple dash can cause such emotion. What do you use your "dashes" for - if at all?

As this is all for now – *the dash is short* - for those interested you may consider delving into the depths of one of the well-known *Usage and Abusage* books - of course for English purposes only.

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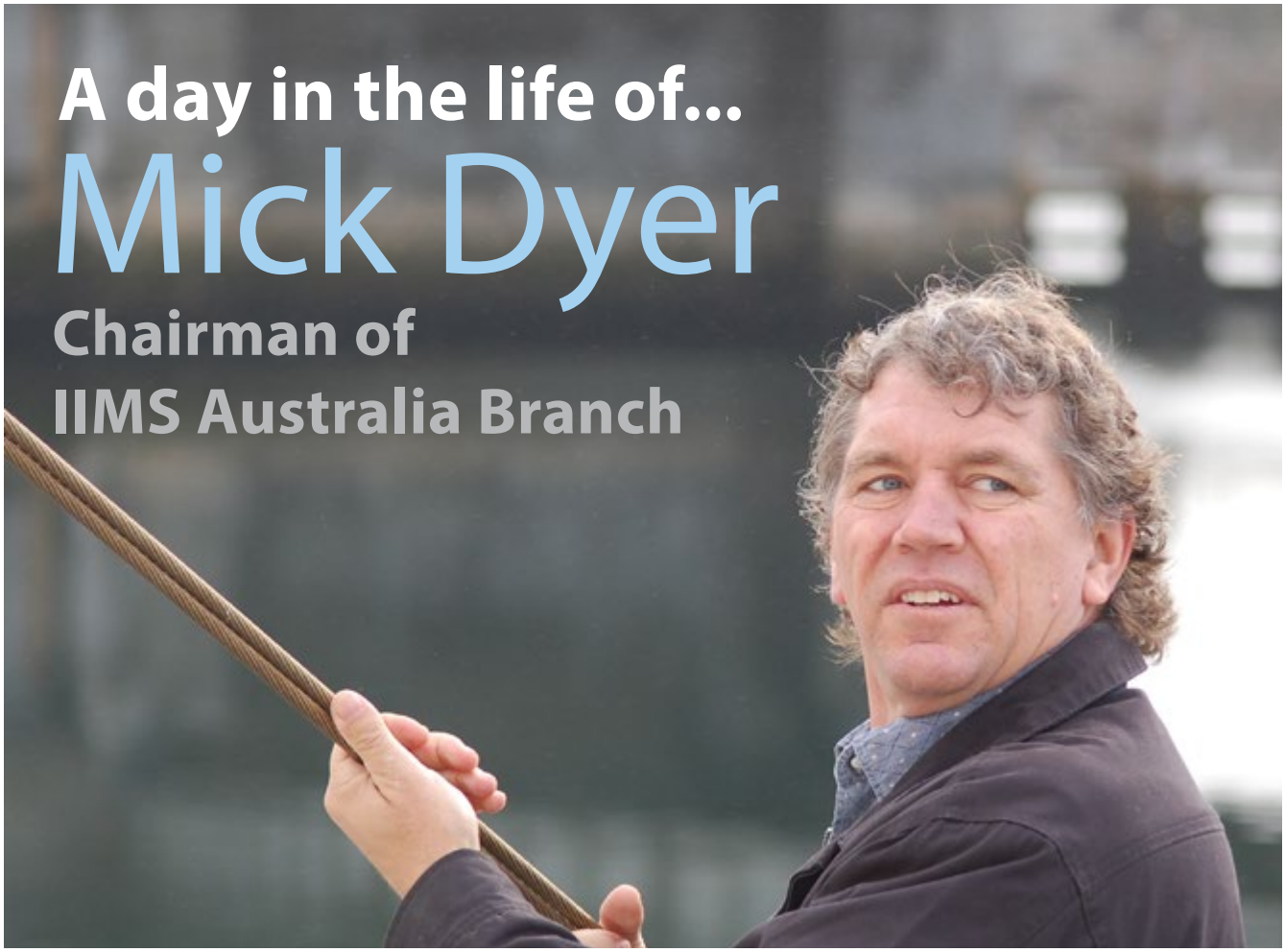


A day in the life of...
Mick Dyer
Chairman of IIMS Australia Branch

Mick Dyer *MIIMS* resides in the district of Port Lincoln in South Australia, a small city in comparison to many with a population of around just 15,000. In June 2015, Mick was elected as Chairman of the thriving IIMS Australia Branch. Mike Schwarz, in conversation with Mick, poses the questions.

Q. What type of marine industry goes on in the Port Lincoln area and typically what sort of vessels are common place?

A. Port Lincoln has one of Australia's largest fishing fleets made up of a range of vessels from 7 10mtr Aluminium Punts to 35mtr Trawlers. There is a large Tuna fleet here which has vessels built for extended voyages out in The Great Australian Bight as well as Aquaculture service vessels to accommodate the 100+ Tuna farms located north of Port Lincoln in Boston Bay. We also have a large fleet of 20mt Prawn trawlers as well as over 50 Cray vessels. Aside from the fishing fleet, Port Lincoln has a deep-water Port to facilitate the large grain ships that load grain harvested from all over the west coast of South Australia.

Q. Australia is a large country. How far do you travel for work, or is there sufficient surveying in the Port Lincoln area to sustain you?

A. The majority of my work is in and around Port Lincoln, yet I do travel quite far up the West Coast of South Australia. There are quite a few aquaculture businesses operating 300-400km west of Port Lincoln which is a remote part of the state. I also do work in Ceduna (West Coast) for some of the tug companies as well as north of the state in Whyalla. I like the travelling part of the job and getting out there to the remote areas along our amazing coast.

Q. How did you get into marine surveying and what was the attraction of surveying as a career choice?

A. I started my working career as an engineer for a Tuna company after working my way up from the deck in 1982. This then lead to becoming a Fleet Manager for a larger company which operated 9 vessels as well as trucks and machinery that serviced the company. Keeping up with compliance for the fleet gave me a solid understanding of how the surveying process worked and I always liked to have the vessels ready for the surveyor upon their

visit. In the mid 90's, I started a small business conducting pre-purchase surveys and insurance appraisals whilst still acting as fleet manager for a fishing company. Prior to 2015, the State Government surveyed the vessels and these surveyors had to fly in from Adelaide on a pre-determined date and hopefully the slipping arrangements and other compliance arrangements were sorted, but often was the case that the surveyors trip was miss aligned with logistics and the process would get complicated. In mid-2015 when AMSA took over the delegation of compliance for Domestic Commercial Vessels, they opened up the process to "Accredited Marine Surveyors" so I immediately went about becoming accredited.

Q. As a surveyor, what would you say is your principle area of specialism?

A. I have spent 30 years on fishing vessels operating in waters from the middle of the Great Australian Bight to 180nm south of Tasmania as well as being involved in the pioneering of Tuna ranching in South Australia. This has given me hands on experience in running high calibre fishing vessels with heavy machinery in heavy weather and witnessing the limits these vessels can endure. It has also shown me the need for watertight integrity and safety systems to be fully functional as most of the problems I have seen at sea, occurred when the "back up system" failed or the crew had no contingency plan when things went left of normal. For this reason, I would say my area of specialism is spotting the potential dangers on board when you look beyond the standard operations and ensuring the vessel is fit for purpose.

Q. What is the best aspect of being a marine surveyor?

A. I would have to say travelling around our beautiful coast, meeting lots of mariners and working outdoors and on the water. The days on the water help offset the nights sitting behind a computer doing the paperwork!

I have spent 30 years on fishing vessels operating in waters from the middle of the Great Australian Bight to 180nm south of Tasmania as well as being involved in the pioneering of Tuna ranching in South Australia

Q. Some are concerned about the image of marine surveying as a profession, saying it does not carry the same kudos it once used to. What would you say is the situation in Australia?

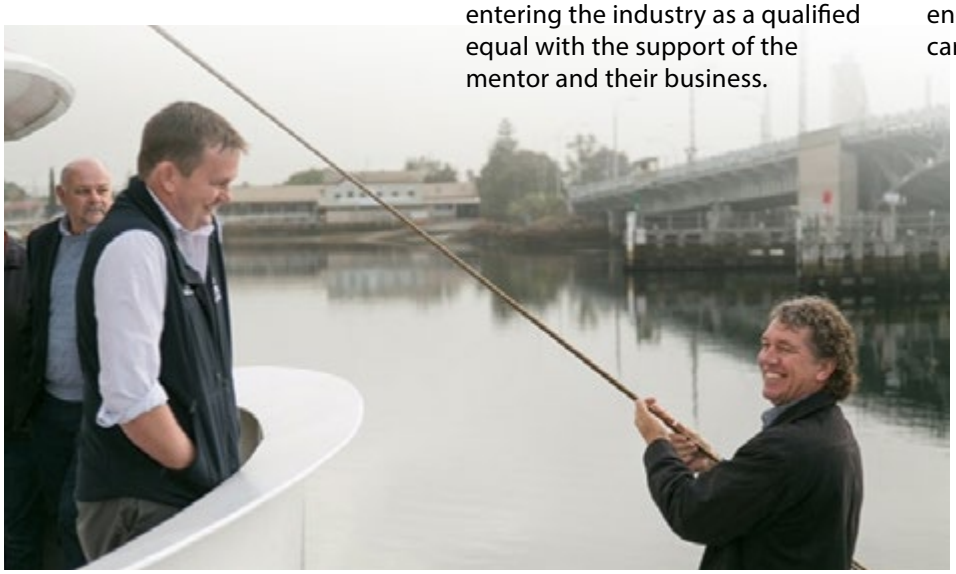
A. I think the opposite has evolved in Australia. Marine Surveyors are now playing a major role in the safety and compliance of the entire Australian fleet and the Australian Maritime and Safety Authority are using these surveyors as their eyes and ears out in the field.

Q. Technology is changing fast and autonomous vessels it seems will be with us soon. An opportunity for a surveyor or a threat?

A. This technology amazes me and I am in two minds as to its future. If it helps save lives and helps keep the marine freight industry lucrative, then it's a good thing but there needs to be more runs on the board. From a surveyor's point of view, I don't see it as a threat as the systems and fail safes aboard the vessel must still be compliant and tested; and there will always be someone wanting that all important signature that takes the responsibility away from them. I think it is important for the modern surveyor to keep on top of their training and Continuous Professional Development which should encompass new technology like this.

Q. How important is appropriate surveyor education and training for upcoming surveyors in Australia and is there any provision for mentoring such individuals?

A. I am a huge advocate of education and training and feel that this is one of the area's which needs work in the surveying industry in Australia. As our industry has changed and grown through the introduction of a National System, there has been confusion and frustration over the various functions of the private surveyor along with the various compliance requirements from state to state. Our National Regulator is actively accrediting new, young surveyors in various subjects of Marine Surveying yet it's hard for these individuals to gain experience and income to run a profitable business. Under the current guidelines, an accredited surveyor can survey and sign off on the areas they have been trained and accredited in yet they must have insurance and administration systems in place equal to a fully qualified surveyor. This leaves them out in a competitive market trying to pick up work within their survey limits and creating micro competition within the industry affecting no one except the customer. I think the training and accreditation could come from the surveying industry itself and this training should be a complete package leaving the fully trained and mentored surveyor entering the industry as a qualified equal with the support of the mentor and their business.



Q. It has been said that Port Lincoln is the 'Seafood Capital of Australia'. What is your favourite food and what would you recommend to eat if anyone finds themselves in that part of the world?

A. Port Lincoln is definitely the Sea Food Capital of Australia and my favourite would be sashimi Tuna or Kingfish. I also like our local whiting and the Oysters from our west coast are world renowned. For visitors, I usually recommend whatever is fresh on the day but you must try the sashimi rosettes from the Lincoln Hotel.

Q. When you have the chance to escape at the end of a busy day, how do you choose to relax and what hobbies do you enjoy?

A. I actually have a 1965 Lewis Ski Boat in my shed which I have been rebuilding for the last couple years. It's a bit crazy spending time on a boat in my spare time, I guess that's why it's taking so long. I get out on my motor bike when the weather lets me and camping with the family is probably my favourite escape.

Q. And finally if you were to give a message for the next generation of surveyors, what would it be?

A. Start at the bottom of the boat. Learn what happens in the engine room before you get too carried away with compliance and administration. This means going out on vessels and experiencing the rigours that the vessel and crew can be exposed to and how difficult simple things can be when the vessel is pitching and rolling, or plunged into darkness. Spend some time on smaller boats and you will learn how important it is to have systems in place before you need them, as problems usually occur in twos and threes and can get out of hand if not dealt with immediately.

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