# THE REPORT

The Magazine of the International Institute of Marine Surveying

MARCH 2021
ISSUE 95

## The CTU Code - why we need it

## VAT on Yachts post Brexit

## Costly claims for crane failures caused by human errors

## The Estonia disaster continues to be a bottomless source of learning

## President's column: The new order after Brexit - what we know

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# THE REPORT

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**MARCH 2021 • ISSUE 95**


## Contents







# Editor's Letter

**Dear Colleague**

Welcome to another packed edition of the **Report Magazine**, one which offers an eclectic mix of content for readers. I have deliberately tried to veer away from COVID-19 in this edition, although the pandemic continues to present real challenges for many surveyors and the Populous at large as we start to emerge from a cold winter in the UK.

A great deal of industrious activity has taken place at IIMS since the start of the year, much of which you will learn about as you turn the pages of this edition. The Institute has made some important announcements and faced a challenge or two. President, Geoff Waddington, reflects on some of these challenges and events in his column - let me refer to some of them as the unintended consequences of Brexit which challenge the livelihoods of some members - and I am grateful to him for the time he has invested in trying to find answers and solutions for the benefit of members.

In January, the Institute unveiled its latest **Professional Qualification**, this one a standalone suite of 10 modules dedicated to *marine corrosion*. The number of expressions of interest registered so far is encouraging and has surpassed my expectations - read more on page 31.

There are no apologies from the editor for the number of pages that are devoted to *container shipping and cargo* in this edition. In fact, the glare of the spotlight shines out to highlight the container shipping sector and some of the serious issues it is currently facing. What seemed to be a reasonably manageable situation in recent years, burst into the media spotlight in the second half of last year with several major 'containers lost at sea' incidents, culminating in November with the loss of 1,800 containers from the ONE Apus. The ramifications of this incident, to say nothing of the cost, are huge. One estimate suggested, almost unbelievably, the final insurance claim could top US$ 200 million. This is simply not sustainable. With this in mind, I am grateful to Bill Brassington, who is well qualified with his work in developing the CTU code, for authoring the lead article entitled '*The CTU Code – why we need it*' from page 38.

Karen Brain has tackled a pertinent topic for our times as she considers *communicable disease exclusions* in insurance policies with advice about what you should know and be aware of - see page 100.

I am grateful to members of the DNV-GL team (now renamed DNV) who have contributed several technical articles to this edition - just the way it goes sometimes - and their combined technical knowledge is impressive.

The subject of *VAT on yachts and boats* post Brexit has been fixating many people. Russell Kelly is on hand, fortunately, to explain the changes and what they mean on page 57.

Innovation plays an increasingly important role in the marine world and looking forward to what lies ahead can be invigorating. This is perfectly illustrated in two articles, the first on page 78 entitled '*AkzoNobel unlocks more sustainable future for coatings after biomass breakthrough*' and the second '*A multi-slat hydrofoil solution for low-speed sailing in heavy seas*' on page 92.

Enjoy learning about *Capt Purnendu Shorey*, who is the subject of '*A Day in the Life of*' (page 103). Purnendu is a man of hidden talents it seems!

And finally, do make sure you read the poem on page 37 by an unknown author called '*The other man's loss is my gain*' about the lot of a cargo surveyor. It is the work of a genius.

Survey well!

Mike

**Mike Schwarz,**
*Chief Executive Officer*


***Editor's comment***
*IIMS is and has always been a non-political organisation and will remain so in the future. But you will appreciate as you read the President's column that in these unprecedented times it is entirely appropriate that the Institute lobbies governments, politicians and flag states for the benefit of its members.*



# The President's Column

**Dear Member**

I feel I should start with an apology for the extent of this edition's column and that once more much of the content is to do with the problems we are facing here in the UK and mostly in respect to yacht and small craft surveyors. That said, there are issues which potentially may have serious effects on commercial shipping and therefore the movement of cargo. I have been asked by many members to say what we have managed to determine following Brexit and the likely effects on our marine industry, which will be of interest to many. And it is complex.
As you may have read in the February News Bulletin, Brexit is now challenging COVID-19 for the top news spot in the UK. We came to the end of the Brexit Transition Period when the UK exited the EU on 31st December 2020 and without warning to the vast majority of us, have entered a new era of confusion.

Since 29 March 2017 the UK was in an ever extending transition period during which time there were many directives raised to assist EU member states prepare for the UK's exit from the union. The transition period was designed to provide time for the new relationship to be agreed while ensuring that businesses will only need to adapt to non-EU rules once the future deal is agreed. The reality is that during this time the EU said it would not negotiate detailed new arrangements with the UK until it ceased to be an EU member - and the deal was rushed through at the eleventh hour. Now, as the UK has left, some of the EU directives are being actioned locally ahead of any formal negotiations.

To allow me to do my best to explain some of this confusion, I make no apologies for using quotes and extracts from official documents and publications from the UK and Spanish Governments, RYA, Maritime & Coastguard Agency (MCA) and others. I hope this will save you from the time consuming, and if I am honest, often pointless research through which I have put myself and our CEO, Mike Schwarz.

For those who have not read the last IIMS News Bulletin, the history is that within weeks of leaving the EU we were informed that 'allegedly' there may be restrictions imposed by some EU member

states that will affect businesses which are dependent on British registration and MCA Commercial Certification of vessels and crews operating in their waters. This meant the threat to some members' livelihoods was suddenly very real. This has since proved to be factual and the situation so far is as follows:

In Spain (Quote): Recreational craft under the British flag with a length of less than 14 metres will lose their current capacity to engage in nautical rental activities. In accordance with the Trade and Cooperation Agreement (TCA) between the EU and the UK, following the latter's withdrawal, the following consequences stemming from its status as a third country in the field of the merchant navy are noteworthy as from 1 January 2021:

- British citizens may not continue to benefit from the recognition of their licence to skipper recreational craft under a Spanish flag until such time as Royal Decree 875/2014, of 10 October, is amended, to stipulate that sailing licences for recreational craft include those from the UK on the list of third countries provided for in Annex IX thereto.
- Cabotage maritime navigation services with the UK will be affected because Council Regulation (EEC) No. 3577/92, applying the principle of the free provision of services to maritime transport within member states (maritime cabotage) will cease to apply to the UK. Pursuant to this Regulation, regular and non-regular cabotage navigation is reserved for vessels under a Spanish or EU flag.
- Furthermore, EU member states may no longer issue the exemption from information on maritime protection to UK vessels prior to reaching an EU port, as provided for in Article 6 of Regulation EC 725/2004, of 31 March 2004, on improving protection for vessels and port installations.
- Aptitude certificates for sailors issued by the UK will remain valid until their expiry. The recognition of professional qualifications on British maritime matters will only be possible once recognised by the EU and a bilateral agreement is signed on the recognition of qualifications.
- Recreational craft under the British flag with a length of less than 14 metres will also lose their current capacity to engage in nautical rental activities.

As regards the import and sale of recreational craft, jet skis and engines from third countries to the EU, Directive 2013/53/EU of the European Parliament and of the Council of 20 November 2013 establishes the mechanism for European importers to carry out a post-factory evaluation that allows the sale of these products after obtaining the CE marking.

From Croatia we hear that: Council Regulation (EEC) No. 3577/92, applying the principle of the free provision of services to maritime transport within member states (maritime cabotage) will cease to apply to the UK. This has led to the exclusion of UK flagged vessels under 24 meters from operating commercial charters within their waters.

Under Article 5b of Directive 2008/106/EC: The certificates issued to seafarers by the United Kingdom are no longer "accepted" by an EU Member Thus, a master or an officer holding a certificate

issued by the United Kingdom "accepted" by an EU member state will not be able to continue working on board vessels flying the flag of that member state after the end of the transition period. Thus, a master or an officer holding an "endorsement attesting recognition" after the end of the transition period, the endorsement will not be renewed and it will not be possible to obtain "endorsement attesting recognition" under Article 5b of Directive 2008/106/EC from another EU member state in order to work on board a vessel flying the flag of that other member state.

This prompted me to write directly to the UK Department of Transport which generated an immediate response from the MCA. They said they had received further information regarding the situation in Croatia which indicated that this was more of a cabotage issue rather than a specific issue with technical acceptance of the UK Codes of Practice for vessels < 24m. From 1 January the rules for non-EEA vessels apply to all UK vessels for the purpose of performing cabotage in EU/EEA waters and these rules differ in each individual member state. Their advice was that vessel owners/operators should familiarise themselves with the rules for performing cabotage in the country in which they operate. They also confirmed that they were working with colleagues in the Department of Transport to clarify the requirements in individual EU member states, and that although they will keep all Certifying Authorities updated on progress, it should be noted that these are matters within the discretion of the relevant national authorities.

This reply still seemed a little vague to me as I considered the exclusion of small commercial vessels as more a matter of commercial business and free enterprise than commercial cabotage. This spurred me to pose my question to my local MP to raise in Parliament as follows: To ask the Secretary of State for Transport if he will take steps to prevent the exclusion of British flagged commercial vessels from operating in EU waters specifically, but not limited, to charter vessels under 24 meters and if he will make a statement.

The response I got was that as part of the UK-EU TCA measures that have been agreed to guarantee legal certainty to UK companies providing international maritime transport services, (including both passenger and freight transport between EU member states and the UK), that UK vessels will continue to have access to ports and port services. Also in line with other UK-EU free trade agreements, these exclude maritime cabotage, which therefore allows individual member states to decide who can provide cabotage services. Some countries may choose not to and the UK will continue to have unfettered access to these markets. The Department of Transport also stated that the MCA would engage with member states to try to maintain the provision of cabotage services; however, companies that currently provide such services in the waters of EU member states will need to be aware of the local rules that apply.

The EU regulation grants cabotage rights to maritime transport operators which qualify as Community Shipowners including nationals of a member state pursuing shipping activities and companies established under the law of a member state and whose business is in a member state. This also includes nationals of a member state or shipping companies established outside the Community and controlled by nationals of a member state provided that their ships are registered in and fly the flag of a member state.

The UK Government's take on this is that third countries (of which the UK is now one) can only perform cabotage where national legislation of an EU member state extends that right. As a result, the loss of cabotage freedoms would commercially threaten a number of contracts for UK shipping companies engaged in trade where there are multiple ports of call in the EU, which at present is possible in Denmark, Ireland, Belgium, The Netherlands and the UK.

The UK does not expect to introduce reciprocal restrictions as there would be little benefit to reverting to a closed market approach in shipping when for several hundred years we have maintained an open market. The UK used to charge Tonnage Tax which was limited under EU regulation but now the UK could adopt a flexible system which the Government hopes would encourage more ship registration. This makes sense as when working in UK ports one would be hard pushed to find a vessel flying a UK flag. However as far as Europe is concerned this flies in the face of the current trend we are seeing with vessels leaving the UK to re-Flag in the EU. The UK government did, however, have concerns that if we ceased to qualify as an EU flag this could affect the Tonnage on the UK ship register and with it the reputation of the UK flag and the UK's attractiveness to

accommodate business. At this point Ross Wombwell, Head of Technical Services for British Marine, pointed out that there were some 60,000 UK flagged recreational craft in Europe and, further, that agreements would be required for the mutual recognition of seafarer certificates of competency because the UK was a large maritime nation with by far the biggest number of seafarers in the EU at over 30,000.

Prior to the end of the transition period the UK Government said that the 'Post Brexit' market access would remain "largely" unchanged for UK ship operators. It did not, however, address cabotage rights or prospects for the UK Ship Register. In relation to seafarers, the Government noted: "UK seafarers are amongst the best trained in the world - it is therefore in nobody's interests to add barriers to recognition of seafarer certificates after exit." The UK Government also determined that "Maritime transport is generally liberalised and underpinned by an extensive body of international law. Post Brexit, UK and EU ship operators will, in most respects, be able to access each other's ports as at present. Cabotage rights, however, are provided under EU law. Unlike the UK, some EU countries do not permit third country cabotage. Loss of cabotage rights would have negative implications for some UK operators. The UK Government also considered that any future UK-EU maritime agreement must provide for mutual recognition of seafarer certificates. In the past the UK flag has attracted a number of registrations from EU and EEA interests, as allowed under EU law. This has supported the growth of the UK Ship Register (UKSR) and strengthened its international reputation. Post Brexit, the UK will be able to review registration rules and determine if the UKSR should become a national registry, remain open to EU and EEA interests, or open up internationally. All of this now appears to have been a somewhat naïve approach on behalf of the UK. Surely no country would undertake these restrictions - that just wouldn't be 'British'!

The RYA's position is that whether UK certificates issued by the RYA are acceptable in other countries continues to be determined by the legislation of the country in which the boat is registered and the country in which the boat is being used.

RYA professional qualifications (e.g. commercially endorsed certificates of competence) are accepted by the UK Government for use on UK flagged commercial yachts but such qualifications are not, and never have been, STCW-compliant certificates. As such, RYA professional qualifications are not subject to the mutual-recognition mechanism envisaged in the STCW convention and they no longer fall within the scope of the EU Directive on the mutual recognition of seafarers' certificates issued by member states.

RYA professional qualifications are accepted by several non-UK national administrations for use on vessels flying their flags, but this is a matter for each of those administrations individually and there is no obligation on them to do so. The UK leaving the EU has not necessarily changed such positions and it has not altered the acceptability of RYA professional qualifications to the UK Government for use on UK flagged commercial yachts.

However, if holders of commercially endorsed Yachtmaster Offshore or Ocean Certificates of Competence experience difficulties with overseas administrations, they may wish to explore the route from RYA Yachtmaster to MCA Master, II/2, code vessels less than 200 GT/Officer of the Watch yachts, less than 500 GT. Further details of what is required and the means of achieving this can be found in MSN 1858. Put in simple terms, your RYA qualification will not be recognised and if you need to operate vessels under 24 meters commercially you will need to gain an MCA Master's ticket.

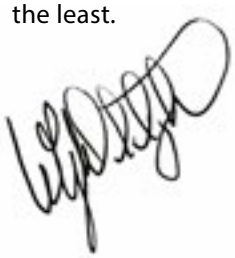
The next subject is VAT post Brexit and you can read an article on this very topic in this edition The issues are that if a UK resident buys a second-hand boat on which VAT has been paid in the EU (other than the UK) and that boat was in free circulation in the EU on 31 December 2020, (for which you require evidence) the boat will retain its VAT free circulation status while it remains in EU waters. However, If the yacht is owned and being imported by a UK resident VAT will have to be paid in the UK on the vessel's value at the time of importation. This applies even where VAT has previously been paid elsewhere in the EU. Additionally, a UK VAT paid vessel will now be entitled to enter EU waters under the Temporary Admissions (TA) provisions provided that the owner and the person taking it into EU waters are UK residents. TA provisions may only remain in EU waters for 18 months and may not be sold or chartered while in the EU on a TA basis. If the yacht is owned and being used by an EU resident the yacht may enter UK waters under TA and may remain here for up to 18 months without additional VAT having to be paid.

Despite these assurances I have been informed recently of UK vessels being impounded for non-payment of VAT in the EU by member states, presumably trying to fill their tax gaps! This would appear to be yet another example of an individual member state applying their own interpretations to the rules. This is because the previously enjoyed VAT paid

status enjoyed by British yachts in the EU will now only apply to EU craft. There is a ray of hope. The requirement of having to return a British owned vessel bought in the EU to UK waters before the end of January has been granted a 'returned goods relief' for a year from 1st January 2021 until 1st January 2022.

I hope that I have assisted in condensing all the mass of information out there into some form of understandable text. My take on all this is that the UK quite naively expected that when we actually left on 1st January we presumed the EU would then commence negotiations. In fact there seems to have been a bit of shoot first and ask questions later. The northern Europe states enjoy open port trade with the UK so we could expect them to maintain a level playing field. The Mediterranean states, however, may react rather differently. So, we must hope that the issues can be resolved before any more UK interests out there are affected and the movement of UK registrations to the Maltese, Croatian and Polish flags, which we are seeing at the moment, comes to an end.

We all thought 2020 was going to be the most problematic year and that 2021 would see a new dawn; but I have a feeling that perhaps we were also guilty of a certain level of naivety because the coming year is already looking challenging, to say the least.



**Geoff Waddington**
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# SALVAGE & WRECK REMOVAL CONFERENCE 2020

## ANNUAL SALVAGE & WRECK CONFERENCE REPORT

The conference, due to COVID-19, was held virtually with speakers and panel sessions available live and also recorded for later viewing.

The salvage industry has in the past emphasized the principle, use it or lose it and in his opening address, ISU president Richard Janssen referred to earlier conferences where panel discussions were held on the subject of capacity stating: '… it is now an open question whether the capacity of the industry is satisfactory and whether its capability is aligned with the risks run by underwriters.' Talking of times gone by, he added: 'We need to recognise that there is no place for romantic or heroic stories about how things used to be, nor for old fashioned prejudice and characterisation of salvage professionals. Only through continued dialogue about today's and tomorrow's challenges and the basis on which salvage services are being remunerated can we ensure - as underwriters and salvors – that we continue to serve our mutual principal, the shipowner.'

Referring to low levels of LOF cases and revenue Mr Janssen stated: 'It is interesting to see the clubs also recognising the value of LOF, facilitating as it does, rapid intervention which can prevent a casualty from becoming a costly disaster.' This theme was explored by Lloyd's Appeal Arbitrator, Jeremy Russell QC, describing the assessment of salvage awards as an 'art not a science' where awards should strike a balance between competing interests and be fair remembering that Article 13 of the Salvage Convention requires that rewards should be fixed with a view to encouraging salvage operations.

Rahul Khanna of Allianz provided a round-up of casualty statistics reporting that the 41 total losses in 2019 was a record low with South China, Indonesia and the Philippines the worst regions for total losses but the British Isles, North Sea, English Channel and Bay of Biscay becoming worst regions for casualties with 605 incidents.

The demise of Ardent in 2020 took many by surprise and the topic was considered by a conference panel with Mr Janssen commenting: 'the market is always right and salvors need to adapt'. Speaking as president of the American Salvage Association, Resolve Marine's Lindsay Malen Habib said that the stringent equipment and speed-of-reaction requirements of the US salvage and marine firefighting requirements of OPA 90 meant providers needed to invest in assets but that previously pricing for providing these services was unsustainable.

Piraeus-based Tsavliris Salvage is one of the best known global marine emergency response contracting companies, a particularly frequent user of LOF contracts. ISU reports that George Tsavliris gave a passionate speech about the industry in which he has more than 50 years' experience and the importance of moving forwards and remaining optimistic.

Ben Harris, claims director for Shipowners P&I Club summed up saying: 'In emergency response, insurers wanted a viable industry ready to respond without delay; salvage capacity with resilience and investment and training.' He stated that in wreck removal insurers want a competitive market and an appetite for commercial risk adding that Clubs want to be more involved at the front of the process stating: 'We want to make sure there is response when required.'

## NEW SAFETY REQUIREMENTS FOR LOCAL PLEASURE VESSELS IN HONG KONG

The Marine Department of Hong Kong has published a circular about the recent safety requirements and regulations for all local pleasure vessels, which will be applied from 1st of April 2021. According to the circular all pleasure vessels licenced to carry more than 12 passengers that are let for hire or reward shall have on-board a suitable first aid kit, as stipulated in "Code of Practice IV" Chapter X – Part 2 with effect from 1st April 2021.

At the same time, from 1st April 2021, the following three categories of vessels shall carry sufficient number of lifebuoys for the maximum number of persons that the vessel is licenced to carry:

- A Class IV vessel that is licensed before 1 August 2020 to carry not more than 60 passengers and is let for hire or reward (except a Class IV open cruiser).
- A Class IV vessel that is an open cruiser licenced to carry not more than 60 passengers and is let for hire or reward. (This requirement is exempted if the passengers on board the vessel wear suitable lifejackets while the vessel is underway)
- A Class IV vessel of more than 150 GRT and is licensed before 1 August 2020.

As explained, a pleasure vessel that is licenced to a) carry 13 to 60 passengers and is let for hire or reward or b)carry more than 60 passengers, shall be equipped with a piece of VHF Radio equipment with a relevant licence issued by the Communications Authority.

## MCA TARGETS UNCODED RACE YACHTS

Action will be taken against uncoded commercially operated sailing yachts engaged in racing, the Maritime & Coastguard Agency (MCA) has warned, following the conclusion of legal proceedings against two vessels.

The MCA has agreed to discontinue prosecution against two boats on the condition both enter into a written agreement to ensure their vessels are coded when engaged in any commercial activity.

**The outcome reaffirms the agency's committed position to ensuring all vessels hold the correct documentation.**

Small, commercially operated yachts must hold a valid code certificate when being used for any commercial purposes, including racing and training, while vessels must also only operate within the category of water for which they have been authorised. A failure to comply will result in enforcement action with the MCA committed to maintaining the rigorous standards of the UK Flag.

Despite initiatives to address concerns raised in 2019, such as publication of the information leaflet 'Are you in code mode' and officers attending Gran Canaria for the start of the ARC, investigations were begun into several yachts.

The Regulatory Compliance Investigation Team found a number of breaches, resulting in the owners receiving official cautions, paying several thousands of pounds in intervention costs to the MCA and ensuring their vessels were coded for future commercial use. Other yachts were sold or removed from the UK flag and no longer entitled to be UK registered.

Mark Flavell, Lead Investigator at the MCA as part of the Regulatory Compliance Investigations Team, said: "A misinterpretation of the code concerning yachts engaged in racing had developed. The MCA want to send a clear message and dispel this misinterpretation.

"Commercially operated vessels, including those engaged in racing, must be coded. This is to ensure commercial vessels are subject of an independent survey and inspection regime. The aim being, as with any scrutiny of commercial operations, is to keep employees and public safe.

"We will not hesitate to take enforcement action against yacht owners who don't want to hear this message and fail to get their yacht coded."

## POLAR YACHT GUIDE PUBLISHED BY WORLD SAILING AND THE ROYAL CRUISING CLUB PILOTAGE FOUNDATION

The Polar Yacht Guide, designed to support the navigation and voyage planning for all polar waters, encourages safe and environmentally friendly navigation by pleasure yachts not engaged in trade, of less than or equal to 300 GT, in Arctic and Antarctic polar waters. The Polar Yacht Guide sets out to offer advice and guidance unique to pleasure yachts and works in parallel with the Polar Code, published by the International Maritime Organisation for SOLAS ships.

In recent years there has been a big increase in the number of yachts cruising in Greenland, Svalbard, Alaska, the Northwest Passage, South America, the southern oceans and the Antarctic. This is as a result of perceptions that global warming is making higher latitudes more accessible, lower latitudes have become overcrowded and commercialised and cruising sailors love explorations.

The different polar regions share some common problems such as navigating in ice, poorly surveyed waters, fragile and precious environments and isolation. However, they differ in other respects. The Antarctic is governed by the Antarctic Treaty system and has well established protocols for visiting yachts, but the northern polar regions are administered by various sovereign countries with different rules. The southern oceans frequently experience extreme weather in very exposed waters whilst the north generally has more ports of refuge.

Download the guide at **http://bit.ly/3i7XDsF**

## UK OFFICE ESTABLISHED BY IMCI TO CERTIFY RECREATIONAL BOATS TO MEET UNITED KINGDOM CONFORMITY ASSESSMENT MARK

The United Kingdom Conformity Assessment mark will be required from 2022 when it replaces the European Union's CE certificates. In readiness, Brussels based International Marine Certification Institute (IMCI) has founded IMCI (UK) and established offices in Liverpool to ensure that recreational boats placed on the British market meet the country's post-Brexit technical, safety and environmental standards.

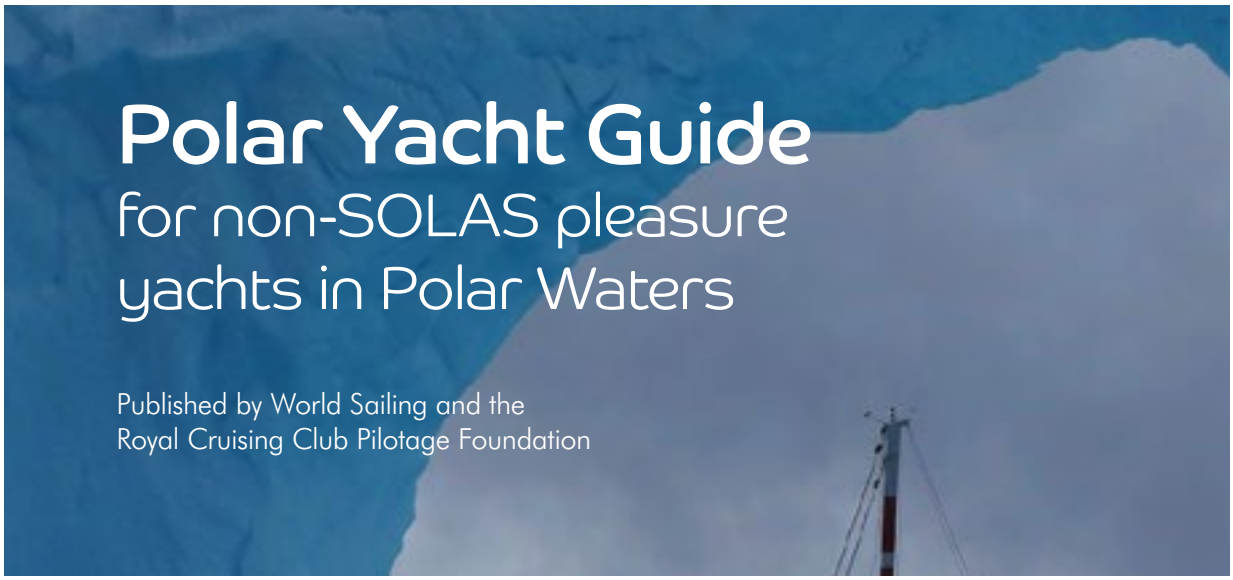
The European Union's CE certificates remain valid in Britain until the end of 2021. But from 2022, CE-marked goods will be required to obtain a United Kingdom Conformity Assessment mark to enter the UK.

In post-Brexit Europe, outfits like IMCI that are designated by an EU country to assess product conformity must be accredited as "UK Approved Bodies" if they wish to award the UKCA mark.

"To this end, IMCI has already incorporated and registered a company called the International Marine Certification Society with the registered trading name IMCI (UK) in Liverpool," says IMCI.

Britain's Recreational Craft Regulations of 2017 are identical to the EU's Recreational Craft Directive. But post-Brexit era, the EU recreational craft standards are now called "designated standards" in Britain.

After December 31, 2021, manufacturers must have a Manufacturers Identity Code with the UK Register to place craft on the UK market. British Marine manages the UK MIC register on behalf of the UK government.



## GUIDANCE ON RMI FLAGGED YACHT RECREATIONAL FIRE APPLIANCES ISSUED

The Republic of Marshall Islands has published its requirements for the design, installation and operation of Recreational Fire Appliances onboard RMI-flagged yachts.

The definition of Recreational Fire Appliances covers fireplaces which use wood, ethanol or LPG as a primary fuel source, or for ignition purposes. They include charcoal galley ovens, LPG or charcoal fire barbeques, spit roasts and fire pits.

Read the full article and download the guidance at **http://bit.ly/3nHzH0p**

## MGN 646 PUBLISHED BY MCA: ENGINE EMISSION STANDARDS FOR INLAND WATERWAY VESSELS

The UK Maritime & Coastguard Agency (MCA) has published a marine guidance notice MGN 646 to provide clarification concerning the applicable engine standards for vessels operating on inland waterways, in accordance with the MARPOL Annex VI requirements that apply to vessels operating on tidal Category C, and D waters, as well as at sea.

Requirements of the Non Road Mobile Machinery Regulation (NRMM) apply to vessels operating on Category A, B, C and D waters.

MSN 1837 defines UK inland water categories as follows:

Category A: Narrow rivers and canals where the depth of water is generally less than 1.5 metres.

Category B: Wider rivers and canals where the depth of water is generally 1.5 metres or more and where the significant wave height could not be expected to exceed 0.6 metres at any time.

Category C: Tidal rivers and estuaries and large, deep lakes and lochs where the significant wave height could not be expected to exceed 1.2 metres at any time.

Category D: Tidal rivers and estuaries where the significant wave height could not be expected to exceed 2.0 metres at any time.

Therefore, the legislation clearly defines the geographical extent of application of the regulations to include tidal Category C, and D waters. This is logical in the context that seagoing ships coming into port are most likely to do so on a Category C or D inland waterway. Category A and B waterways are specifically excluded from the legislation.

Overall, the UK's approach to implementation of the Inland Waterway Directive has been to make use of the derogation in the Directive which allowed Member States with inland waterways unlinked by inland waterway to those of another Member State to which the Directive applies, to derogate from some or all of the technical requirements of the Directive, or to implement more stringent requirements in certain cases, such as additional provisions for passenger vessels.

The MCA commented, "It is considered that the NRMM Regulation does apply irrespective of the requirements set out in the derogation to inland waterway vessels operating on Category A, B, C and D waterways".

Yet, inland waterway vessels only operating on tidal Category C and D with an installed engine rating power of 130 kW or above are subject to the requirements of the Merchant Shipping (Prevention of Air Pollution from Ships) Regulations 2008. As the NRMM Regulation applies to engines fitted to inland waterway vessels with a net power of 19 kW and above, it will therefore apply to such vessels operating on tidal Category C and D waters which are below the threshold for compliance with the 2008 Regulations.

## FIRST EVER UKCA RCR CERTIFICATE ISSUED BY HPI-CEPROOF

Oxfordshire-based company, HPi-CEproof has issued the Princess X95 with the first ever UKCA RCR certificate of conformity, following the new UK Recreational Craft Regulations which came into force on 1st January this year. HPi-CEproof is currently the only Approved Body empowered to issue 'UKCA mark' certificates, enabling compliance with the post-Brexit UK Recreational Craft Regulations.

Celebrating the significance of its appointment, HPi-CEproof auctioned the rights for a boatbuilder to be assessed for RCR certificate number one. Proceeds were split equally between the Blue Marine Foundation (BLUE) and British Divers Marine Life Rescue. No fees were charged for the assessment. The auction winner, Princess Yachts, chose the fourth off-the-line of its X95 class to receive the UK's first RCR certificate.

Adam Greene, Senior Naval Architect at Princess Yachts explains: "Our UKCA certificates will use the existing CE marking and technical files as the starting point from which to issue new UKCA certificates. All Princess models will eventually have both CE and UKCA certification, along with conformity statements for US USCG and ABYC rules. HPi-CEproof and HPi Verification Services (Ireland) provide all three requirements for us."

"We had already safeguarded all of our clients prior to the UK's exit from the EU by transferring their CE conformity to HPi Verification Services (Ireland), which is a fully approved notified body, operating independently," adds Alasdair Reay, HPi-CEproof's CEO. "The UK RCR can use the same compliance assessment documentation, since both regimes apply the same standards and all the compliance documentation was already within the company and reviewed by the same personnel."

## IHM REQUIREMENTS FOR HONG KONG, SINGAPORE AND AUSTRALIAN FLAGGED VESSELS CALLING INTO THE EU OR UK

Hong Kong, Singapore and Australia flagged vessels must ensure they carry onboard an addendum to their Inventory of Hazardous Materials (IHM) Statement of Compliance if calling into the EEA (EU countries plus Norway and Iceland) or Great Britain (excluding Northern Ireland).

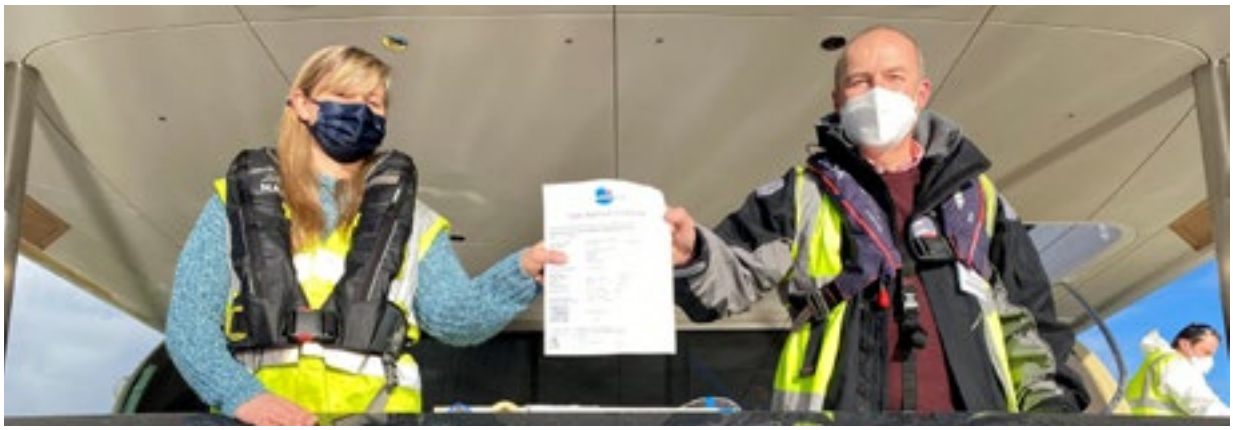
The EU Ship Recycling Regulation (EU SRR) became applicable for all existing ships on 31 December 2020. It requires vessels calling into the EEA and flying the flag of a 'third country' (non-EEA) to have onboard an up-to-date IHM and a Statement of Compliance issued under the authority of the flag Administration against EU SRR. This also continues to be the case if calling into the UK following its exit from the EU.

Lloyd's Register (LR) can issue a Statement of Compliance, however this cannot be under the authority of the Hong Kong, Singapore or Australia flag Administrations. Each Administration has therefore prepared standard (non-vessel specific) covering letters to be placed on board, alongside the Statement of Compliance issued by LR. These letters outline to Port State Control Officers that the flag Administration supports its Recognised Organisations to conduct the IHM approval, verification and certification work.

**For Hong Kong, Singapore or Australia flagged vessels to be certified by LR:** The respective covering letters are issued alongside the Statement of Compliance as soon as your vessel(s) are ready for certification. These letters can be accessed via LR Class Direct and downloaded from the ship recycling section of the relevant country file.

**For Hong Kong, Singapore or Australia flagged vessels already certified by LR:** If you have not already been sent a copy of the letter(s), these can be accessed via LR Class Direct and downloaded from the ship recycling section of the relevant country file.

*The first ever UKCA RCR certificate of conformity is presented to Princess Yachts.*



## ICOMIA PUBLISHES A YACHT INDUSTRY GUIDELINE FOR CERAMIC COATINGS

ICOMIA has produced a Ceramic Coating Yacht Industry Guideline as a result of their work with leading ceramic coating manufacturers, paint manufacturers, independent coating inspectors, coating supervisors and surveyors. The aim is to provide objective industry guidance on ceramic use on large yachts.

The yacht market has identified the need for an industry guidance document detailing key areas of information and considerations when using ceramic coatings or treatments on large yachts.

Whilst not an exhaustive document, it attempts to provide general guidance on application and warranty considerations, relevant information on in-service expectations and maintenance and, most importantly, proper guidance on the effective and safe removal of ceramic coating systems, including how to actively test a surface for complete ceramic removal prior to repainting.

## IACS ADOPTS NEW GOVERNANCE MODEL

The IACS Council agreed at its 82nd Council Meeting (C82) to adopt a range of far reaching measures to prepare it to meet the long-term challenges faced by many associations in a time of rapid technological development, constant regulatory evolution and changing market dynamics. These measures include the move to an elected Council Chair in post for two years, an elected General Policy Group (GPG) Chair to join the IACS Secretariat in London, a move to simple-majority voting for the majority of decisions and an enhanced Chair's Office to facilitate faster decision making.

A fast-moving maritime landscape requires the constant development of responses and solutions which, to be effective, entails a consistency of effort often over several years. To identify evolving issues quickly and then resolve and implement the appropriate responses over a longer period, IACS has adopted a package of measures to do just that; speeding up reaction times by simplifying the voting requirements and having issues pre-considered by the Chair's office, whilst ensuring the focus on delivery can be sustained by an elected Chair in post for a two-year term (renewable). In parallel, having a GPG Chair elected for a three-year term and located in London, together with a supporting team, brings these highly expert, technical specialists closer to IACS' key stakeholders including the IMO and other industry associations.

The consistency in representation provided by a two-year Chair, a permanent Secretary General and a GPG Chair in post for three years will reinforce the establishment and maintenance of key industry relationships. Deeper and wider cooperation will allow potential issues to be identified early while also providing time for solutions to be discussed and worked through in a more consistent fashion at both the policy and technical levels.

These external facing measures are complemented by efforts to streamline IACS internal decision as both the number and pace of new initiatives continues to increase. As a technical standards-setting body, the results of which are embedded into IACS Members' own Class Rules, IACS needs to balance the need for robust adoption criteria with the need to minimise bureaucracy. Moving to simple majority voting for most decisions achieves this while the robustness of that process is protected by having any such majority decision also being dependent on it being comprised of members who collectively represent fifty per-cent or more of IACS' total registered gross tonnage.

## NEW QUALITY STANDARD DRYBMS TO BE LAUNCHED FOR THE DRY BULK SECTOR

RightShip and INTERCARGO have announced the launch of an important new quality standard for the dry bulk sector, DryBMS. The standard will be governed by a new NGO to be established later this year and will support the improvement of safety in the dry bulk segment.

Both organisations have strongly and consistently advocated the need for significant improvements to dry bulk safety standards. In August 2020 both organisations combined their expertise to create a single framework for the whole industry. Supported by the International Chamber of Shipping (ICS) and BIMCO, DryBMS now exists as a simple set of best practices and key performance indicators and raises the bar on safety, environmental and operational excellence.

RightShip's CEO Steen Lund says that he is confident that such a programme will be supported and adopted: "We are proud to launch DryBMS to the industry. The standard is a product of extensive collaboration with many stakeholders within the dry bulk sector.

"We believe that this ensures the program will be supported and adopted across the industry as a whole. The rapid delivery of the initial consultation document means that we are a step closer to providing consistent, meaningful safety expectations for the dry bulk industry.

"Handing the standard over to a new and independent NGO will ensure the standard is protected and governed with the industry's best intentions at heart."

Dimitrios Fafalios, Chairman of INTERCARGO agrees: "This is an important step, not only for the industry, but for the sector as a whole. We are all collaborating in a scheme that is being developed by the industry and for the industry, which will deliver a truly robust standard with the buy-in of those that the industry relies upon to implement and support it."

Read the article in full and download the standard at **http://bit.ly/3oj5tkx**.

# Shipping Industry Flag State Performance Table

2020/2021
(Including Port State Control Data from 2019/2020)

## LATEST FLAG STATE PERFORMANCE TABLE PUBLISHED BY INTERNATIONAL CHAMBER OF SHIPPING

The International Chamber of Shipping (ICS) has published the latest flag state performance table (2020/2021) which finds that many of the largest flag states, including the Marshall Islands, Hong Kong (China), Singapore as well as the Bahamas and Cyprus, continue to perform to an exceptionally high standard, with traditional flags and open registers performing equally well.

ICS Secretary General, Guy Platten, says: "The flag state performance table clearly indicates that distinctions between 'traditional' flags and open registers are no longer meaningful. Alongside several European registers, and flags such as Japan, we have seen many open registers amongst the very top performers".

Mr Platten concluded: "There is still a number of smaller flag states that have a lot of work to do to considerably enhance their performance, and shipowners should consider very carefully the prospect of using these flags, which may be perceived to be sub-standard."

The ICS table provides an invaluable indicator of the performance of individual flag states worldwide. It analyses how the countries included deliver against a number of criteria such as Port State Control (PSC) records, ratification of international maritime Conventions and attendance at IMO meetings.

Read the full article and download the performance table at **http://bit.ly/3a7mfyf**.

# MARITIME INDUSTRY 2.0: THE FUTURE IS DIGITAL

## NEW DIGITALISATION WHITE PAPER PUBLISHED BY RIVERTRACE

In the midst of digital technology continuously changing the landscape of the international shipping industry and how ships are operated, market leading developers of smart water quality monitoring technology, Rivertrace Limited, has published a new white paper on digitalisation. If offers expert insight into the evolution of smart water quality monitoring technology and electronic reporting methods.

Entitled 'Maritime Industry 2.0: The Future is Digital', the white paper explores key milestones passed in the shipping industry's digital transformation journey to-date and examines how traditional, manual methods for monitoring and record keeping are evolving towards the greater use of electronic documentation, supported by digital monitoring equipment.

The move towards exploiting the power of digitalisation for monitoring and reporting purposes has been accelerated by a recent shift international regulation. From the 1st October 2020, the International Maritime Organization (IMO) amendments to MARPOL Annexes I, II, V and VI that permit the use of electronic record books entered into force.

This permitted use of electronic oil record books is a welcome step change in the industry, and Rivertrace supports this transition with the development of smart monitoring technologies and services, and collaborations with other original equipment manufacturers (OEMs).

Read the full story and download the report at **http://bit.ly/39sivH9**

## LEADING CLASSIFICATION SOCIETY DNV GL HAS A NEW NAME FROM 1 MARCH

DNV GL, the assurance and risk management company, has changed its name to DNV from 1 March 2021. The move comes after a comprehensive review of the company's strategy as it positions itself for a world in which many of DNV's markets are undergoing fundamental change. The present name has been in place since the 2013 merger between DNV (Det Norske Veritas) and GL (Germanischer Lloyd). The name simplification is a natural consequence of a successfully completed merger and of having operated as a fully integrated company for several years now.

Remi Eriksen, Group President and CEO, said, "We merged two leading companies with complementary strengths and market positions, and combining the two names was the right solution in 2013. However, it was not a name that rolled off the tongue, and many customers already refer to the company as DNV. Our brand is used by many of our customers to build trust towards their stakeholders, and a simpler name will be an even stronger trust mark for our customers in the future, but still carries with it all our strengths and proud 157-year-old legacy with a purpose to safeguard life, property and the environment."

The 2020s has been called the decade of transformation or the "exponential decade", where the pace of the energy transition will be set and where food, health and transport systems will change immensely and digital technologies underpinning industry 4.0 will mature from experimentation into large-scale application. Most importantly, this is the decade where humanity will succeed or fail to deliver on the Sustainable Development Goals.

## CLASSNK PUBLISHES GUIDELINE FOR LNG BUNKER VESSEL SURVEY AND EQUIPMENT

Class NK, the leading Japanese classification society, has published its Guideline for Survey and Facilities/ Equipment of LNG Bunkering Ships, which outlines the additional safety requirements of liquefied gas carriers that supply LNG fuel at sea.

There are currently no established international conventions for the facilities/equipment of ships that transfer LNG to other ships at sea, and additional safety equipment has been considered individually. Based on the examinations conducted so far, ClassNK has developed the guideline which compiles the requirements for additional equipment for the safe transfer of LNG, a cryogenic substance, between ships, and surveys.

Specifically, the guideline stipulates the layout and system design of LNG bunkering ships, fuel transfer systems and operation, as well as class notations according to the equipment to be installed.

The Guideline is available to download free of charge via ClassNK's website at **http://bit.ly/39G72Fb**.

## US BOAT SALES REACHED A 13 YEAR HIGH IN 2020 AND ARE SET TO CONTINUE IN 2021

With heightened interest in outdoor recreation activities and ways to social distance, consumer demand for new boats surged across the US in 2020. The National Marine Manufacturers Association (NMMA), representing North American recreational boat, engine and marine accessory manufacturers, reports that retail unit sales of new powerboats in the US increased last year by an estimated 12 percent compared to 2019. More than 310,000 new powerboats were sold in 2020, levels the recreational boating industry has not seen since before the Great Recession in 2008.

"2020 was an extraordinary year for new powerboat sales as more Americans took to the water to escape pandemic stress and enjoy the outdoors safely," said Frank Hugelmeyer, NMMA president. "For the first time in more than a decade, we saw an increase in first-time boat buyers, who helped spur growth of versatile, smaller boats – less than 26 feet – that are often towed to local waterways and provide a variety of boating experiences, from fishing to watersports."

The following new powerboat categories drove record retail unit sales in 2020:

- Sales of personal watercraft, including Jet Ski, Sea Doo and WaveRunner are estimated to be up 8 percent to 11,000 units in 2020; with accessible entry-level price points, personal watercraft are often considered a gateway to boat ownership.

- Sales of wake boats—popular for wakesurfing, skiing and wakeboarding and attractive to new and active boaters—are estimated to be up 20 percent to 13,000 units in 2020.

- Sales of freshwater fishing boats and pontoons boats, often sought for their versatility and entry-level price points and accounting for 50 percent of new powerboats sold in 2020, are expected to be up 12 percent to 143,000 units.

- Boat sales are expected to remain at historic levels in 2021 as manufacturers continue to fill a backlog of orders from 2020. – Pandemic-related supply chain constraints curbed powerboat production and shipments for several months in 2020, which are expected to subside and restore marine manufacturing to normal levels this year. Additionally, social distancing measures are likely to continue well into the latter months of 2021, spurring additional interest in safe outdoor recreation activities including boating.

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## WRONGLY STOWED CONTAINER LED TO FIRE

The Swedish Club has reported an incident where a wrongly stowed container led to a fire.

During early morning hours, the Master was at the bridge of the vessel when they observed a large cloud of smoke issuing from the forward part of the vessel. At the same time the fire detection system for cargo hold 3 sounded on the bridge. According to the Master, the smoke was first white and then greyish. Yet, the Chief Officer, however, described the smoke as being "dark grey, almost black".

Following, the ventilation fans for the cargo holds were stopped. The fans for cargo hold 3 were not operating at that time but natural ventilation was being provided for the holds as the covers for the vents were open. Crew members closed the covers of the vents for cargo hold 3 and no crew member entered the cargo hold.

The Master, then, anchored the vessel nearby. After checking the vessel, the Chief Engineer released the contents of almost 200 CO2 cylinders into cargo hold 3. This discharge was the designated full complement of CO2 required for the hold, and appeared to extinguish the fire. A couple of hours later smoke began to issue from the hold and a further 50 CO2 cylinders were released into cargo hold 3. About six hours later smoke was observed issuing from cargo hold 3 and the Chief Engineer released a further 50 CO2 cylinders.

The next morning, salvors boarded the vessel to better check the vessel. Shortly before midnight, temperature checks were completed by the vessel's crew indicating that the temperature in cargo hold 3 was rising so five more CO2 cylinders were released.

In the morning, another 20 CO2 cylinders were released. The salvors entered cargo hold 2 and measured the temperature for the bulkhead to cargo hold 3 - it was 80°C. It was decided that cargo hold 3 should be filled with water from the fire hydrants. The water filled three container tiers up and after a couple of hours the salvors considered the fire to be extinguished.

It is stated that the container where the fire started was not declared as dangerous cargo but was actually loaded with calcium hypochlorite and had been misdeclared by the shipper. The charterer had loaded the container as per the rules of the IMDG code. As per the manifest, the container was allowed to be loaded in the cargo hold, but as the cargo was calcium hypochlorite it should not have been loaded below deck or in the position it was stowed in.

# REPORT bites

Seldén Mast has developed its first carbon furling mast, a lighter weight furling rig designed to enhance the performance of cruising yachts in the 48ft – 75ft range.

**Robert Kuchinski, Head of Commercial Insurance at Zurich UK, has been elected as the new Chairman of the International Underwriting Association.**

The SS Master is being restored at Seaspan's Vancouver Shipyards to restore it to its original condition in time to celebrate the century that has passed since it first started towing barges.

**With COVID-19 testing improving and vaccine roll-out accelerating, there is much to feel hopeful about in 2021 for a maritime industry learning from its 2020 experiences, writes Paul Jennings, Chief Executive of North P&I Club.**

Russian Federal Agency for Maritime and River Transport has issued Rules for application of the COLREGs-72 by autonomous vessels.

Knut Ørbeck-Nilssen, DNV GL's ceo believes the challenges of 2020 have tested international shipping to the limits, but that the world's oldest mode of cargo transport has emerged stronger and fitter.

***Marc Pajot has announced a collaboration with the Italian shipyard Wider for the construction of its radically innovative and ecological catamaran superyacht.***

Oxfordshire-based company, HPi-CEproof has issued a Princess X95 with the first ever UKCA RCR certificate of conformity, following the new UK Recreational Craft Regulations which came into force on 1st January 2021.

**Williams Jet Tenders is to invest in more than £1m in a new in-house moulding facility and large boat production unit.**

# Safety Briefings

## INVESTIGATION REPORT INTO COLLISION BETWEEN MOTOR YACHTS MINX AND VISION PUBLISHED BY MAIB

In the evening on 25 May 2019, the Gibraltar registered motor yacht Vision collided with the UK registered motor yacht Minx, which was anchored at Île Sainte-Marguerite, near Cannes, France. Minx's crewman was on the foredeck and there was nothing he could have done to prevent being fatally struck by Vision's bow. The accident happened because Vision's skipper underestimated the risk associated with attempting a fast, close pass by the anchored Minx, a manoeuvre intended to provide an opportunity for the guests to wave goodbye, as the charterer had asked. Vision's skipper had also consumed cannabis, which is likely to have impaired his judgement.

**Safety Issues**

- it is vital for the safe operation of a commercial motor yacht, that the skipper prioritised the safety of the crew, passengers and the vessel
- Vision's surface-drive propulsion system was complex to operate and there were insufficient margins for error in the skipper's plan to allow for any misjudgement, loss of control or failure
- the use of recreational drugs, even in a 'tolerant' individual can impair decision-making and responses, which are vital for the safe operation of vessels
- the accident took place in an anchorage with a 5-knot speed limit applicable to all vessels; however, Vision was proceeding at over six times that limit. Speed limits exist for a reason and it was unsafe to proceed at high speed in the anchorage

**Recommendation**

A safety recommendation (2021/101) has been made to the Royal Yachting Association and the Professional Yachting Association to promulgate the safety lessons from this accident to owners and operators of commercial motor yachts.

## FIRE ON RORO LINKED TO ACCIDENTAL FUEL SPILL SAYS ACCIDENT REPORT

Transport Malta has published an investigation report into the engine-room fire onboard the Maltese-registered RoRo cargo vessel Eurocargo Trieste, following departure from the port of Livorno in November 2019. The investigation identified an accidental fuel spill onto a hot surface as the most likely cause of the incident.

**Probable causes**
The safety investigation concluded that the fire was most likely caused by an accidental fuel spill onto a hot surface near the entrance to the purifier room. Once the fire started, it spread quickly due to the presence of combustible material, leaking heavy fuel oil and lubricating oil around the engine and its bilges.

**Other findings**
- The smoke detectors, although operational, failed to alert the crew of the existence of a fire immediately, as they probably had been silenced for a short period of time, while the vessel was in port.
- Combustible materials in the form of leaked fuel, leaked oil, braided PVC pipes (to direct the leaks), plastic containers to collect drained oils, oil in the bilges and the vicinity contributed to the propagation of the fire.
- It is highly likely that the leak in the CO2 system compromised its effectiveness.
- Evidence indicated that the doors to the fuel oil modules and separator rooms were open.
- The delay to stop the port main engine is likely to have contributed to the fire taking hold.
- The decision-making process of the master would have been very complex, involving at least cues (possibly conflicting), technological data, information from fellow crew members, interpretation of that data and a decision to act, either in one way or another.
- The leakage of CO2 in the storage compartment is likely to have occurred when the main valve was accidently closed, soon after releasing the gas.
- There was a delay between the fire being detected and the port authorities being informed of the emergency onboard.

Read the full article and download the report at **http://bit.ly/3oJZaro**.

*Marine Safety Investigation Unit*

Transport Malta

# REPORT bites

**Primary pupils in Ireland are taking a stand against litter in their area via a unique schools-based programme that makes used of upcycled sail cloth.**

Norsepower Oy Ltd., has announced its first newbuild order for the installation of a record five tilting Rotor Sails on board a large bulk carrier.

**Japan's Nagashiki Shipping said the grounding of MV Wakashio that caused an ecological disaster in Mauritius was due to a lack of safety awareness and a failure to follow rules as it pledged better training and oversight.**

Hand-drawn, Elizabethan-era maps depicting the Spanish Armada have been saved from export after £600,000 was raised to buy them. The National Museum of the Royal Navy in Portsmouth raised the money in eight weeks.

**Leading Classification Society ClassNK has released "Guidelines for Remote Surveys Ver. 2.0" including a class notation requirement for the ship with advance preparation for remote surveys.**

This summer Narke will unveil the GT95, the latest in its Electrojet range of personal watercraft powered solely by electricity.

A major voice of the European shipbuilding industry has proposed to set-up a dedicated EU Maritime Fund – as an opt-out alternative to an inclusion of shipping into the EU Emission Trading Scheme.

***Powering ships with hydrogen, electrolysed at floating solar islands, could become a reality says Dutch firm SolarDuck.***

Ship owners facing looming deadlines to use less-polluting fuels have slashed the number of new vessels on order because they don't know which alternative technology to switch to.

# Safety Briefings

## CARGO FUMIGATION INCIDENT LEADS TO ONE FATALITY

Cargo fumigation remains a challenging operation onboard. An investigation by the Bahamas Maritime Authority found that the crew had been exposed to the fumigant gas – which had been used to treat a cargo of corn – after positive pressure in the accommodation was lost when the ventilation system was stopped by a large wave flooding the galley and store through the ventilation trunking.

Due to the fumigant gas leak, one seafarer died and three others had to be evacuated from their ship after exposure to hydrogen phosphide gas, it has prompted calls for a radical overhaul of the rules governing fumigated cargoes.

In addition to the checks after the accident it was found that the door between the hydraulic room and cargo hold was mounted incorrectly and the fan casing and ventilation duct located in the space, which served the accommodation's sanitary spaces, were not airtight.

Investigators said the crew were not sufficiently aware of the risks of carrying a fumigated cargo, symptoms of exposure to the fumigant, or what to do if they were exposed. They had not smelled the gas and periodic monitoring did not detect it in time to avert lethal levels of exposure.

It is noted that there was no assessment conducted prior to accepting the charter, loading or fumigating. There was no guidance in the company's safety management system, or any formal assessment of the risks associated with carrying fumigated cargoes.

In order to conduct a safe cargo fumigation, you are reminded of the following steps:

The ship's cargo can be fumigated and ventilated:
- While stored prior loading;
- In the hold of the ship before departure;
- In the hold prior to departure with fumigation continued during the voyage (in transit).

## LIMITING LIQUEFACTION

Although the IMO provides the official regulations and guidance notes on cargo liquefaction, P&I Clubs such as The London P&I Club offer complementary advice to ship's masters to raise awareness of the issue and to suggest practical steps to reduce the danger.

IMO has identified 75 bulk cargoes that have the potential to liquefy under certain conditions – these are known as Group A cargoes. If the Moisture Content (MC) of a Group A cargo exceeds the Transportable Moisture Limit (TML) then vibration and the motion of the vessel might cause that cargo to behave as a liquid rather than a solid when it is being transported in the hold. When in liquified form, and in a heavy sea, the cargo can easily flow from one side of the hold to the other. This affects the vessel's stability and can lead to a vessel capsizing. Therefore it is vital that the crew are fully aware of this issue and are able to spot warning signs as early as possible.

Most importantly, the master must be confident that the cargo to be loaded into his ship is safe. Prior to loading a Group A cargo, the actual MC and TML must be determined by an accredited scientific laboratory in accordance with the IMO regulations. The master must be in receipt of a valid, signed certificate stating that the MC is less than the TML. Even if the master has been presented with a valid certification, he/she should be aware of the prevailing climatic conditions, such as a prolonged period of rain or snow after the test has been performed, which might have significantly altered the MC of a cargo that has been left unprotected.

As an additional precaution, the master should carry out his/her own inspection using the "can test". Examining the results for free moisture or fluid won't definitively show that the moisture content of the cargo is less than the Transportable Moisture Limit (TML) but may indicate that the cargo has exceeded its Flow Moisture Point (FMP). Can tests should be performed regularly during the loading process and the results photographed and recorded.

If the master is not in receipt of a valid certificate, or if the can test results are concerning – or if he/she is prevented from taking a sample – then loading operations should be stopped.

During loading operations, the master should continue to visually inspect the cargo and try to prevent any excess water from entering the holds. If it is raining hard, then a further test to check that the MC has remained below the TML should be carried-out. In some circumstances it might be appropriate for the master to request the attendance of an experienced, independent cargo surveyor.

At any point, if the master has reason to suspect that the MC has exceeded the TML then he/she must stop loading and inform the vessel owner. In addition, the master has the right to issue a "Letter of Protest" and seek further advice from the P&I Club.

It is important for all Group A cargoes to be closely monitored throughout the voyage even if the master was satisfied during loading. Holds should be inspected for excess moisture – taking care to comply with all guidance on safe entry of enclosed spaces, of course. Cargo hold bilges should be sounded regularly and additional ventilation introduced as necessary. The crew should also be aware of the general motion of the ship as changes can occur if the cargo is beginning to change state. If the master is concerned, he/she should attempt to reduce the vessel's vibration; contact the nearest coastal state authority; consider heading to the nearest port or place of refuge; and contact the P&I Club.

***Extract from an article written by Carl Durrow***

*Photo credit: London P&I Club*

# REPORT bites

**The Royal Navy's only ice patrol ship, HMS Protector, is back at sea after a £14m ten-month revamp to enhance her ability to work in Antarctica.**

Discovery Shipyard has received a £2m additional investment in its Lymington yacht building business.

**The Canal & River Trust has pledged a further £190K in 2021 and 2022 to improve the facilities and moorings on London's inland waterways.**

ABB is to power South Korea's first domestic zero-emissions ferry. Juha Koskela from ABB Marine & Ports said, "Our agreement with Haemin represents a major advance in the local market, supporting South Korea's plans for sustainable shipping."

**Royal Huisman has received an order to build what it says is the world's largest sportfishing yacht, a 52m (171ft), six-deck aluminum craft designed by Vripack.**

Egypt has begun construction of a yacht marina in Dahab to promote yacht tourism with Saudi Arabia and other Gulf countries.

***Norsepower has successfully installed two 35m tall rotor sails for Sea-Cargo, a logistics provider in the North Sea market - this installation is said to be the world's first tiltable rotor sail.***

ICOMIA has produced a Ceramic Coating Yacht Industry Guideline as a result of their work with leading ceramic coating manufacturers, paint manufacturers, independent coating inspectors, coating supervisors and surveyors.

**Slovenia's Greenline Yachts has teamed up with Canal Boats Telemark AS in Norway, W-Yachts and Torqeedo to create what it describes as the "first 100% electric charter fleet in the world".**

Ocean Cleanup and Finnish crane manufacturer Konecranes have partnered to design, manufacture, and service The Ocean Cleanup's Interceptor, a system that extracts plastic from rivers before entering the ocean.

# Safety Briefings

## REPORT INTO FATAL ACCIDENT ON BOARD SUNBEAM PUBLISHED BY MAIB

MAIB has released a report on the fatal accident on board the trawler Sunbeam. On 14 August 2018, a second engineer on board was asphyxiated and died in one of the vessel's refrigerated saltwater tanks. The report found that entering Sunbeam's tanks without safety precautions had become 'normalised' by the crew and had been done 'without consequence' over a period of many years.

**MAIB reports that Freon gas had leaked into the tank.** Hazards associated with enclosed spaces can include flooding, heat, toxic gases, flammable gases, and oxygen deprivation, the report states. It is vital that enclosed spaces are recognised, and safety precautions are put in place before personnel enter them. These include proper ventilation, atmosphere monitoring, and a rescue plan. Risk assessments help to identify hazards and lead to method statements for the safe control of work, says MAIB. Without control of the maintenance work being undertaken on board Sunbeam, the second engineer was working alone and in an enclosed space. Lone working presents significant hazards if you get into difficulty, says MAIB's report, and it is completely unacceptable in enclosed spaces.

MAIB recommendations include that the Maritime and Coastguard Agency implements measures for the safe conduct of enclosed space entry on board fishing vessels by extending the application of the Merchant Shipping (Entry into Dangerous Spaces) Regulations 1988 to include fishing vessels (2020/137), and making corresponding updates to the relevant codes of practice.

Read the full article and download the report at **http://bit.ly/3hb7OMv**.

## *Sunbeam* (FR487)

in Fraserburgh, Scotland

on 14 August 2018

resulting in one fatality

VERY SERIOUS MARINE CASUALTY REPORT NO 19/2020 DECEMBER 2020

## RIVER CANAL RESCUE CALLS FOR 'STICKY FUEL' SAMPLES

After a spate of incidents in which River Canal Rescue (RCR) saw up to 100 cases of 'sticky fuel' in 2020, MD Stephanie Horton is asking for similar fuel samples to be sent to her. RCR says it is the UK's largest national 24/7, 365 days-a-year breakdown/emergency assistance service provider for inland waterway boaters. As such, with around 4,000 call outs each year, it says it can usually gauge when an issue is arising. Now with regions affected from York to London and Bristol to Lancaster, Horton says it's time to act and work out what the cause of the sticky fuel is. She's calling for samples – and locations – so she can try to identify common factors like treatments being used.

The situation came to light when River Canal Rescue had two identical jobs. Fuel injectors were diagnosed as needing an overhaul, yet their replacements stopped working within a week. The injection pumps were found to have failed even though the diesel was clear and bright.

Upon further investigation, RCR engineers found in both cases the injector pump racks had seized solid and the nozzles were blocked, and when replacing the plunger filter head, they found the fuel had a sticky, syrup-like substance. Alongside stuck injection pump racks, injectors and filter head plunger failures, RCR is also seeing cases of fuel filters blocking with wax inside them.

"Over the last nine months, we've come across higher than normal call outs for injector, injection pump and fuel problems not related to diesel bug. Our contractors are also reporting reoccurring issues with these systems and 'sticky fuel'," Horton says.

"It's definitely a type of contamination, but not one we've seen before. Samples have been taken and we're trying to build a picture of the problem. Our engineers are reporting problems across the UK and this particular issue is only becoming clear when a fault reoccurs, because the diesel on the whole looks bright and clear.

"Initially we suspected sugar in the fuel, but sugar stays crystalline instead of dissolving. We now believe it may be related to a reduction in FAME-free fuel and a change in fuel and fuel treatment additives."

# REPORT bites

**Crew kidnappings in the Gulf of Guinea surged to a new record in 2020, the International Maritime Bureau reported in its annual piracy report.**

Inmarsat, the world leader in global, mobile satellite communications, has completed its 10,000th Fleet Xpress ship installation.

**ABB Marine & Ports has opened a new laboratory to stress-test cyber threats to shipping, in view of shipping's digital development as stricter maritime cyber security rules from January 2021.**

US boat sales reached a 13 year high in 2020 and the recreational boating boom is expected to continue through 2021 says the National Marine Manufacturers Association.

**Turkish maritime authorities have published some terrifying video showing a cargo ship breaking in half. The incident took place on 17 January when the Palau-flagged Arvin broke in half and sunk off the Port of Bartin.**

ShoreMaster which merged with HydroHoist in 2019 and acquired Neptune Boat Lifts in 2020, has rebranded under the umbrella title Waterfront Brands.

RAD Propulsion has been awarded grants totalling £300,000 to develop new electric marine propulsion systems.

***Graham Westgarth, Chairman of V.Ships, believes the shipping industry needs to come forward and engage with the regulators so the legislation that comes out is shaped in a way that it is fit for purpose.***

Since the first 12X92DF engine was built in 2019, WinGD has been confident in calling it the world's most powerful dual-fuel engine. Now the engine series has been awarded a GUINNESS WORLD RECORD for the most powerful Otto-cycle engine ever built.

***Ports need to better protect themselves against cyber-attacks, attendees of the first digital International Association of Ports and Harbours European region meeting were told.***

# Safety Briefings

## RS Venture Connect sail number 307

VERY SERIOUS MARINE CASUALTY REPORT NO 20/2020 DECEMBER 2020

### MAIB REPORT PUBLISHED ABOUT CAPSIZE AND FULL INVERSION OF SELF-RIGHTING KEELBOAT RS VENTURE CONNECT

MAIB has published a report about the capsize and full inversion of self-righting keelboat RS Venture Connect. On 12 June 2019, Blackwell Sailing's self-righting RS Venture Connect keelboat sail number 307 (RSVC 307) suffered a capsize and full inversion while sailing on Windermere, England. The boat was crewed by an experienced disabled sailor at the helm and a local sailing instructor who was acting as crewman.

Having been knocked down by gusty winds, RSVC 307 initially lay on its starboard side with its two crew still in their seats. The boat's liftable keel then slid back into the hull, following which the boat inverted completely, trapping the disabled helmsman under the hull. The crewman was able to swim clear, but with the keel retracted he was unable to right RSVC 307 unaided.

The boat was righted by the Windermere Lake Wardens working with the crew of the sailing centre's safety boat, and the helmsman was recovered from the water. Attempts to resuscitate him in the Lake Warden's boat and on shore were unsuccessful.

**Safety Issues**

- the boat's weighted keel was not secured, and it retracted into its casing when the boat was knocked down
- the requirement for the keel 'restraining' strap to be fastened was not stated in the Owner's Manual
- none of the Blackwell Sailing instructors involved in the rigging or use of the boat on the day of the accident were aware of the keel strap's function or importance
- a total inversion of the boat had not been identified as a risk, so the safety boat crew were insufficiently prepared
- the RYA inspections of Blackwell Sailing did not prompt the centre to reassess its risks

**Recommendations**

A recommendation (2020/141) has been made to Blackwell Sailing to review its safety management system in light of the new guidance.

A recommendation (2020/142) has also been made to the Royal Yachting Association aimed at improving the support provided to Sailability centres.

Download the report at **http://bit.ly/34AaYnU**.

## NTSB PUBLISHES ITS SAFER SEA DIGEST WITH LESSONS LEARNED FROM US MARINE ACCIDENT INVESTIGATIONS IN 2019

The National Transport Safety Board (NTSB) has published its 104 page Safer Sea Digest. The Digest shares lessons learned as a result of the Board's many incident and accident investigations in 2019. The aim of the Digest is to focus those who read it on what can and does go wrong and how it can be prevented in the future.

The digest covers incidents and accidents caused by:

Organisational oversight
Fatigue
Dynamic Risk Assessment
Seafloor Hazards in Undersea Operations
Effective Hull and Structural Component Inspection & Maintenance
Watertight Integrity and Subdivision
Fire Protection During Hot Work
Securing Ventilation and Openings During a Fire
Remote Fuel Oil and Lube Oil Cut-Off Valves
Labelling of Alarms


Read the full article and download the digest at **http://bit.ly/2K6otoj**.

# IIMS releases two free compilations from Matrix Insurance Services for free download

Over the years, Karen Brain, Managing Director of Matrix Insurance Services Ltd, has spoken at various IIMS events, conferences and small craft seminars, both in person and online. Her input has been invaluable, her depth of knowledge is significant and is always much appreciated by surveyors.

Karen has also written extensively for the Report Magazine in recent years on the subject of both insurance for marine surveyors and aspects of law and contracts.

For the first time, IIMS has produced two compilations, each presented as 28 page pdfs that brings the contents together in two easy to read documents. These are now freely available to download.


## *50 Shades of Law & More*

The International Institute of Marine Surveying presents a compendium of the five chapters of the ***50 Shades of Law*** series and a further four related chapters in association with Matrix Insurance Services Ltd - nine articles in total written by Karen and her colleagues.

There are a number of topics covered, including:

- A surveyor's duty
- A fair representation
- What is evidence and when is it admissible
- Giving expert witness
- The root of most problems with contracts is caused by common formation problems


## *50 Shades of Insurance*

This publication is made up of a collection of thirteen articles written by the Matrix Insurance Services Ltd team and originally published in ***The Report Magazine*** over a number of editions. IIMS now presents these articles together in one publication for the first time.

Some of the subjects covered include:

- Discover our needs and understand the demands of others
- The three S's - control your risk, control your desires
- Unleashing the advantages of mediation
- The claims process - justice in law
- Tales from Miss History: Things you should know

To download your free copy of either or both publications go to **https://bit.ly/3rebtxZ**.

# The IIMS standalone Professional Qualification in Marine Corrosion


After many months of detailed discussion and product development behind the scenes, IIMS is pleased to announce the launch of a new standalone professional qualification in marine corrosion - subtitled ***marine corrosion and prevention in small vessels, ships and offshore structures***. The programme has been written primarily with marine surveyors in mind, those whose job it is to inspect, understand and report on corrosion. The new qualification is pitched at education level 4, examples of which are certificate of higher education (CertHE), higher apprenticeship, or higher national certificate (HNC).

The developer and content producer behind this new qualification is Mike Lewus, a name known to some members as he has presented at various IIMS events and seminars in recent years. Mike has an encyclopaedic knowledge of corrosion and has spent many years as a technical lead with the British Stainless Steel Association.

Each module will be presented in person by Mike, who has an engaging presentation style, over half a day and an online multiple choice test for each module will follow, requiring a 70% pass mark. The lecture schedule will be published soon and modules will be presented at different times of day, night and at weekends to facilitate students. If for any reason you cannot take the lecture live, you can study the video recording that will be made and then sit the module test. Download the course Prospectus at **http://bit.ly/2M2FVeH**.

**Who should study for this qualification?**

The course is intended for marine surveyors of yachts and small craft, ships and offshore structures. It is also relevant for design engineers, material specifiers, other professional engineers and students of marine science and engineering. To gain the professional qualification 7 of the 10 modules must be undertaken and passed to achieve the IIMS professional qualification. Assessment is by multiple choice tests, with a pass mark of 70% required for each module.

There are four core modules that all students are required to study and they are modules 6, 7, 8 and 9. In addition to the four core modules, commercial ship marine surveyors will be required to study module 1 and then choose two others from modules 2 to 5 or module 10. And, in addition to the four core modules, yacht and small craft surveyors are required to study module 3 and to choose two others from modules 1, 2, 4, 5 or 10.

**MODULE 1 - Ship types, structure, strength, stability and corrosion control strategies**

Examples of some of the learning outcomes from Module 1 are:

- Appreciate the architectural requirements of a 'typical' merchant, passenger and military ship.
- Be able to explain quantities such as centre-of-gravity, centre-of-buoyancy, meta centre, metacentric height, righting moments and how these relate to stability.
- Understand how a ship is affected by wave motion, sea state and how buoyancy and ship weight vary along ship length.
- Understand how ship design and propulsion affects stability.
- Be clear about safety regulations for 'freeboard', subdivision and floodable length and the situation expected after damage.
- Know how poor design can undermine the corrosion resistance of materials and what other corrosion control strategies are used on ships.

**MODULE 2 - Processing, construction methods and testing of steel products used in ship building**

Examples of some of the learning outcomes from Module 2 are:

- Know the process steps for flat and long steel products and understand how these affect metallurgical structure, surface finish, presence of defects and, influence strength and corrosion properties.
- Describe the underlying principles of welding techniques commonly used in ship building including SMAW, SAW, GMAW (MIG/MAG), GTAW (TIG) and OAW and appreciate the benefits of 'best practice'.
- Be able to describe the mechanical testing techniques carried out on metal alloys used in ship building and know the meaning of specific strength, toughness and ductility parameters.
- Know how shipyard practices impact material quality and how to minimise costs associated with remedial measures for improving surface condition

**MODULE 3 - Small craft structure, strength, stability and corrosion control strategies**

Examples of some of the learning outcomes from Module 3 are:

- Be able to describe the key features of a yacht including hull form, keel and rudder shape, sails and rigging and understand how they influence the forces, moments and performance.
- Explain what is meant by the centre of effort of the underwater body and centre of effort of the sails and the relevance for stability.
- Describe the factors that influence corrosion rates in atmosphere, splash zone and subsea and know which materials are used to mitigate the corrosion risks in these zones.
- Identify common corrosion mechanisms that occur on yacht components; and suggest how these can be minimised.
- Explain the corrosion control strategies that are used to protect critical yacht parts.

**MODULE 4 - Off-Shore structures, strength, stability and corrosion control strategies**

Examples of some of the learning outcomes from Module 4 are:

- Be able to describe the different types of offshore platforms and comment on their purpose, structure and stability.
- Appreciate the wind and wave loading on offshore structures and explain how mass damping can provide a benefit with respect to stability.
- Explain the corrosion control strategies used to protect offshore platforms and wind turbines.
- Explain why fatigue and fracture of structural components is an issue and what measures are used to mitigate the risks.
- Understand what techniques are used to assess the reliability of marine structures.

**MODULE 5 - International regulations for the construction of ships, safety and environmental protection**

Examples of some of the learning outcomes from Module 5 are:

- Be familiar with the national and international maritime regulatory authorities, their jurisdiction, regulation scope and the details.
- Know how to use safety analysis and risk assessment techniques i.e. failure probability distributions, hazard analysis, Boolean algebra, what-if and fault tree analysis.
- Appreciate how classification societies rules on weld inspection differs, including ABS (American bureau of shipping), RINA (Italian naval register), KR (Korean Classification org.), NK (Nippon Kaiji Kyokai CR: Central Research of Ships), DNV (Norway) and Lloyds Register (UK classification society).
- Recognise weld types in different ship members and be able to suggest a non-destructive inspection plan, based on a classifying organisation.

**MODULE 6 - The marine environment**

Examples of some of the learning outcomes from Module 6 are:

- Identify the zones that make up the marine environment and know how the characteristics of each zone influence engineering and corrosion control decisions for sea going vessels and off shore structures.
- State the definitions of fresh, brackish and sea water and know how their physical, chemical and biological properties differ in terms of impacting corrosion and preventative measures used.
- Be familiar with the meteorological conditions that impact performance of sea going vessels, how risks from these conditions can be minimised through design and where data can be sourced.
- Appreciate how marine pollution from marina management, ships (fuel and dumping), air and land affect corrosion can detrimentally affect the environment.

**MODULE 7 - Steels and non-ferrous alloys used in marine applications; composition and properties**

Examples of some of the learning outcomes from Module 7 are:

- Familiarity with the common designation systems relating to iron, non stainless steel, stainless steel and non-ferrous alloy grades.
- Know how compositions, mechanical properties and corrosion resistance change for alloy types suited to different marine conditions (zones).
- How to set about the task of specifying a suitable grade for a specific marine application i.e. basic knowledge of some material selection methods.
- Insight into the manner in which established grades can be attacked by corrosion processes and how such outcome affects further selection.
- Appreciate the corrosion mechanisms that undermine different alloy types and alternative materials that offer improved performance.

**MODULE 8 - Corrosion mechanisms that degrade metals in the marine environment**

Examples of some of the learning outcomes from Module 8 are:

- Understand the basic conditions that need to be established for corrosion to occur and explain what Redox reactions are and what forms/evolves at the anode and cathode during an electrochemical reaction.
- Categorise the spectrum of corrosion mechanisms, what conditions give rise to their initiation, which marine metals are affected and hence, how material selection in specific marine environments can be used to optimise performance.
- Understand how design can reduce and/or eliminate certain corrosion mechanisms.
- Know what material defects can facilitate early onset of cracking processes.
- Know the principles of and discuss approaches used to mitigate the risks of different forms of corrosion.

**MODULE 9 - Corrosion control and prevention of metals used in the marine environment**

Examples of some of the learning outcomes from Module 9 are:

- In what circumstances do metals behave in an anodic or cathodic manner, which one corrodes and how could the corrosion rate be estimated by calculation.
- Know how design features for open and closed structures can accelerate the onset of corrosion and consequently, explain what changes can be made to decrease risk and improve material performance.
- Differentiate between different types of inhibitors where they are used and how they suppress corrosion.
- Be able to calculate the mass of an anode needed to protect a ships stern gear and hull and, suggest an arrangement for the anode(s).
- What maintenance strategies are typically used to protect metal structures and components.

**MODULE 10 - Failure analysis**

Examples of some of the learning outcomes from Module 10 are:

- Distinguish between ductile, brittle and intergranular metal failures.
- Be able to set up a failure analysis strategy, identify microscopic investigations that can assist and identify the most appropriate spectroscopic and/or other techniques that can be employed.
- Know about the characteristics of different cracking mechanisms including fatigue, stress corrosion cracking, hydrogen cracking and mechanisms that occur in weld seams.
- Know how to assess toughness of metals and the metrics that quantify resistance of a material to crack propagation.
- Design and implement an appropriate strategy for investigating the likely cause of a failure in an engineering component.

**Your investment in the Professional Qualification and the next step**

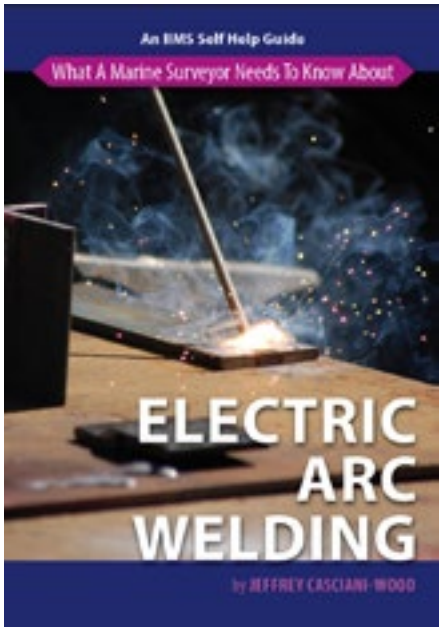
The cost of the qualification is £950, which covers live lectures or video recorded delivery of the seven modules and tests (including resits) you are required to study. IIMS members and students are offered a discounted price of just £895. You can either pay up front on enrolment, or in two equal instalments with 50% payable on booking and 50% due before the start of the programme.

At this stage IIMS is not seeking your commitment to study, rather we want you to lodge your expression of interest to study for this professional qualification. Registering your interest does not obligate you in any way. The first course is to be held around June and the second one in November 2021. Once you have expressed your interest, we will be in touch in the coming weeks to see if you wish to progress on to formally enrol for the Professional Qualification or not.

The qualification will be managed by the Institute's wholly owned subsidiary, the Marine Surveying Academy, but formally awarded by certification by the International Institute of Marine Surveying.


To register your expression of interest go to **http://bit.ly/39gVOGV**.

# New Handy Guides available: numbers 25 and 26




The Institute is pleased to bring its twenty fifth handy guide to market, now available to purchase in either paperback or eBook pdf format.

***What a marine surveyor needs to know about electric arc welding:*** Arc welding refers to a group of processes that use a power supply to create an electric arc between an electrode and the base material to melt the metals at the welding point.

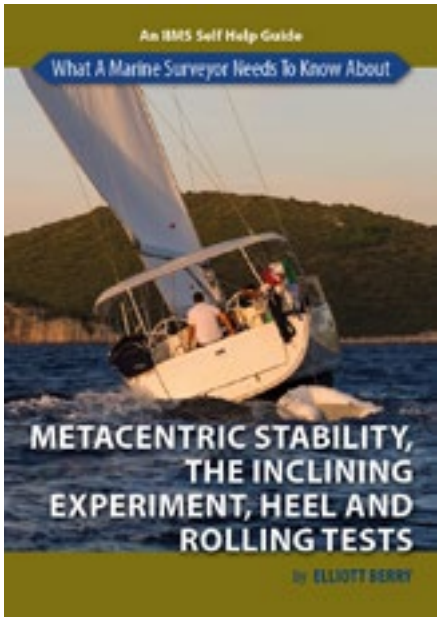
The process of manual arc welding is widely used because of its easy manipulation and its low capital and running costs, which also makes it ideal for use in ship and boat building. In arc welding, the voltage is directly related to the length of the arc and the current is related to the amount of heat input. Constant current power supplies are most often used for manual welding processes such as gas tungsten arc welding and shielded metal arc welding because they maintain a relatively constant current even as the voltage varies. That is important because, in manual welding, it can be difficult to hold the electrode perfectly steady and, as a result, the arc length and thus the voltage tends to fluctuate.

The marine surveyor should have an understanding of what happens when the arc is struck. The electrode must first touch the piece to be welded. The causes a short circuit and, when the electrode is lifted slightly from the work piece, an electric arc is formed. Intense heat is generated to a temperature of about 6,000 degrees centigrade - high enough to melt both the electrode wire and its coating.

The aim of this handy guide is not to transform the surveyor into a competent welder, but to give him/her a deeper understanding and appreciation of this vitally important activity.

***Electric arc welding*** runs to 76 pages and is available in paperback at £25 or in eBook pdf format at £22. To purchase a copy go to **https://bit.ly/2KIN5WM.**

The handy guide, ***What a marine surveyor needs to know about metacentric stability, the inclining experiment, heel and rolling tests***, authored by Elliott Berry FIIMS, covers an area that for many marine surveyors remains something of a dark art. Yet understanding stability and its theory as well as in practical terms as to why a vessel floats is something all surveyors must understand fully.




The handy guide is presented in four distinct parts:

Part 1 - The inclining experiment
Part 2 - A typical inclining experiment report for a steel yacht
Part 3 - An approximate determination of a small vessel's stability by means of the rolling period tests
Part 4 - The statical stability and stability criteria

An experienced practicing marine surveying practitioner, Elliott presents the theory using a number of formulae backed by helpful diagrams and illustrations to show what the marine surveyor should do and be aware of when conducting inclining experiments and heel tests.

What a marine surveyor needs to know about metacentric stability, the inclining experiment, heel and rolling tests is an essential companion for experienced and less experienced surveyors alike.

This handy guide is only available in downloadable pdf format and is priced at just £10. Click for more information **http://bit.ly/2M9zaYe**.

## RECENT NEW IIMS MEMBERS

***Full members***

| | | |
|---|---|---|
| Duncan Soffe | *MIIMS* | UK |
| Michael Boyle | *MIIMS* | UK |
| George Zeitler | *MIIMS* | USA |
| Kingsley Cowdrey | *MIIMS* | South Africa |
| David Mietla | *MIIMS* | Canada |
| Sundras Govender | *MIIMS* | Australia |
| John Whitham | *MIIMS* | UK |

***Technician members***

| | | |
|---|---|---|
| Rafal Tymcik | *TechIIMS* | Poland |

***Affiliate members***

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| Luca Marziale | *AffilIIMS* | Italy |
| Josefine Lauridsen | *AffilIIMS* | New Zealand |
| Greig McAlpine | *AffilIIMS* | UK |
| John Cardona | *AffilIIMS* | USA |
| Mateu Fullana Pascual | *AffilIIMS* | Spain |
| Caleb Gaiya | *AffilIIMS* | Nigeria |
| Maurits Winkel | *AffilIIMS* | Curacao |
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***Corporate members***

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| Global Marine Consultants | *CorpIIMS* | UK |

***Associate members***

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|---|---|---|
| Jim Normey | *AssocIIMS* | Canada |
| Andrea Armas | *AssocIIMS* | USA |
| David Pate | *AssocIIMS* | UK |

***Graduate members***

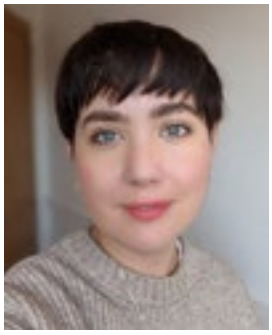
| | | |
|---|---|---|
| Paul Hatch | *GradIIMS* | West Indies |
| William Danby | *GradIIMS* | UK |
| Albert Esgleas Tarifa | *GradIIMS* | Spain |
| Samantha Bartlett | *GradIIMS* | St Vincent & Grenadines |
| Clifford Blaylock | *GradIIMS* | Greece |

*IIMS congratulates these students for completing their studies in the* ***IIMS Professional Qualification in Yacht and Small Craft Marine Surveying***

| | | |
|---|---|---|
| Mark Bosworth | *GradIIMS* | UK |

*IIMS congratulates Mark for completing his studies in the* ***IIMS Professional Qualification in Commercial Ship Marine Surveying***

# A warm welcome to Vicki Loizides



*Good luck Vicki.*

After two successful years with IIMS as Education Co-ordinator responsible for managing the Institute's distance learning Professional Qualifications programme and output, Lorna Robinson has decided to move on to pastures new.

As her replacement, IIMS is delighted to welcome Vicki Loizides from 1 March who takes over management of this important part of the Institute's work. Living locally, Vicki is not entirely new to the shipping and cargo arena as she spent eight years in a project management role with NYK Group Europe Ltd based in Southampton.

Vicki gained a BSc degree in Psychology with Criminology (2:1) from Portsdmouth University before embarking on her career and, as she says, this gives her some knowledge from the other side understanding the expectations of a student and knowing how to successfully tackle and complete assignments.

Vicki lives with her husband and young family close to the sea not far from the office. Away from work, she enjoys camping holidays, spending time dog walking, entertaining friends and pottering in the garden.


# New wooden sign for IIMS HQ

IIMS is most grateful to member, Geoff Bowker AssocIIMS, who has been putting his new wood engraving equipment to good use by testing to reproduce the Institute's logo on a piece of oak.

Geoff is a traditional wooden boatbuilder, repairer and restorer based near Weymouth in Dorset, UK. A graduate of the Boat Building Academy in Lyme Regis, he achieved a BBA Certificate of Achievement (Distinction) and a City & Guilds Level 3 Diploma in Marine Construction, Systems Engineering & Maintenance.

Traditional wooden boats are an art form in themselves and have served a practical purpose for centuries. Building methods such as clinker are amongst Geoff's favourites and have been mostly unchanged since before the days of the Vikings.

# Locked in battle for the America's Cup

At the time of writing, the winner of the Prada Cup challenge is taking place to determine which team will take on New Zealand in the final of the 36th America's Cup during March. One lucky IIMS member, Nick Parkyn, was handily placed to capture a photograph of Team Ineos' Britannia II as she was foiling up Auckland Harbour returning from a practice session.

**History of the competition**
The America's Cup, the pinnacle of yachting, was first contested in 1851 making it the oldest trophy in international sport. The trophy's roots date back to when a syndicate of businessmen from New York sailed the schooner America (from which the race takes its name) across the Atlantic Ocean for the World's Fair in England. The schooner won a race around the Isle of Wight against a fleet of British yachts to claim the £100 Cup.

From there, the United States embarked on what would become the longest winning streak in the history of sport. A 132-year stretch saw boats representing the country successfully defend the trophy 24 times from 1870 through to 1980. In 1983 Australia II became the first successful challenger to lift the trophy from the Americans.

Throughout its history, the America's Cup has enchanted leaders of industry and royalty from tea merchant Sir Thomas Lipton, to brewing and real estate mogul Alan Bond, aviation pioneer Sir T.O.M. Sopwith, the Aga Khan, media mogul Ted Turner, and Harold S. Vanderbilt.

May the best team win the 36th America's Cup.


*The 'Ineos UK' team's AC75 yacht returning from a practice session. Photo: Nick Parkyn*

# Web site domain names for sale

Mark Wiater MIIMS has some web site domain names that are surplus to requirement and are available to purchase. If you are interested in acquiring any of the domain names below, please email Mark directly at **mark@bmsuk.co** to discuss the matter further, or telephone +44 (0) 7827292171.

yachtandboatsurveyors.com
boatsurveyors.uk.com
yachtssurveyor.co.uk
bmssurveyors.com
marinewarrantysurveyor.com
narrowboatsurveyors.com
marinesurveys.uk.com
marinesurveyor.uk
bmssurveyors.co.uk
marinewarrantysurveyor.co.uk
yachtsurveyor.net
yachtssurveyor.com
marinesurveyors.uk
narrowboatsurvey.co.uk
yachtsurveyor.uk

# The Other Man's Loss Is My Gain

*The Institute is grateful to Capt Jerry Zingale who has submitted this most relevant poem for marine surveyors to IIMS for publication.*

*By author unknown*

I'm a cargo surveyor, a checker and weigher,
I separate; sort and compare.
The stained and the sound, with my ear to the ground,
For misrepresentations, take care!
I boss the longshoremen, a dozen or more men
Drop hooks when they see me pass by.
For "Handling in Transit" how anything stands it is surely a wonder, say I!

There's rumour of shipwrecks, there's oil in the 'tween decks,
There's salt water, fresh water, brine.
There's contamination, too much fermentation,
And leakage in ten casks of wine.
There's copra that's rotten, six bales of wet cotton, crude rubber, raw sugar and grain.
A ship that's on fire, just what I require.
The other man's loss is my gain.

An overturned truck is a great piece of luck.
A worm eaten barge is my meat.
A smothering line with a leak is divine
As are ship sweat, and dampness and heat.
Spontaneous ignitions all damage conditions, some matting infected with lice.
And flour with weevils and all sorts of evils,
And coffee with inherent vice.

Some fruit over-ripe, and some old rusted pipe.
Men's shirts, chocolate, candy and soap.
Some toys in trans-shipment, electric
Equipment and coils of the finest hemp rope.
Some pilferage in cases of Chantilly laces, a carton of damaged canned milk.
A statue for Church, and a long futile search
For the cause of some damage to silk.

Some lumber that's green, the worst that I've seen,
Split peas, and some long Chinese hair.
A shipper pernickety, antiques very rickety,
Shoes that just cannot pair!
Irate consignees and some maggots in cheese; some shrimp for Japan packed in ice.
Some damage by hurricane, sisal that's wet by rain,
Pockets of damp swollen rice.

There's beet-seed that's mildewed, some olives quite ill-hued.
A harp, and some moth eaten books.
A rug from Damascus, a fake if you ask us,
That's damaged by stevedores' hooks,
A cargo-surveyor! A life that is gayer; you really must search far to find.
With trips out of town that I never turn down,
Though hundred odd-jobs trail behind!

For the G.A. Adjuster, my forces I muster
To minimise loss I sweat blood.
I squeeze the last dollar, though retailers holler,
The market with off grade I flood.
I salvage wet carbon black, poke at a bag that is slack, climb over mountains of scrap.
I help stow some big sedans, look at some leaking cans,
Finding what caused the mishap.

There's heat that's intense, there is smoke that is dense;
And holds that are dark-some and deep;
And jobs late at night when it's really a fight
To ward off some much needed sleep.
Now I'm not complaining I'm merely explaining, the ins and outs of my trade.
For take it or leave it, I like it, believe it,
It's one way of making the grade.

*Poem submitted for publication by Capt. Gerard (Jerry) V. Zingale, AMS*
*M. R. Wolf & Co. Marine Surveyors & Consultants*

If you can shed any further information on the origins of this poem, please email Jerry at **vesselsafety@yahoo.com**

# The CTU Code – why we need it ...

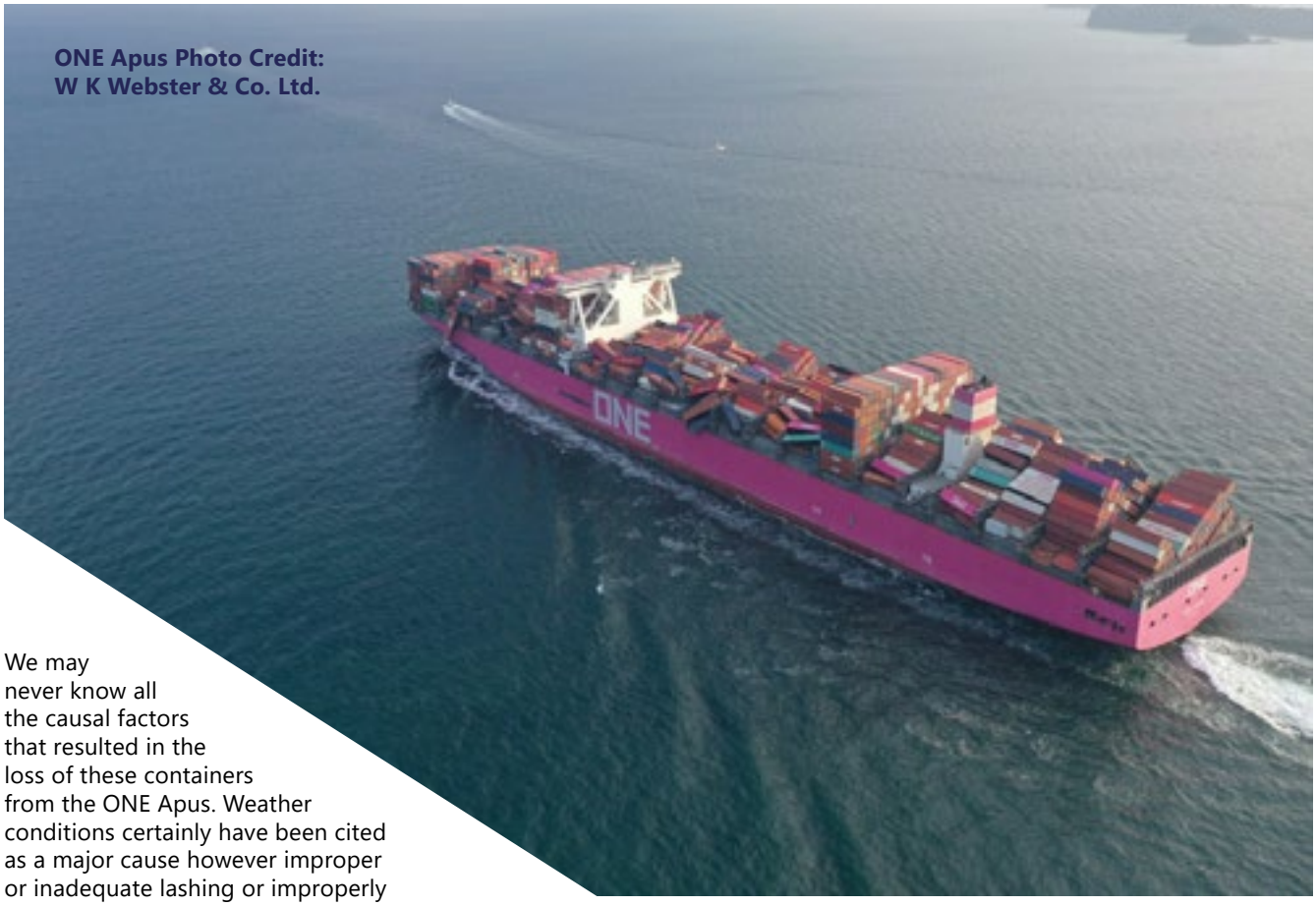
By **Bill Brassington**

**In late November 2020, the ONE Apus was under way from Yantian, China to Long Beach, California when it encountered a storm about 1,600 nautical miles northwest of Hawaii and sustained a massive container stack collapse, losing more than 1,800 boxes over the side. The master diverted the vessel, then aborted the voyage and headed for a port of refuge in Japan, arriving in Kobe on December 8.**


ONE Apus Photo Credit:
W K Webster & Co. Ltd.

**Bill Brassington** is an independent safety and security consultant in the freight supply chain with nearly 20 years' experience in container industry. As part of his work Bill has always played an active role in health and safety issues and as a consequence of which become an active member of the International Organisation for Standardisation's Technical Committee 104 (freight containers) and is now the Chairman of the Sub-committee responsible for special containers (SC2). He has played an important role in developing many standards including IS 6346, IS 9897 (SC4) as well as the structural and testing standards in SC1 including IS 1496 Specification and testing of freight containers, IS 1161 Freight Containers: Corner Fittings and IS 3874 Freight Containers: Handling and Securing.

Bill has a detailed knowledge of container safety and has participated in, and presented, seminars on many container safety related issues. He was the consultant editor of the ***"Code of practice for packing cargo transport units (CTU Code)"*** for the International Maritime Organisation, International Labour Organisation and United Nations Economic Commission for Europe.




**ONE Apus Photo Credit: W K Webster & Co. Ltd.**

We may never know all the causal factors that resulted in the loss of these containers from the ONE Apus. Weather conditions certainly have been cited as a major cause however improper or inadequate lashing or improperly declared contents can certainly result in stack instability.

What we do know is that salvors discharged a total of 50 boxes between December 8 and December 22, and another 76 boxes were removed by December 31 - an average rate of fewer than ten containers per day. Thousands of containers remained on deck and it would need another month to complete the operation.

The salvors reported: "The careful removal of the dislodged units under a schedule formulated by stowage planners is expected to take over a month with safety the number one priority". The salvors are hampered by the lack of information available for the contents of the remaining containers. It is reported that "Shipowners and operators have, unfortunately, not been cooperative as to the status of each container and their stowage positions".

This lack of information may be due to the fact that the shipowner or operator is unable to furnish this information to the salvors due to improper declarations by the shipper.

This is one of the core responsibilities identified within the CTU Code.

## IMO/ILO/UNECE Code of Practice for Packing of Cargo Transport Units

The aim of the IMO/ILO/UNECE Code of Practice for Packing of Cargo Transport Units (CTU Code) is to give advice on the safe packing of cargo transport units (CTUs) to those responsible for the packing and securing of the cargo and by those whose task it is to train people to pack such units. In addition to advice to the packer, the CTU Code also provides information and advice for all parties in the supply chain up to and including those involved in unpacking the CTU. If all parties involved in the ONE Apus container loss had fully complied with the CTU Code, the disaster may not have been avoided but the extent of damage may have been reduced and the recovery of the containers remaining on board would have been quicker.

Improperly packed and secured cargo, the use of unsuitable CTUs and the overloading of CTUs may endanger persons during handling and transport operations. Improper declaration of the cargo may also cause dangerous situations. The misdeclaration of the CTU's gross mass may result in the overloading of a road vehicle or a rail wagon, or in the allocation of an unsuitable stowage position on board a ship, thus compromising the safety of the ship.

Starting at the beginning, it is important to recognise that a CTU is not just a freight container. The term CTU also incorporates road vehicles and trailers and rail wagons, all of which can be carried by different transport modes - road, rail, inland waterways or deep-sea.

This Code comprises 13 chapters which follow the transport chain from consignor to unpacking at the destination. Most of the chapters refer to one or more annexes which are highlighted in the text where applicable. Further practical guidance and background information is available as informative material, which does not constitute part of the CTU Code but is provided to all stakeholders so that they are able to make correct decisions with regard to the selection and packing of CTUs.

| Chapter | | Referenced annexes | | Related informative material[1] | |
|---|---|---|---|---|---|
| 1 | Introduction | | | IM1 | Consequences of improper packing procedures |
| 2 | Definitions | | | | |
| 3 | Key requirements | | | | |
| 4 | Chains of responsibility and information | A1<br>A2 | Information flow<br>Safe handling of CTUs | IM2 | Typical documents related to transport |
| 5 | General transport conditions | A3 | Prevention of condensation damages | | |
| 6 | CTU properties | A4 | Approval plates | IM3 | CTU types |
| 7 | CTU suitability | A4 | Approval plates | | |
| 8 | Arrival, checking and positioning of CTUs | A4<br>A5<br>A6 | Approval plates<br>Receiving CTUs<br>Minimizing the risk of recontamination | IM4 | Species of concern regarding recontamination |
| 9 | Packing cargo into CTUs | A7<br><br><br>A8 | Packing and securing cargo into CTUs (supplemented with appendices 1 to 5)<br><br><br>Access to tank and bulk tops, working at height | IM5<br>IM6<br>IM7<br>IM8 | Quick lashing guides<br>Intermodal load distribution<br>Manual handling<br>Transport of perishable cargo |
| 10 | Additional advice on the packing of dangerous goods | | | | |
| 11 | On completion of packing | | | IM9 | CTU seals |
| 12 | Advice on receipt and unpacking of CTUs | A5<br>A9 | Receiving CTUs<br>Fumigation | IM10 | Testing CTUs for hazardous gases |
| 13 | Training in packing of CTUs | A10 | Topics for consideration in a training programme | | |

*Table 1 – Summary of contents (CTU Code)*

Chapter 3 identifies the key requirements for those involved with packing CTUs and shipping the cargo. It provides an overview of basic safety issues related to the packing of CTUs, briefly described as "dos and don'ts". Detailed information on how to comply with these "dos" and how to avoid the "don'ts" are contained in the following chapters and in the related annexes.

The following chapter is one of the most important of the CTU Code which identifies the chains of responsibility and communication for the principal stakeholders in the transport chain. The relationship between the stakeholders is shown in a simplified form in Figure 1.


*Figure 1 – Transport chain*

Stakeholders identified in the CTU Code are functional roles, and an organisation may undertake many of the roles, for example the seller of the cargo may be the Consignor, the Shipper and the Packer. It is the functional roles of Shipper and Packer that start the transport chain of cargo. The Shipper is the party named on the bill of lading or waybill as shipper and/or who concludes a contract of carriage with a carrier. The Packer is the party that loads, places or fills the cargo within or on the CTU. The Shipper generates the documentation for the cargo and declares that it is properly described while the Packer ensures that the cargo is properly packed and secured in the CTU.

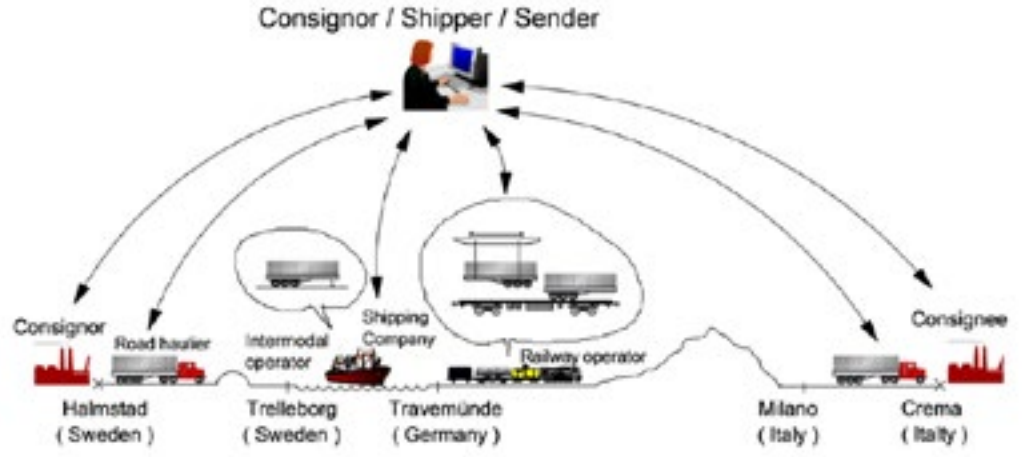



*Figure 2 – Typical flow of information*

However, recent investigations carried out by members of the Cargo Incident Notification System (CINS) found that 50% of all CTUs inspected did not comply with the CTU Code or dangerous goods regulations, due to mis or undeclared dangerous goods, packing errors or CTU structural failures. These failures can be attributed to either the Shipper or the Packer or both. However, the Shipper is reliant on the Consignor providing a proper description of the cargo. The Carrier requires information about the cargo and, in the case of freight containers, the verified gross mass, so that planners can correctly stow the CTU, which is a requirement of the CTU Code (transporting the CTU in compliance with agreements and all applicable regulations[1]). The Carrier's planner should ensure that the CTU is stowed in accordance with the CTU Code and "Safety Considerations for ship operations related to risk-based stowage of dangerous goods on container ships"[2]. The stow plan then needs to be properly transmitted to the Intermodal Operator (terminal) so that the CTUs can be correctly stowed in their designated cell. Only then can the Carrier be in a position to provide the salvors (when needed) the location and a full description and of the CTU and its cargo. This transfer of information is a requirement of the CTU Code and is described in Annex 1. A typical flow of information is shown in Figure 2.

Referring back to the transport chain stakeholders (Figure 1), an important support service can be provided by inspectors and surveyors. In addition to the survey carried out for CINS described earlier, a surveying company in USA have regularly reported back to the International Maritime Organisation (IMO) incompliance with IMO Circular 1442[3] the number of deficiencies found. Chart 1 shows the percentage of deficiencies found.

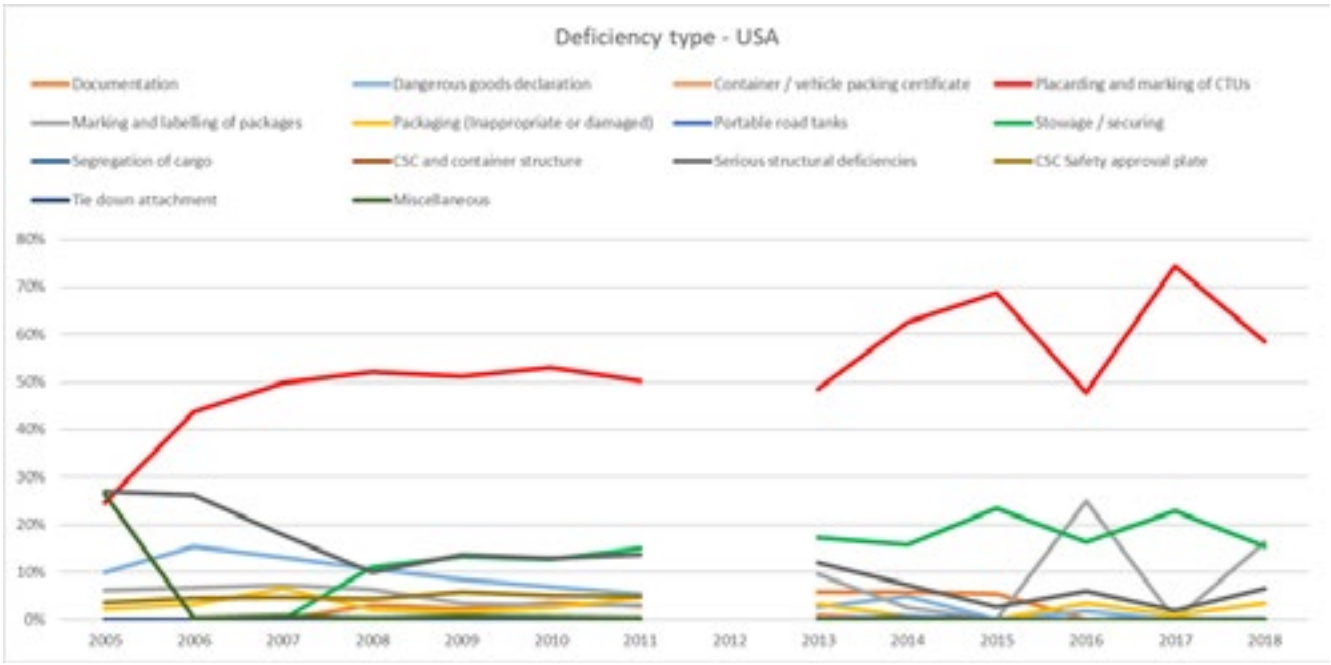



*Chart 1 – Deficiencies found during CTU inspections*

[1] for example IMDG Code and SOLAS
[2] A Publication of CINS (the Cargo Incident Notification System)
[3] MSC.1 / Circ,1442 Inspection programmes for Cargo Transport units carrying dangerous goods

The most significant deficiency is placarding and marking of CTUs (red line). This external marking of CTUs is a major safety requirement and covered in the CTU Code in section 11.2. Averaging at 16.27% the second most significant deficiency is "Stowage/securing inside freight containers, vehicles and other CTUs" (green line). Bearing in mind that in 2019 the World Bank reported that there were 795 million teu of packed cargo (521 million packed containers), there could have been 84 million containers transported with deficiencies related to the packing and securing of the cargo. The TT Club reports that 66% of incidents related to cargo damage are caused or exacerbated by poor packing and securing practices, resulting in a cost to the transport and logistics industry in excess of US$ 6 billion.

In 2010 a major shipping line banned the carriage of calcium hypochlorite following a major fire onboard of one of their ships that could be directly attributed to the misdeclaration of cargo. Compliance with the CTU Code and IMDG Code would have ensured that the carrier was fully aware of the cargo and could therefore place the container is a position where there was the minimum risk to the ship and crew. Compliance with the CTU Code could save hundreds of millions of dollars and countless lives just by reducing the frequency of fires on board ships.

A shipper transported a number of 5 tonne generators and struggled to get them into the 40ft container. The packer placed battens nailed to the floor to stop them sliding. By the end of the sea journey the generators had shifted and penetrated the container side wall. The container was stowed below deck, but had it been on deck it would have resulted in the stack collapsing and a significant proportion of the bay's container being lost or severely damaged.

This second example of a packing failure demonstrates the forces that CTUs and their cargos are subjected to during transport which are covered in Chapter 5 of the CTU Code. Many Packers confuse weight with mass and struggling to get a "heavy" item into a container often gives the impression that it is so heavy that it will never move. However, in this case heavy seas during the marine leg of the transport resulted in the generators becoming weightless due to the vertical acceleration of the vessel.

When the vessel pitches in large waves the vertical movement can double the weight or make it weightless and when associated with a rolling motion, this caused the generator to lift out of its retaining battens and crash through the container side walls.

Chapter 9 (Packing cargo into CTUs) is the core chapter of the CTU Code dealing with the actual packing operation. This chapter directs the user to the related provisions in annex 7, where detailed information on load distribution, securing arrangements, capacity of securing devices and methods for the evaluation of the efficiency of a certain securing arrangement are provided. This annex is supplemented with appendices on packaging marks, friction factors and on calculations for load distribution and cargo securing. To facilitate the evaluation of the efficiency of cargo securing arrangements, one sound practical tool is the "quick lashing guide" provided in informative material IM5. In addition, very detailed information on intermodal load distribution is provided in informative material IM6. Information on manual handling of cargo is provided in informative material IM7. Information on the transport of perishable cargo is provided in informative material IM8.

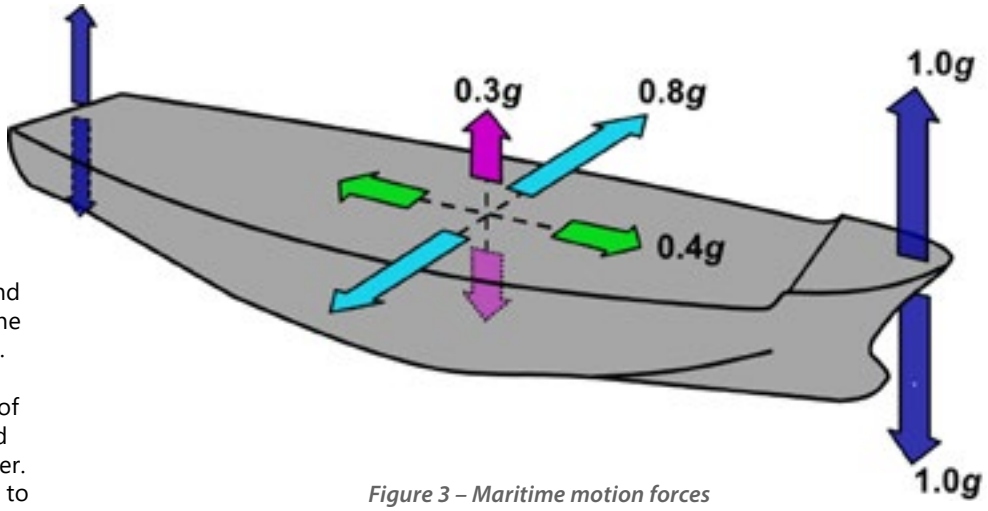



*Figure 3 – Maritime motion forces*

The CTU Code provides useful guidance on the tasks that are essential for the safe transport of cargo:

- Planning of packing
- Packing and securing materials
- Principles of packing
- Securing cargo in CTUs
- Packing bulk materials
- Safety at work and security

## Contamination

The transport of CTUs across national borders and internationally also has some negative aspects, not only do CTUs carry illegal immigrants or contraband/drugs but they can also be the transport means for incredibly harmful alien pests who piggy-back on or in the CTU and then escape in the destination country, sometimes causing very severe damage to crops, plants and indigenous species.

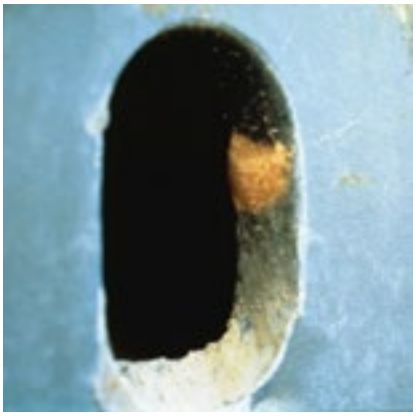
For example, pests such as the Bactrocera Dorsalis, the oriental fruit fly, are a very destructive pest of fruit in areas where it occurs. It is native to large parts of tropical Asia, has become established over much of sub-Saharan Africa, and is often intercepted in the United States, sometimes triggering eradication programs. Many species of concern have spread to large parts of the world, and it is probable that they cannot be eradicated.

To counter the risk of contamination in CTUs the container industry has worked collaboratively to develop joint industry guidelines for the cleaning of containers. The purpose is to assist in minimizing the movement of pests by freight containers and their cargoes. The guidelines are complementary to the guidance given in the CTU Code. They do not replace applicable local regulatory pest contamination measures and requirements, nor do they replace individual container operators' cleaning guidelines. Further, industry guidelines regarding container cleanliness for non-pest contaminations such as paint, oil, etc. fall outside the scope of these guidelines.

Chapter 4 of the CTU code, "Chains of Responsibility and Information" states in para.4.1.4: "All persons involved in the movement of CTUs also have a duty to ensure, in accordance with their roles and responsibilities in the supply chain, that the CTU is not infested with plants, plant products, insects or other animals…".

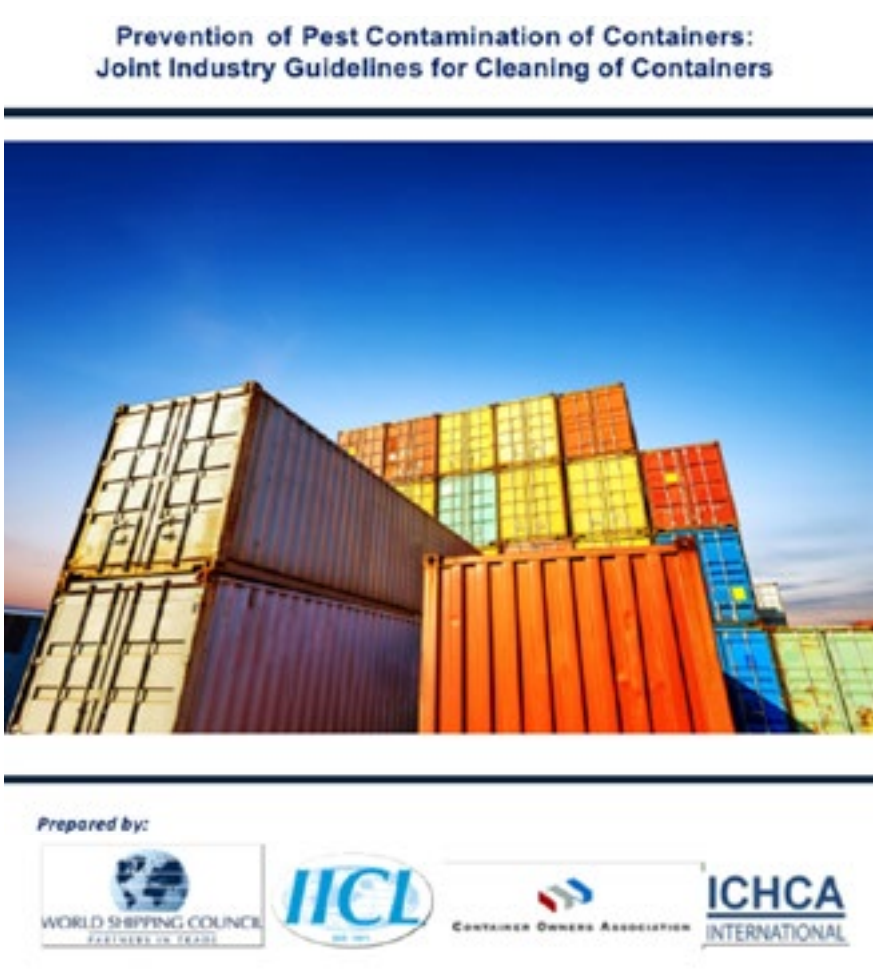
Asian Moth egg sack

When reviewing and implementing these guidelines it should also be kept in mind that the locations with the most potential for pest contamination of both the cargo and the container structures are those where the containers are being packed. Such locations are under the control of the shipper or the packer acting on behalf of the shipper. Shippers and packers are encouraged to consult the CTU Code regarding their responsibilities to ensure that they put measures in place to minimize the movement of visible pests and re-contamination of the container while in their custody.



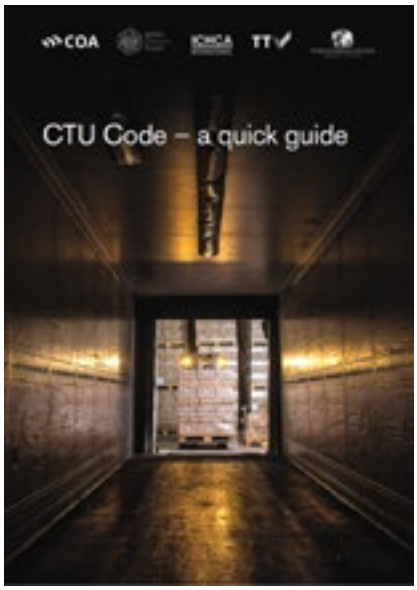
On arrival CTUs should be checked for such contamination such as egg sacks or nests and actions taken to ensure that pests or insects are not allowed to enter the CTU during the packing process.

It is also worth remembering that some pests can be found in soil and so CTUs should not be placed in an environment that permits the collection of soils in or on it.

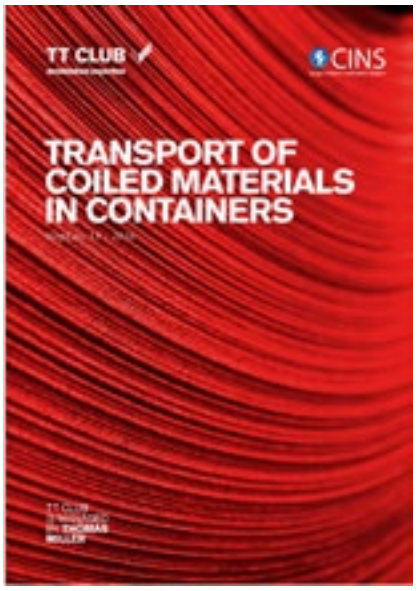


## Role of surveyors and inspectors

During the recent TT Club and UK P&I Club webinar session on *Ship Fires – containership fires: getting the cargo right*, a question was asked concerning the role of inspectors and surveyors. The speakers agreed that they had a very important role in reducing incidents in the transport chain. We have already seen that inspectors in the US have identified an incredible number of packing failures and the TT Club has reported that the majority of incidents are caused or exacerbated by poor packing. Properly trained surveyors who are conversant with the good packing practices identified within the CTU Code can assist Packers and Carriers to identify deficiencies in CTUs. To assist those involved with the transport of cargos in CTUs, the Cargo Integrity Group[4] have published the *"CTU Code – a quick guide"*.




The purpose of the guide is to facilitate the proper packing, transport and unpacking of cargo transport units (CTUs), including freight containers. The information included is intended to assist in planning and executing the packing of cargo so that its shipment will be satisfactory to the shipper, carrier and consignee. It will also help in the prevention of pest contamination and damage to CTUs and their cargoes transported by road, rail, and by ship. More importantly the guide includes a checklist relating to the packing of freight containers and assists all parties, especially surveyors and inspectors, to validate the packing and securing of cargo so that the risk involved in damage or harm during transport is minimized.




The information in the guide and the CTU Code itself is only of a general nature, as there are many different commodities and cargo types. Therefore, standalone publications such as the TT Club's Stop Loss No. 13 *"Transport of coiled materials in containers"* provides specific packing and securing information for coiled materials especially steel coils.

## Due Diligence

The CTU Code outlines various parties' roles and responsibilities regarding the packing, storage, handling and transport of CTUs.

Companies causing CTUs to be transported would want to be assured that the activities undertaken by a service provider are carried out in compliance with international and national regulatory frameworks and conform with the CTU Code.

The IMO has produced a circular[5] that applies to international traffic and users of this document should be aware that national regulations may also apply. It provides an example of a due diligence checklist for the provision of packing services and is intended to serve as a guide to what companies involved in the transport of CTUs should consider when selecting a provider of CTU-related services. The checklist may be modified to reflect the roles and responsibilities of other service providers and surveyors.

## The CTU Code's role in the transport of cargo

The CTU Code is a code of practice published by the three UN Agencies, but is an instrument that, without being binding nor imposing legal obligations upon member states, provides guidance to governments, employers and workers concerning a particular sector. Codes of practice are intended to assist governments and employers' and workers' organisations in drawing up regulations and can thus be used as models for national legislation.

The CTU Code therefore requires parties who are concerned about the safety of their cargo, or the persons involved in the cargo's packing, transport and unpacking, and the integrity of the infrastructure to adopt the practices described in the Code and needs champions, such as surveyors and inspectors, who will promote the best practices described in the Code.

Failure to adopt the practices described in the CTU Code will result in more fires, more containers lost overboard and, tragically, more deaths.

*"The CTU Code – a quick guide"* is freely available and can be downloaded in pdf format at **https://bit.ly/35gwhdO**.

*The author of this article, Bill Brassington, may be contacted by email at* ***bill.brassington@ets-consulting.org***

IIMS would like to thank W K Webster & Co. Ltd. for the use of their photos of ONE Apus.

*W K Webster is the world's leading service provider in the settlement of cargo claims, acting on behalf of marine & transit insurers, and companies that operate their own risk retention programs.* ***https://www.wkwebster.com/***

[4] Comprising the Container Owners Association (COA), Global Shippers Forum (GSF), ICHCA International, TT Club and the World Shipping Council (WSC).

[5] MSC.1/Circ.1531 Due diligence checklist in identifying providers of CTU-related services.

# New insights into MSC ZOE in shallow water that require further action to prevent future container loss

On the night of January 1st 2019, the large containership MSC Zoe sailed on a southerly route along the Dutch Wadden Islands during a northwesterly storm. The storm caused the ship to lose 345 containers, leading to large-scale pollution of the sea and Wadden Islands.

The Dutch Safety Board asked the Deltares research institute and the Maritime Research Institute Netherlands (MARIN) to assist in an investigation. The aim: to answer two central questions:

1) **what could have caused the loss of containers above the Wadden Islands?**
2) **how can we prevent this in the future?**

With detailed calculations, Deltares was able to determine the wind, current, water depth and wave conditions at the time of the accident. Arne van der Hout, senior advisor port and waterways at Deltares: 'The water depth on the route that night was between 21 and 26 meters. There was a northwesterly storm, with winds up to Beaufort 8, almost perpendicular to the route. Large beam waves with a significant height of 6.5 metres were coming towards the ship, resulting in extreme wave heights of up to 11 metres. These conditions occur once or twice every year in this area.'

As a result of the shallow water above the Wadden Islands, the waves were steep with high crests. Regular breaking occured, resulting in wave crests falling forward at high velocity. These dangerous shallow water waves are well-known to crews sailing regularly in the area.

The environmental conditions determined by Deltares were modelled accurately at a scale of 1:63 by MARIN at its unique model testing facilities. MARIN prepared a test model of an Ultra Large Container Ship like the MSC Zoe at this scale. MARIN also did extensive calculations and simulations and talked to nautical specialists who have sailed containerships in this area.

Based on these investigations MARIN came to the conclusion that the following four phenomena together could have led to the loss of the containers above the Wadden Islands:

1 60 metre-wide containerships like the MSC Zoe are very stable; When a force is applied to them they want to return to their upright equilibrium position quickly. This results in a short natural period during which the ship starts to roll as it is brought into motion by an external force. For the present generation of ultra large containerships this natural period can be between 15 and 20 seconds, close to the wave periods that occur above the Wadden Islands during northwesterly storms. As a result, roll resonance can occur, causing heeling angles of up to 16 degrees. So, although they are stable, these large containerships can roll steeply. This causes large accelerations and forces being applied to the containers that can exceed safe design values.

2 In these beam waves, the ship does not only roll from side to side, but also heaves up and down many vertical metres. With a large draft of around 12 metres in a water depth of only 21 metres, there is very limited under keel clearance between the ship and the seabed: less than 10 metres. As a result of the combined rolling and heaving, a wide ship with a large draft can touch the seabed. When this happens, shocks and vibrations can occur in the ship, containers and lashings. The lashings can fail as a result.

3 In the very shallow water above the Wadden Islands, breaking waves can hit the side of the ship, resulting in a large upward jet of water reaching the containers, which are 20 to 40 metres above the surface of the sea. This is called 'green water', as it is massive sea water, not just white foam in the wind. This massive green water hits the bottom and the side of the containers. These can become damaged as a result, but complete stacks of containers can also be pushed over like dominos. If MARIN compares the locations on the ship where green water impacts are observed with the damaged rows of containers on the ship, it is probable that green water impacts played a role in the loss of the containers.

4 Finally: the hull of the ship was also hit by breaking waves. This can result in vibrations throughout the ship, damaging containers and lashings. To prevent this type of disaster from occurring in the future, it is important to look further to other ship types and sizes that sail this busy area. The same four phenomena will occur for smaller ships, but their sensitivity will be different as will be the limiting weather conditions for safe operations. Bas Buchner, president at MARIN: 'Based on the annual traffic above the Wadden Islands, MARIN has advised the Ministry of Infrastructure and Water Management to conduct further investigations of three ship types: ultra large containerships with lengths of up to 400 metres, like the MSC ZOE, a shorter and narrower Panamax, nearly 300 metres long, and a smaller container feeder with a length of 160 metres. The importance of testing smaller ships was underscored when the feeder 'Rauma' lost seven containers on February 11th 2020. The goal of the present MARIN investigation is that these ships and their crews and cargoes may also sail safely in this Particularly Sensitive Sea Area, as well as the prevention of container loss. We're doing this for the shallow southerly route directly above the Wadden Islands, as well as the deeper more northerly route. Based on these results the government can determine what policy is required: advice to ships from the Coast Guard, or closing an entire route under certain conditions.

Download the full report at **http://bit.ly/3nURDVs**.

**About MARIN**
MARIN (Maritime Research Institute Netherlands) is an independent research institute for the worldwide maritime sector, society and governments. With their modern calculation techniques, test facilities, simulators and measurements at sea, they are working on their mission: cleaner, safer and smarter ships and the sustainable use of the sea. MARIN employs 400 people and is the largest independent research institute worldwide.

**About Deltares**
Deltares is an independent institute for applied research in the field of water and subsurface. Throughout the world, they work on smart solutions, innovations and applications for people, environment and society. Their main focus is on deltas, coastal regions and river basins. Managing these densely populated and vulnerable areas is complex, which is why they work closely with governments, businesses, other research institutes and universities at home and abroad. Their motto is Enabling Delta Life. As an applied research institute, the success of Deltares can be measured in the extent to which their expert knowledge can be used in and for society.

# Tackling the scourge of container ship fires

By **Andrew Gray**



**Andrew is a Director at Campbell Johnston Clark and is based at their London office. Following a career at sea as an officer in the Royal Navy, he trained as a solicitor with an international law firm in the City. He has since worked in London, Singapore and Hong Kong and has over 20 years of experience in Admiralty and shipping law.**

**In this article, Andrew discusses the proliferation of serious fires onboard container ships in recent years that has shocked the shipping industry. He considers the causes and impact of such fires and the urgent efforts being made by a wide variety of stakeholders to solve this seemingly intractable problem.**

**Incidence of container ship fires**
**Over the last decade there has been a 70% fall in ship total losses. This has been widely credited to long term improvements in ship safety management and loss prevention programmes. Counter to this trend, there has been a substantial increase over the last decade in the number of fires in containers carried onboard container and ro-ro ships. One troubling statistic is that on average there is a fire onboard a container ship every week, with a major container fire occurring on average every 60 days. Nine major container ship fires were reported in 2019. By comparison, despite an overall fall in casualties in the first half of 2020, ten such incidents were reported.**

## Cause

This disturbing situation has been linked to both supply chain issues, including the widespread non-declaration and mis-declaration of dangerous goods cargoes, and inadequate fire-fighting systems onboard many of these vessels.

About 10% of laden containers or 5.4 million containers being shipped annually are estimated to contain declared dangerous goods. Of these, about 1.3 million containers may be poorly packed or incorrectly identified, indicating the scale of potential risk.

A 2020 study by the New York based National Cargo Bureau (NCB), supported by Maersk amongst others, revealed that of 500 containers inspected, 2.5% of DG containers imported to the USA were found to include mis-declared cargoes which represented a serious risk. Another study found there may be about 150,000 volatile containers in the supply chain annually.

Undeclared or mis-declared cargoes which have become notorious for causing container fires include calcium hypochlorite (widely used as a bleaching agent), lithium batteries and charcoal. Non-declaration or mis-declaration of cargoes is generally understood to arise from shippers' attempts to pay lower freight or circumvent restrictions on the carriage of dangerous cargoes.

## Dealing with fires onboard

There has also been widespread concern about the suitability of existing ships' fire-fighting systems to deal with container fires. A 2017 study highlighted that systems originally developed for fighting fires in general cargo ship holds have proved to be unsuitable for container vessels.

Smoke detection and $CO_2$ fire-extinguishing systems developed for large open holds may be completely ineffective within the confines of individual containers stowed beneath hatch-cover pontoons which are not gas-tight. There are calls for more sophisticated fire detection systems, utilising infrared cameras or thermal sensors installed both below deck and on deck.

While the containment of a fire within a limited number of containers remains the approved method of firefighting onboard a container ship, the equipment available is often unsuitable. Many stakeholders warn that new technical solutions are needed to make this approach effective. These issues have only been magnified by the steadily increasing size of container ships from 10,000 TEU vessels in 2005 to ultra large container ships in excess of 20,000 TEU today.

Improvements have been made to new vessels constructed after 1 January 2016 under amended SOLAS regulation II-2/10, but there are calls for substantial changes to existing ships' firefighting systems. These include utilizing the ship's

structure to create more effective fire compartments while installing enhanced below deck and on deck water water-based systems to cool the ship's superstructure and prevent fire spread.

On deck, monitors should be installed to create water curtains which can cool the maximum height and width of container stacks, particularly on the very much larger container ships now at sea. Other innovative fire-fighting systems are being deployed such as HydroPen, which drills though the container door and then switches mode to spray water inside the container.

Without adequate ship's firefighting systems, the ability of a container ship's crew to respond to and contain a blaze is severely limited. Despite the undoubted bravery and professionalism of crews in tackling such fires, external assistance is invariably required. The ship may be a considerable distance from shore and, even when outside assistance arrives, such fires may take weeks to be brought under control. Meanwhile, a further concern is the pressure placed on the resources and expertise of the global salvage industry in dealing with the rising numbers of major container fires.

## Loss and damage

As a specialist shipping law firm, we are only too aware of the increasingly severe consequences of large container ships fires. Not only have such events resulted in the injury and death of many crew members and others over the years, but the environmental implications and financial losses continue to be significant.

Apart from needless injury and loss of life, potential losses from a container ship fire might include hull damage, total loss of the ship, cargo and container loss and damage, claims between ship owners, charterers and slot-charterers, environmental damage prevention and clean-up, salvage costs, wreck removal, fines, investigation and legal costs.

With the increased size of container ships and their carrying capacity, a large container fire will severely impact the global marine insurance and P&I market with the sheer value of the property at risk, not to mention the GA effort of trying to collect security, vastly scaled up for the largest container ships. With present claims potentially running into tens or even hundreds of millions of US$, there is the fear that a total loss of a 20,000 TEU vessel and her cargo might exceed US$1 billion.

A considerable burden is also placed on the salvage industry and external firefighting services, with the significant challenge of fighting such fires due to the increased beam and stack heights of the larger container ships.

In addition, ports of refuge face the nightmare of how to deal with say 10,000 burned-out container shells and their cargo, many of which are not insured and abandoned. For example, exemplary support was recently given by the Singapore MPA and PSA in providing a port of refuge to MOL CHARISMA, the latest victim of last year's major container fires.

The human and financial carnage inflicted by a single undeclared or mis-declared cargo in a badly stowed container onboard a modern container ship cannot therefore be overstated.

## Solutions

Major efforts are however underway to deal with this problem from both the supply chain side and in improving the firefighting systems onboard. In an ideal world every cargo loaded in every container would be checked before shipping, but the cost of such an undertaking would be immense. At the same time, there are calls for more widespread spot checks by IMO member states and shipping lines to help identify undeclared or mis-declared cargoes.

Leading stakeholders are also working together to develop systems which reduce risk. The Cargo Incident Notification System (CINS) has over a number of years shared information on cargo related incidents and identified commodities which commonly cause problems during transportation.

A number of shipping lines are using artificial intelligence to develop increasingly sophisticated algorithms to search through their booking systems to identify potential mis-declaration, including Hapag-Lloyd's Cargo Patrol, Exis Technologies' Hazcheck Detect and ZIM's ZimGuard.

Other ventures include the Maritime Blockchain Labs (MBL) Misdeclaration of Dangerous Goods pilot, using blockchain technology to verify documentation and demonstrate the end-to-end delivery of dangerous goods.

Meanwhile, IUMI and other major stakeholders have co-sponsored a submission to the IMO Maritime Safety Committee's 102nd session to amend SOLAS in respect of improved detection, protection and firefighting capabilities onboard container ships.

Further pressure may also need to be brought to bear on rogue shippers by building a world-wide consensus for those mis-declaring dangerous container cargoes to face criminal sanctions in their home country, with jail time for deliberately endangering life and the marine environment.

## About Campbell Johnston Clark and Conclusion

Campbell Johnston Clark has offices in London, Newcastle, Singapore and Miami. They advise on all aspects of shipping and international trade, from handling major casualties to dry shipping litigation and ship finance. The firm has been involved in many significant ship and container fire cases over the years. Most recently, their Singapore office has acted in the MOL CHARISMA container ship fire which occurred off Sri Lanka in September last year.

As a firm, Campbell Johnston Clark shares the serious concerns of their clients and the wider shipping industry about the proliferation in container ship fires. Campbell Johnston Clark strongly supports the numerous efforts being made by different sectors, from the supply chain side to shipboard improvements, to bring this unhappy chapter in shipping history to a close.

# Container stack collapses
# CAUSES AND SOLUTIONS

Photo by New Zealand Defence Force

By **Captain Sudhir Malhotra AFNI**
*Marine Surveyor, The Standard Club*

In 2019 the international liner shipping industry transported 226 million containers around the world with a cargo value of more than US$4tn. Many of these were carried on ships' decks but – due to container stack collapses – not all arrived safely.

Despite various advances in standards and procedures, such collapses are still happening, putting vessels, their crews and the environment in danger. These incidents can often result in significant financial losses to the container industry and their marine insurers, sometimes with hefty fines for clean-up costs.

According to the World Shipping Council, an average of 1,382 containers were lost at sea each year between 2008 and 2019. Indeed, the frequency and value of container stack collapse claims experienced by Standard Club members has grown during the past five years, rising to a record US$1m from 13 incidents in 2019.

While these figures are only a tiny proportion of the total number of containers carried, container stack collapses and their not insignificant costs are mostly preventable.

This article aims to remind ships' officers and crews of the various factors that can contribute to container stack collapses, and how they can be avoided by taking greater care and attention during loading, securing and passage planning and when underway at sea.

## Bigger, stiffer ships

Economies of scale have resulted in ever-larger container ships being built. Modern container ships have come a long way from the first vessels designed in the late 1950s, which had a capacity of about 600–800 TEU with less than 50 containers loaded on deck.

By contrast the 2020 Algeciras class container ships have a capacity of just under 24,000 TEU, with a length of 400m and a beam of 61m – over three times wider than the early vessels. With a deck capacity of 24 bays, 24 rows and up to 12 tiers, ultra-large container carriers can carry nearly 14,000 TEU above the holds.

But the large beams of these post-Panamax giants result in them having relatively large metacentric heights (GM), meaning the vessels are very stable and therefore stiff. This in turn can result in very high rolling accelerations when the weather deteriorates, generating similarly high loads in the container lashing and securing gear.

## More powerful ship engines

Increasing commercial pressures means that container ships usually have to keep to very tight operating schedules, particularly in the liner trade, and they need to be as fully loaded as possible. As a result, they have increasingly powerful engines, not only to provide the high speeds required but also to enable speed to be maintained during bad weather.

The consequence is that, at times, container ships can be driven hard. When ships are driven hard in bad weather, the loads on the container lashing and securing gear can be severe.

## Higher wind loading

Almost all container stack collapses at sea occur in rough weather with strong winds. When fully loaded, the deck stacks on modern container ships present additional windage areas over 25 m high. Combined with large freeboards, the stacks act like giant sails to amplify a ship's motions as the weather deteriorates, further adding to lashing and securing loads.

## Parametric rolling of ships

Parametric rolling is a phenomenon where sudden heavy rolling occurs in head or following seas. Although very rare, it tends to affect vessels such as containerships which have large bow and stern flares.

It is difficult for masters to predict when parametric rolling will occur, as it requires certain conditions to be met. These include larger waves with a wave length equal to the ship's length, and a wave encounter period that is half the ship's natural roll period.

The resulting variations in waterplane area can, at the right frequency, trigger violent rolling of over 30° in a very short period of time. Such violent rolling can lead to extreme loads on container lashing and securing gear.

## Synchronous rolling of ships

For beam and quarter waves, if a container ship's natural roll period synchronises with the experienced wave period, resonance can occur resulting in similarly violent rolling motions.

Larger, stiffer container vessels tend to have shorter natural roll periods that more closely match the periods of the wave spectrum. This in turn increases the risk of synchronous rolling and over-loaded container lashing and securing gear.

For example, following a large container stack collapse in January 2019, the Dutch Safety Board confirmed that large, wide container ships using the shipping routes north of the Wadden Islands in the North Sea are at risk from synchronous rolling during north-westerly winter storms.

## Ship contact with seabed

In the same report by the Dutch Safety Board, it was concluded that on the shallower southern shipping route by the Wadden Islands, there is also a risk of container ships contacting the seabed as a result of violent motions caused by north-westerly storms.

Larger, deeper-drafted container ships are clearly at higher risk of contacting shallow sea beds during extreme roll and heave motions. Such contacts, even on a sandy seabed, can result in large additional loading in container lashing and securing gear. On rocky sea beds they can also severely damage the hull.

## Green water and wave impacts

In heavy weather, waves and ship motions can become so large that water flows over the deck, known as 'green water loading'. On container ships this can cause high impulsive loading on container stacks and potentially trigger a collapse. Steep waves with high horizontal speeds breaking against the side of a container ship can also generate additional forces in container lashing and securing gear.

## Improper container stowage

The stack weight on a container ship is the total weight of all containers and their contents in the tiers of a particular stack added together. The ship's cargo securing manual states the maximum permissible stack weight for each stack. Deck stack collapses often occur in those bays where the stack weight was exceeded.

Furthermore, the distribution of weights in a container stack directly affects a vessel's stability. The cargo securing manual specifies a maximum permissible GM for the vessel to avoid excessively short rolling periods and high accelerations. It is therefore important to get the GM within the right range before a voyage starts to avoid overloading lashing and securing gear.

Cargo securing manuals generally advise that deck containers are stacked in weight order, with the heaviest in the bottom tier and the lightest at the top, to minimise loads on the lashing and securing gear. This relies on accurate knowledge of container weights. If heavy or overweight containers are inadvertently loaded into the upper tiers, it could result in catastrophically high forces on the lashing gear and collapse of the stack.

## Overweight containers

To tackle the problem of overweight containers, the International Maritime Organization (IMO) amended SOLAS chapter VI regulation 2 in 2016 to require mandatory verification of the gross mass of packed containers loaded on ships.

The shipper is responsible for providing the verified gross mass (VGM) by stating it in the shipping document. They must then submit it to the master or their representative and to the terminal representative in time for it to be used in preparing the ship stowage plan. Furthermore, a VGM declaration is a mandatory prerequisite for any containers loaded onto a ship subject to SOLAS.

In practice, the role of the ship planner and terminal representative in ensuring compliance with the regulations is critical. While some container ports in developed countries have created resilient systems to comply with the regulations, there are ports in lesser-developed jurisdictions which fail to implement them. Port authorities are often unable to afford spot checking or enforcement, which does little to encourage offending shippers to comply.

As stated above, overweight containers with incorrectly declared or deliberately misdeclared weights can, if loaded on the upper tiers of deck stack, lead to a stack collapse.

## Poor packing of containers

Incorrect packing of containers can lead to both internal cargo damage and, more seriously, container stack collapse. Unlike breakbulk cargo, masters and officers do not have sight of or control over the contents of containers or the methods by which they are packed and secured. Carriers usually depend on third parties such as the shipper, freight forwarders or their sub-contractors for stuffing and securing cargo in containers.

If contents shift, they could potentially damage a container – and a stack of containers is only as strong as its weakest member. A container damaged due to shifting cargo could collapse and lead to a domino effect, resulting in an entire bay collapsing.

The IMO, the International Labour Organization (ILO) and the United Nations Economic Commission for Europe (UNECE) approved a Code of Practice for the Packing of Cargo Transport Units (CTU Code) in 2014 to help the container industry ensure safe stowage of cargo in containers. In summary, cargo should be packed evenly and solidly, and stowed securely within the container. Project or unusual cargo items should be adequately dunnaged and secured with adequate ratchet straps, wires or chains to secure fixing points. The side panels, end panels and roof panels of an ISO container should not be considered as structural members.

## Structurally weak containers

Containers are essentially meant to contain cargo but can get seriously degraded with factors such as rough handling, forklift damage, inadequately secured contents, wear and tear, and overloading. These along with other factors could lead to structural failure of the container, which in turn could cause to the stack above it to collapse.

The strength of a container is provided principally by the outer framework, side rails and corner posts, together with the corner castings. The side, end panels and closed doors provide racking resistance only. Effective stacking of containers relies on the strength of the corner posts to support the weight of the containers above. Damage to a corner post, in particular buckling, can seriously degrade its compressive strength and lead to collapse of a container stack.

## Inadequate container securing

The lashing of many containers in a large deck stack can prove challenging and difficult. Containers are basically secured to each other with twistlocks fitted at their four corners. Lashing rods and turnbuckles are then used to secure the container stacks to the deck by connecting them to the hatch covers, deck posts or lashing bridges if fitted.

However, lashing rods are only able to reach to the bottom of the third tier of containers loaded on hatch covers or deck posts, or to the bottom of the fourth or fifth tier of containers where a lashing bridge is fitted. This means that on large modern container ships, several upper tiers are secured by twistlocks only.

For the deck stowage system to be effective, the lashing and securing gear needs to be fitted correctly. Missing twistlocks, unlocked twistlocks, damaged lashing gear and lashings becoming lose in a seaway are examples of inadequate securing which can lead to a container stack collapse.

While lashing and securing gear is class approved, it is not usually inspected by a classification society. Replacement of sub-standard equipment is the responsibility of a ship's crew, who must keep a watchful eye out for damaged or worn components and arrange for them to be replaced without delay.

## Adjacent container stack clashing

Each cargo stack will experience slightly different lateral and vertical forces during a ship's motions at sea such that, in the event of large motions, adjacent stacks can clash. As a result, a stack of containers could collapse, either falling overboard or against another stack. Stack collapses due to clashing are often progressive as, when one stack begins knocking into adjacent ones, the forces can be much higher.

## Conclusions and solutions

Proper packing, stowage and securing of containers, and reporting of correct weights, are of key importance to the safety of container ships, their crews and cargoes; of shore-based workers and equipment; and of the environment. However, despite proper packing of the cargo into containers, correct weight declarations, and proper stowage and securing on ships, factors ranging from severe weather and rough seas to more catastrophic and rare events like groundings, structural failures and collisions can result in containers being lost at sea.

All of the factors discussed in this handout could contribute towards a catastrophic stack collapse which, besides causing large monetary losses, could potentially lead to serious crew injury and damage to the vessel and the environment. Understanding the cause of such collapses is the key to preventing them from occurring again and to appreciate who is liable for the incident.

As container ships have become larger, beamier and thus stiffer, the only significant enhancement in deck lashing and securing systems has been the provision of lashing bridges. While larger container ships provide commercial advantage to shipowners, these are often being staffed with fewer and fewer crewmembers. Given the highly commercial and systems-driven nature of the container trade, crewmembers might sometimes think their role is reduced to that of passive bystanders. This must not be allowed to happen: they must always be able to react quickly and make the correct decisions.

Crewmembers need to be mindful at all times of all the factors which could contribute to a container stack collapse. Indeed, proper training given to crewmembers could enhance their nuanced understanding and therefore enhance situational awareness on board container vessels. A proper understanding of the loading and lashing software and its limitations will go a long way to preventing such losses from occurring. Similarly, a thorough understanding of the trim and stability booklet and the cargo securing manual, and the limitations stipulated within them, must be considered and strictly adhered to by ships' crews and officers.

However, they need to bear in mind that while the cargo securing manual may only state one permissible GM value, this might not account for different wind exposures or consider if high cube containers (2.9 m high) are being loaded. There are many variables and officers and crew need to appreciate the limitations of the cargo securing manual and interpret its content. A correct stow requires innovative planning both ashore and on board. While approved software and advanced programs can be used, it is ultimately the crewmembers and cargo planners who need to make their own considered and informed decisions on loading.

Crewmembers must also not let commercial pressure dictate their actions; a sharp eye on cargo operations should be kept at all times to ensure that errors are prevented. Damaged, leaking and overweight containers must be spotted and rejected from being loaded on board.

Similarly, a sharp eye should be kept on the condition of the lashing and securing gear on board, which should be regularly evaluated for damage and deterioration in quality; and should be removed and replaced as necessary. While at sea, regular checks and tightening of the lashing gear, including turnbuckles and associated check nuts, will help keep the containers safely stowed.

Finally, since heavy weather is always a causal factor for stack collapses, a sound and well considered passage plan, an understanding of the dynamic forces affecting the vessel, and proactive and effective weather routing for container vessels will go a long way to preventing such incidents from occurring in the future.

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# The Serious Health Risks of a Polluted Ocean

By **Jacqueline McGlade** and **Philip Landrigan**

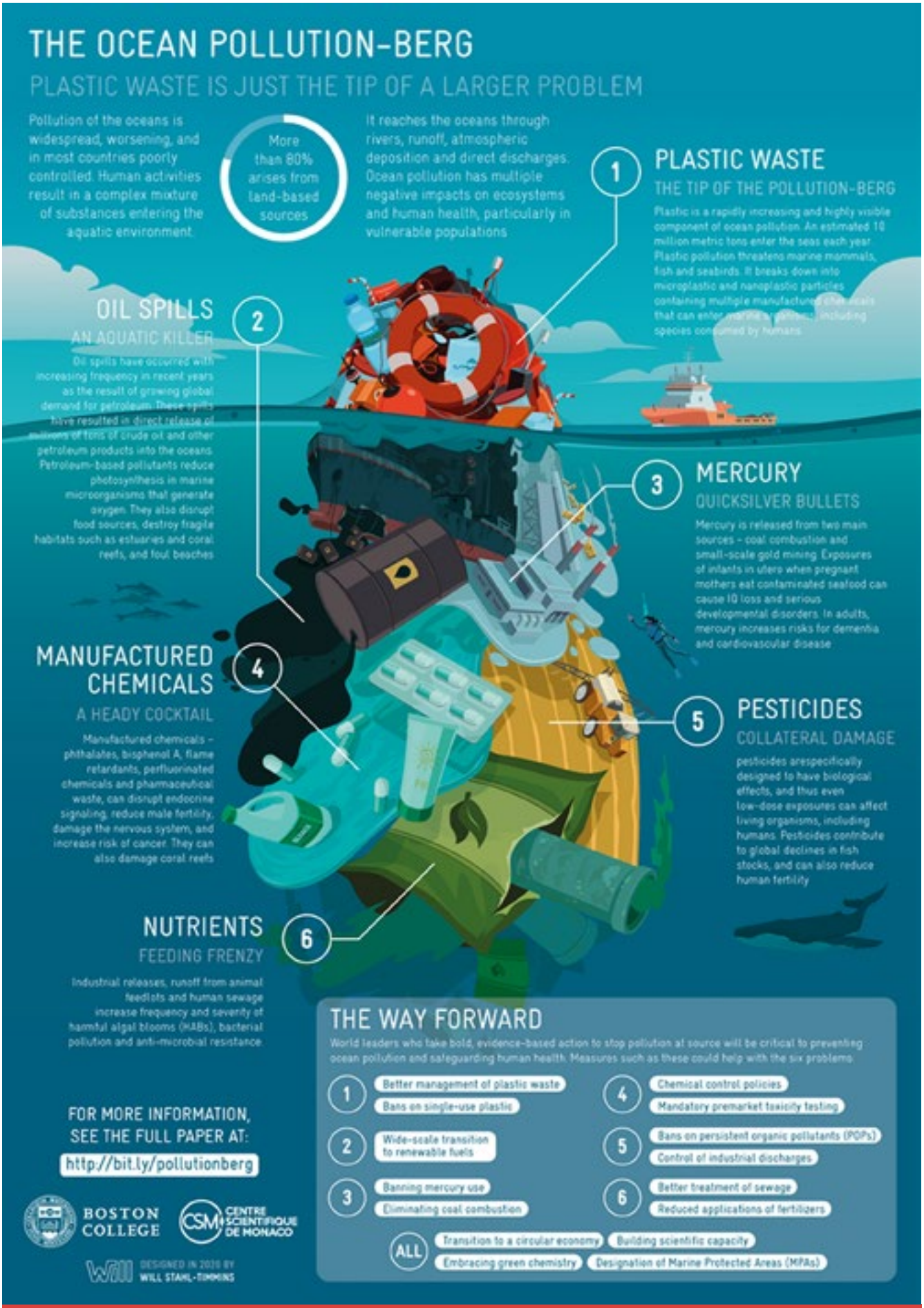
Jacqueline McGlade is Professor of Natural Prosperity, Sustainable Development and Knowledge Systems at UCL.

Philip Landrigan is Professor and Director, Global Public Health Program and Global Pollution Observatory, Schiller Institute for Integrated Science.

Ocean pollution is widespread, worsening, and poses a clear and present danger to human health and wellbeing. But the extent of this danger has not been widely comprehended – until now. Our recent study provides the first comprehensive assessment of the impacts of ocean pollution on human health.

Ocean pollution is a complex mixture of toxic metals, plastics, manufactured chemicals, petroleum, urban and industrial wastes, pesticides, fertilisers, pharmaceutical chemicals, agricultural runoff, and sewage. More than 80 percent arises from land-based sources and it reaches the oceans through rivers, runoff, deposition from the atmosphere – where airborne pollutants are washed into the ocean by rain and snow – and direct dumping, such as pollution from waste water treatment plants and discarded waste. Ocean pollution is heaviest near the coasts and most highly concentrated along the coastlines of low-income and middle-income countries.

Ocean pollution can also be found far beyond national jurisdictions in the open oceans, the deepest oceanic trenches, and on the shores of remote islands. Ocean pollution knows no borders.




For more information see the full paper at: http://bit.ly/pollutionberg

## THE MOST HAZARDOUS OCEAN POLLUTION

Plastic waste is the most visible component of ocean pollution. More than ten million tonnes of plastic enter the seas every year. The majority of this breaks down into microplastic particles and accumulates in coastal and deep-sea sediments.

Some large pieces float in the water for decades ending up as massive concentrations where currents converge and circulate. The Pacific Ocean's so called "garbage patch" is a well-known example.

Microplastics contain multiple toxic chemicals that are added to plastics to make them flexible, colourful, waterproof or flame-resistant. These include carcinogens, neurotoxins, and endocrine disruptors – chemicals that interfere with hormones, and can cause cancer, birth defects, and reduced fertility.

These chemical-laden particles enter the food chain and accumulate in fish and shellfish. When humans eat seafood contaminated with these materials, we ingest millions of microplastic particles and the many chemicals they carry. Though there is still debate on the harm to humans from microplastics, exposure to these chemicals increases the risk of all the diseases that they cause. Virtually all of us have microplastics in our bodies today.

Mercury is widespread in the oceans, and the major culprit is coal burning in homes and industry. All coal contains mercury, and when it burns, mercury vaporises, enters the atmosphere, and eventually washes into the sea. Gold mining is another source, as mercury is used to dissolve gold from the ore.

Mercury can accumulate to high levels in predatory fish such as tuna and swordfish, which are in turn eaten by us. Contaminated fish can be especially dangerous if eaten by expectant mothers. Exposure of mercury to infants in the womb can damage developing brains, reducing IQ and increasing risks for autism, ADHD, and other learning disorders. Adult mercury exposure increases risks for heart disease and dementia.

Petroleum pollutants from oil spills threaten the marine microorganisms that produce much of the Earth's oxygen by reducing their capacity for photosynthesis. These beneficial microorganisms use solar energy to convert atmospheric $CO_2$ into oxygen and are also affected by organic pollutants and other chemicals. When there is a major oil spill, the impact can be huge.

Coastal pollution from industrial waste, agricultural runoff, pesticides, and sewage increases the frequency of harmful algal blooms, known as red tides, brown tides, and green tides. These blooms produce powerful toxins like ciguatera and domoic acid that accumulate in fish and shellfish. When ingested, these toxins can cause dementia, amnesia, paralysis, and even rapid death. When inhaled, they can cause asthma.

Dangerous microorganisms result from a combination of coastal pollution and warming seas, which encourages their spread. Harmful bacteria such as the vibrio species – found in warmer waters and responsible for vibriosis, a potentially fatal illness – are now appearing further north and causing life-threatening infections. There's a high risk that cholera, caused by vibrio cholerae, could spread to new, previously unaffected areas. And the health impacts of ocean pollution fall disproportionately on indigenous peoples, coastal communities and vulnerable populations in the Global South, underlining the planetary scale of this environmental injustice.

## POLITICAL WILL AND SCIENTIFIC EVIDENCE

While the findings in this report are alarming, the good news is that ocean pollution, as with all forms of pollution, can be controlled and prevented. Bans on single-use plastics and better waste sorting can curb pollution at its source, especially plastic waste, both on land and at sea.

Wise governments have curbed other forms of pollution by deploying control strategies based on law, policy, technology, and targeted enforcement. The US, for example, has reduced air pollution by 70% since the passage of the Clean Air Act in 1970. They have saved thousands of lives. They have proven highly cost-effective.

Countries around the world are now applying these same tools to control ocean pollution. Boston Harbour in Massachusetts and Victoria Harbour in Hong Kong have been cleaned. Estuaries from Chesapeake Bay in the US to the Seto Inland Sea in Japan have been rejuvenated. Some coral reefs have been restored, such as those in American Samoa, where vigilance, protection and quick response have happened in relation to various pollution threats.

These successes have boosted economies, increased tourism, restored fisheries, and improved health. They demonstrate that broad control of ocean pollution is feasible and their benefits will last for centuries. Our study offers some clear recommendations for preventing and controlling ocean pollution, including transitioning to cleaner energy, developing affordable alternatives to fossil fuel-based plastics, reducing human, agricultural and industrial discharges, and expanding Marine Protected Areas.

Protecting the planet is a global concern and our collective responsibility. Leaders who recognise the gravity of ocean pollution, acknowledge its growing dangers, engage civil society, and take bold, evidence-based action to stop pollution at source will be essential for preventing ocean pollution and safeguarding our own health.

*Article first published in The Conversation -*
https://theconversation.com/uk

# VAT on Yachts - What has changed since 31 December 2020?

In this article, Russell Kelly gives a quick, but essential overview on the subject of VAT on boats post Brexit.

By **Russell Kelly**

Russell is a Partner with Lester Aldridge and Head of the Marine Team. Prior to moving to Southampton, Russell worked for 12 years at one of the specialist shipping law firms in London, where he qualified and subsequently became a partner. He relocated to the South Coast and joined Lester Aldridge in October 2000 as one of the founding members of LA Marine.

Russell's long and broad experience across both the commercial shipping and the leisure marine and superyacht sectors means that he can provide detailed and client focused advice on a broad range of issues.

***Buying a new boat in the UK for use in the UK***

No change.

VAT must be paid at 20% on all new pleasure craft purchased in the UK by UK residents where the yacht is going to be kept in the UK.

***A UK resident buying a new boat from a UK dealer for export***

A UK resident buyer can purchase a vessel for export VAT free provided that the supplier arranges the export to a destination outside the UK and delivers the yacht to the purchaser there. If the vessel is being exported to the EU the vessel will be permitted to be imported into the EU under the Temporary Admission (TA) provisions but may only remain in EU waters for 18 months and may not be sold or chartered while in the EU on a TA basis.

### *Taking a yacht on which VAT has been paid in the UK into EU waters*

The yacht will now be entitled to enter EU waters under the TA provisions (see above) provided that the owner and the person taking it into EU waters are UK residents (a UK owner/user could engage a professional skipper to take the yacht in provided that the owner user was on board at the time).

### A UK resident buying a used boat in the EU

If a UK resident buys a second-hand boat on which VAT has been paid in the EU (other than the UK) and that boat was in free circulation in the EU on 31 December 2020, the boat will retain its VAT free circulation status while it remains in EU waters. See below, however, in respect of position should the buyer seek to bring it back to the UK.

### *Bringing a yacht into the UK when VAT has been paid in the EU*

If the yacht is owned and being imported by a UK resident VAT will have to be paid in the UK on the vessel's value at the time of importation. This applies even where VAT has previously been paid elsewhere in the EU.

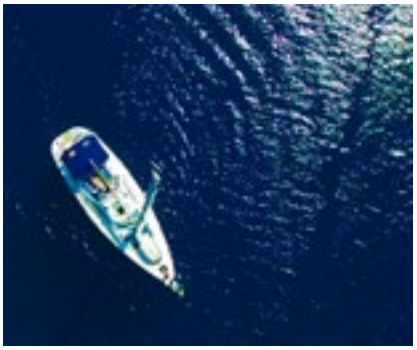
If the yacht is owned and being used by an EU resident the yacht may enter UK waters under TA and may remain here for up to 18 months without additional VAT having to be paid.

### *Bringing a yacht on which VAT has been paid in the UK back to the UK*

No change – the yacht can be returned to the UK without VAT having to be paid again provided that VAT was previously paid on the yacht in the UK, it is returned within 3 years of the date of export by the same person who exported it (no change of ownership has occurred whilst it has been out of UK waters) and it has undergone no more than running repairs whilst outside the UK.

### *Non-UK resident buying a new boat from a UK dealer for export*

A non-UK resident buyer can purchase VAT free provided that the vessel is sailed out of the UK under its own power within 6 months of delivery from the manufacturer ("Sailaway"). If the yacht will be kept in the EU the purchaser will need to pay VAT in the country concerned if he/she is a EU resident.



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# The Estonia disaster continues to be a bottomless source of learning

By **Dr Torkel Soma**




Dr Torkel Soma is a senior partner at Sayfr, the Oslo based company that specialises in safety and culture change services across diverse sectors, including the maritime and offshore industries. With its unique expertise, technology platform and data sets, Safyr enables efficient behavioural change at scale and provides services to clients worldwide. Dr Soma is responsible for Sayfr's research activities and provides delivery support as well as managing the company's core safety insights in various fields.

**The sinking of the Estonia ro-ro passenger ferry more than a quarter of a century ago stands out as one of the most disastrous accidents in modern times. The tragedy claimed 852 lives and the wreck was declared a marine graveyard. Dr Torkel Soma has analysed the accident reports and explains why a new investigation may reveal more than the newly identified hole in the hull and should go beyond that narrow focus.**

At first glance, the sinking seems to have been triggered by a single technical failure only minutes before the point of no return, with no warning signs. The first objective of this review was to verify whether the pattern of typical major accidents can be found in the Estonia disaster. The usual pattern involves multiple human errors combined with an immature organizational culture. Our detailed review of the Estonia sinking revealed several characteristics of typical major accidents in the chain of events leading up to it. However, the review also made it clear that, to be sure about what really happened, a thorough reinvestigation of the accident is necessary. To fully understand the story, we first need a short recap of the ro-ro ferry disasters.

## High-risk design of ro-ro ferries

The earlier designs of the Roll-on Roll-off (ro-ro) ferries were inherently high-risk. To maximize the effectiveness of any cargo vessel, the key is to minimize the time in port by efficiently loading and unloading the cargo. The ro-ro vessels were specially designed for this purpose, in that trucks and cars could be loaded quickly in open deck spaces with few bulkheads and segregations.

"It took less than an hour from the first concern being raised to the vessel sinking."

The negative implications of this design became obvious in 1982 when the ro-ro vessel European Gateway collided with another ship. Water entered the cargo deck and the vessel capsized, leading to the loss of six lives. The story continues in 1987, when the crew omitted to close the bow visor of the ro-ro ferry Herald of Free Enterprise. The result was a rapid capsize causing 193 fatalities.

When water is allowed to move freely on an open deck space, the vessel's stability is significantly reduced. This "free surface effect" was therefore also a concern when extinguishing the fire on the ro-ro ferry Scandinavian Star in 1990. This time, however, the fire itself caused 159 deaths.

### Lessons were not learned

It is terrible when accidents like those involving Estonia and Herald of Free Enterprise take place. But it is unforgivable when we are not able to learn from them. During a storm in the Baltic Sea in January 1993, the Polish ro-ro ferry Jan Hewelius capsized and sank. Only nine of the 64 persons on board survived. This is the deadliest maritime disaster involving a Polish ship.

Only two days later, there was a close call. The crew on board a large ro-ro ferry, Diana II, discovered that the bow visor locks had failed, allowing seawater to enter. Luckily the vessel was sailing into calmer waters and major technical repairs were carried out in port. The problem seemed to have been solved.

However, Diana II was not "one of a kind". She was very similar to another vessel, which could almost be considered her sister vessel. This younger "sister" was the ro-ro ferry MS Estonia. She had practically the same bow visor as Diana II but was owned and operated by another company. The crew of Estonia were therefore unaware of the problems experienced on board Diana II when they sailed into a heavy storm on 28 September 1994.

### The accident investigation conclusion

The official accident investigation into the Estonia disaster in 1997 stated that the locking system of the ship's bow visor was defective, flooding the car deck and causing the vessel to roll over and sink. Heavy head-on swells triggered the loss of the bow visor, allowing seawater to enter the car deck. It took less than an hour from the first concern being raised to the vessel sinking. Hence, the high-risk design combined with a critical technical failure is the reason for the accident.

### A typical major accident scenario

Most major accidents follow a similar pattern:

- Multiple failures take place
- There are several human errors
- Failures were present over a period of several days or even two years
- Somebody was aware of these failures
- Some of the eight leadership behaviours had a weak presence

As listed above, in most cases somebody knew about the failures before the accident took place. But because of point 5, the failures were not responded to, allowing them to escalate to a critical situation. This is the reason why organizational culture plays an important role in accident scenarios.

### Technical failures can also reveal cultural characteristics

The categorization of failures as "human" or "technical" is not always sufficient. For example, technical failures that should have been identified- or responded to by the personnel also divulge something about the organizational culture. The official accident investigation report reveals several cultural characteristics that played an important role in the accident.

### The eight leadership behaviours

It is too superficial to state that the failures were caused by an immature safety culture or "human error". The challenge must be more specifically defined, addressing the reasons why the failures were not managed in time to prevent the accidents taking place. Through numerous reviews of major accidents in several industries, SAYFR has identified eight Leadership Behaviours that needs to be in place to effectively manage failures and hinder this escalation. These are described on the following page...

Learn
Openness
Manage Dilemmas
Care
Give Feedback
Trust
Teamwork
Speak-Up

**Manage Dilemmas:** Seek out and manage failures arising from conflicts and dilemmas between goals, policies and people.

**Teamwork:** Collaborate towards common goals and agreed norms, while helping each other to become better in the process.

**Speak-Up:** Speak up if you observe non-compliance, hazards or if you have any concerns. Encourage and empower others to do the same

**Give Feedback:** Give personal feedback to show that you see, understand and appreciate what people around you do.
Give critical feedback without blame or causing shame.

**Learn:** Have the attitude that you can always learn something new and see failure as a vital source of learning.

**Openness:** Be open to the possibility that no-one (not even you) is right and that this might have severe consequences. Be open to feedback from others.

**Care:** Take ownership of your job by resolving problems and manage failures, even when they are outside of your formal role. Show colleagues that you care about their wellbeing.

**Trust:** See the value of and have confidence in other people. Believe that people act with good intentions (and without hidden agendas), even when they act and think in a way that is different from you

### Most accidents follow the pattern

The above cultural characteristics can be seen in the chain of events leading up to the accidents involving European Gateway and Herald of Free Enterprise, which were operated by the same company, Townsend Thoresen (TT). It can even be documented that one TT captain, Captain Blower, spoke up to shore management about the risks involving the bow visors, but his concerns were not listened to, manifesting low Trust, Openness and Learning. Several failures on board Scandinavian Star were obvious even to the passengers, as the vessel was not ready for operation. Jan Hewelius had been involved in at least 28 incidents prior to capsizing. Last, but not least, the Titanic received more than 30 iceberg warnings, but still continued her voyage at full speed.

### Estonia managed dilemmas differently to other ferries

On the night of the Estonia accident, there were two other ro-ro ferries in the same area of the Baltic Sea. These were Mariella and Silja Europe. Both reduced their speed due to the heavy weather. Estonia was 15 minutes late leaving Tallinn and the captain expressed concerns that they would arrive late in Stockholm. The engines were kept at full speed through the heavy head-on swells, until the ship developed a list. This implies that the Dilemma of keeping to schedule was evident onboard Estonia.

### Low openness for the possibility that something was very wrong

At about 00:55 one of the seamen on board Estonia heard a sharp metallic bang on the car deck in the bow area. This was reported to the bridge. Despite this information, the speed and course were kept constant. This illustrates that there was low Openness to the possibility that something fundamental was wrong. An avoidance manoeuvre at this stage, turning the vessel's bow away from the waves, might have changed the outcome of this situation.

### Deficient accident investigation

The official accident investigation report did not reflect some of the survivors' key observations. Firstly, the survivors are convinced that the time sequence in the accident report does not match what they experienced; they claim that the accident happened much faster in reality. Secondly, several survivors observed water on the cabin deck below the cargo deck. The investigation does not fully explain how the water got there.

The decks below the car deck were subdivided into 14 watertight compartments. This means that even capsizing should not in theory have caused the vessel to sink. However, it is common in major accidents that watertight doors are not properly closed, thus disabling this safety barrier. This happened

in the European Gateway sinking, the Costa Concordia capsize in 2012 and several other accidents. But such failures are normally well documented by the accident investigations. The Estonia report only states that the officer on watch started to close the watertight doors when a list developed. It is unclear if this operation was successful and, if not, which watertight doors were not properly closed. It might be that open watertight doors explain the water below the car deck.

### Several conspiracy theories

In hindsight the accident scenarios of major incidents like the Titanic and Scandinavian Star disasters seem unrealistic. And that is sadly the nature of major incidents. In the minutes before these accidents took place, even the people at the scene did not anticipate what was about to occur. In the case of the Estonia accident, the rumours started early. The first official diving operation reached the MS Estonia at 70-90 meters depth four days after the sinking. The ROV pictures revealed some surprising observations. Somebody had already visited the vessel. The railing on the ramp behind the bow visor had been dismantled and stacked on the sea bottom next to the ship.

It soon became clear that Estonia was used by Western intelligence agencies to bring out Soviet military equipment. The official announcement only confirmed two incidents of such transportation, respectively one and two weeks prior to the disaster. However, some survivors of the Estonia accident observed military vehicles entering the ship on her last voyage too.

This has fuelled conspiracy theories alleging that the sinking might have been deliberate. One motive could be to prevent secret military equipment from falling into the hands of the enemy. Furthermore, the well-respected builder of Estonia claimed that explosives had been used to remove parts of the bow visor. Lastly, it has been suggested that the rapid capsize and sinking may indicate other holes in the hull in addition to the open bow. For example, a collision could have damaged the starboard stabilizer fin. It is known that such damages can be critical, such as in the case of the Nordlys ro-ro ferry accident in 2011.

### Need for reinvestigation

The official accident report seems to identify the most plausible accident scenario. It would be difficult to fabricate the Diana II incident that took place 18 months prior to the Estonia accident. But, over time, alternative strategies have gained terrain.

The investigation failed to:

- Document why seawater was observed below the car deck at an early stage of the incident.
- Thoroughly interview survivors with respect to both their observations and their perception of time.
- Rule out that the vessel had other holes in the hull.
- Document the kind of cargo on board.
- Document that the failure of the bow visor to lock was identical on both Estonia and Diana II.

It seems that the investigation locked its conclusion at too early a stage, without considering alternative scenarios. Even though the most likely scenario may be what the official investigation documented in 1997, alternative scenarios cannot be ruled out.

### Two takeaways

Our review revealed two things. First of all, the Estonia scenario followed more of a typical pattern of major accidents, than previously anticipated. The combination of low Openness and weak management of Dilemmas is similar to several other accidents such as those involving the Titanic, Exxon Valdez and Deepwater Horizon where people spoke up but nobody did anything about it. This plus the Diana II incident also demonstrates that the failures were actually known 18 months prior to the accident. The learning across organizations should be an area of increased focus on the part of shipping companies, yards and classification societies.

Secondly, the investigation failed to establish the facts that would rule out alternative scenarios. When survivors have experienced something different to what the official investigation report says, one party must be wrong. This, combined with the impression that the survivors were not properly interviewed, means the investigation can easily be questioned. A new investigation may reveal more than the newly identified hole in the hull of Estonia and should go beyond that narrow focus. New insights into the watertight doors, the military cargo on board and the timing of the sequence of events should be more thoroughly investigated. One thing is for sure; the Estonia accident will provide an almost bottomless source of learning far beyond ship design.


"...THE ESTONIA ACCIDENT WILL PROVIDE AN ALMOST BOTTOMLESS SOURCE OF LEARNING FAR BEYOND SHIP DESIGN."

# Costly claims for crane failures caused by human errors

By **Ivan Todorov**,
Brookes Bell, Marine Consultants and Marine Surveyors

Ivan Todorov is a Senior Master Mariner. He joined Brookes Bell in November 2014 and became an Associate in May 2017. He sailed as master for 5 years on board Aframax and VLCC tankers for Sanko Ship Management. He has also served on product tankers, bulk carriers and general cargo vessels.

Following many investigations over a number of years, Ivan Todorov, has found that human error element is commonly not addressed when talking about crane rope failures. Beyond the common causes such as wire fatigue and overloading, there is usually a human error behind these causes. In the following article, Mr Todorov delves into how the human element is neglected, and what are some of the unsafe practices that can lead to crane rope failures.

In 2018, the crane failure on the Atlantic Giant II highlighted how the decision to lift beyond the planned weight with no proper risk assessment ultimately resulted in an estimated $6.4 million worth of damages. Three people were injured, and the load and crane boom fell into the harbour as a result.

This is a typical example of a crane failure resulting from mishandling, and other cases might arise from component failure and ineffective maintenance practices. Crane failures can lead to damage to ship structures, loss of cargoes, lengthy loading and discharge delays – floating barge cranes may even be required to complete operations. Most importantly, they can potentially endanger those nearby and may even lead to the tragic loss of life.

Crane wire rope failures are typically caused by fatigue and overloading. However, as highlighted by the Atlantic Giant II example, there is usually an underlying human error element involved.

I have seen cases where wires have not been renewed for almost 10 years – quite an excessive period of operational time that is likely to cause a potential incident. Some companies do not have detailed maintenance and inspection policies and they tend to rely on reactive

maintenance instead. This is short-sighted as any failure is likely to incur hefty costs.

Instead, a proactive maintenance programme is far more appropriate, and this usually involves periodic and pre-operation inspections of wires, bearings and sheaves, including the crane's hydraulic pumps and motors. Details can be found in the crane manufacture manual, which will explain how often and thoroughly they should be inspected. These items should all be included in a comprehensive planned maintenance system to maximise crane availability, and they should be reviewed regularly by technical managers to ensure their effectiveness.

Beyond proactive maintenance, failure to properly operate the crane can result in catastrophes too.

Cranes are to be operated by trained vessel personnel or stevedores, but complications can arise when they are working under time pressure or have not received proper familiarisation of the crane condition.

Vessel cargo operations will always be carried out with time constraints, but these can be exacerbated when a port tries to make up for lost time due to bad weather or delays. To speed up the operation, stevedores may occasionally perform the lifts at an angle as opposed to the usual vertical lift.

Lifting at an angle is not allowed by the manufacturer. In some cases, lifting at 1° or 2° is allowed by the manufacturer, but this may not always be safely observed, and doing so increases the risks involved, as lifting from an angle decreases the effective loading limit of the crane.

Furthermore, the hoisting wire of the grab may be mechanically damaged when this is performed, particularly when an attempt to reach the under-coaming area is made. Although the wire may not necessary break immediately, it may fail at a future point.

Mishandling can happen when there is a lack of communication between the crew and the stevedores. Good dialogue between the crew and stevedores is necessary before and during any operation so that the two parties can reach a mutual understanding on the requirements to operate cranes and how to jointly expedite the cargo operation. There should also be a supervising member of crew or stevedore in attendance during operations.

The signalman or supervising crew must flag up any mishandling during the operation and stop it, to prevent any potential incidents or accidents. Similarly, stevedores should highlight any triggered alarms or any unlikely bypassed safety devices to the crew and rectify the issue before continuing.

However, in the unfortunate event of a crane failure, it is important to obtain contemporaneous forensic evidence at the scene as soon as possible. This will help expedite any claim settlement in the event of a dispute, and is why we always advise clients to engage us early as it can make their case less costly.

It is crucial to seek out a multidisciplinary team of master mariners, marine engineers and metallurgists who can provide prompt and accurate preliminary advice to reduce loss of time and cost of failure. This is then followed by detailed forensic analysis and testing to determine the root cause in any individual case.

Depending on the severity of the incident and availability of spare parts, crane failures can take anywhere between four to five hours and several days (and even months) for repairs to be completed, with alternative arrangements being dependent on availability of local assets.

However, the adage "prevention is always better than cure" still holds true. Shipowners and charterers looking to avoid costly claims and disputes, should seek recommendations on preventive maintenance to significantly reduce the likelihood of a crane failure.

# From composite evolution to vessel construction revolution

By **Philippe Noury**,
Principal Engineer, DNV-GL

The primitive approaches to brick-building famously used by Egyptians and Mesopotamians may seem light years away from the construction techniques harnessed in today's maritime and offshore industries.

However, the creation and architecture of the earliest structures still holds relevance for marine-based industries in 2020 and beyond. Specifically, the combination of mud and straw used in ancient construction represents the original use of composites – where two or more materials with significantly different physical or chemical properties are combined to produce a material with characteristics that are different from the individual components.

**Long history of composites**

"Composites have been around for thousands of years," says Dr Philippe Noury, principal engineer, fracture mechanics and non-metallics at DNV GL – Oil & Gas, a naval architect and composites specialist who has spent more than two decades working with composites in the marine, oil and gas and naval industries. "Today you can find composites almost everywhere, from cars to planes and bicycles – the list is growing. In the maritime industry, the invention of glass and carbon fibre in the 1930s and 1960s respectively paved the way for the introduction of composites to the sector. In the 1970s their use really picked up, starting with high-speed leisure vessels made from fibre-reinforced polymer (FRP) composites."

Dr Neil Little, technology and innovation director at SPS Technology, is part of the original executive team that took SPS Technology's permanent composite – the Sandwich Plate System (SPS) – from a lab concept to a proven technology with more than 500 applications worldwide. He recalls one of the most significant early uses of maritime composites. "These composites were cement-based and known as thermo-cement constructions, which consisted of a steel frame that was reinforced with steel rods and then covered with chicken wire. This provided a template you could pour cement over and cure. The result is a very inexpensive composite mainly utilized in low-cost barges."

**Most promising: Thermoset and thermoplastic composites**

Fast-forward to today, and maritime applications of composites are varied and growing. Although there are many composite types, it is two solutions in particular which are generating the most excitement. According to Noury, thermoset (including SPS) and thermoplastic composites offer standout examples of the latest technology. "They are the driving force pushing the reputation of composites to new levels," he says.

FRPs – as a thermoset solution – remain popular for leisure crafts, naval vessels below 80 m and submarine components. FRP

*A No Hot Work SPS® Installation*

thermosets and SPS are utilized in the repair, reinstatement and reinforcement of existing steel structures, replacing traditional crop and renewal or gouging techniques. SPS is currently the only thermoset solution utilized in the maritime industry and is comprised of two metal plates bonded with an elastomer core. To date, SPS has been used on projects involving many vessel types, including cruise ships, bulk carriers, tankers, ro-ros, floating production storage and offloading (FPSO) units and military craft, as well as many offshore rigs. Application examples include vessel decks, side shells and bulkheads.

Modern-day composites (including SPS) are cost-competitive with conventional building materials, such as stiffened steel, and deliver equivalent or even superior strength. They are significantly lighter and can often be installed without any "hot work", reducing project risk, costs and duration. "You have a scenario where the faces of the construction (i.e. the exterior plates of the composite) are taking the load, and then the centre is making the structure very light and efficient," says Noury. Importantly, composites also utilize advanced production techniques. "Lately, the industry has moved towards industrialized robot-type product systems which look very much like 3D printing in layers. Therefore, production has also greatly evolved, which has allowed this construction technique to become even more sophisticated."

*A top plate being fixed into place, creating a cavity into which the elastomer core of the SPS® will be injected*

**Proven fire safety of composites**

While different types of composites offer a particular structural response, stringent fire safety assessments are a prevailing overall priority. In the early 2000s, Regulation 17 of the International Convention for the Safety of Life at Sea (SOLAS) made it possible for large commercial ships to use composites where it was possible to demonstrate equivalence of safety under alternative design and arrangements. The main deviation from the regulation was fire safety. "At the time, this was complicated because there was no clear guidance on how to demonstrate equivalent fire safety," says Noury. "A lot of research was done and about five years ago engineers and scientists from several nations – under the lead of Sweden – succeeded in putting together new guidelines that were presented at IMO. These more detailed guidelines were finally adopted to help designers and national authorities demonstrate fire safety equivalence," he says.

In parallel with this global-level work, Little and the team at SPS Technology spent the early 2000s working with the Maritime and Coastguard Agency (MCA) in the UK on a fire testing programme. This demonstrated SPS's performance during a standard IMO fire test, with the findings presented to the IMO Sub-Committee on Fire Protection. Following the tests, a class society conducted a study on some of the SPS designs under SOLAS Regulation 17 in order to demonstrate the composites' fire equivalence with stiffened steel. "The conclusion was that SPS was at least equivalent if not superior in terms of fire performance, when compared with insulated stiffened steel," says Little.

**Understanding the risks and benefits to create acceptance**

Notwithstanding the benefits of composites and the recent progress on regulatory hurdles, the pathway to widespread adoption still presents barriers. Key areas to address include enhancing foundational knowledge and opening up sufficient resources to demonstrate compliance with regulations on fire safety equivalence , which, despite recent clarity, remain demanding.

"In many current scenarios we have traditional shipyards, designers and national authorities that have little knowledge of composites, with many lacking the resources to enhance their understanding," says Noury. "We must reach a position where everyone understands the risks but also, importantly, the benefits. Not just in terms of the technology, but also the business case."

Little agrees, concluding, "It's not just the technology, it's the business case. It's got to work economically for the shipowner, otherwise it isn't going to happen."

**Newbuilding applications herald radical change**

So, what does the future hold for composites? According to Little and Noury there are two main areas of growth. Firstly, the emergence of further newbuilding applications. Secondly, and more boldly, the creation of entire vessel structures constructed from composites as opposed to structural steel.

*Fixing top steel plates to form a cavity*

Currently, most composites are restricted to a few newbuild applications, rooted to small components such as decorative equipment on cruise ships. SPS Technology has however bucked the trend, having already utilized its composite to construct the escape tunnel on the Glen Lyon FPSO, as well as citadel access protection doors on more than 90 vessels. Other applications include funnel casings, cruise ship deck panels, modular impact protection decks and blast-resistant bulkheads. There is a strong appetite in the maritime industry to use composites for more newbuilding projects. For example, DNV GL is working on emerging applications of composites on hatch covers and tween decks. There are also several EU research projects underway that are looking to build vessels of up to 80 m entirely from composites. These include Fibre Ship and the Ramsses Project.

**Autonomous ships as one future option to apply composites**

Noury concludes: "There will be growth. It will be radical, but it will take some time. The first applications for newbuilds will be on low-risk applications and on medium-sized vessels. I see autonomous ships as an opportunity because of the low risk to life. Overall, I am optimistic. We moved from wood to steel and we will move from steel to composites. That's for sure. You can't stop technology."

Summarizing his thoughts on the journey of composites so far, and what the future could hold, Little says: "The industry's understanding of composites has already grown significantly. Twenty years ago, no one knew what SPS was, and then we went through a period where those who did understand it expressed a strong desire to see its proven performance, which is perhaps understandable in a conservative sector. Now SPS is very well established and has a great track record, with many structures already in service for more than 15 years. We remain highly motivated and determined to play our part in ensuring composite solutions gain widespread acceptance. They genuinely provide a real benefit in terms of performance and costs – I can only see the business case increasing."

*Article and images courtesy of DNV-GL*

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# Corrosion-resistant steels for cargo oil tanks

By **Eva Junghans**,
Senior Principal Engineer,
DNV-GL

The use of corrosion-resistant steels in cargo oil tanks offers certain advantages compared to coatings. Tried and tested for about 12 years, they have now been included in DNV GL's rules, and a new class notation for these steels is available.

Crude oil is a complex mixture of substances at varying ratios and in most cases contains at least some salt water. Even after desalination some of this brine remains dissolved in the crude and gradually sinks to the bottom of the cargo oil tank during transport. The corrosive nature of salt, along with microorganisms and other aggressive substances contained in the cargo oil, causes rust, most notably in the form of pitting, which are cavities in the steel that deepen over time.

## Double-hull tankers are more prone to pitting

"Pitting corrosion is typically found in the bottom area of cargo oil tanks," explains Dr Eva Junghans, Senior Principal Engineer and Lead of Practice Materials & Welding and Additive Manufacturing at DNV GL. "Above the cargo surface, especially on the underside of the upper deck, corrosion tends to be more evenly spread," the expert continues. "It is primarily caused by aggressive chemicals contained in the inert gas, which is flue gas from auxiliary engines pumped into the cargo tanks to prevent an explosion of fumes rising up from the cargo."

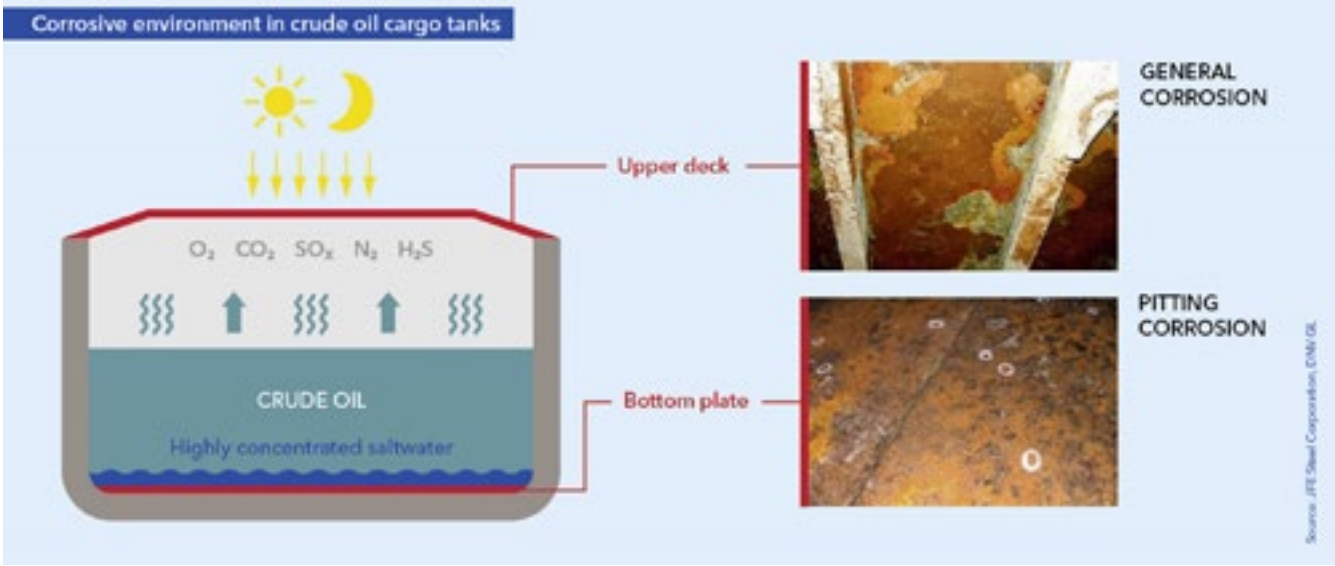
While in the single-hull tankers of the past the cooling effect of the seawater slowed down bacterial growth by keeping the cargo relatively cool, the double hull of compliant modern tankers insulates the cargo from the low temperature of the seawater. As a result, the cargo stays relatively warm, providing ideal conditions for corrosion-causing microorganisms to thrive. Pitting therefore progresses rapidly on an unprotected tank bottom, weakening the metal and risking cargo loss, structural damage and environmental pollution.

"The traditional way to prevent pitting and general corrosion has been to apply specially formulated coatings to the affected surfaces," says Dr Junghans. "This is an expensive, time-consuming process that needs to be supervised to ensure proper execution. What is more, protective coatings typically have to be renewed from time to time."

## Corrosion-resistant steel - a proven alternative approach

These well-known facts prompted three Japanese steel manufacturers – JFE Steel Corporation, Nippon Steel Corporation and Kobe Steel, Ltd. – to submit a proposal to IMO to accept the use of corrosion-resistant steels as an alternative method of preventing corrosion in crude oil tanks. Following thorough discussion, IMO issued its new 'Performance Standard for Alternative Means of Corrosion Protection for Cargo Oil Tanks of Crude Oil Tankers' as an extension of the Performance Standards for Protective Coatings (PSPC) in 2010.

Research performed over a ten-year period by JFE Steel Corporation in a crude oil tanker delivered in 2008 confirmed that the corrosion-resistant steel dramatically reduced both pitting corrosion and general surface corrosion compared to uncoated conventional steel. Various other vessels featuring cargo tanks fitted with these advanced steels have been in operation since the new IMO PSPC standard came into effect and have demonstrated vastly improved corrosion resistance. The technology can thus be considered as validated.




*Corrosive environment in crude oil cargo tanks*

## New notation COAT-PSPC(CA) confirms compliance

DNV GL has since revised its relevant ship construction rules to incorporate corrosion-resistant steels for cargo tanks, and recently added the new classifier "CA" (for "corrosion protection by alternate means") to its existing corrosion protection class notation. Announced in July 2020, the new notation COAT-PSPC(CA) confirms a ship's compliance with the corrosion protection requirements for cargo oil tanks of crude oil tankers, by application of approved corrosion-resistant steel grades in one of the following areas of a cargo tank:

a) Lower surface of the strength deck and surrounding structures (RCU)
b) Upper surface of the inner bottom plating and surrounding structures (RCB)
c) Both the strength deck and the inner bottom plating (RCW)

Besides using the approved steel grades, the notation also implies the use of appropriate, approved welding consumables to join the plates. Compliance with both requirements must be substantiated by submitting specific documentation. The class notation will enter into force six months after publication of the rules, i.e. in January 2021.

## Eliminating the cost of coating

Opting for corrosion-resistant steels in the corrosion-prone areas of crude oil tanks offers various benefits to owners and charterers as well as shipyards. One example is to eliminate the cost of coating and shortening the time it takes to complete a newbuild in the yard. Furthermore, no coatings need to be reapplied to the relevant tank wall areas over the lifetime of the vessel since the IMO performance standard assumes a useful life of 25 years of the cargo oil tank (COT) steel until its thickness is reduced beyond acceptable levels. Owners who choose this class notation can demonstrate to cargo owners that their crude oil tankers have a lower risk of tank bottom or wall failure, cargo loss and environmental pollution, thereby enhancing confidence in their ships.

## Approved steel grades enhance customer confidence

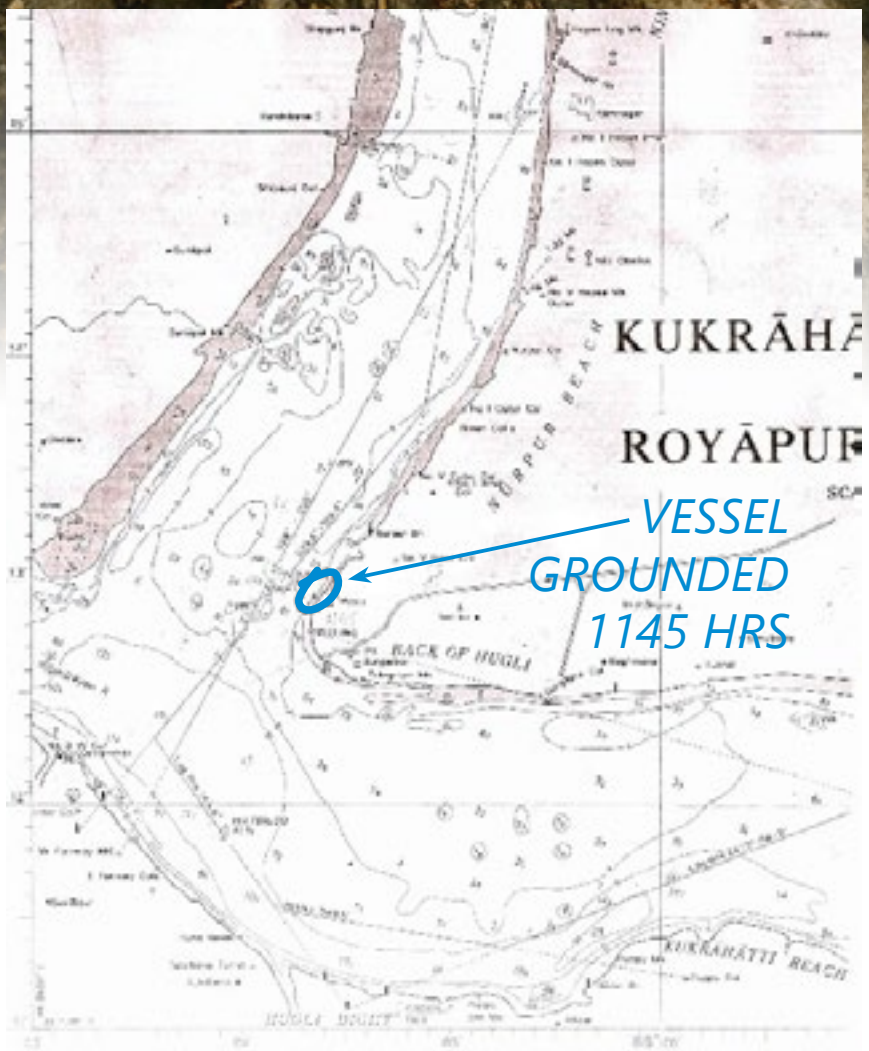
DNV GL has approved all corrosion-resistant steel grades developed by the three Japanese steelmakers according to the IMO standard and the corresponding DNV GL standard, DNVGL-CP-0429. The Tokyo head office of JFE Steel Corporation commented: "Receiving approval from DNV GL, a world-leading classification society, for our corrosion-resistant steels is a milestone for us. Corrosion-resistant steels have not been so popular among oil majors and Euro-American operators of crude oil tankers, although these steels have already been well adopted for use in cargo oil tanks of crude oil tankers operated by Japanese operators for Japanese oil companies. However, DNV GL's approval for our corrosion-resistant steels raises awareness among oil majors and Euro-American operators as an alternative means to meet the IMO standard." Several Chinese steelmakers have since requested approval from DNV GL for their COT steels.

*Crude oil tankers must protect their cargo tanks against corrosion. Corrosion-resistant steels have shown to be a viable and attractive alternative to protective coatings*

# FAULT TREE ANALYSIS OF THE INCIDENT OF GROUNDING OF M.V. "C.S CIGNE"

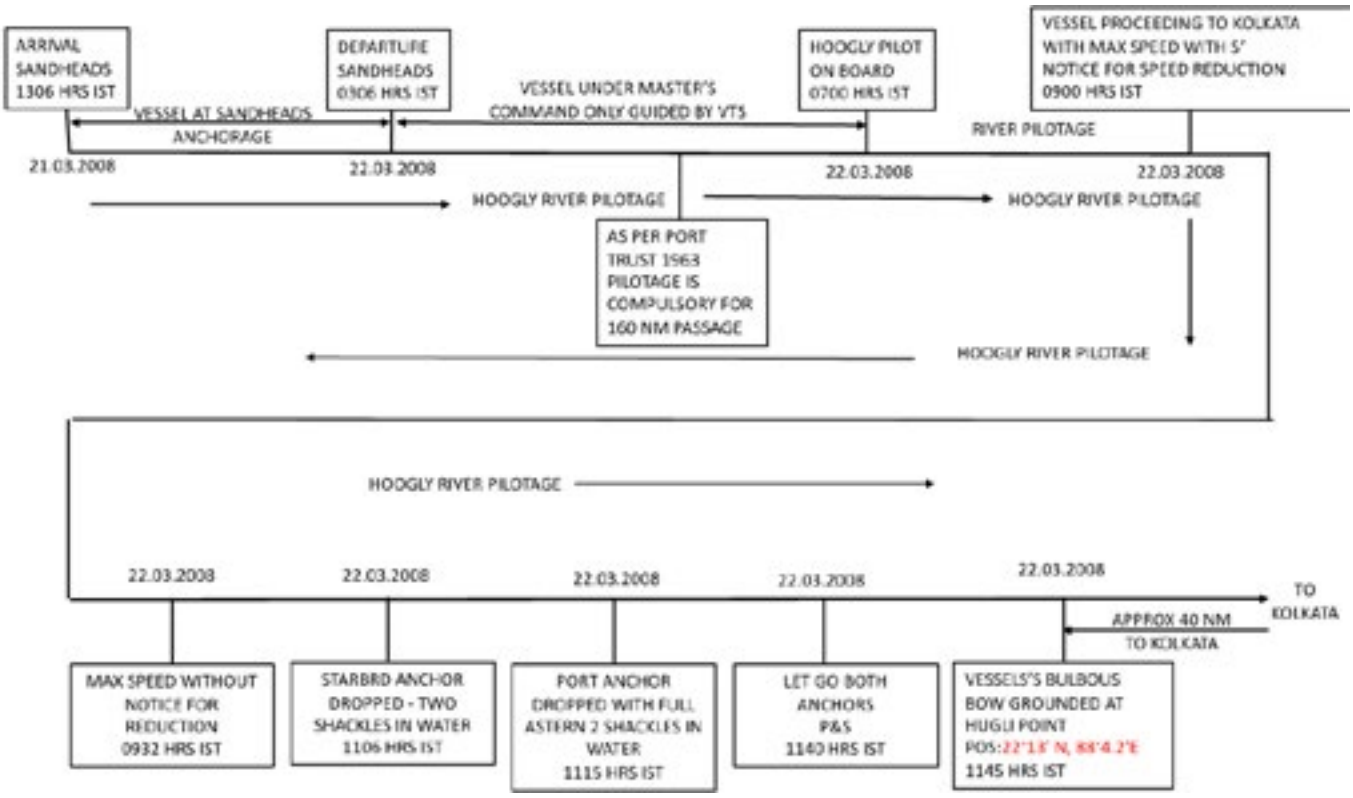
By **P.K. Bhattacharyya**
C. Eng., M.I. Mar.E., FIIMS, RMS

The Panama registered 8689 GT container Feeder vessel M.V. C.S CIGNE with 6370 MT of container cargo was on her way to the port of Kolkata from Colombo, Sri Lanka on 22nd March 2008. On the way the vessel had to pass through the Hooghly river passage under pilotage for a distance of 160 nautical miles to reach Kolkata. But while on the way the vessel ran aground at a position of 22°13′ N and 88°42′ after making contact with a riverside concrete jetty (belonging to KoPT) at Nurpur. The place of grounding is shown in the Navigating Chart.



*POSITION OF M.V. C.S. CIGNE AFTER GROUNDING...*


*... and the HOOGHLY RIVER PASSASGE*




*GRAPHICAL TIMELINE OF EVENTS SURROUNDING GROUNDING OF C.S. CIGNE*

### GRAPHICAL TIMELINES

The time-line shown in the above figure illustrates the modelling technique for a reconstruction of the event. The simple relationship between spatial locations on the diagram and temporal location during an incident is to be noted.

### INVESTIGATION

In the event of such an incident/ accident as described above and in view of SOLAS Reg 1/21 and Marpol Article 8 & 12 and article 23 of load line convention:

"Each Administration undertakes to conduct an investigation on any casualty occurring to any of its ships subject to the provision of present conventions when it judges that such an investigation may assist to determine what changes in the present regulation might be desirable".

Further, under UN convention on LAW OF SEA UNCLOS 82 it becomes the responsibility of every Flag State to conduct investigation of any casualty that occurs on board a ship flying the flag of its state. Hence in effect accident/incident investigation of any kind of marine casualty is mandatory on the part of the Flag State of the vessel.

### DEFINITION OF MARINE CASUALTY

A marine casualty is an event which results in:

1. Death or serious injuries as a result of vessel operation.
2. Loss of an individual on board.
3. Grounding/collision/allision of the vessel.
4. Serious material damage to the vessel.
5. Serious damage to the environment.
6. Abandoning the vessel.

These "events" are known as incidents or accidents depending on the seriousness.

### DEFINITION OF AN INCIDENT

It is an event that involves no loss (or only minor loss) with potential for loss under different circumstances. An incident is an undesired and unpleasant EVENT that did not result, or only minimally resulted, in a loss, damage or injury due to favorable circumstances. But when the circumstances are different it could have developed into an ACCIDENT.

### DEFINITION OF AN ACCIDENT

It is an UNDESIRED and UNPLANNED event that results in a loss (including loss of human life or injury, property damage and environmental pollution).

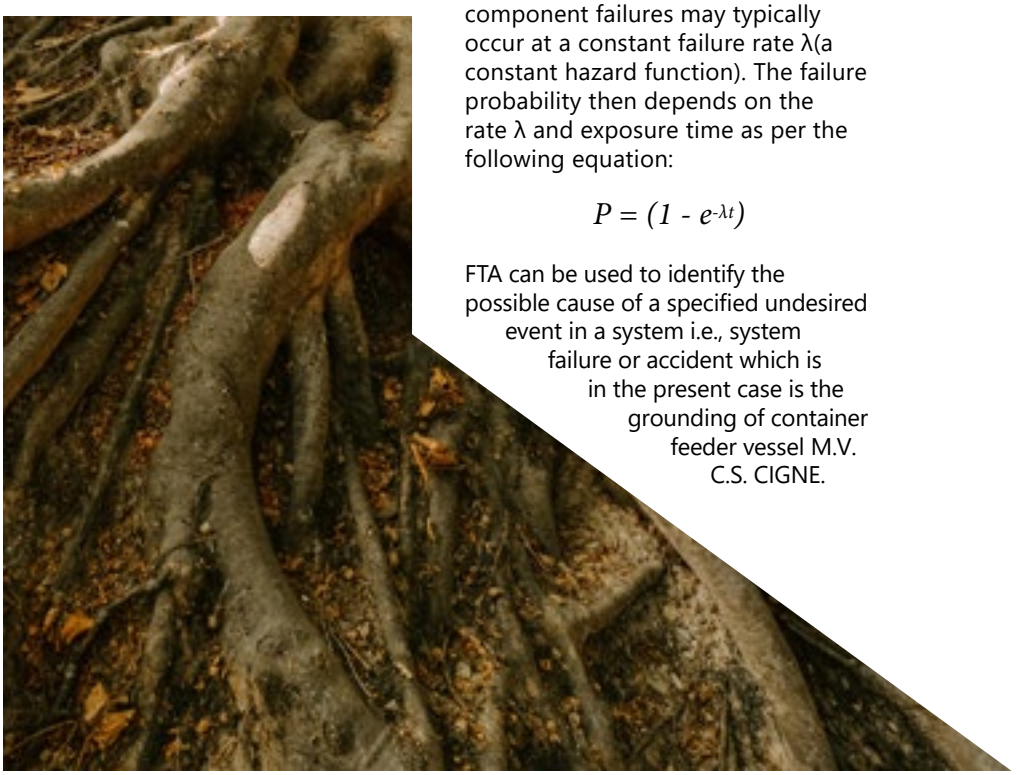
### ACCIDENT / INCIDENT MODELS

There are many Accident models which are used during casualty investigation such as SHELL, MAIIF, FTA (Fault Tree Analysis), SMART, FRAM etc. Out of all these and many other models, most popular are SHELL, REASONS SCM and MAIIF for marine casualty investigation.

Without going into the details of the above models only FTA model will be discussed in the following paragraphs and its application to the Grounding of CS CIGNE in 22nd March 2008 during transit of the vessel from Sandheads to Kolkata.

### ACCIDENT AND/OR INCIDENT ANALYSIS

The purpose of accident and/or incident analysis is to IDENTIFY key accident events in the build-up to casualty and its aftermath. The accident analysis articulates how each accident event is analyzed to discover contributory factors towards safety issues. For this purpose, a fault tree analysis was carried out, details of which are illustrated in the following paragraphs.



### FAULT TREE ANALYSIS LITERATURE REVIEW

This is an analytical technique whereby an undesirable event (top event) is decomposed into possible cause in increasing detail to determine the cause, or combination of causes, of the top event. Fault Tree Analysis is a top-down deductive failure analysis in which an undesired state of a system is analyzed using Boolean Logic to combine a series of lower-level events. When using this technique as a modelling tool it must be assumed that top event and all basic events are binary. The main determinants of a Fault Tree are composed by the top events, intermediate events and logic gates.

This analysis method is mainly used in Safety and Reliability Engineering in order to understand how the system can fail. FTA maps the relationship between faults, subsystem and redundant safety design elements by creating a logic diagram of the overall system, in which the cause of the top event is connected through logic gates. The logic gates are the outcomes of one or a combination of the basic events. (The gate events are also referred to as intermediate events). The analysis proceeds by determining how the top event can be caused by individual or combined lower-level failure of events. The events in a fault tree are associated with statistical probabilities, for example, component failures may typically occur at a constant failure rate λ(a constant hazard function). The failure probability then depends on the rate λ and exposure time as per the following equation:

$$P = (1 - e^{-\lambda t})$$

FTA can be used to identify the possible cause of a specified undesired event in a system i.e., system failure or accident which is in the present case is the grounding of container feeder vessel M.V. C.S. CIGNE.

## IMPORTANT DEFINITIONS WITH RESPECT TO FTA

Top event: Undesired event in the top level, usually the system failure or accident.

Basic Event: The basic causes for the undesired event.

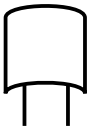
Gates: Outcomes of one or a combination of basic events.

Primary Failure: Independent component failure that cannot be further defined at a lower level.

Secondary Failure: Independent component failure that is caused by an external force on the system.

Minimum Cut Set (MCS): Cut Set that has been reduced to a minimum number of events that cause the top event to occur.

= AND GATE: The AND Gate represents the logic operation which requires the simultaneous existence of all the INPUT events to produce the OUTPUT event.



= OR GATE: The OR Gate represents the logic operation which requires the existence of only one (but permits more than one) of the Input Events to produce the Output Events.

= Basic Event: A basic event indicates fault requiring no further development.

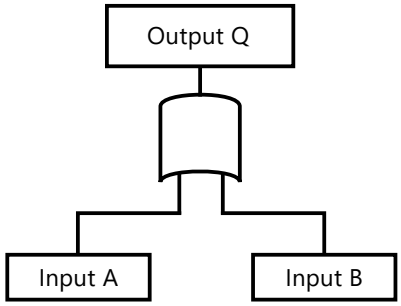
= Intermediate Event: A fault event that occurs because of one or more antecedents cause acting through logic gates.

= Undeveloped Event: An event which is not further developed either because it is of insufficient consequences or because information is unavailable.

There are many event and gate symbols used in the logic diagram of the FTA which are not explained here since we will mostly use the above event and gate symbols in our FT diagram.

## BASIC ELEMENTS OF A FAULT TREE

The figure below is a typical two-INPUT "OR" Gate with INPUT Events A+B and OUTPUT event Q. Event Q occurs if A occurs, B or both A+B occur.




The probability of Output Event (TOP EVENT) is determined by Sum of probability of all the Minimum Cut Sets (MCS) in the system which can be expressed by the following equation.

$$P(\text{TOP EVENT}) = \sum_{K=1}^{N} P\,(MCS_K)$$

K = Minimum Cut Set
N = Total No. of MCS in the system

## M.V.C.S. CIGNE GROUNDING FAULT TREE CONSTRUCTION

Ship grounding is defined as a contact of a ship's hull with ground. Grounding of a ship can cause destructive secondary consequences such as ship sinking and environmental pollution. The main cause of grounding can be attributed to human error, equipment failure and heavy weather conditions.

Groundings are of two types:
- Power grounding - Drift grounding

### POWER GROUNDING

It is an event in which grounding occurs because a vessel proceeds down an unsafe track, even though it is able to follow a safe track due to error related to human or technical failure.

### DRIFT GROUNDING

It occurs because the vessel is unable to follow a safe track due to mechanical failure, adverse environmental conditions, anchor failures and assistance failure.

In the case of C.S. CIGNE only Drift Grounding is considered as the vessel proceeded along the safe track but was pushed towards the shore side shoal due to nearly 6 kt current in the area acting almost perpendicularly to the ship on her port side and pushing the vessel towards starboard side shore. In the Drift Grounding incident of M.V. C.S. CIGNE the FTA method of risk assessment was used to investigate the probability of root cause of the grounding accident at Hugli point of Hooghly river passage.

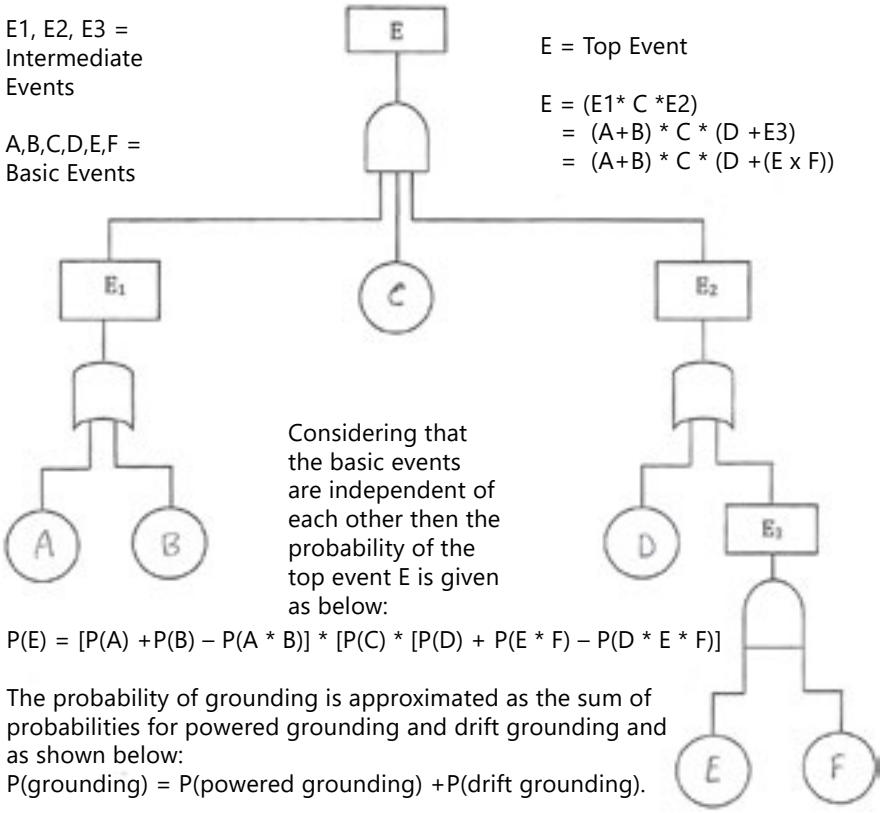
## FTA METHOD

The FTA provides a means of reconstructing the events that contribute to incidents and/or accidents. This method is utilized both for qualitative and quantitative purpose. One of the main purposes of representing a Fault Tree in terms of the Boolean logic is that the related equations can be used to determine the fault trees associated with MCS. MCS defines the smallest combination of component failures in which if they occur will cause the top event to happen.

Qualitatively it identifies the individual scenario that leads to top event, while quantitatively the probability of each factor is determined for the top event. The main determinants of a Fault Tree are composed by the top event, primary events, intermediate events and logic gates. A simple Fault Tree diagram is shown on the following page.

E1, E2, E3 = Intermediate Events

A,B,C,D,E,F = Basic Events




E = Top Event

E = (E1* C *E2)
= (A+B) * C * (D +E3)
= (A+B) * C * (D +(E x F))

Considering that the basic events are independent of each other then the probability of the top event E is given as below:

P(E) = [P(A) +P(B) – P(A * B)] * [P(C) * [P(D) + P(E * F) – P(D * E * F)]

The probability of grounding is approximated as the sum of probabilities for powered grounding and drift grounding and as shown below:
P(grounding) = P(powered grounding) +P(drift grounding).

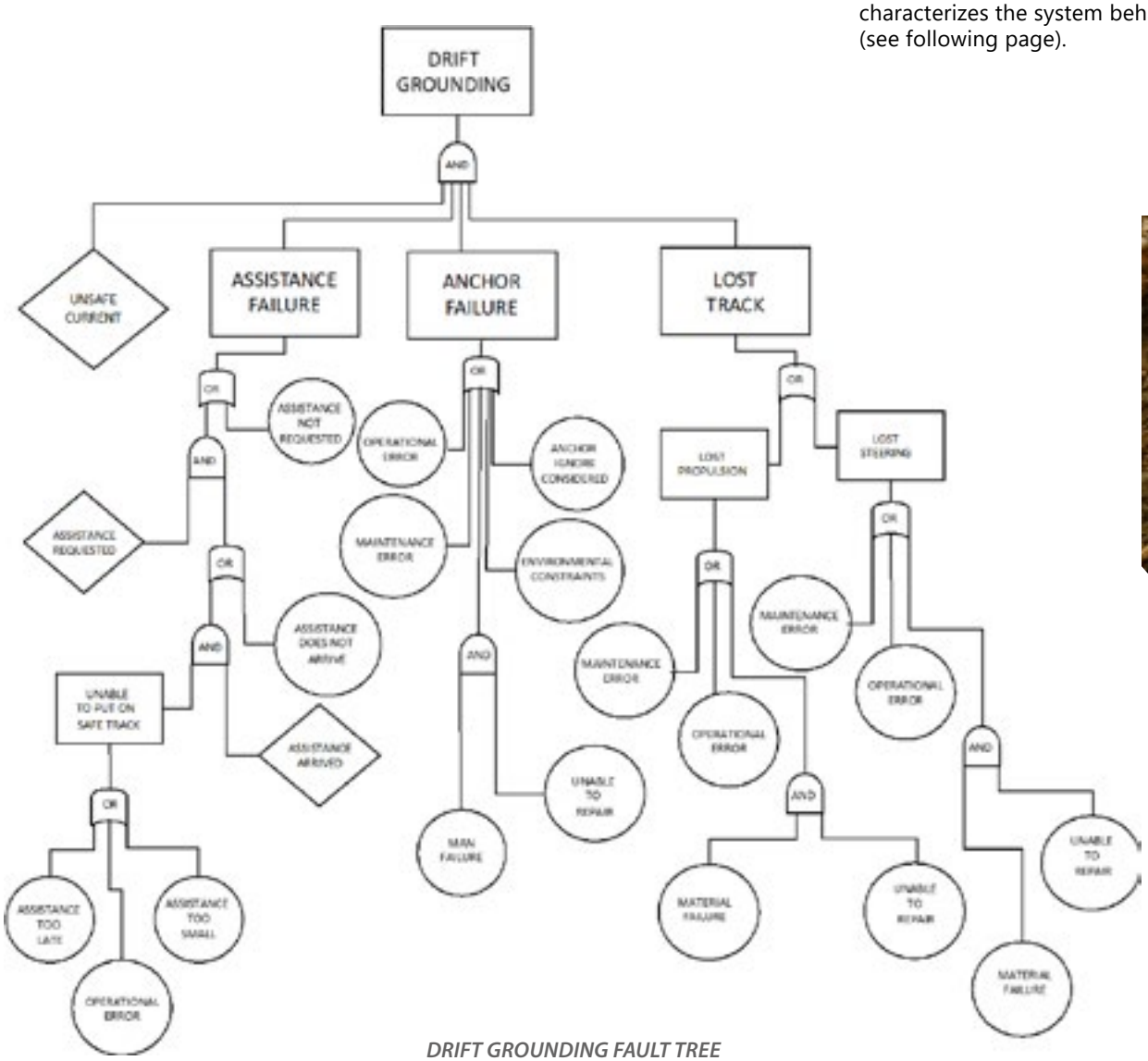
## DRIFT GROUNDING FAULT TREE

The drift grounding Fault Tree which is shown in the figure below is constructed based on PSC system of construction which classifies Primary, Secondary or Command (Operation) failure.

In the Fault Tree accident, fault consist of two broad categories:

**1) Planning and piloting**
The vessel planning is made to follow a safe track, but in case of piloting failures it proceeds down an unsafe track. During the entire river passage the decision by the river pilot on board is very important since a wrong / improper decision by the pilot will render the system of the vessel unreliable.

The unreliability function (such as Ground Topology, Impact Conditions, Speed Draft and Displacement etc) is determined by integrating probability density function f (t) which characterizes the system behaviour (see following page).




*DRIFT GROUNDING FAULT TREE*

$$f(t) = \lambda e^{-\lambda t}$$

λ = the relative failure rate
t = the exposure time

(The exponential distribution is used to describe the probability density function (pdf) since there is constant hazard rate with time).

The probability of piloting failure is time dependent, as the piloting continues throughout the transit can be determined by the following equation:

$$F(t) = (1 - e^{-\lambda t})$$

Where the piloting failure along the track is obtained by the evaluation of f(t) over the entire transit period.

**2) Equipment assistance and environment**

The vessel is unable to follow a track because of mechanical failure, assistance failure and or adverse environmental condition.

In order for a drift grounding to occur the following failure condition must be present...

1. **Piloting Error:** Due to piloting error, faulty navigation results during the transit period.
2. **Unsafe wind and/or current:** Although wind was safe, the environmental forces due to 6 kt current exerted almost perpendicularly to the vessel at Hooghly Point pushing the vessel towards shore and grounding.
3. **Assistance failure:** No assistance was requested by the Master or the on board Pilot to tend the vessel from a grounding hazard.
4. **Anchor failure:** Anchoring of the vessel did not prevent the vessel from tending towards grounding hazard. It is to be noted that all speed greater than 1 knot the anchors will not hold. At Hooghly point, it was reported that there was a current action on the vessel was 4-6 kn on 23rd March 2008. Hence anchors of the vessel did not help to prevent grounding hazard.
5. **Loss of steering:** The vessel is unable to proceed with directional stability due to either loss of steering or propulsion.
6. **Lost Way:** Navigational error by the Pilot and the Bridge team causes deviation from the actual course resulting in the lost way in the vessel and grounding.

## CONCLUSION

**Based on the above built up of fault tree, all the basic combination known as Minimum Cut Set are evaluated for the occurrence of top event (drift grounding of C.S. CIGNE) due to ship system failure.**

**The fault tree analyses indicates that the accidental event of drift grounding was caused due to navigational error by the on board river pilot and a Bridge Team, although no error enforcing condition existed due to external disturbances.**


**REFERENCES**

**MEPC/ Circ. 372, MSC / Circ. 953**

**Resolutions A. 849 (20) and A. 884 of IMO**

**Fault Tree Hand Book – NUREG 0492**

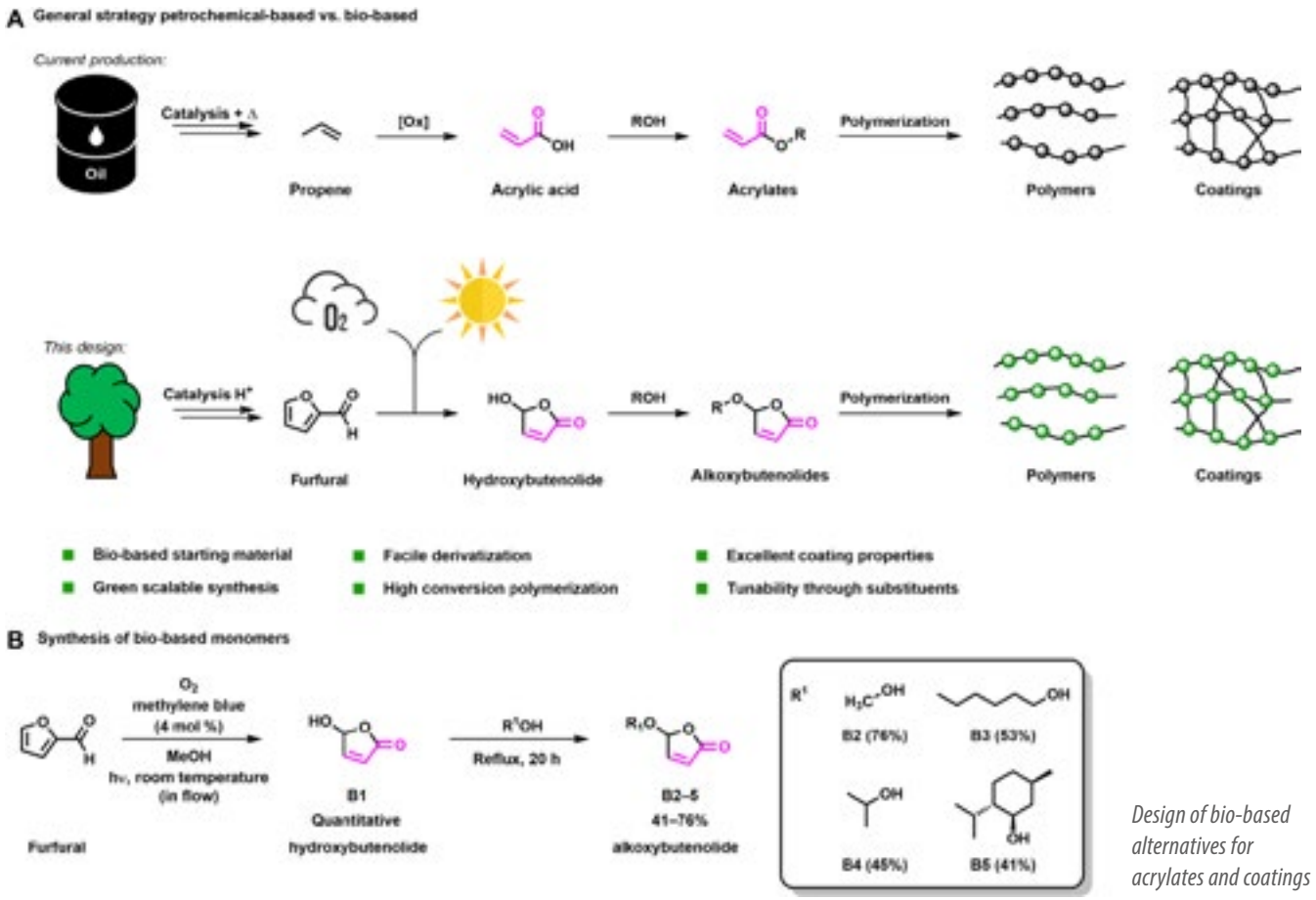
**DOE Hand Book Vo. 1**

**Probability Risk Assessment and Management for Engineers and Scientist by E.J. Henley & H. Kumamoto**

**Fault Tree Analysis by Clifton A, Ericson H**


# AkzoNobel unlocks more sustainable future for coatings after biomass breakthrough

A world of possibilities for paints and coatings has been unlocked by research being conducted by AkzoNobel, in collaboration with the Dutch Advanced Research Center Chemical Building Blocks Consortium (ARC CBBC).




*Design of bio-based alternatives for acrylates and coatings*

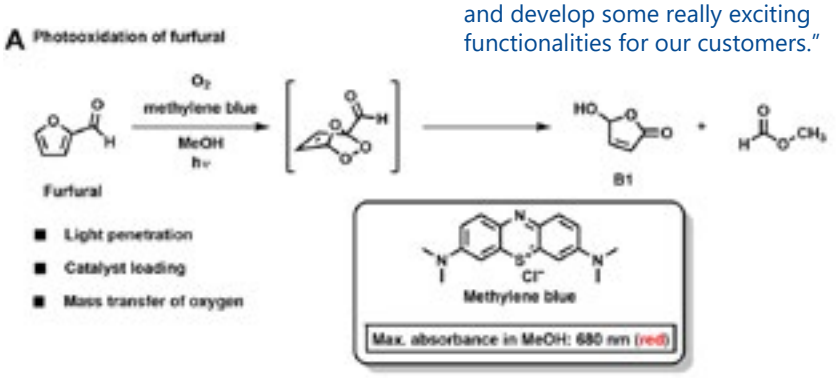
The breakthrough innovation involves the development of a more sustainable way of making resins, which could pave the way for the introduction of futuristic functionality – such as intelligent paint that uses controlled release of active ingredients, or the ability to add new functionality during the lifetime of a coating.

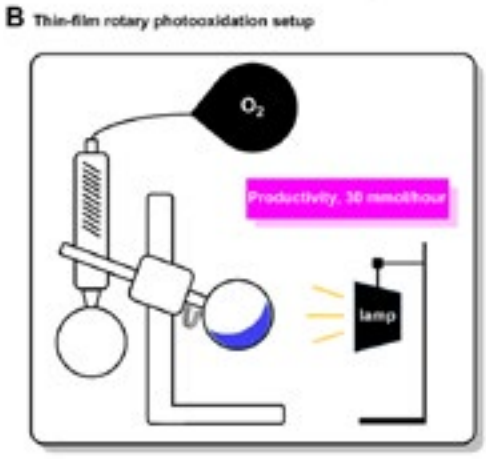
The new process uses bio-based monomers to make the resins, rather than the traditional oil-based. Requiring just UV light, oxygen and renewable raw materials, patent applications have already been filed for resins and coatings made with monomers derived from sugar derivatives isolated from biomass.

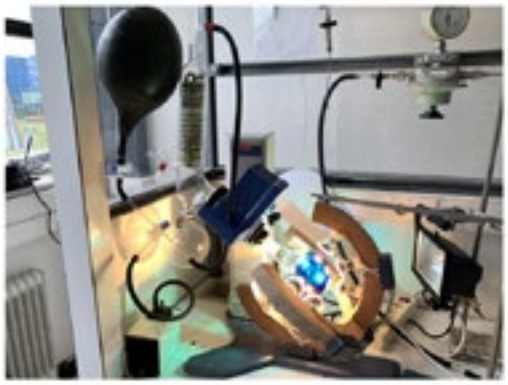
"There's no doubt we're on the verge of progressing to the next level of coatings technology, thanks to this fantastic example of collaborative innovation in action," explains Klaas Kruithof, AkzoNobel's Chief Technology Officer. "We're opening up a new future for paints and coatings by using sustainable building blocks that will enable us to explore and develop some really exciting functionalities for our customers."

AkzoNobel already produces many of its own resins, but in a bid to make the process more sustainable, the company has been working with the ARC CBBC, with most of this research taking place at the University of Groningen – where the team is led by professor in organic chemistry and Nobel Prize winner, Ben Feringa, and PhD student, George Hermens.

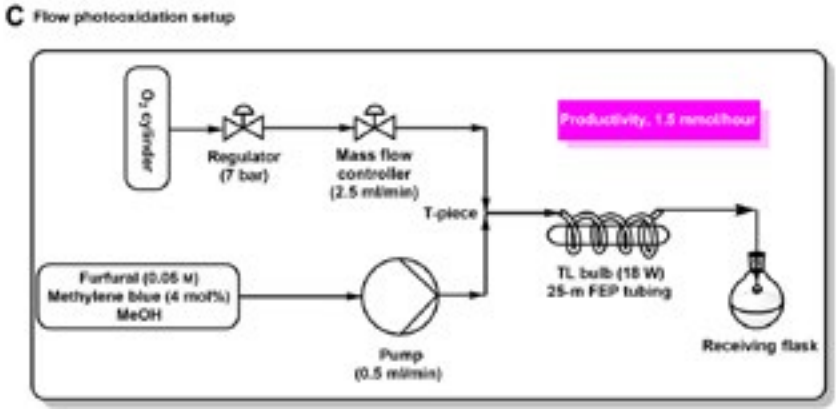
"Faced with the challenge of developing the sustainable chemistry of the future – a major goal of the ARC CBBC – I'm extremely pleased with these game-changing results," adds Feringa. "They show that a material for coatings can be produced from biomass using a sustainable chemical process."



*Upscaling of the photooxidation of furfural*




Having started in 2018, the research project is still at a relatively early stage and a lot of work still lies ahead in order to optimize the monomers so they can be made in a more efficient way and on a larger scale. Estimates suggest it could be around five years before the first products start to emerge."

"We've still got a long way to go in terms of exploring the scope of the technology, but it will almost certainly define the future of our products," continues Kruithof. "By 2040 or 2050, there's also a good chance we might only be using bio-based monomers in our resin production, which will help us to reduce the overall carbon footprint of our products."

The biomass breakthrough is the latest example of the progress AkzoNobel is making in its search for sustainable solutions, having adopted a People. Planet. Paint. approach to sustainability. A detailed explanation of the science behind the development of the new process can be found in a research article which has just been published in the journal Science Advances.

If you want to read the hard science go to the article entitled 'A coating from nature' in Science Advances journal at **http://bit.ly/3p1xRJq**.

# New guidance document for cargo and cargo hold ventilation published

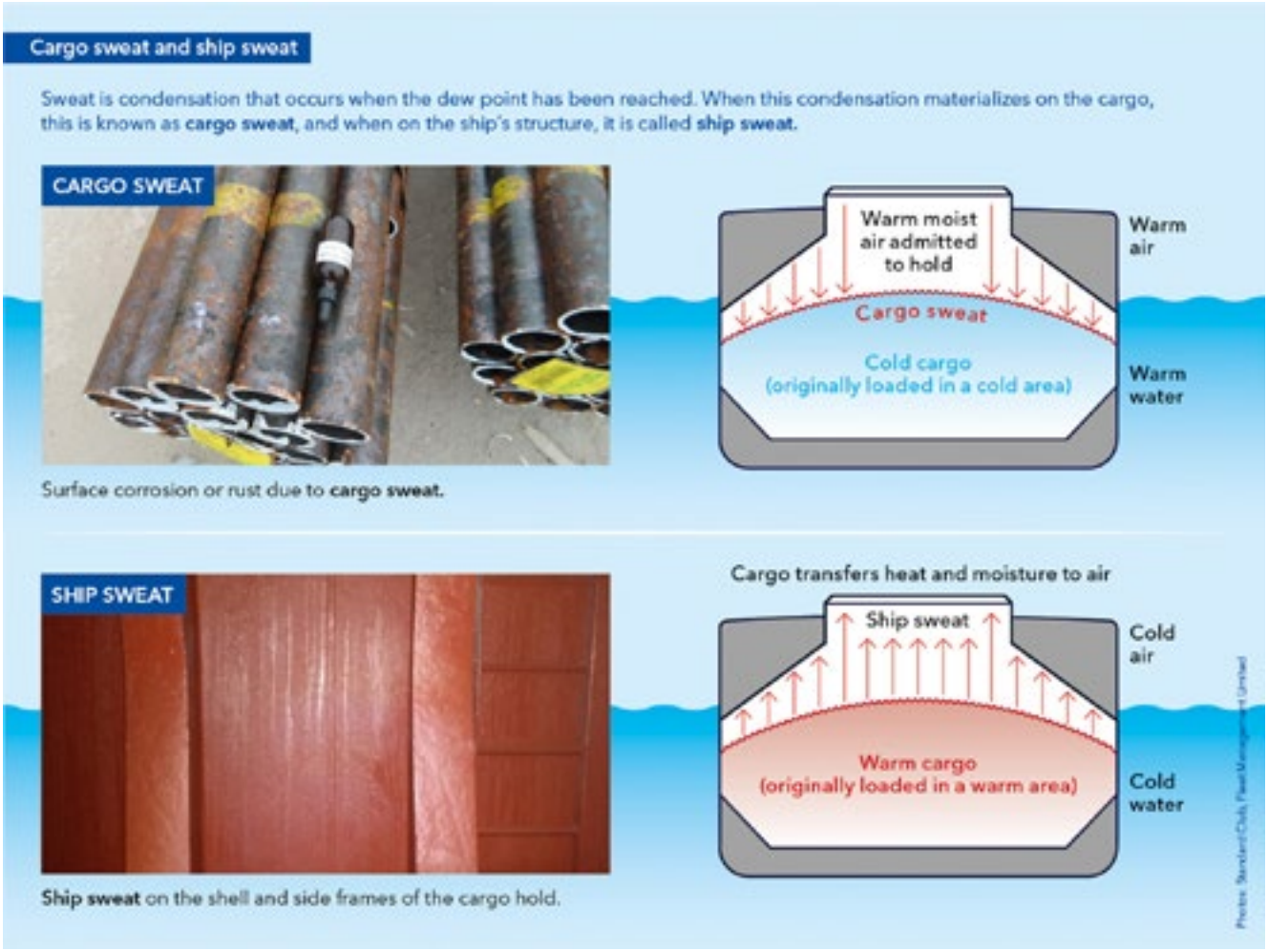
By **Morten Løvstad**,
Business Director Bulk Carriers, DNV GL

Many cargo shipments transported in bulk form can suffer damage, or even pose a hazard to the crew while in transit. A new guidance document produced jointly by the Standard Club, INTERCARGO and DNV GL helps with practical recommendations and a better understanding of how to mitigate these risks by ensuring proper ventilation.

A number of factors can compromise the cargo integrity during normal transit. They can originate from the physical and chemical properties of the cargo itself or from changing temperature and air humidity conditions. Knowing and controlling those factors are key to avoiding hazards to humans as well as claims for cargo damage.

## The ventilation guide takes a closer look at risks

INTERCARGO, the Standard Club and DNV GL have jointly developed a guidance document called 'Cargo and cargo hold ventilation' which looks at the specific risks associated with particular types of cargo and how ventilation should be applied to mitigate them. "The guide will provide ships' crew with a practical understanding of when to ventilate and the reasons to do so," says Ed Wroe, Technical Manager at INTERCARGO.



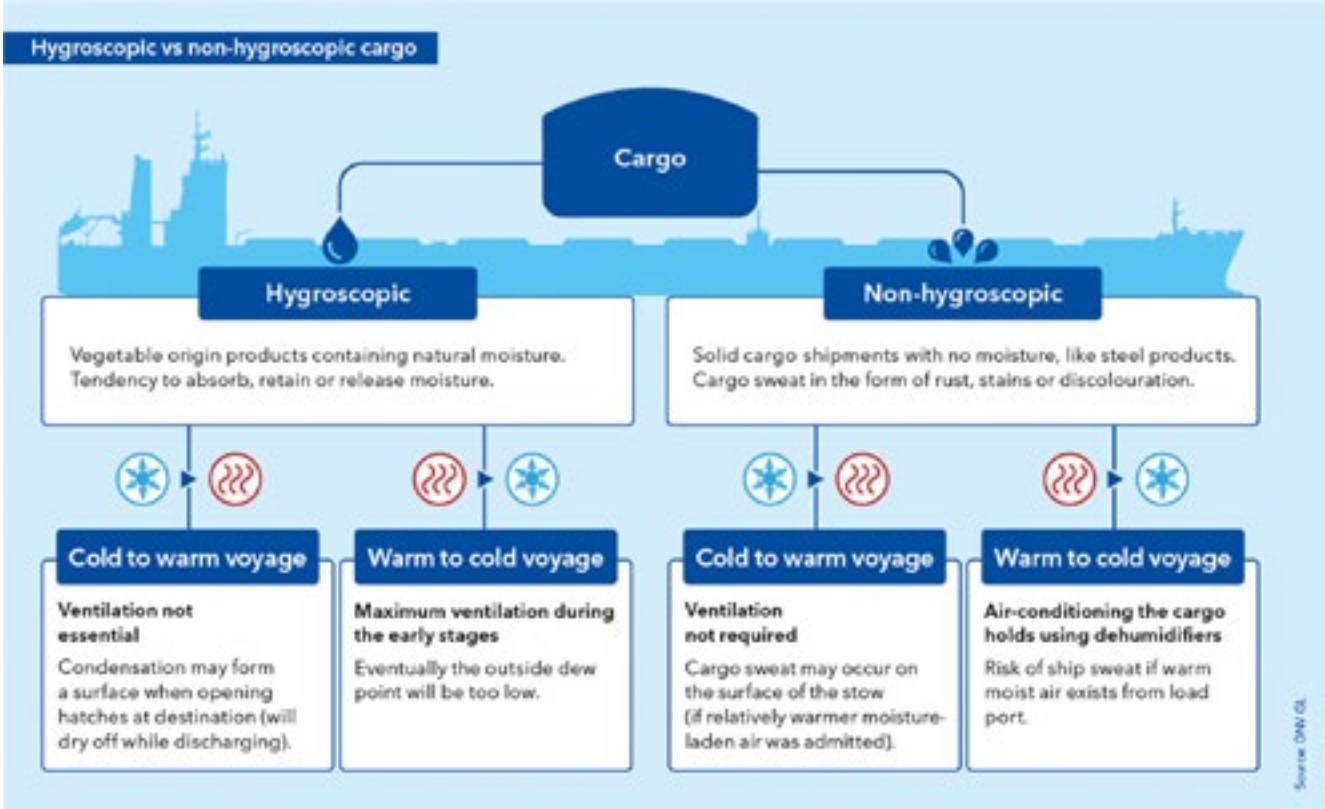
## Ship sweat and cargo sweat

"By far the most common threat to cargo integrity is 'sweat', the condensation of air moisture, which can cause agricultural products to spoil, steel products to rust, and other cargo types to undergo unwanted and potentially hazardous chemical reactions," points out Yves Vandenborn, Director of Loss Prevention at the Standard Club. When air moisture settles on the cargo, it is referred to as 'cargo sweat'. Condensation on the ship's structural elements inside the cargo hold is called 'ship sweat'. Both phenomena are directly related to the dew point, the temperature at which air becomes saturated with water, triggering condensation.

## Cargo types susceptible to interaction with sweat

Organic matter, such as grains, animal feed, seed cake, timber or wood pulp, may decompose or ferment when exposed to sweat. Non-organic and/or hygroscopic cargo that can absorb or release moisture, such as fertilizer, salt, sugar or minerals, can react chemically with water and may self-heat and emit carbon monoxide, carbon dioxide or methane. Apart from the resulting degradation of product quality, carbon monoxide is toxic to humans, and carbon dioxide can displace atmospheric oxygen and cause asphyxiation if undetected. Both gases are odourless.

Some non-organic cargo shipments, especially silicomanganese and ferrosilicon, can emit toxic gases such as hydrogen, especially when moist. Coal and direct-reduced iron may in the same way self-heat and cause fire in the cargo hold as well as emit hazardous methane under the wrong atmospheric conditions. Both hydrogen and methane are highly explosive.




## Hazards on board

Several cargo types may pose fire, explosion and health risks. Further, non-odorous toxic gases or an oxygen-depleted atmosphere in a cargo hold pose an immediate danger to anyone entering. What is more – toxic gases exiting from cargo holds, whether by natural or mechanical ventilation or through leaks, could enter crew accommodations and in worst case cause injury or death if not detected at an early stage. Certain cargo shipments produce dust that can also pose a health hazard. Mixing hygroscopic and non-hygroscopic cargo shipments with different inherent temperatures in the same hold adds additional risks.

## Ventilation mitigates risks

"Cargo hold ventilation is the established means to mitigate these risks," explains Ed Wroe from INTERCARGO. "The critical question is how and to what extent ventilation is advisable. In some cases, ventilation may actually aggravate the hazard by increasing the amount of moisture and oxygen interacting with the cargo, thereby accelerating the processes which taint the cargo or cause it to self-heat and emit dangerous gases."

"Deciding when and how to ventilate can therefore be a complex task," admits Morten Løvstad, Business Director – Bulk Carriers at DNV GL. "The 'Cargo and cargo hold ventilation' guidance document explains in detail what masters and crew should pay attention to, how their decisions will affect cargo quality as well as safety on board, and what the relevant codes, regulations and standards tell them to

do. It also points out how operational flexibility is heavily impacted by what ventilation equipment is available on board the vessel."

## Natural ventilation system

There are generally two types of ventilation – natural and mechanical or forced ventilation. Natural ventilation relies on air circulation driven by convection, with outside air entering and inside air exiting the hold through vents located above the deck level. Today's bulk carriers typically have hinged-door type ventilators located at the sides of the hatch covers. These can be opened or closed depending on the relative wind direction to ensure adequate surface ventilation and prevent sweat inside the hold.

## Mechanical ventilation system

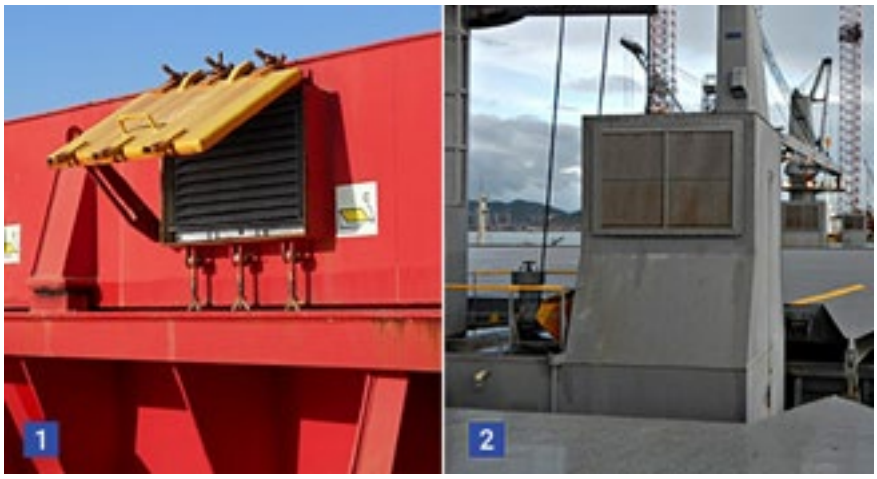
Mechanical ventilation systems actively blow air across or through the cargo hold to remove hazardous gases or vapours. If the cargo is prone to self-heating in the presence of moisture, mechanical ventilation should be applied in specific circumstances only. In some situations, air-conditioning or specialized dehumidifying equipment should be used instead of ventilation to remove moisture from the atmosphere in the hold. Where flammable gases might be present, the ventilation fans must be designed to avoid sparking and ignition or explosion.

## Monitoring and maintenance ensure proper ventilation

It is important to ensure proper monitoring and maintenance of all ventilation openings and equipment, not only to guarantee proper operation but also to avoid cargo contamination by falling rust or paint chips, and to prevent sea or spray water from entering a hold in heavy weather.

## Complex regulatory landscape for cargo hold ventilation

It takes careful consideration of all influential factors and proper preparation ahead of a voyage to make sure that the cargo hold ventilation achieves the intended purpose. The charter party or voyage order may contain specific instructions, for example, ventilation rule applicable for the voyage or the period when ventilation might not be possible due to in-transit fumigation of the cargo. Furthermore, the IMSBC Code, SOLAS regulations, the International Convention on Load Lines (ICLL) and several IMO Resolutions contain important recommendations and rules relating to cargo hold ventilation and related equipment. The 'Cargo and cargo hold ventilation' guidance document makes frequent reference to the applicable codes and documents to help crews understand the implications.




*1. External view of hinged-door ventilator on cargo hold hatch cover side*
*2. External view of mechanical ventilation casing with louvre on the main deck*

*Fumigant residue on cargo surface*

## Crew knowledge about transported cargo is key

Familiarity of the crew with the nature and specific properties of the cargo carried is essential. "Suitable equipment must be available on board to measure key influential parameters, such as cargo and ambient temperature, relative humidity and dew point inside and outside the hold, and sea temperature," stresses Vandenborn. "These measurements should be repeated regularly during the voyage to predict their influence on the atmosphere inside the cargo holds. All readings, events and measures taken with regard to the cargo and its condition should be logged to provide a continuous record in case any issues emerge upon the arrival of the ship at the destination."

Case studies provide insights on proper and improper ventilation
The document closes with two case studies which illustrate how improper or inconsistent application of ventilation rules can cause cargo damage and financial loss, and how proper documentation during a voyage is key to a ship's ability to defend itself against cargo claims. A brief glossary of terms, a cargo temperature and ventilation log template, and a dew point table are included as additional practical tools.

Download the 32 page pdf guide at **http://bit.ly/3slctRj**.

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## ULTRASONIC LEAK DETECTOR

## RELIABLE CHOICE FOR HATCH COVER WEATHER TIGHTNESS TESTING

Type approved & accepted by P&I clubs
Can be used in sub - zero temperatures
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# SURVEYING RIVETS AND RIVETING Part One

By Eur. Ing. **Jeffrey N. Casciani-Wood**

Rivets are a permanent mechanical fastening and one of the oldest and most reliable methods of fastening and have been found in archaeological digs dating back to the Bronze Age. Modern vessels are, of course, fully welded but, before that became commonplace as the method of constructing them, iron and steel ship and the parts from which such vessels were built, were connected together with rivets. Riveting in shipbuilding is, these days, an old fashioned and long out of date method of securing together the structural items forming a ship's hull, nevertheless, a good small craft marine surveyor should know about it as, even today, many of the vessels he will have to survey are fastened together using the method. Dutch and London river barges are prime examples. On the face of it riveting seems to be a simple process but there are a number of factors of which the marine surveyor should be aware if he is going to be successful in his understanding of that particular aspect of his chosen profession. A full understanding of those various factors will enable him to 'read' the structure and thereby to give better advice to his client.

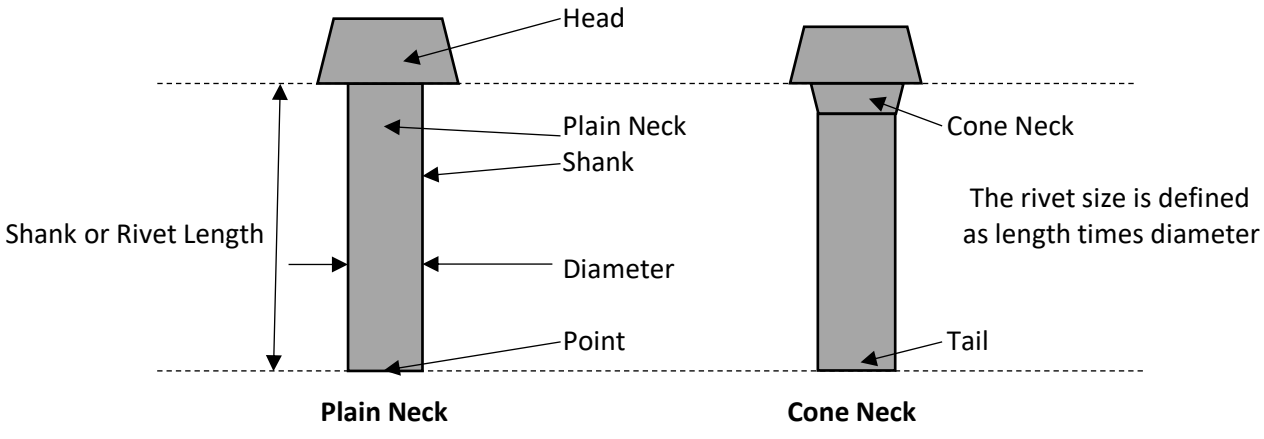



**Figure 1 The Names of the Parts of a Cone Headed Rivet**

Pan head | Flat or Cheese head | Snap head | Countersunk head

**Figure 2 Other Rivet Head Types**

The first of those factors is that there are a number of different types of rivets designed to meet different cost, accessibility and strength requirements and the most common of these in the marine world will be discussed below. Rivets generally fall into two main families depending upon the shape of the shank. They are called plain necked or, simply, plain rivets and cone necked or coned rivets. To understand them, the reader is referred to the Figure 1 above which gives the names of the different parts of a plain cone headed rivet. Cone necked rivets were used in all watertight work such as the shell, weather deck and hatch coamings and the main transverse bulkheads. The reason for that was that the cone on the rivets neck filled fully the cone formed on the other side of the plate when the hole was punched out from the faying surface. The slightly cheaper plain necked rivets were used elsewhere. Although the shape of the rivet head varies with rivet type the names of the various parts do not.

The cone necked rivet is similar to the plain necked one shown on the left in the Figure 1 but the upper end of the shank *i.e.*, the neck, is expanded to form a slight cone under the head.

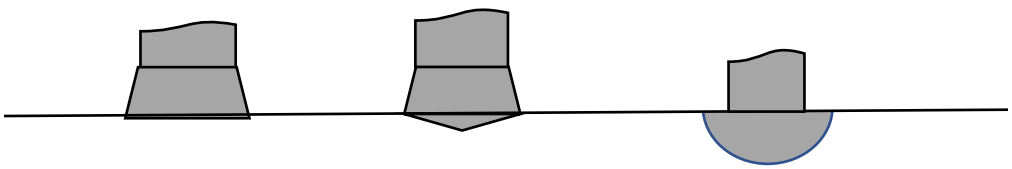
In merchant shipbuilding, the rivet head was traditionally of the cone type.

Before the rivet is installed it consists of a smooth cylindrical shank with a head on one end. The end opposite to the head is called the point or tail. On installation, the rivet is placed in a pre-punched or drilled hole and then the tail is closed (*i.e.* deformed) or upset if the reader is American to form the point so that it flattens and expands to about one and a half times the original shank diameter and that holds the rivet in place.

The rivet is driven and closed while it is sparkling near white hot and, as it cools, it shrinks and pulls the two pieces to be joined tightly together. Because there is effectively a head on each end of an installed rivet it can support tension loads (loads parallel to the axis of the shank) although it is much more capable of supporting shear loads (loads perpendicular to the axis of the shank). It is surprising, judging from the reading of their reports, how many marine surveyors incorrectly call the point of the rivet its head. In America, to distinguish between the two ends of the rivet, the original head is called the factory head and the deformed end is called the shop head or buck tail. The rivets in the Figure 1 are called cone head or, commonly, but incorrectly, pan head, and it is the type most commonly found in commercial shipbuilding and such rivets have either a plain or a cone necked shank. Strictly, and mathematically, the head is not a cone but a right frustum of one.

Both plain and coned rivets can be fitted with different types of heads and points as shown in Figures 1 and 2. All the heads are circular in plan form. The snap head can, on occasions, be found in shipbuilding but is most commonly found in shoreside structures such as railway bridges where it is also often closed with a snap point. In the U.S.A. the snap head is called a button head. There are other head types, but they are very rarely found in shipbuilding though the pan head was used in the construction of 19th century warships. It is now obsolete. There is no real reason other than tradition for the cone head to be used in shipbuilding. On cheap work the plain rivet was used but that did not fill the cone in the plate under the head caused by punching out the hole from the faying surface between the plates being riveted allowing crevice corrosion to appear under the rivet's head. So, for high class or passenger ship work, the cone necked rivet was used to eliminate that risk.

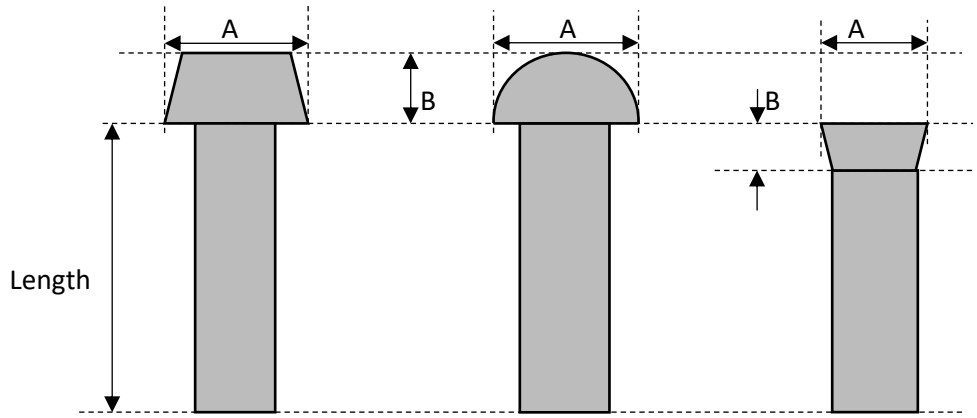
An unusual type for use in special places is called the screwed or tap rivet. With such a rivet the shank is cut with a coarse pitch screw thread and the head is fitted with a squared projection to take a spanner. After fitting and caulking the squared head is ground off. That type of rivet is very rare but may still occasionally be found in awkward corners. In shipbuilding, either the boiler point, or the flush point is usually used although the author has seen a narrowboat with snap points to its riveting. The snap point used in bridge building, however, has the advantage that the hole in the plating does not need to be countersunk and so is cheaper in man hours although the structure is heavier. Weight on bridges although important is, of course, not really the same problem as it is in shipbuilding.



Flush Point | Boiler Point | Snap Point

**Figure 3 Rivet Point Types**

**Surveying tip 1 | To estimate the size (shank diameter) of rivets used in a structure measure the diameter A with a pair of callipers and multiply that dimension by 0.625 for a cone headed rivet and 0.57 for other types. Although the head is squashed during the riveting process, that particular dimension usually does not alter significantly.**




**Cone Head** **Snap Head** **Countersunk Head**

| Rivet Type | A | B |
|---|---|---|
| Cone Head | 1.60d | 0.70d |
| Snap Head | 1.75d | 0.75d |
| Countersunk Head | 1.75d | 0.65d |

The radius of the head of the snap type is 0.885d, the sides of the countersunk type are at 60° to each other and the edges of the head are slightly rounded.

The weight of cone rivet heads is $9.80d^3 \times 10^{-4}$ kg per 100 where d is the diameter of the rivet shank in mm and the defining rivet dimension.

**Figure 4 Dimensions of the Three Most Common Marine Rivets**

The rivets originally were handmade but by the 1850's various machines had been designed and built to manufacture them automatically. The machine pulls a continuous length of wire into itself cutting off a pre-set length and then cold upsets the head at one end before discharging the completed rivet into a waiting collection tray. A good, modern machine can produce up to 50 rivets a minute depending upon the diameter. Rivets were manufactured in both mild steel and wrought iron.

Also, in good quality shipbuilding the rivets were nearly always of mild steel but in barge building they were often of (cheaper and softer) wrought iron. Rivets for shipbuilding are required by the classification societies to be made of best-best (BB) iron or of mild steel. Iron rivets are made to the modern standard of 2-3% slag content as rokes or stringers in the metal. Rivets for small unclassed vessels were often made from best or No. 3 iron and, for classed vessels, shipbuilders typically used best-best or No. 4 iron rivets. The wrought iron rivets for the biggest ships were often supplied in two main grades called treble best and treble-treble best. That meant that the iron for rivets was fagotted six times to almost pure iron with less than about 2% total slag inclusion.

The problem with No 3 or best iron rivets, the type that the small craft marine surveyor will mostly see, is that they are often riddled with high concentrations of siliceous slag, a glassy residue of smelting, which can make them brittle and prone to fracture. The particles of slag present in the wrought iron after preparation by puddling were drawn into long fibres during the following manufacturing processes and its proportion of slag was intended to be no more than about 3% but the process was difficult to control and examples with up to 10% slag were produced. The slag inclusion was similar to wood grain and usually oriented along the length of the bar from which the rivets were rolled. The slag inclusions were called rokes or stringers by the riveters. Such bars were stronger along the grain and the long slag inclusions made them weaker across the grain. The slag does, however, tend also to dissolve out. Rivets made from even the best-best wrought iron bar typically contain stringer filaments running their full length and filaments and which may also be found at right angles to the rivet's centreline, particularly beneath the head, causing weakness in tension.

The hot working of the rivets is one way of making intimate contact between the fay of the plates in way of the joints. To be worked successfully each rivet needed to be heated to over 2,000 degrees Fahrenheit – any less and the iron silicate in its fabric would crack, causing what would now be considered microscopic construction defects, that could lead to fatigue issues. Importantly, unlike hydraulic fitting, hand riveting was much slower, taking around ten seconds to dome the point. It, therefore, had a great deal more time to cool while still being worked, potentially under the necessary 2,000o F mark. Every rivet was a working test. The rivet boy had to bring it to exactly the right temperature. If it were too cold, the riveters could not seat it properly leading to leakage. If it were too hot it would sag or crumble. The catcher had to fit it into the hole quickly, or the rivet would cool. The steel rivets were heated to a bright red to yellow colour (1,800o F) but wrought iron rivets were worked to a sparkling white heat – (2,000oF). That meant that the latter could be thrown longer distances to the catcher before becoming too cold to close properly. Steel was only used for the rivets of the midship sections of the big trans-Atlantic liners and similar vessels. The marine surveyor should note that wrought iron is more malleable than mild steel and, in the event of the vessel being involved in a collision, wrought iron rivet are more likely to give than steel ones which tend to shear in such circumstances.

The difference in metals from that of the plating by the use of wrought iron usually also results in a characteristic deep low area pitting of the rivet point after several years in service due to galvanic action as iron is very slightly anodic to mild steel. It usually takes a good eye to see it.

The second factor to consider is the riveting process itself. As few modern marine surveyors will have seen a ship riveted up, a brief description of the process may be worthwhile. A rivet point can be upset cold or hot. The rivet completely fills the hole in the hot process, but it must be understood that, due to subsequent cooling, both the length and the diameter decrease. The reduction of length pulls the head and point of the rivets against the plates and makes the joint slightly tighter and stronger.

The reduction of diameter, however, creates a clearance between the inside of the hole and the rivet which does not occur in a cold worked rivet. That reduction may lead the rivet to loosen as the vessel works in a seaway. When the diameter of the rivet is 10 mm or less, cold upsetting is fairly common (although not in shipbuilding) but for larger diameters the rivet is first heated to a glowing red or white, inserted in the hole and then the point is knocked down. A riveting squad usually consisted of up to five men and a boy; one or two riveters if the riveting is effected by machine or hand respectively, a holder on and a passer (possibly two). The rivet heater was usually a boy. The machine or hand charge riveter handled the logistics of the work advising the heater by sign language of the different lengths and types required. If the rivet was too short, it would not fill the countersink, or the point too flat. If the rivet was too long, the rivet would be so large that the riveter had to remove excess stock from the point during forming which added to his work and slowed the process. At a central location near the areas being riveted, a small coke fired furnace was set up and the cold rivets were placed in the furnace and heated to a sparkling white hot temperature when they should be in the upper range of 2,000oF. To be worked successfully each rivet needed to be heated to over 2,000 degrees Fahrenheit – any less and the iron silicate in its fabric would crack, causing what would now be considered microscopic construction defects, that could lead to fatigue issues. Importantly, unlike hydraulic fitting, hand riveting was much slower, taking about twenty seconds to dome the point. It therefore had a great deal more time to cool while still being worked, potentially under the necessary 1,200o F mark. Every rivet was a working test. The rivet boy had to bring it to exactly the right temperature. If it were too cold, the riveters could not seat it. If it were too hot it would sag or crumble. The catcher had to fit it into the hole quickly, or the rivet would cool. When they had reached the correct temperature (judged by the rivet's colour), the heater would use a long pair of tongs to individually remove and throw them or slide them down galvanized pipes to a catcher stationed near the joints to be riveted. The latter would catch the hot rivet in a bucket and place the still glowing and sparkling hot rivet into the hole to be riveted and then quickly turn around to await the next rivet. Modern Health and Safety men would have a pink fit at what, when the author was serving his time, were considered to be normal working conditions. The hot rivets are thrown to the passer at a pace that was comfortable for the riveter(s). One worker – the holder on - would then put the hot rivet in the rivet hole and drive it hard to the plate by a heavy hammer called a dolly or, in America, a rivet set or buck against the head of the rivet. The holder on was also responsible for keeping the rivet tight to the shell plate and making sure the rivet head was not deformed during driving. He would also sound the rivets to check for any loose ones

**Surveying tip 2 | As a general rule, steel rivets will have round shallow pits whereas wrought iron rivets will have small diameter but deeper pits. The distinction is, however, not infallible. Wrought iron rivets often contained an elevated amount of incorporated slag and the orientation of the slag within the rivets is important.**

before the squad moved to a new location. When the holder on had the hot rivet in the hole, the riveter(s) on the other side of the plate would first strike the surrounding plate two or three times with their hammers to close the structure tight and then knock down the rivet causing it to mushroom tightly against the joint. That would cause it to fill the countersink and they would then finish off the job leaving the rivet in its final shape. When that was done, the riveters would then give a double tap on the plate to tell the holder up what was going on and then put their hammers one behind the other on the flattened point and the holder on would 'head up' the rivet by hitting it hard two or three times with his hammer and set it close against the bar or plate.

When the author was an apprentice that was at least two hundred and fifty rivets a day per squad to make up a decent piecework bill. The combined noise of the riveting and the metal caulking was deafening, and nobody wore earmuffs. To overcome the noise problem the riveting squads developed a sign language so that they could tell the rivet boy (or, during World War II, woman) on the forge the size of the next rivets they needed - the number of fingers held up indicated the number of whole inches and the position of the hand on the body the number of quarters of an inch. Thus, two fingers together with a tap on the head was a bare two inches while two fingers with the hand at the neck it was two and a quarter inches, the waist two and a half inches and at the knee or ankle two and three quarter inches. There were local variants.

The sparkling white hot rivets were thrown or slid down a length of pipe from the forge to the catcher who fitted it into the hole for the holder on to drive it home when the point was hammered (knocked down) to shape by a single riveter with a pneumatic hammer or a pair of riveters on the other side of the plate striking the rivet alternatively. The author still has his (3lb) riveting hammer.

The two riveters would then 'lay down' the point by one of them holding a hard steel dolly moving it round the edge while the other would hit it with his hammer thus setting the edge of the point hard against the plate making the rivet watertight. With a snap point the plate would not be countersunk, and the rivet point would be roughly formed by hammer. One riveter would then hold a former of the correct shape on the roughly formed point while the other struck it with a somewhat heavier hammer. Snap points were not used on watertight or oiltight work as they were difficult to caulk. Occasionally it would be necessary after knocking down a rivet to go back to the previous one and dress it down further. When the riveting was done with a pneumatic (in shipyard language a windy) hammer only one riveter was needed. Rivet hammers were two to seven pounds in weight and the holding up hammers 10 to 40 pounds. The dolly weighed from 10 to 30 pounds.

Windy hammers were not liked in the shipyards and those that had to use them often complained that they lost the feeling in their hands and forearms. When the point was closed by hand hammering as in the author's apprenticeship days two men were needed each striking the point in turn with a long handled long headed hammer of about three to four pounds weight. The pace was set so that when the riveters finished one rivet a fresh one was in the next rivet hole about five or six seconds later. The rivets were driven through with the head on the inside and closed up (upset or knocked down or up as appropriate depending upon which yard the marine surveyor is in) with the point on the outside or sea side. It is often assumed that when the rivet holes are punched and countersunk into a pair of plates along a common butt or seam that the corresponding holes are coincident and have a common centreline. That ideal was aimed at in every yard but, in practice, it often happens that the two items are put together a number of the holes will not reach that ideal and, if the holes are only partially out of line, they are said to be half blind, but it is a common experience to find some of the nearly totally blind even on vessels where great care has been taken in marking, transferring and punching the holes. That is not surprising when it is understood that the plate is held and shifted by manual labour and that, therefore, such deviations are inevitable. In practice, when the holes are half blind, the riveters drive in a hard steel punch called a drift of which one end is tapered and the centre nearly parallel. Use of a drift forced the plate and tore it around the hole which was enlarged and forced out of line such the rivet passed obliquely through and so was imperfectly knocked down. The practice cannot be too strongly condemned, and such holes should be opened up with a reamer (rimer) or a rose drill. Rivets fitted into half blind holes that have been drifted can easily be recognised in that the points are usually irregular in shape; the rivets are often out of line with those nearby and the spacing is also often irregular. They also, have often been Frenched.

When riveting up, the squad would carry on until they reach the next service bolt then go two or three rivets beyond before removing it, the squad would then go back and fit a rivet into the hole where the bolt had stood. That ensured that the faying surface did not open up. Upon cooling, the rivet would contract and exert further force tightening the joint. Rivets fill the hole where they are installed to establish a very tight fit. In good and reasonable quality ship building the rivet point was closed so as to form a shallow cone - called a boiler point - on the outside of the plate.

A flush rivet was used primarily on external metal surfaces where good appearance and the elimination of unnecessary hydrodynamic effects are important. On the shell plating of a ship both boiler and/or flush pointed rivets also takes advantage

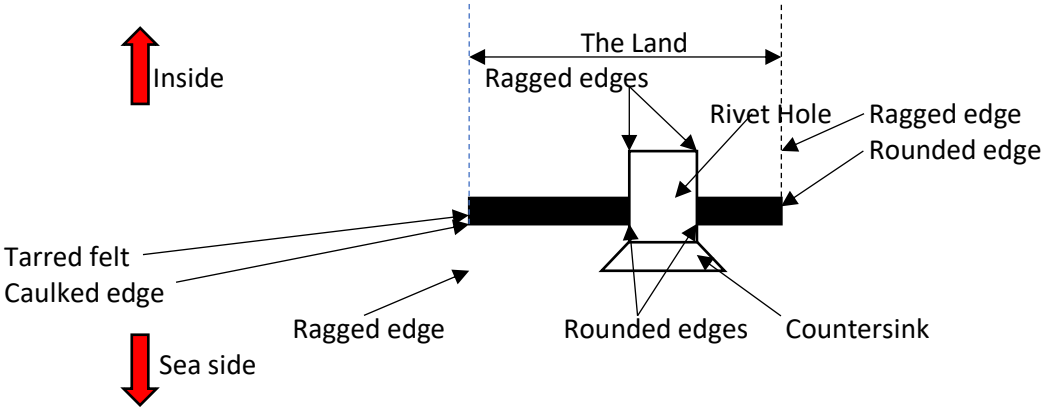



**Figure 5 Exploded View of Shell Seam or Butt prepared for Riveting**

of a countersunk hole. On cheap or low quality ship or barge building, the point was closed flat or flush as, to keep the cost down, a shorter shank rivet was used, and the countersinking was not undertaken.

When the rivets had gone cold, the edges of the seams and butts were split and caulked to make the joints watertight. The noise made by the riveting and subsequent caulking was unbelievable.

The third factor is the hole and how that is cut into the plate. Following the catastrophic loss of the r.m.s. TITANIC in 1912 caused by, inter alia, brittle fracture of the rivets due to the low temperature of the sea near the now (in)famous iceberg, Lloyd's Register of Shipping in common with the other classification societies required all rivet holes on large passenger liners to be drilled. Drilled holes were one mm bigger in diameter than the nominal diameter of the rivet. In all other vessels the holes are simply punched out. It is the punching out process and its effects on the surrounding metal that is of interest to the marine surveyor. For a riveted vessel when a plate is prepared for fitting into a ship, a number of processes were involved. A template or mould was first made of the plate either from the mould loft or, if the ship was in frame or under repair, direct from the ship's structure.

The template was made from 75 mm x 6 mm fir or deal strips connected by copper tacks and all rivet holes and other necessary marks put onto it. The template was then laid out flat on the chosen piece of plate and the marks transferred to the plate using the appropriate reverse marking tool. (There was one for every rivet size in common use). The short length of tube was dipped lightly into a bowl of white paint and the hole above it used to sight the marks on the template. When the hole and mark were correctly aligned, the reversing tool was tapped lightly by hand causing the white painted length of tube to contact the plate and so make a white paint indicator ring on it.

Then the plate was taken to the punching machine and all rivet holes punched into the plate. The rivet holes in the plate were punched two mm larger than the nominal diameter of the rivet and countersunk for three quarters of the thickness of the plate. In frames or plates that were not countersunk the holes would be two mm larger than the rivet diameter. The shape of the plate was then transferred from the template to the steel. The plate was then cut to shape by an oxyacetylene burning torch or, better, by shearing and any necessary jerrolds forged or planed in by machine. In punching and shearing the plates, they were left with a smooth corner and a sharp ragged one. The punching and shearing on both plates and sections was, therefore, always done from the faying surface outward so that the fay closed properly. The Figure 5 above is exploded to illustrate the point. The plate was then turned over and any necessary countersinking of the rivet holes carried out. Countersinking was not carried out on the inside of the plate or the faying on the sea side nor was it carried right through the plate – a small lip of 1 or 2 mm was left at the bottom of the countersunk hole. The plate was then rolled in a press to the approximate shape, taken to the ship and hung off and bolted up.

As the plates were hung off each faying surface was coated in red lead or similar luting material and, in good class work, a layer of tarred felt was fitted between the faying surfaces of the plate seams and butts which were

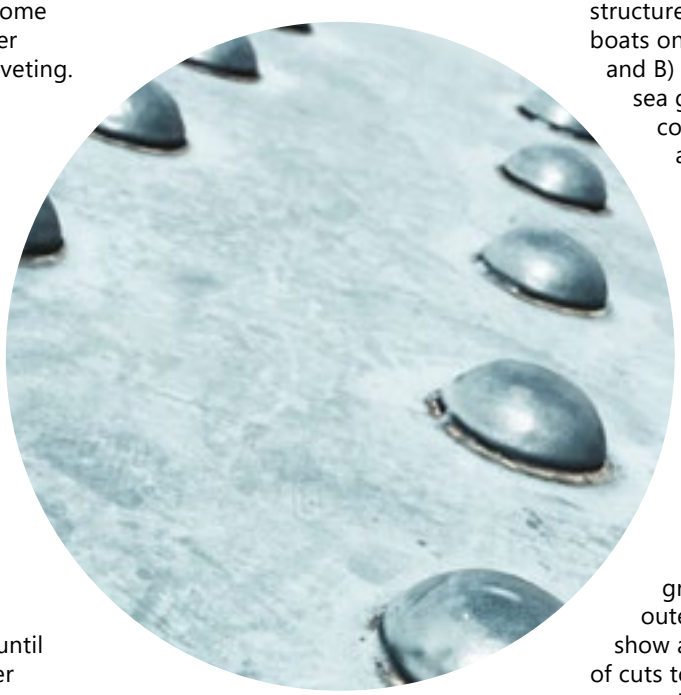
**Surveying tip 3 | The presence of the tarred felt is given away by runs of tar leading away from the joint on the inside of the boat on top of the plate's priming paint. If these are not found, then it is a fair guess that the boat was built down to a price and that should ring alarm bells in the marine surveyor's head to watch out for other corner cutting.**

then drawn together tightly by means of ordinary black iron service bolts in about every tenth or twelfth hole hove tight with a podger spanner. The tarred felt was inserted to reduce the risk of crevice corrosion and it is the absence of the material between the frame flanges and the inside of the shell plates in the structure of Dutch barges, Thames lighters and narrow boats that makes the faying surfaces of such and similar vessels prone to such corrosion. The service bolts were hardened up using a long point handled tool called a podger spanner and were usually discarded and scrapped as the hull was riveted up and contributed a fair amount to the cost of the structure. The modern method of using computer controlled machinery did not come into shipbuilding until long after welding had taken over from riveting.

A machine with a hand controlled cam which pushes a hard steel punch of appropriate size through the plate whilst it is held in place over a hard steel dolly is used to carry out the punching. See the outline in Figure 6 below. The hole in the dolly is usually 2 to 2½ mm larger than the punch which latter is always of the 2 mm larger in diameter than the rivet. The shipwright or plater together with his helper(s) guided the plate, which is held in a chain sling from an overhead crane, until the mark for the hole was under the punch. He then pulled down the handle controlling the machine which turned the cam and drove the punch through the plate. On big ships where plates can be up to 10 m (thirty feet) or more in length and 2½ - 3 m (eight to ten feet) wide this process sometimes required up to four men to hold the plate. Inevitably, not all the holes were punched clean *i.e.*, in the correct spot and that sometimes lead to holes that did not align correctly – called blind holes as described above.

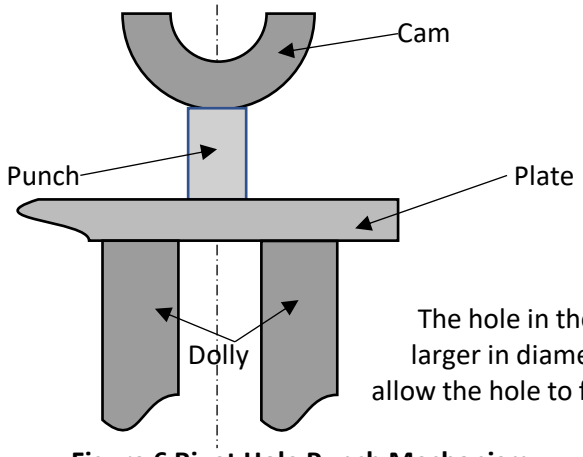
Holes that are incorrectly aligned should be drilled clean but, as the riveters were usually on piecework rates, that nicety was frequently dispensed with and a hard steel drift hammered into the plate instead. That, inevitably, damaged the hole and led to fractured and/or leaking rivets. Badly drifted holes also lead to shearing of the rivet when the ship worked heavily in a seaway. As the punch pushes into the plate, it first of all makes a small indent in the top surface and a small bubble on the under surface.

The punch then cleanly shears into the plate for about half the plate's thickness and at that point the stress in the plate causes the steel to fail along the grain lines and the punching falls out of the hole in the bottom of the dolly onto the ground. As the hole in the dolly is slightly larger than the punch that opened the lower part of the hole in the plate into the form of a small cone. The process also causes small intergranular cracks



in the surface of the plate radiating out from the hole. In the winter or very cold weather such cracks may be up to 10 mm long. The cracks result from the fact that the mild steels used at the time were not notch tough. Due to the method of manufacturing and its resultant stringy microstructure wrought iron does not show these radial cracks. However, the shipbuilders generally did not worry about them because they were so small, and it was generally thought that a well driven rivet would exert a clamping stress that would negate any risk. Notch tough steels did not come into general use in shipbuilding until after the end of WWII following experience with the famous Liberty ships. In good quality merchant and naval shipbuilding, the plate is then turned over and the holes where the rivet points are to be formed countersunk using a triangular shaped bit to remove the cracks and damaged steel in way. In cheap ship and barge building that expensive and time consuming process was often deleted and the grip of the rivet then relied on the slight cone caused by the punching process.

Unclassed barges built down to a price were often built without the countersinking and using shorter length rivets. The effect of that is often found on Dutch barges where it can be clearly seen by the marine surveyor when the rivet points will be found of small diameter, flat and often flush with and even below the plating surface. That type of structure is probably acceptable for boats on EC Category D (MCA Class A and B) waters but is not suitable for sea going ships or boats. After countersinking, the hole would appear as shown in Figure 5 above. The grip of the rivet tightens as it shrinks on cooling. Figure 7 below shows a section through a rivet hole in the plate after it has left the punch and before it is taken to the countersinking machine. The surface of the cone will be clearly granular in appearance whereas the top part of the hole will show vertical straight lines without any granularity. At that stage to outer edge of the cone will also show a small sharp lip (**beware** of cuts to the fingers) which is the reason that the plates should be punched from the faying surface outward as the lip prevents a fully watertight joint from being made. The size (diameter) of the rivets used in such a structure is dependent upon the thickness of the plate. As a rough guide, the diameter of the rivet should be about twice the total thickness of the plates and the length of the shank in properly countersunk work at least three times the double thickness of the plate and the diameter of the hole 2 mm greater than the rivet diameter. Thus, two ply 6 mm plates would typically be connected by 12 mm diameter rivets each about 36 mm long. If the countersinking has been omitted than the length of the rivet can be reduced to about two and half times the plate thickness *i.e.*, to about 30 mm. With three ply riveting, the rivet needs to be about 2 to 3 mm longer.

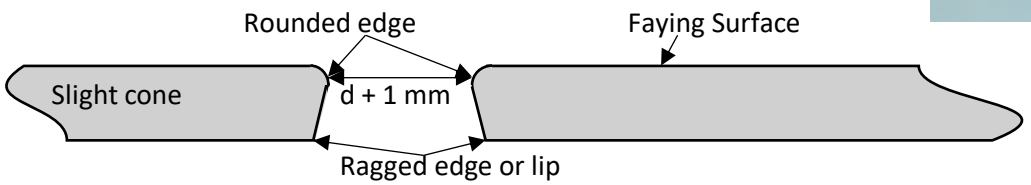



The hole in the dolly is up to 4 mm larger in diameter than the punch to allow the hole to form its own countersink

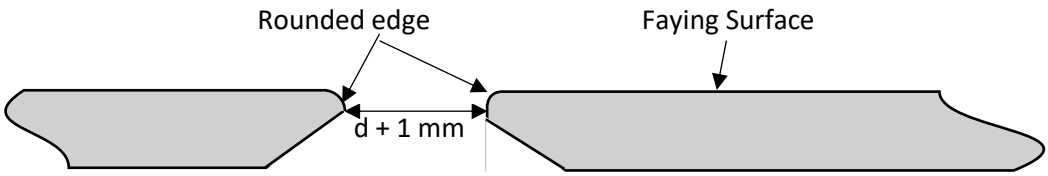
**Figure 6 Rivet Hole Punch Mechanism**

**What's covered in Part Two of Surveying Rivets and Riveting...**

- **The Classification of Riveted Joints**
- **Rivet Arrangements**
- **The Diameter and Pitch of Rivets**
- **The Edge Set in Riveted Joints**
- **The Failure of Riveted Joints**




**Before Countersinking**




**After Countersinking**

d is the nominal diameter of the rivet in mm

**Figure 7 Section through a Rivet Hole Before and After Countersinking**

INNOVATION

# A multi-slat hydrofoil solution for low-speed sailing in heavy seas

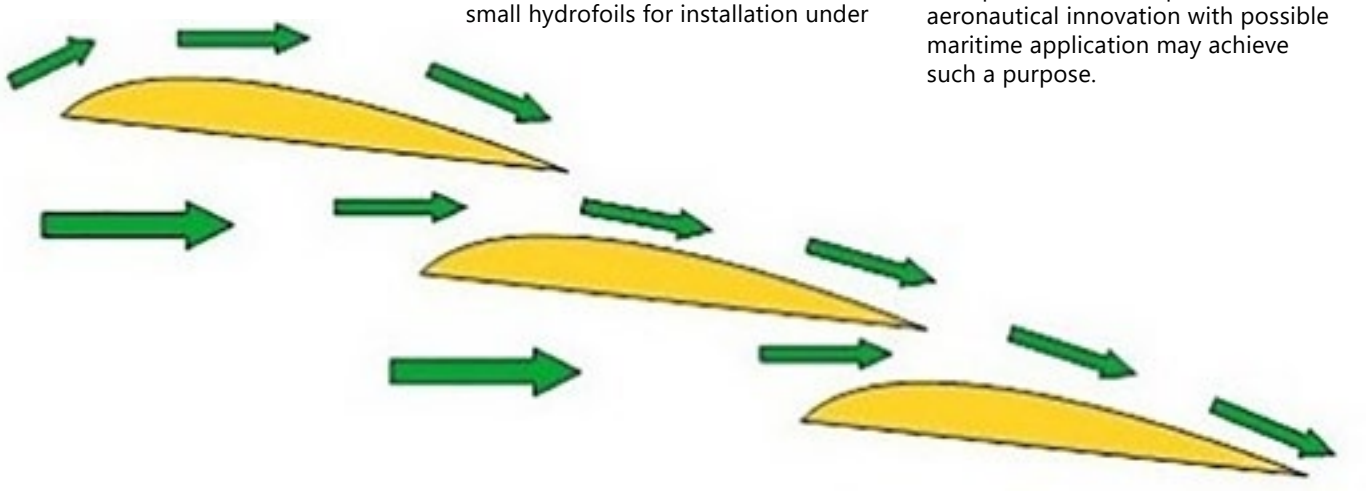
By **Harry Valentine**

## BACKGROUND

Aeronautical hobbyists have built, tested and flown scale model airplanes that use multi-slat aeronautical main wings that provide higher lift at lower speed than conventional main wings. The aeronautical concept provides a basis by which to develop multi-slat hydrofoils capable of sailing passenger vessels at low speed through heavy seas with greatly reduced vessel pitching and rolling motions. Vessels using such technology could be assigned to short-distance ferry service or multi-stop regional coastal service.

## INTRODUCTION

There is much overlap or duplication between aeronautical wing technology and marine hydrofoils, with the latter providing the equivalent of flight when sailing at a certain speed through water and lifting a boat hull upward. Traditional hydrofoils are an old concept that have typically activated at elevated speeds, but were rarely applied to the boat industry. In more recent years, the wind-powered competition boat fraternity applied hydrofoil technology to increase the sailing speed of racing yachts and with spectacular results. Surfboard enthusiasts subsequently adapted small hydrofoils for installation under surfboards to increase speed. Hydrofoils have been applied to oar-powered racing kayaks and human pedal-powered water craft to reduce drag and increase speed while providing smoother ride when sailing through choppy water. While a segment of the maritime sector focuses on developing hydrofoils to achieve higher sailing speeds, there are potential market niches for slow sailing vessels that will be required to provide smooth ride over short distances, such as a ferry required to sail through severely choppy water or a coastal boat that makes multiple calls at small ports. A recent aeronautical innovation with possible maritime application may achieve such a purpose.



*Cross-section of a concept low-speed multi-slat hydrofoil*

## THE MULTI-SLAT WING

While many aircraft use slats attached to wings to increase the lift phenomena at low speed, some enthusiasts have taken the concept to an extreme by building scale model aircraft that use a series of slats for wings, with one concept even resembling a staircase. In flight, the same wind stream that flows under a leading slat subsequently flows over a trailing slat and including when flown in fixed-wing mode. Such operation provides a precedent to develop a multiple-slat fixed-wing hydrofoil that is free from moving components and capable of providing upward lift at low sailing speed.

While the hydrofoil-catamaran battery powered Sea-Bubble water taxi lifts its hull above water at nine knots, there may be scope to develop a multi-slat fixed-wing hydrofoil that would lift a vessel hull above water perhaps as low at six knots, or equal to the highest recorded sailing speed of a wave-powered vessel. Windmill-powered vessels have sailing directly into headwinds at speeds as high as eight knots. Fixed-wing technology installed below the water line translates to greater long-term reliability and allowing a vessel to remain in continuous service over extended durations of time and distance.

## ROUGH SEAS

Rough seas and severely choppy seawater occur frequently in regions where slow-sailing vessels provide ferry services or provide services to coastal communities that are difficult to access via road or railway. Installation of multi-slat hydrofoils offers the possibility of providing smoother ride characteristics with greatly reduced roll, pitching and vertical heave motions when a small vessel sails at low speed through rough sea conditions. The proof-of-concept precedent involving operation of working scale-model aircraft that have flown using multi-slat wings provides the basis for a multi-slat hydrofoil to lift a boat hull above water at lower speed.

A fixed-wing multi-slat hydrofoil eliminates moving or hinged components that rough sea conditions could damage, thereby increasing the durability and longevity of such technology. Previous research and development into hydrofoils suggests that catamaran vessels equipped with hydrofoils represent the optimal configuration, especially with hydrofoils set with the outer edges installed at higher elevation than the inner edges to produce a high roll-axis. The worst of local sea conditions at any geographic location where ferry or local coastal boats operate would determine the elevation to which hydrofoils would raise the hull above water.

## FUTURE RESEARCH

Boat designers, engineers and marine architects would need to evaluate the multi-slat wing concept for potential maritime hydrofoil application. The success in the aeronautical sector suggests potential for successful adaptation for installation under twin-hull catamaran design of vessels. Maritime researchers and designers would likely make changes and modifications to the multi-slat concept as it is adapted to maritime application. A fixed-wing multi-slat hydrofoil concept represents an optimal configuration with potential to offer enhanced performance to future windmill-powered and wave-powered vessels that sail extended distances across ocean and including through rough sea conditions.

## CONCLUSIONS

A hydrofoil version of the multi-slat aeronautical wing has potential application on smaller vessels that are required to sail for comparatively short distances through rough sea conditions. It would have further application of wind and wave powered vessels, including when sailing extended distances across ocean and especially when encountering storms at sea or severe wind-driven wave conditions.

# **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.

## Yamaha Marine set to upgrade its premium V6 outboard range

The range has taken inspiration from the company's flagship XTO and now includes features such as Digital Electric Steering (DES), Thrust Enhancing Reverse Exhaust (TERE) and Yamaha's exclusive TotalTilt. This function allows complete tilt up or down (until trim ram contact) from any position.

The new 4.2-litre 300 – 250hp V6 engines feature a new one-piece top cowling with water-draining air duct moulding, a new bottom cowling, apron shape and a colour-matched lower unit.

Yamaha says the lower unit has also been improved with a new design for the gear tooth profile (improved contact and reduced surface pressure). In addition, the durability has developed by changing the oil flow inside the lower case and the bearings that support the gears.

DES is now built into the 300 – 250hp V6 engines. These are equipped with Steer by Wire, which Yamaha says delivers a smoother and more intuitive driving experience, with no hydraulic systems to bleed or steering cables to snag.

Augmenting the outboards reverse thrust and control, TERE keeps exhaust bubbles above the anti-ventilation plate and out of the propeller below 2500rpm ensuring the prop only bites bubble free water. Combining TERE with optional DES and the Helm Master EX joystick will enhance manoeuvrability around docks and confined spaces, says Yamaha.

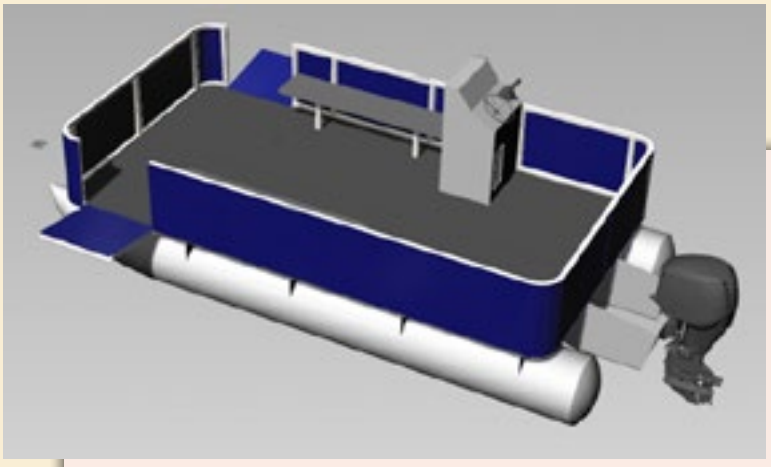
New 225hp V6 engines are designed with the same styling as above and are compatible with optional DES, but include TotalTilt function and TERE.

## New Magnet propulsion system for superyachts by The Switch

Finnish firm, The Switch, says is has developed a permanent magnet propulsion system and is pushing into the superyacht market as it 'can push the frontiers of clean energy performance and open the door to Arctic exploration in comfort and with confidence'.

The Poseidon Power range, says the company, cuts emissions and works towards greater efficiency, increased reliability and superior flexibility over conventional propulsion systems. It offers superyacht builders the option to use diesel electric, hybrid or fully electric power propulsion and is a 'near silent' propulsion system, with low vibrations.

"With our concept, if you were to put the permanent magnet propulsion machine to the aft of the vessel, you have a much shorter shaft and fewer bearings. And with our solution, you also get rid of the switch-gear, freeing up space and cutting weight" says Ville Parpala, director product marketing.



## New pontoon boat

Composite Manufacturing and Design Ltd (CMDL) and sister company Buckley Yacht Design (BYD) have teamed up to build pontoon boats.

The first vessel will be built for the QE2 Activity Centre, provider of activity opportunities for people with additional needs. The new boat will be based on the Hamble River and used to take visitors for daytrips on the river. It will be able to accommodate 12 people and will be powered by a 60hp outboard.

Pontoon boats are generally built in metal or a combination of plastic injected floats and a metal base. The versatile platform of the new pontoon boat allows for a large deck area that can be used for a number of configurations including workboat, house boat or pleasure boat. The first pontoon boat from the partnership will be delivered in Spring 2021.

## Aquafighter aims to keep boat tanks water free

Aquafighter can keep a boat's diesel tank water free, elimanating the risk from harmful microbial growth says its manufacturers Eurotank Service Group.

The cost to industry of microbial damage or diesel bug is huge with corrosion and engine failure. The problem comes not just from free water but also from bound water and while tank driers can help eliminate free water, they cannot help with bound water. However, Aquafighter can. Once dropped into a tank it attracts not only free water but also any bound water, eliminating what could be a very costly problem.

Tommi Buckley, Marine Specialist at Eurotank Service Group, comments: "Aquafighter is a very simple, cost-effective way of eliminating water from your tank, removing the risk of diesel bug and the problems that brings with it. It brings piece of mind to an industry-wide problem.



## New forward looking sonar from EchoPilot

The FLS 3D is the latest development of the well proven patented Echopilot Forward Looking Sonar, which displays a 3-dimensional representation of the underwater scene ahead of the boat.

Daniamant's range of EchoPilot's Forward Looking Sonars have one of the leading technologies in the market and gives real time sonar images of the underwater scene ahead. The easy to install system can fit in both leisure boats and industrial ships. The EchoPilot gives real time feedback every 0.5-2 seconds. Users will always be updated about what underwater dangers or objects are in front of them, giving plenty of time to avoid a collision.

The number one boat insurance claim is hitting an object underwater. Unfamiliar waters, submerged objects, rocks or rock beds are all issues when sailing. The EchoPilot shows hidden underwater objects and alerts the captain of possible dangers ahead.

# **NEW** PRODUCTS


## Sea Sure aiming to prevent back injuries

Reducing back injury has become a mission at Sea Sure with its Shock-WBV range of shock mitigating seat products. EU directive and MCA guidelines define exposure limit values and for employers to meet this Vibration Dose Value (VDV), a programme of measurement and controls to minimise exposure needs to be introduced.

According to MAIB figures there have been 21 accidents that have resulted in lower back compression injuries on board RIBs in the last three years. Of these, 12 were confirmed as spinal fractures and 16 occurred during thrill-type boat rides.  Sea Sure is currently enhancing its in-house drop testing facility which it is hoped will become one of the most advanced in Europe.


## New call distress service from Iridium

Iridium Communications has launched a Global Maritime Distress and Safety System service giving those at sea a real-time emergency response and rescue service that works anywhere in the world.

**How it works:** Once a user holds down the red 'distress' button a signal is routed through the Iridium satellite network and delivered to a designated Rescue Coordination Centre (RCC). Said to be unique to Iridium's system, this is then followed automatically by a distress phone call, allowing the RCC to speak to those on board to better understand the emergency.

Captain Moin Ahmed, director general of IMSO, which regulates the GMDSS system, explained that the formal evaluation of Iridium took more than four years. "At each step Iridium successfully demonstrated that its safety voice, distress alert and Iridium SafetyCastSM maritime environment broadcasts not only met all IMO requirements but in many cases exceeded them," he said.

## New female lifejacket from Baltic

Baltic Lifejackets Sweden has launched its first female specific lifejacket, the Athena. The lifejacket is a lightweight, slim, and supple lifejacket with an ergonomic design developed to make it easy to put on without it having to go over the wearer's head. It is secured in place with a padded Velcro and quick release buckle.

Key features include moving the gas cylinder from its usual place near the wearer's chest. As a Baltic spokesperson explained: "You wouldn't place a 20cm vertical metal bar in your jacket breast pocket so why place a cylinder there in your lifejacket?" For this reason, the 33G co2 auto inflation valve is positioned on a diagonal axis low down away from the bust, to prevent chaffing.

The lifejacket is 165N and adjustable to suit all sizes and shapes. It comes with padding for extra comfort and a mesh lining.


## New app launched by Cox Powertrain to manage its engines

British diesel outboard manufacturer Cox Powertrain has launched a Coxswain app, which it says enables customers to access aftersales support for their Cox diesel outboards at the touch of a button. It's been developed as part of Cox Powertrain's drive to deliver aftersales service for its customers, supported by its distributor and dealer network.

The mobile app provides images of a customer's vessel, along with information relating to each outboard, such as warranty, service records, serial numbers, and maintenance information – all managed in real-time. Customers can request support via the app, indicating their preferred dealer, and will receive a response within 30 minutes of their request. Cox says the app also holds an extensive knowledge base, allowing self-help for those smaller, less technical issues, along with all the relevant owner's documentation.

## Five new solutions added to the Hempel antifouling range

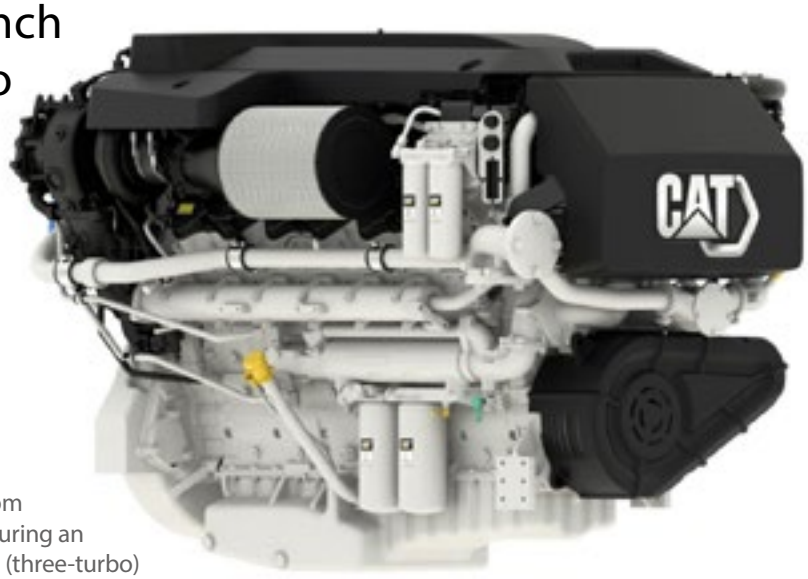
The introduction by Hempel of Oceanic Protect+, Oceanic Flex+, Olympic Protect+, Olympic Flex+ and Olympic Protect aims to deliver greater performance through better control of the leached layer and an enhanced mechanical strength.

All five reformulated products use Hempel's Smartfibre technology and each coating now contains a 20% higher fibre content which is said to improve its mechanical strength by allowing the increase of the hydrophobic characteristics, leading to reduced leached layer thickness.

The new range is designed to suit different trading patterns – Olympic Protect, Olympic Protect+ (for medium to high activity levels) and Olympic Flex+ (for low activity levels) are based on ion-exchange technology and give protection for up to 25 idle days and up to 60 months service interval.

Oceanic Protect+ (for medium to high activity levels) and Oceanic Flex+ (for low activity levels) are based on zinc carboxylate technology and protect for up to 30 idle days and 60 months service interval.

## Caterpillar set to launch the C32B Triple Turbo 2433 for the high performance boating segment




Caterpillar Marine will release its C32B Triple Turbo 2433 metric horsepower (MHP) high-performance diesel engine late this year, targeting sportfishing, governmental and yachting repower markets. The new package is described as delivering a rated engine speed of 2300rpm with a 20% increase in power output, featuring an updated cooling system a new sequential (three-turbo) air system that delivers faster response and better performance.

The C32B Triple Turbo is EPA Tier 3 compliant for the recreational market and IMO II emissions regulations, and a fully integrated SCR solution for IMO III.

## First carbon furling mast from Seldén

Seldén Mast has developed its first carbon furling mast, a lighter weight furling rig designed to enhance the performance of cruising yachts in the 48ft – 75ft range.

"Larger boats with small crews call for smart sail handling and we are constantly pushing our product development in that direction," said Seldén's CEO, Peter Rönnbäck. "The benefits of carbon fibre masts have been appreciated by racing sailors for decades so why wouldn't a cruising sailor be offered the same deal?"

Seldén's carbon masts, both furling and conventional, are manufactured at its facility in Gosport using its computer-controlled mandrel filament winding technique.

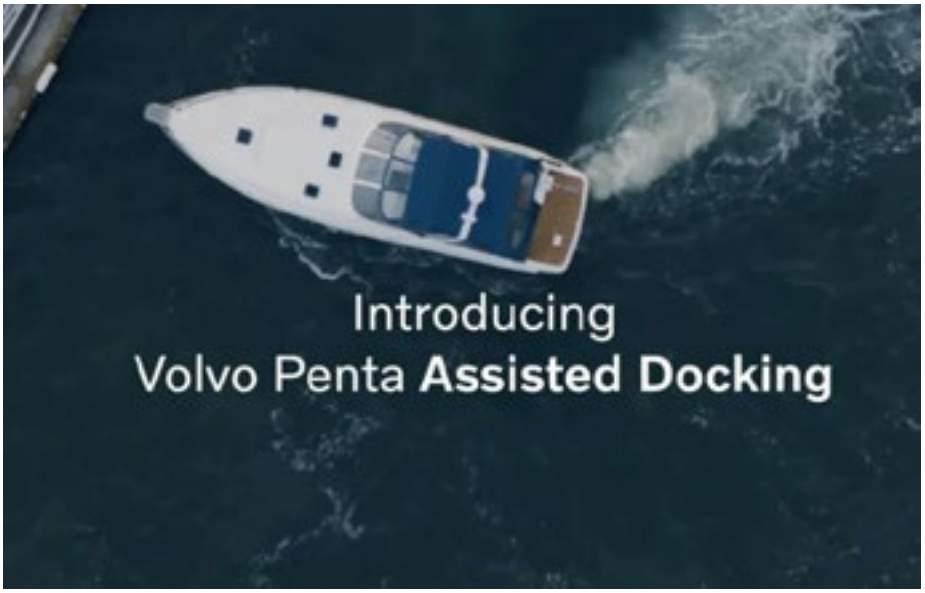

## New chartplotter from Lowrance

The latest new product in Lowrance's mid-range fishfinder/chartplotter displays is the Elite Fishing System. The chartplotter combines a line-up of fishfinding tools with a display that has been designed to be easy to use and install and is the most powerful yet from Lowrance.

Features include ActiveTarget Live Sonar and extreme high-resolution Active Imaging with Lowrance CHIRP Sonar, SideScan, DownScan Imaging and preloaded C-MAP Contour+ Fishing Maps.

The product has networking capability with integrated wireless, NMEA 2000 and Ethernet connectivity. Halo Dome Radar, Outboard Pilot or share sonar, charting, waypoints, and other user data between multiple displays can be added via Ethernet.

## Volvo Penta launches first fully integrated Assisted Docking System




The Assisted Docking system integrates a software layer developed in house with the company's GPS-based Dynamic Positioning System and proprietary Inboard Performance Systems for a complete package including human-machine interface at the helm, electronics via the engine, propulsion systems and sensors, and advanced navigation processing power for a much easier boating experience, even in rough conditions.

"When we launched our joystick technology in 2006, the maneuvering and control functionality it brought to leisure boating shook up the marine industry - delivering game-changing innovation is in our DNA," explains Anders Thorin, Product Manager Electronics at Volvo Penta. "From our Electronic Vessel Control system, which connects and manages the internal communications between the engine and driveline, joystick and display screen so the driver can control everything from the joystick – to our Dynamic Positioning System, which automatically maintains a boat's heading and position, even in rough conditions – to today with the release of the Assisted Docking system, we take the next step in easy boating and continue our long-held ambition to make docking a boat easier for a more enjoyable boating experience."

## THOUGHT FOR THE DAY – PROTECTING YOURSELF

# COMMUNICABLE DISEASE EXCLUSIONS

By **Karen Brain,**
*Matrix Insurance Services Ltd.*

It is not always easy to decide what clauses should be in a contract as so often a small two page contract can end up triple the length by the constant addition of clauses. However, in these unusual times with COVID-19 it is worth considering including what is known in the insurance industry as a communicable disease exclusion. This clause is similar to a force majeure clause, which all contracts should contain. Its intention is to prevent parties being liable for events outside of their control that could be a cause of action under a contract or in common law because, for example, a contracting party has not been able to fulfil their obligations under the terms of a contract, perhaps because of COVID-19 restrictions preventing them from doing so.

**Below are a couple examples from the UK insurance industry of exclusion clauses that are frequently applied to liability sections of policies and property sections of policies including business interruption.**

## A COMMUNICABLE DISEASE EXCLUSION (LIABILITY INSURANCE)

**Notwithstanding any provision to the contrary within this agreement, this agreement excludes:**

1) any loss, damage, liability, cost, or expense directly arising from the transmission or alleged transmission of a Communicable Disease, or from any fear, or threat of a Communicable Disease;
2) any liability, cost or expense to identify, clean up, detoxify, remove, monitor, or test for a Communicable Disease;
3) any liability for or loss, cost or expense arising out of, any loss of revenue, loss of hire, business interruption, loss of market, delay or any indirect financial loss, howsoever described, as a result of a Communicable Disease or the fear or the threat of a Communicable Disease.

**Communicable Disease means any disease, known or unknown, which can be transmitted by means of any substance or agent from any organism to another organism where:**

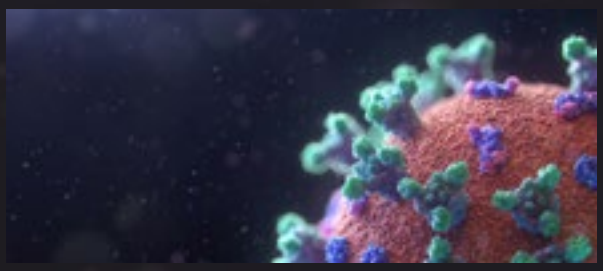
(i) the substance or agent includes but is not limited to a virus, bacterium, parasite or other organism or any variation or mutation of any of the foregoing, whether deemed living or not, and
(ii) the method of transmission, whether direct or indirect, includes but is not limited to human touch or contact, airborne transmission, bodily fluid transmission, transmission to or from or via any solid object or surface or liquid or gas, and
(iii) the disease, substance or agent may, acting alone or in conjunction with other co-morbidities, conditions, genetic susceptibilities, or with the human immune system, cause death, illness or bodily harm or temporarily or permanently impair human physical or mental health or adversely affect the value of or safe use of property of any kind.

## B COMMUNICABLE DISEASE EXCLUSION (PROPERTY INSURANCE)

1. Notwithstanding any provision to the contrary within this agreement, this agreement excludes any loss, damage, liability, claim, cost or expense of whatsoever nature, directly or indirectly caused by, contributed to by, resulting from, arising out of, or in connection with a Communicable Disease or the fear or threat (whether actual or perceived) of a Communicable Disease regardless of any other cause or event contributing concurrently or in any other sequence thereto.

2. As used herein, a **Communicable Disease** means any disease which can be transmitted by means of any substance or agent from any organism to another organism where:

2.1. the substance or agent includes, but is not limited to, a virus, bacterium, parasite or other organism or any variation thereof, whether deemed living or not, and
2.2. the method of transmission, whether direct or indirect, includes but is not limited to, airborne transmission, bodily fluid transmission, transmission from or to any surface or object, solid, liquid or gas or between organisms, and
2.3. the disease, substance or agent can cause or threaten damage to human health or human welfare or can cause or threaten damage to, deterioration of, loss of value of, marketability of or loss of use of property.



**These clauses can be adapted and then inserted in various contracts for the benefit of one or more parties to a contract depending on what parties wish in an agreement.**

**We hope you find the above of use and wish readers a safe 2021.**



Matrix Insurance Services Ltd - Provider of professional indemnity scheme for IIMS members

Karen Brain

Managing Director – solicitor non-practising

**Tel: 01892 724060**

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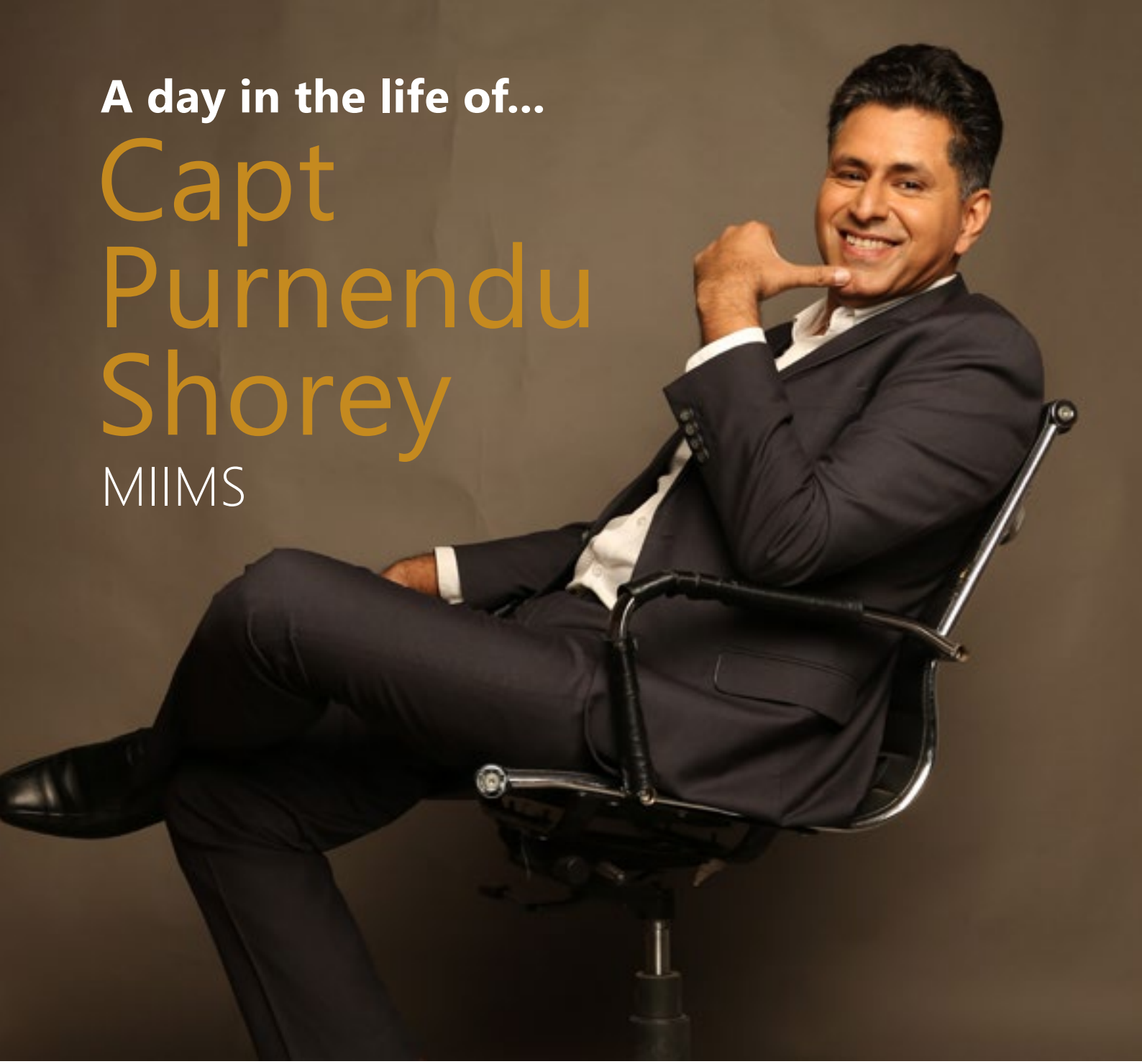
# A day in the life of...

# Capt Purnendu Shorey

## MIIMS



Mike Schwarz sought out Purnendu, a member of the IIMS India Branch Committee and successful marine surveyor, following the publication of his Mission 100 initiative earlier this year. But as Mike found out, there is rather more to the multi-talented Purnendu than just marine surveying, not least for his love and respect of the Sound of Music which deeply resonated with Mike!

**Question 1**

**How long have you been a marine surveyor and what drew you into the profession initially?**

I have been a marine surveyor for over 15 years now. Although I hung my sailing boots up in 2005, it was actually 2002 when I first developed an interest in marine surveying. When I had a few months between my sailing stints, I would often assist senior surveyors and the beginning was actually carrying their bags and fixing their coffee!

What drew me to this field (and still keeps me glued) is the ability to maintain connection with the sea even though I am technically ashore. The chance to step on board a ship every now and then, exercise my grey cells and stay up-to-date with the latest in the Industry – isn't that a perfect combination in itself?

**Question 2**

**How easy was it to make the transition from seafarer to shore based surveyor; and how did you gain the new knowledge and training you required?**

I have to admit I was definitely blessed in this aspect. I had the good fortune

of meeting my mentor, Capt. Kapil Dev Bahl at a rather early stage of my marine surveying story. As meticulous as he is, I would also like to take the liberty of calling him a rather "tough nut" to crack. I was indeed very fortunate that he took me under his wing, made me learn the hard way and there was no looking back. The ability to dot the 'I's' and dash the 'T's' is where it began!

The transition was rather smooth on the surface because it was a continuation of what I had learnt at sea, but the detailing that a marine surveyor needs to look at matters with is what has always kept the fire burning. Every report (especially those that are investigative in nature) takes me back to the basics and the voice of Julie Andrews from the Sound of Music singing "Let's start at the very beginning, a very good place to start" is something I use all the time.

**Question 3**

**We often talk about the importance of specialisms in the marine surveying sector on the basis that no surveyor can know it all. How important is it to stick to one's strengths?**

I believe that evolution is inevitable. Humans evolve and so does education. The secret is in learning how to strike a balance rather than continuously only focusing on a particular aspect, which can have its downfalls.

I believe this on-going Covid crisis has definitely thrown light on the importance of diversification being one of the key skills to have to move forward.

While I would agree that one can specialise in a few areas, however, one must remain open to learning as we move forward and evolve with time. So, it is important to keep garnering new strengths and let's face it – your biggest strength is always going to remain the one that comes naturally to you!


**Question 4**

**What in your opinion are the key skills a marine surveyor must possess to become successful?**

Domain knowledge with an eye for detail, to begin with. There are no shortcuts in marine surveying which means a riff-raff report can only take you so far. The other two skills I believe to be important are the zest to learn and to remain physically fit. It is definitely a challenging field that requires you to go up in tanks, go to different areas of the ship and liaise with a number of people. Keeping this in mind, I would like to definitely stress the importance of both physical and mental fitness to be a key skill to possess to become a successful marine surveyor.

**Question 5**

**What is the most bizarre or humorous encounter you have had whilst on survey that you can talk about?**

I was once on board a vessel and was carrying out a routine condition survey and after I gave him the list of defects, the master of the ship looked at me and asked if I could reduce the number to a single digit, because it was considered to be a mental block with their ship manager that if there are more than 9 observations, he would have to face the brunt!

I am yet to discover the real secret behind that magic number of 9!

**Question 6**

**The jury seems to be out on surveying remotely at the moment, but what is your opinion on carrying out remote surveys and how might they change the future role of surveyors?**

As it is well known, "Change is the only constant". Remote surveying and physical surveying will co-exist and I believe that they should. Let us take the example of tank inspections as one. It is sad that enclosed space entry incidents seem to be rather high and the use of drones for tank inspections is extremely innovative, effective and much safer! That said, the survey report still needs to be prepared, the condition of the tanks still needs to be assessed and that is where the surveyor comes in.


On the other hand, let us take the example of a claim. We all know that documents and records can reveal only so much. The investigative nature of such surveys is best handled face to face.

In a nutshell – co existence is here to stay!

**Question 7**

**What advice would you give to a new entrant to the marine surveying business, not least given the huge technological changes that are taking place and planned?**

I have another quote for you - Love what you do and you shall not work a single day in your life!

Come with a will to learn each day, adapt to technological advancements whilst you stick to the basics and never ever forget that YOU are because the Ship Is and NOT the other way around !

Marine surveying is interesting and also rewarding!

**Question 8**

**I am curious to know more about Offing, the events, publications and web platform business of which you are a Director. I am keen to understand how a former Captain and marine surveyor comes to be involved in such a business, for they are poles apart. Please explain.**

If I am to be candid, the truth is I get bored very easily. If I were only to do one thing for the rest of my life, I would probably live a long life but not a full one. That being said, I am very fond of the marine surveying part but at the same time I thoroughly enjoy interacting with seafarers, especially students and cadets. One of our ventures, NAUGHTICA, which I would humbly like to say is known as the largest intercollege festival in the maritime industry in the world is the outcome of this love for gen next.

Since mental well being is so widely spoken about, we, at Offing, adapted the mantra much earlier and that is where our venture into events began. From NAUGHTICA we moved forward to organise Maritime Indoor sports leagues, conducting various conferences and seminars (with a little bit of spice, as I call it) for marine surveyors and various stakeholders of the industry. Moving forward, the publications came in as we realised that everyone needs a voice! That lead to the birth of Offing Echoes.

Publications and events are truly as important as marine surveying at Offing.

You can get to know more about these initiatives at **www.offing.biz** and **www.naughtica.in**

**Question 9**

**IIMS salutes you for your recent initiative Mission 100, featuring a hundred female maritime professionals published in a special magazine in January 2021. What was your motivation to put this initiative together and how has it been received?**

I received certain invitations to attend webinars and be a part of a few surveys with regards highlighting the gender disparity in the maritime industry and although I agree with all these initiatives, I feel that there is already a growing strength of female professionals in the industry and that also needs to be brought to the forefront.

The earlier edition of our magazine, Offing Echoes, traditionally had 7 sections; however for this edition I decided to scrap all those sections and to feature 100 female maritime professionals instead! I am very humbled to see the response we received. This is indeed their edition and not ours.

We, at Offing, are also very bullish that alternate genders should be equally welcomed to the industry. Hence the concept of a #GENDER FREE industry came about. It has been received extremely well and I am glad to say I already have at least 20 more participants for our upcoming editions related to this concept!

**Question 10**

**What do you miss about life at sea and what do you not miss about a life on the ocean waves?**

The one thing I'd say I miss is waking up in the morning and looking to the horizon. I believe that there are a lot of beautiful things in the offing, so to say. The connection to nature is definitely something that I miss and living in a city has killed that aspect for me. On the other hand, I think the one thing that I do not miss could be the aspect related to loneliness that is also widely discussed. This can lead to people becoming introverts and I most certainly am not one.

**Question 11**

**If you could live your life again, how different might it look?**

I am NOT going to say that I should have married my first girlfriend because my wife is going to read this article! Joking apart. My life would not look any different from what it is and I remain thankful for all the lovely opportunities it has given me (including featuring in this article ☺)

**Question 12**

**I imagine you hardly have much time to relax and unwind, but when you do how do you spend your leisure time?**

I wouldn't really call it leisure time, but I do enjoy everything that I indulge in. This may come as a surprise to a few who don't know me; I am also a stand up comedian because I prefer to see the lighter side of life. I do participate in stand up shows in theatres and in bars as well, the perk being the free pint of beer at the end!

I am also an actor; I do some work on television in India and am currently looking to work in a Web Series as it seems to be the next big thing. Apart from this, I enjoy playing with children and am known to latch on to the children in my family and spend as much time with them as possible

And oh yeah, I also host events, so do think of me for your next big one!

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