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Seaways

The International Journal of The Nautical Institute

Updating the pelorus

An ePelorus for the 21st century **p06**

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Contents

August 2018

Comment & Opinion

Features

MARS

Reporting back

Members & Branches

Cover picture: Danny Cornelissen

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Diary

What's on?

Maritime Cyber Resilience Forum
05 September

0830, Hamburg Messe, Germany
30% discount for NI members

Website: www.smm.thedigitalship.com/register/

How do we embed cyber resilience into the maritime organisation? And If incidents occur, how do we respond and make the necessary contingency or recovery plans? We will also investigate regulations and guidelines to develop a safe, compliant, cyber. In this forum, we will discuss ways to mobilise internal commitment, set up training and incorporate cyber awareness into daily procedures.

To take advantage of the discounts available for events listed in the Diary section, please log in to www.nautinst.org using your membership details and click on 'Event Discounts'

29-30 August

Vessel Efficiency & Fuel Management
Singapore
https://www.wplgroup.com/aci/event/
15% discount for NI members

12-13 September

Marine Surveying International Fest
Online
Sign up for a whole day looking at aspects of marine surveying around the world. 24 presentations – every hour, on the hour. Available live and after the event.
www.iims.org.uk

12-13 September

Maritime Salvage & Casualty Response
London, UK
https://www.wplgroup.com/aci/event/
15% discount for NI members
Contact: dpalyk@acieu.net, quoting MSSE9NI

13 September

Port Marine Safety Code
Solent Branch
East Park Terrace, Southampton
Solent University, UK
https://www.nautinst.org/uk-solent
nisolentbranch.secretary@gmail.com

13 September

Maritime Incident Investigation Course
Singapore
Contact: courses@nautinst.org
Discount available for NI members

17 September & 20 September

Navigation Assessors Course
New Zealand Maritime School, Auckland, NZ
Contact: courses@nautinst.org
Discount available for NI members

24-26 September

Salvage & Wreck Asia
Novotel Clarke Quay, Singapore
https://goo.gl/jxh7wL
20% discount for NI members

24 September

Navigation Assessors Course
Melbourne, Australia
Contact: courses@nautinst.org
Discount available for NI members

25-27 September

BWMTech North America
Bahia Mar Fort Lauderdale Beach, Florida, USA
https://goo.gl/gsQ8Cp
20% discount for NI members

27 September

Sydney, Australia
Contact: courses@nautinst.org
Discount available for NI members

Captain John Lloyd FNI Chief Executive

Focus

We need to talk

> It is important The Nautical Institute remains at the centre of the discussion to ensure the evolution of technology is focused on support of the seafarer

From the feedback and correspondence I receive I know that many readers of *Seaways* also enjoy *The Navigator* magazine, which is published three times a year and has a global reach thanks to a network of committed volunteer distributors*. The magazine encourages discussion and debate with a particular focus on the needs of the younger seafarer. If you are not familiar with *The Navigator* then let me know and we can provide copies for your company.

Most recently the discussion focused on the current and future arrangements for VTS. There is an important role for VTS in the support of ships navigating in and around our harbours and the proper training of the operators is essential to their effectiveness. It seems to me that the role of VTS operators will grow in importance in the coming years especially as we utilise improvements and developments in technology that will allow us to monitor and even control our ships closely and remotely.

While there are many sceptics on this subject, it is important The Nautical Institute remains at the centre of the discussion so we can influence events positively for safer shipping and to ensure the evolution (revolution?) of technology is focused on the support of the seafarer, not developed to satisfy the technical curiosity of the creator.

At the same time these changes lead us to think about the skills the seafarer of the future will need. Of course, STCW establishes the minimum requirements for competency and capability in the ships of today. With developing technology – and more reliable technology, it is likely we will need different and complementary skills for the mariner if we are to exploit innovations to the full.

We should remind ourselves that STCW is the minimum level of qualification required.

Forward-looking employers, colleges and regulators are already exploring how we can ensure the upcoming seafarers have the adaptability and technical versatility to embrace these changes. Those who don't lead on this front will surely be left with inefficiencies in the operation of their ships. It is counter-intuitive to think the increased sophistication of tomorrow's vessels can be managed effectively by seafarers with only the skills of yesterday.

The next generation of navigators deserves to be supported by a curriculum and qualification framework that establishes them as life-long learners in a career that uses the best of technology in some of the most challenging environments. That really is a career of choice! Regulators and educationalists who hide behind the phrase 'it is not required by STCW' rather miss the point. Employers who follow the same mantra will find it hard to be 'employers of choice' in a competitive market.

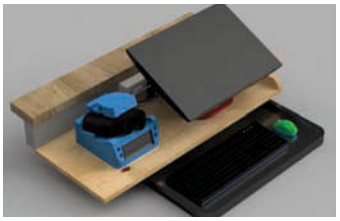
Such subjects are often discussed at our branch meetings. Thank you to all those who engage and lead in the development of sessions for our maritime communities. If there are areas of support you need from a technical perspective or content for presentations then let me know. We have a lot of material developed by colleagues at headquarters and we will be very pleased to share this with branch secretaries or other nominees.

On the subject of technology, you will see inside an article about the ePelorus. This initiative by the GLA sees traditional skills harnessed with modern technology. I hope you will find it interesting.

We also follow on from our discussions in Malta with an article on the superyacht sector. As these vessels become larger and more sophisticated they play an increasingly significant role in both our professional and membership mix. Do encourage seafarers you know in this sector to take part in the activities we offer and urge them to join The Nautical Institute.

Enjoy this edition of *Seaways* and kindly think about submitting your own article. Reading of the thoughts and experiences of our members is such an important part of our professional collaboration. You do not have to be an expert author – our editorial team will help with grammar, layout and even some supporting pictures from our library. We look forward to hearing from you.

**The Navigator* Magazine production and distribution is generously sponsored by the International Federation for Aids to Navigation and Trinity House as well as a global network for volunteer distributors. The Nautical Institute acknowledges and thanks you all.



p6

p26

p35

p35

VTS – Let's seize the moment!

IMO has agreed the need to update the current resolution providing guidelines for Vessel Traffic Services, offering the opportunity for improvement and rationalisation.

Commodore Barry Goldman
CBE, FNI Royal Navy (Rtd)

The first meaningful IMO guideline on Vessel Traffic Services (VTS), IMO Resolution A.587(14) was issued 33 years ago in November 1985. This was updated in November 1997 to the current IMO Resolution A.857(20). In the 21 years since, there has been a revolution in technology, and VTS has matured into the professional and formally certificated organisation that we see today. It is therefore unsurprising that there are a number of areas where the current resolution requires updating.

The International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) recently coordinated a submission calling for the current IMO resolution to be reviewed and updated [see column opposite]. IMO's Maritime Safety Committee (MSC) approved this resolution at its 99th session in May this year and passed it to the sub-committee on Navigation, Communications and Search and Rescue (NCSR) for action by the end of 2020.

VTS has matured enormously over the last two decades and this review will allow a thorough appraisal of the current document and a suitable period of time for the involvement of a wide range of stakeholders. It offers an important opportunity to correct areas where experience indicates that improvement and further development is now appropriate.

Areas of contention

A significant proportion of the review and update should be relatively self-evident and uncontroversial, and will simply bring the resolution into line with current developments and practices. There are, however, two areas where we now have the opportunity to consider more radical solutions to overcome existing confusion and misinterpretation. These are the Types of Service and the concept of results-oriented instructions.

The June edition of *The Navigator* had a timely focus on Vessel Traffic Services. However, it also clearly highlighted these two areas of confusion. Thirty-three years since the terms Information Service (INS), Traffic Organisation Service (TOS) and Navigational Assistance Service (NAS) were first introduced in the initial IMO Guideline on VTS, David Patraiko's introduction included the worrying statement 'Many mariners don't recognise that there are three distinct types of VTS service'.

The concept that VTS 'instructions' to vessels should be 'results-oriented' was introduced 21 years ago in the current version of the Resolution. Differing interpretations of what constitutes 'result-oriented' and why it is linked only to 'instructions' is widespread even among VTS experts and training establishments. These differing interpretations were even reflected in the various articles on the subject in *The Navigator*.

These concerns were also reflected in my article 'Navigational assistance in VTS – service or procedure?' (*Seaways*, March 2016). The feedback received was enormously helpful in the development of the recently approved submission to MSC. My article proposed a change from providing NAS as a 'service' to providing navigational assistance as a procedure. It has been pleasing to find that this initiative has not just gained traction within IALA but is now being developed further.

Types of Service – the problem

Types of Service have long been a source of debate. In an attempt to clarify the resolution, IALA issued Guideline 1089 on the Provision of VTS Services. This set out the basic principles that a VTS that is not organising vessel traffic should provide INS and NAS, while a VTS that does organise vessel traffic should provide INS, NAS and also TOS.

Considering this IALA guidance in more practical terms, the decision to invest in a VTS will have been the result of an overall port risk assessment. A VTS is just one of many mitigation measures available to reduce risk to as low as reasonably possible. It is, however, one that involves a very significant investment in infrastructure, staff and training. In practice, it is inconceivable that a port would invest in a VTS to mitigate risk and then use it only for providing information, with no role in organising vessel traffic. Thus, if a VTS is implemented to reduce risk, it is undoubtedly going to organise traffic and all three types of service will inevitably always be required.

Despite the IALA guidance, there are a number of VTSs that do not declare the provision of a NAS and a smaller, but significant number of VTSs that are clearly organising traffic yet only declare an INS. Nevertheless, VTS operators in these areas would almost certainly intervene if a vessel is seen to be standing into danger and are indeed trained to do so. They are also likely to attempt to organise traffic within the meaning of the term even when no TOS is declared.

It is equally confusing that the resolution differentiates between coastal and port VTS, indicating that a coastal VTS would normally only provide INS. In practice, VTS operators in a coastal VTS will, and do, intervene if a vessel is standing into danger, and will also attempt to manage traffic within the legal basis of the coastal VTS. Thus, the distinction between a port and coastal VTS is misleading, inaccurate and completely unnecessary.

Types of Service – a solution

From the perspective of the mariner, the subtleties of the different types of service are unnecessarily complex. The specific types of service provided will probably not even have registered among the host of other information that has to be researched before entering port or passing through a coastal VTS. Having established that the port has a VTS, the Master might reasonably expect to be provided with all of the following:

- Basic factual information relating to the vessel's arrival;
- Movements through the approach channel, the embarkation of the pilot and the passage into port will be deconflicted with other vessels;

- The entry into port will be managed and organised;
- Should the vessel start heading towards the wrong pilot station or towards a navigational danger or shallow water, the VTS would warn and advise.

The current difficulties lie with the word 'service', which gives the misleading impression that some of these things are somehow optional. Further, the current need to declare the 'levels' of service individually creates a focus on liability and leads to the incorrect assumption that, by not declaring a service, the port is absolved of liability.

Remove the word 'Service' after 'Information', 'Traffic Organisation' and 'Navigational Assistance' and remove the capital letters, and all starts to become clear. The provision of information, the organisation of vessel traffic and the provision of navigational assistance need to be identified as key functions of any port or coastal Vessel Traffic Service. This would also help to dispel the misconception that navigational assistance is an optional 'service' that is synonymous with shore based pilotage. While all VTS operators should be trained as part of their generic V103/1 basic operator training to recognise when a vessel is standing into danger and to issue appropriate warnings and advice to contribute to getting it to a position of safety; this is not shore based pilotage.

The new Resolution simply needs to identify *all* of the three services described in the current Resolution as functions required of *any* VTS, together with a stated need for the development of common and globally harmonised procedures to achieve them.

Result oriented instructions – the problem

The establishment of common and globally harmonised procedures is also the solution to the confusion over the statement that 'instructions should be result-oriented only'. No other term in this Resolution has been quoted so widely, and interpreted so differently, by those seeking to justify their own particular ends – and none has caused so much confusion to VTS operators and trainers alike.

Result oriented instructions – a solution

The original statement in the 1985 version of the Resolution that VTS need to respect the Master's ultimate responsibility is all that is needed. As long as this is clearly understood by both VTS operators and Masters, there is absolutely no reason why advice cannot be given. There is no need to agonise over whether VTS should give courses to steer or courses to make good as long as the advisory intent is clear and there is no possibility of such advice being misinterpreted as a conning order.

The military has long used the terms 'come left/right' and 'increase/decrease' to direct the officer of the watch to give appropriate wheel and engine orders – but only if it is safe do so. Prefixed with an indication that this is in the form of advice or a recommendation, this might usefully be adopted for VTS use.

The current resolution gives each individual VTS responsibility for establishing its own operating procedures, but there is a critical need to develop and set internationally recognised procedures. In developing consistent procedures, we need to stop pussy-footing around with the coded language, currently in common use, designed to acknowledge the master's overall responsibility in each and every radio transmission.

Developing procedures – air/sea comparisons

The concept is no different from the aircraft pilot's ultimate responsibility for the aircraft. We need to emulate the air world where this is perfectly well understood and is, therefore, left unsaid, leaving Air Traffic Control (ATC) free to develop crisp, concise and unambiguous procedures that are consistent and internationally recognised.

With a background career in both basic air traffic control and VTS (see box), I have been advocating for some years the need for VTS to learn from ATC. Rather than becoming preoccupied with the differences, we need to focus on the similarities and how we might draw on them to improve the way VTS is delivered. There are a number of relevant International Civil Aviation Organisation (ICAO) and Civil Aviation Authority (CAA) documents. The CAA's interactive CAP 413 Supplement (ATC/Aircraft) and CAP 413 Supplement 2 (ATC/Ground Staff Drivers), which can be accessed online, are just two examples giving an interesting insight to ATC procedures.

While the current Resolution mentions the Standard Maritime Communication Phrases (SMCP), it compares very unfavourably as a standard for operational procedures for VTS use. The recently issued IALA Guideline G1132 - VTS VHF Voice Communication was quoted extensively in *The Navigator* and sets out the principles of voice communication; the next, but much more demanding, step is to develop these into harmonised and internationally recognised procedures.

Revising the Resolution

Whether subconsciously or not, VTS has been made to appear more complicated than it needs to be. Separating out functions that any VTS should reasonably be expected to provide into Services and indicating that these might be optional has proved to be misleading and confuses theory with practical application. This must be corrected in the next issue of the Resolution on Guidelines for Vessel Traffic Services. The update also needs to establish high level requirements and avoid bland statements and solutions that are open to varying interpretation. This will enable the development of more detailed and much-needed guidance on globally harmonised procedures, modelled much more closely on Air Traffic Control.

The International Harbour Masters' Association (IHMA) will continue its involvement through IALA and IMO in the review and update of the current IMO Resolution A.857(20). Any comments on this article would be welcome, and should be sent to bg.vts@btinternet.com

MSC 99

Proposal for a new output for a revision of Resolution A.857(20) on Guidelines for Vessel Traffic Services

Submitted by Australia, China, India, Norway, the Republic of Korea, Singapore, South Africa, Turkey, International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) International Harbour Masters' Association (IHMA) International Federation of Shipmasters' Associations (IFSMA) International Association of Institutes of Navigation (IAIN) and The Nautical Institute (NI)

6. Since the entry into force of the Resolution 20 years ago, various organizational, operational and technological developments have taken place globally in a rapidly changing maritime domain. This has rendered important parts of the Resolution open to differing interpretation, resulting in debate amongst stakeholders and a reduced ability to implement the Guidelines for VTS in a consistent and harmonised manner.

Commodore Goldman's career has included the role of helicopter controller and lifeline from ship to a very basic single engine Wasp helicopter with just a pilot and no observer or radar, the responsibility for piloting formations of warships into ports not previously visited and 10 years running one of the UK's most complex VTSs, including liaison visits to NATS Swanwick.

The Nautical Institute has been calling for the development of an electronic pelorus (ePelorus) since 2008.

Visual AtoN are one of the backup options to GNSS. For e-navigation to become the over-arching concept envisaged it should encompass visual AtoN. An ePelorus would enable the integration of visual AtoN directly with electronic charts (ENC/ECDIS) and e-navigation, without the requirement for overlaying bearings on a physical chart.

Initially, only a costly military version appeared to exist. Now, the Research and Radionavigation Directorate of the General Lighthouse Authorities of the UK and Ireland has developed a low-cost ePelorus from commercially available components.

Resilient PNT and the ePelorus

Martin Bransby
General Lighthouse Authorities of the UK & Ireland (GLA)

Resilience in positioning, navigation and timing (PNT) has been identified by the IMO as a lead area in the delivery of e-navigation. It is now well recognised that all global navigation satellite systems (GNSS) are vulnerable to interference, whether these interferers are from natural causes (space weather and atmospheric disturbances) or from manmade sources such as jamming or spoofing [See Captain's Column, *Seaways*, July 2018]. GNSS component and satellite failures do occur and there are many examples of all the forms of interference cited above.

Resilient PNT information is needed to ensure continuity of maritime operations and safe navigation – especially for e-navigation, sea traffic management and autonomous vessels.

NavStar Global Positioning System (GPS) jamming trials were conducted by the Research & Radionavigation Directorate (R&RNAV) of the General Lighthouse Authorities of the UK and Ireland (GLA) in 1994, 2008, 2009 and 2012. These trials showed the real-time vulnerability of maritime systems to jamming. They identified that many ships' systems were affected by GPS jamming, including some that had not been anticipated, such as the helicopter-deck stabilisation system and the ship's gyro-compass.

Developing resilient PNT

Through its R&RNAV, GLA has conducted a programme of work looking at GNSS vulnerability and investigating ways of tackling it.

A series of studies have looked at a number of systems such as:

- Enhanced Loran
- Absolute radar positioning (two methods)
- R-Mode (two methods)
- Signals of opportunity (many methods)
- Hybrid systems
- Dead reckoning
- Inertial navigation
- Other onboard systems, including the development of ePelorus.

A driver for optical navigation systems

On 14 December 2002, in early morning thick fog, the *Tricolor* collided with a Bahamian-flagged container ship named *Kariba*, about 20 miles north of the French coast in the Dover Strait Traffic Separation Scheme. Despite sustaining damage above the water line, the *Kariba* could continue, while the *Tricolor* remained wedged on her side in 30m of water in a busy area of navigation.

The shipping lane was marked by buoys and guarded by the French police vessel *Glaive* and HMS *Anglesey*, warning other vessels of the *Tricolor*'s presence. Despite the marking and patrolling, only two days later a cargo ship, *Nicola*, followed by another vessel, *Vicky* (carrying 70,000 tonnes of highly flammable gas oil), collided with the wreck of the *Tricolor*, after failing to heed several French naval warnings. In between the two further collisions, more buoyage and patrol vessels were deployed. On 22 January, a third accident happened when a salvage tug knocked a safety valve off the *Tricolor*, resulting in a massive oil spill.

The incident was blamed on declining professional standards among seafarers, which was leading to scores of near misses in the area every day. It is clear from the incident and the ensuing investigation that navigators were not looking out of the window, despite various radio navigation warnings and other methods, not the least of which was deploying wreck marking buoys and virtual aids to navigation.

A very good way of mitigating the failure of any navigation system is by using reversionary methods of navigation, like looking out of the window. This was a big driver in the GLA development of the BinoNav®.

What is BinoNav®?

BinoNav® is an electronic pelorus. A pelorus is a device that is completely independent of any other system or electronic position fixing system (EPFS) – important for providing resiliency.

A standard pelorus is used to take relative (to the vessel's head) bearings to charted objects. The navigator then draws a line on the relevant navigation chart bisecting the charted object. It is clear now that the vessel lies somewhere on this line from the charted object. This process is repeated several times, with a minimum of three iterations. This process creates a 'cocked hat' generated from the intersection of the lines. The vessel should lie somewhere within this cocked hat.

BinoNav® configuration

This process is laborious and time-consuming, but it does have the advantage of getting the navigator to look at real features outside the vessel rather than just following a 'red line' on an electronic chart without question.

What about ECDIS?

Electronic chart display and information systems (ECDIS) are excellent when used correctly, and have driven innovation in the shipping industry. They do have disadvantages, however. For example, if you are using a pelorus, you cannot very easily draw on a screen. You can generate an electronic bearing line (EBL) on an ECDIS, but it is a convoluted way of providing a position not derived from an EPFS, such as a GNSS fix.

Any system required to generate an EBL on an ECDIS must do it electronically. Moreover, it needs to do this without having to rely on GNSS for position or time, as it should be completely independent in order to avoid GNSS vulnerability issues. It should also be able to carry out optical-to-electronic integration. Another GLA requirement was that it should be relatively low-cost to make and distribute to enable take-up by all users. BinoNav® fulfils all these criteria easily, intuitively and quickly, updating the electronic position of the vessel. Moreover, as it has a wireless connection, bearings can be taken anywhere on the bridge of a vessel.

Using BinoNav®

BinoNav® comprises two parts: the 'Bino' unit, which is a modified pair of binoculars, and a 'base' unit that performs the communication link between the Bino unit and the electronic chart. See above for the overall configuration of the BinoNav®. Pick up the Bino unit from the base unit. Line up the graticule inside the Bino unit with a charted feature of use, and press either of the buttons to automatically generate on the displayed electronic chart a line that is relative to the ship's head. As with the standard pelorus, you need at least another two EBLs to generate a cocked-hat position on the electronic chart. Using either the touch screen or the mouse, hover over the cocked hat to generate a triangle. Now, right click to drop a marker at the centre of the cocked-hat position and delete all lines. Dictated by the operating environment at the time, this process can be repeated once the vessel has moved. When two or more of the markers have been dropped, a line is drawn between the marks, thereby showing a track on the chart.

Other features

Using the BinoNav® unit as described above produces a track on an electronic chart that is not derived from an electronic position finding system (EPFS). This shows the integration of visual navigation into e-navigation, something which e-navigation has tried to do from the very beginning, as described by Brian Wadsworth in his earliest vision of e-navigation.

Another feature of BinoNav® is 'radar mode' for charted feature recognition. This draws a continuously moving line on the display that points at the position relative to the ship's head. This is useful for the recognition of charted features when in unfamiliar territory.

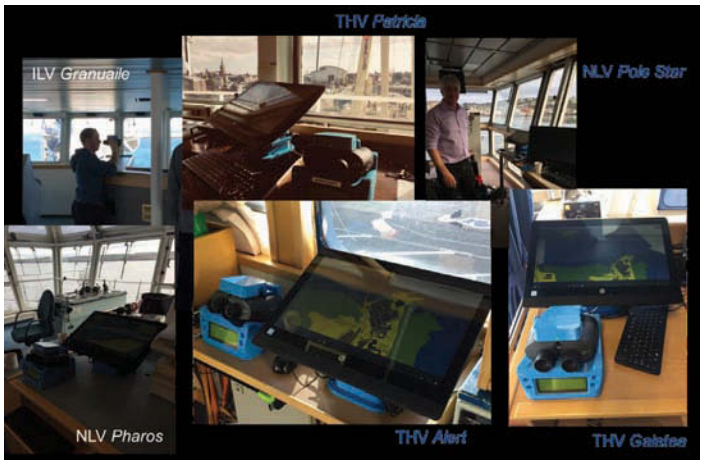
The BinoNav® is very easy to install, with only a connection for power and a connection for a suitable NMEA2 data feed for heading.

Currently, the BinoNav® is 3D printed which allows for the quick production of one-off units. However, this is clearly not a suitable solution for long production runs, and a different method of production will be needed if the BinoNav® is to be produced commercially.

We will also seek to gain approvals through IMO and IEC to integrate BinoNav® with ECDIS, so there will be no need for separate displays (unless on non-SOLAS vessels).

Looking to the future

The BinoNav® has been installed on all six GLA vessels. R&RNAV has received a lot of interest in the BinoNav® not only from our own mariners, but also from a variety of influencers in the maritime world. We have had a great deal of positive feedback on potential improvements and additional features that we are taking in hand to develop further in the future.



BinoNav® installations on GLA vessels

In summary:

- e-Navigation is based on the premise of electronic navigation from berth to berth
- Many accidents happen because crews do not look out of the window
- There is a need for electronic positioning from non-GNSS sources
- BinoNav® integrates visual navigation and electronic navigation through an ECS/ECDIS
- BinoNav® provides an independent verification of position with or without EPFS.

The author thanks the Masters, officers and crews of all the GLA vessels for their help and for the benefit of their experience throughout the whole process of the BinoNav® development. Especial thanks go to those who helped during the various development trials on ILV *Granuaile* and THV *Alert* prior to the mainstream installations.

This article is based on a presentation given at the IALA symposium in Incheon. A fully referenced version is available on request from the editor.

Superyachts:

professionalism, manpower and training

The vessels on which crew in the superyacht sector serve have changed dramatically since the mid-1990s as the market has increased in size, design, and complexity. How have the training and certification requirements for crews kept pace?

Capt Adrian Croft
MBA AFNI

In the UK, until the early 90s, hiring and manning in this sector was mostly left up to the owner/manager independent of any regulatory body. Although there was a UK requirement that fully trained merchant officers should be employed on Red Ensign yachts over 80GRT, this was in essence ignored by almost everyone. Even on yachts for charter, it was quite common for crew to have few or no formal qualifications, from the Captain downwards. Of course there were yacht crew in this period who held merchant navy training, but they tended to be in the minority and there was little premium placed on hiring them over a less qualified candidate.

In the early 1990s the UK maritime authorities woke up to the fact that the superyacht industry was booming and that a number of larger, complex yachts were being commissioned used for both private and charter use. The result was the UK regulations for *Vessels in Commercial Use for Sport and Pleasure*, meaning that yachts for charter of over 80 GRT were now considered to be commercial vessels.

However, very few yachts would have been able to operate under this legislation even if they wanted to, as there was no ready supply of merchant officers aware of the yacht market or looking to join the sector. Owners also wanted to keep their existing captains and crew, who had mostly been serving on board their yachts without issue.

***Sailing Yacht A*, one of the many superyachts making use of cutting edge design (image: istockphoto)**

Faced with the prospect of a number of superyachts operating illegally in what was already approaching a billion dollar industry, the UK Marine Safety Agency, as it then was, took a global lead in creating a training and certification path for captains already serving on yachts, but without formal qualifications. Over the past two decades, this has led to a multi-layered approach towards providing a pathway for deck and engineering seafarers to become licensed to serve on yachts of any size or gross tonnage.

For yachts under 3,000 GRT with a 12 passenger limit, deck and engineering officers typically tend to hold a Yacht Restricted Certificate of Competency. Shore-side training is provided via modular courses generally conducted over five days, covering celestial navigation, stability, business and law, for example. Only the GMDSS and navigation/radar/ARPA modules run into a second week.

Onboard training requires the completion of an OOW training record book (TRB). The quality of onboard mentoring varies from very competent to non-existent, depending on the level of engagement from senior officers. There is no established legacy of training and mentoring on board yachts as many of the older captains/senior deck officers were not exposed to mentoring in their own formative years. For some, the training record book is no more than a collection of signatures, with little proof of the level of mentoring/onboard teaching provided.

Yachts over 3,000 GRT must be manned by officers with unlimited Certificates of Competency (CoCs), who have attended full-time training in nautical establishments culminating in exams. These officers will have been exposed to continued mentoring and schooling both shipside and shoreside with close supervision of TRBs.

As with all CoCs, there is currently no regulatory requirement for formal reassessment of navigational/seamanship skills later in the career of any deck officer (including Master). As long as the sea time requirement is fulfilled when the CoC is revalidated, the CoC issuing state assumes that critical knowledge and skill sets remain current.

Formal navigation/seamanship skill assessments are rarely if ever undertaken in the yacht sector, and rarely form part of any hiring or annual assessment process.

Compounding this potential loss of skill sets is the fact that many yachts have only one cruising season so sea time can be quite limited on a yearly basis.

Stability concerns and other issues

Having served as a relief captain on a number of yachts, it is clear to me that core areas of critical knowledge are not being practised or have been lost. For example, the vessel's stability booklet is rarely understood or used in any meaningful way by deck officers. In general, it is hard to load a yacht so that IMO minimums for GM and GZ values for intact stability are breached. On the other hand, there are a number of yachts where it is easy to overload when bunkering to full capacity with the water tanks full. I have yet to see on any yacht basic stability calculations to include taking draught marks, calculating true mean draft (TMD), and then using hydrostatic data to calculate remaining tonnage available to load to the All Seasons Summer Load Line.

Celestial navigation is rarely practised, even when time allows such as on ocean crossing. Even knowledge of ColRegs/buoyage is being lost for those that do not regularly review and test themselves in these subjects. Empirical studies have shown that 50% of watch keepers believe that poor application of ColRegs is caused by ignorance or wilful disregard of these Rules.

Often onboard training and mentoring is required to return officers to a level of operational competency in such critical skill sets.

Encouraging investment in training

Yacht employer training schemes vary considerably, depending on the interest of the owner/management in investing in their crew. As a result, seafarers in the yacht sector often support themselves while investing in training courses. However, a recent market survey carried out by the Professional Yachting Association (PYA) highlighted that a large number of seafarers in the sector see CPD as a waste of resources, especially as few seafarers feel that it is valued by those that might employ them. It is rare that seafarers are advised that they obtained a position or promotion based on having additional knowledge/training above standard qualifications.

One factor that affects willingness to invest in additional training is that the luxury yacht sector is an image driven environment. There is strong survey evidence that crew often encounter age bias during the hiring process. This particularly limits employment opportunities for those re-entering the market aged 50 and over. Age bias is forcing out a number of time-tested, highly skilled, talented, creative, productive, experienced senior seafarers, in the prime of their careers – whereas in most transport industries top earning power normally comes between the ages of 45-65. With this in mind, individual training investment may start to look less appealing.

The sector needs to realise that seafarers are not innate commodities, and unlike modern technology they generally appreciate with age. Experience is not the same thing as training. You can't google experience. The challenge is to make the industry realise this and value it appropriately.

The role of the managers

The luxury yacht sector operates to a different set of market forces than the larger shipping world. No private yacht earns its own living in financial terms and the majority of charter yachts cover at best only a percentage of the yearly capital, periodic maintenance, operating and voyage costs.

Very few yacht owners or their businesses have the maritime skill sets to manage their asset effectively in the wake of ISM, ISPS, MLC, etc. This has led to the rise of numerous yacht management companies who generally take on the responsibility as the vessel's operating owner. These companies can vary in size from managing one yacht to over 100 yachts. Almost none of these yacht management companies actually own the asset (yacht), and they have limited exposure if asset is damaged or lost. Yacht management superintendents and DPAs range from the very competent to the not competent at all, which will have a knock on effect on shore side management understanding of onboard operations.

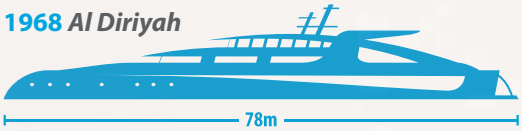
SUPERYACHTS IN NUMBERS

10th largest yachts

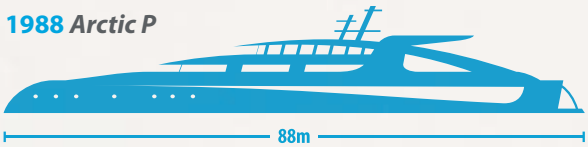
(in the given year; this is not the year they were built)

1918 *Mariquita*

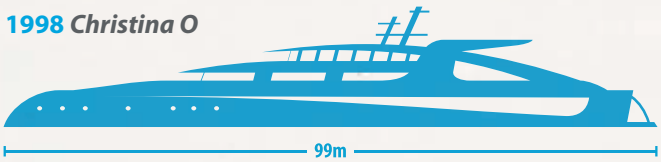
1968 *Al Diriyah*



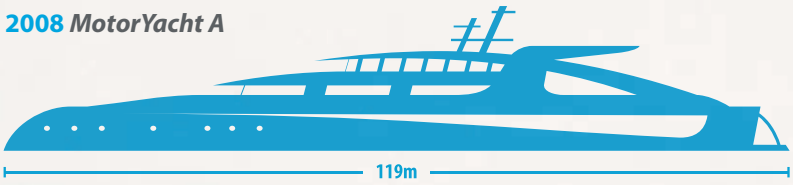
1988 *Arctic P*



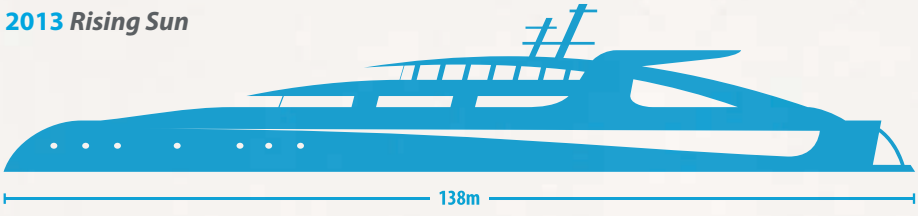
1998 *Christina O*



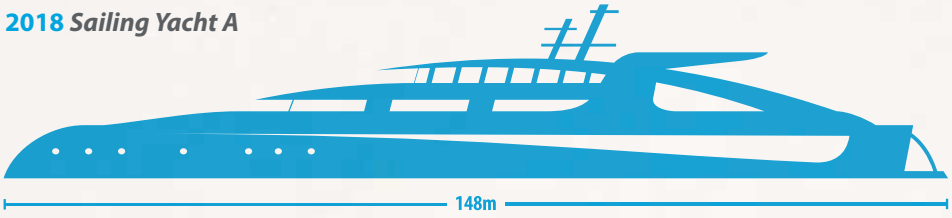
2008 *MotorYacht A*



2013 *Rising Sun*



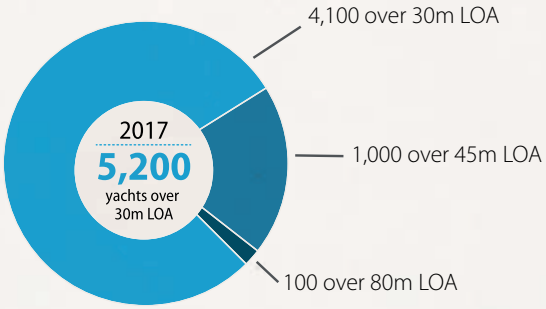
2018 *Sailing Yacht A*

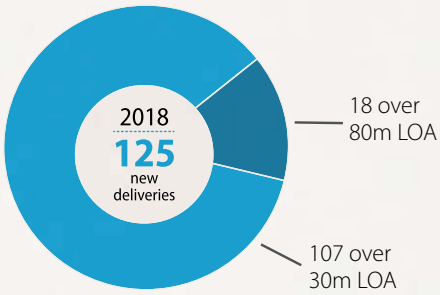


World yacht fleet

Some of today's yachts are based on advanced nautical engineering, with *Motor Yacht A*, for example, designed for waveless cruising, with a reverse bow and tumblehome design paralleling to some degree the zumwalt class of stealth destroyers designed for the US Navy.

The largest private yacht currently afloat, *Azzam* is 180 metres in length, and has a top speed of in excess of 32 knots. While the latest superyachts may use cutting edge technology, existing vessels are very likely to remain in operation for many years. Although a yacht may be sold for scrap, very few luxury yachts actually end up in the scrapyard. At this valuation level new owners have shown a willingness to invest in large refits bringing an old yacht back to its original state.





4,200
motor yachts

1,000
sailing yachts

Employment concerns

There is a large regulatory difference between commercial and privately operated yachts. Budgets vary considerably even between similar sized yachts, which not only impacts salaries but also the safety emphasis on equipment and crew training. Employment across a fleet is rare, which tends to lead to limited promotion prospects. Even on the same yacht, employment patterns can vary between short seasonal jobs and permanent long periods.

Low job security/high crew turnover is more typical than not, and in these cases operational knowledge is often lost.

Crew hiring decisions are generally made by the Captain, with the owner/management involved only for more senior positions. While there are a number of specialised yacht crew placement agencies, very few are staffed by HR trained professionals. A large number of yacht positions are now advertised on the internet, potentially by-passing crew agencies, and competition for places is fierce. There is little ethnic and cultural diversity in yacht crews compared with general shipping

Cruising patterns

Yachts may operate in several regions in a single year, or be based in one area with long periods in port. Where yachts have a home port, crew may live ashore or on board in port for a large part of the year.

Vessel handovers for senior personnel signing on board for the first time, including captains, can vary from a few hours to several days.

There is almost inevitably a high ratio of crew to passengers – necessary in an industry which requires an exemplary experience for guests. Despite this, constraints arise with Hours of Rest regulations, especially when the vessel is running at full guest/passenger capacity. It is not uncommon for Hours of Rest to be less than the minimum legally required, or for crew to falsify records during these periods.

Yachts often make short passages close to the coast. These are frequently near navigational dangers, and in areas experiencing large volumes of traffic especially in high season. Itineraries are often subject to last minute changes despite detailed planning – or may not be planned at all.

There is a considerable risk of criminalisation for Masters, especially on yachts that operate or even anchor in sensitive areas. There is a certain amount of pressure to provide the 'ultimate guest cruising experience' by operating in such areas. While relationships with the owner and the family can vary from the close to the distant, it is very hard for the Master to say no to such requests. This can – and has – lead to groundings and large fines.

Casualty rates

Although groundings and similar accidents are relatively rare in the superyacht sector, they are not unknown. The 134m *Serene*, for example, went aground at speed in daylight somewhere south of the Strait of Tiran on the approach to the Gulf of Aqaba, despite being manned by deck officers holding unlimited CoCs – and this is not the first yacht over 100m to have suffered a grounding incident.

Clearly this is not the image that the sector wishes to project, and owners/management will want to limit the public fallout from such events. Very few accident reports from the large luxury yacht sector are released in the public domain or are reported to organisations such as CHIRP or MARS. This is in marked contrast to the commercial sector where detailed analysis and the availability of navigational/operational safety accidents reports are far more regularly and promptly provided.

The facts and figures surrounding an accident, the application of onboard training/positive mentoring, human performance, situational awareness, bridge team management, navigation practices, passage planning, position fixing and monitoring, fatigue, are all key areas in the incident web concerning interaction of the human element and technology. Unfortunately, the data on such accidents is often deliberately withheld and personally I doubt we will ever become privy to much of this information.

Another area in which accidents seem to occur with depressing regularity on yachts is working aloft/over the side. Recently, there have been a number of fatal injuries from crew falling whilst working. Yachts do require crew to access masts, raised flats, and to work over the side for cleaning and maintenance. *MGN 578 (Overside working on vessels)* requires the employer to ensure that crew are competent in the use of the equipment needed for this type of work, but no independent level of training/qualification has been mandated.

Some yachts employ robust training and safety regimes, others less so. Just walk around any busy marina and watch crew working aloft and you will witness both safe and unsafe working conditions. Just as we would not send crew to dive to inspect the underwater hull without suitable qualifications, so we should not send crew to work aloft without the relevant competency.

Clearly, formal onboard training from a shoreside provider in basic leading line/abseiling to include certification would bring yachts in line with best industry practices. If safety training looks expensive, try costing an accident.

The need for further professionalism

As the yachting industry grows and matures, it is hoped that it will move towards greater transparency, with a much improved process of providing data, greater awareness of how accidents occur, and a better understanding of how training and the adoption of lessons learned can improve safety at sea.

We should all be striving towards the reduction of such accidents whilst maintaining and building on core skill sets, well past post examination dates.

Anchors and anchoring ground tackle

Captain Michael Lloyd
MNM, FNI

More accidents involving ship damage occur in anchorage than on passage. Most of these incidents are never reported, as they are comparatively minor in nature without human casualties. They therefore remain, for the most part, uninvestigated. One exception is a report from a P&I club that deals with a ship trying to anchor in gale force winds of 8 to 9 and a wave height of 4.5 metres. Not surprisingly, the ship dragged anchor and grounded, with the following consequences:

- 250 tonnes of fuel oil spilled, polluting 37 protected areas along 120 kilometres of coastline
- The cost of salvage was $70 million
- Ship was out of service for 10 months
- Master and third mate were sentenced to jail (a typical reaction from shoreside authorities that we see all too often).

While this may be an extreme example, it does show that anchoring decisions cannot be taken lightly and, overall, poor anchoring decisions are extremely costly. This article will look at the importance of the tackle used in anchoring. A future article will examine the process of anchoring itself and the seamanship involved.

Temporary holding

Sometimes it seems the purpose of anchors has been forgotten. Anchors are designed for one purpose – to hold the ship temporarily while waiting for a berth or a pilot. They are not intended to continue to hold a vessel in strong winds, currents or seas.

Over time, this initial and excellent principle has been modified by circumstance, but the general intention cannot be forgotten. There must be an understanding that an anchorage is not to be regarded as a safe area and that, should any circumstance arise, either weather- or ship-related, that might in any way endanger the ship, then the only course of action must be to heave anchor and leave.

Factors affecting safe anchoring

There are many factors that affect the safe anchoring of a ship.

The main factors are, in no particular order:

- Type of anchor
- Draught of the vessel
- Deadweight of the vessel
- Loading condition
- Nature of the holding ground
- Depth of water
- Tide and strength of current
- Weather conditions
- Windage area
- The proximity of other vessels.

Anchor maintenance

Not all anchors are lost through dragging. Some have simply fallen off through lack of maintenance. The once common sight of anchors being lowered to the water and the chief officer in a boat examining them is now a rare thing – yet why? This is not a matter of good seamanship practice being replaced by something better. The need for anchor inspection is just as great today as it ever was, yet how many company SMS manuals require it?

When interviewing young officers to prepare them for their examinations, I found that they seem not to ever have discussed or been taught it, about the importance of anchor inspection. It is even possible that the examiners themselves may know little about it and therefore it is not expected that candidates will be prepared for such questioning.

What, then, should such an inspection look out for? Close examination of the anchor is required to check that the D shackle holding the anchor joining ring is not worn or bent and that the spline pin is still in position.

The flukes should be free of any debris, as this could reduce the angle of the flukes and affect the efficiency of the anchor. Do not assume that washing down when heaving in will clear this.

Washing down when heaving in the anchor cable is nevertheless essential, because it reduces mud build-up in the chain lockers and keep suctions free, enables sighting of the chain markings and, most importantly, removes mud from the chain. If this is not done and the chain is allowed to run on the next anchoring, the hardened mud can fly out and hit a member of crew, possibly causing serious injury.

The anchor

Over recent years, ship size has increased dramatically in relation to the size of cable and anchor. Given this change, it is particularly important that we understand the limitations of anchors and the problems that can arise.

Anchors are of many types and designs, but generally fall into one of two categories: standard stock anchor (SS) and high holding power anchor (HHP). High holding power anchors have larger flukes, meaning that more force is needed to shift them from their position compared with a standard anchor of similar weight.

The chart below shows the holding power under the IACS rules.

Vessel dwt	Max holding power: SS anchor (tonnes)	Max holding power: HHP anchor (tonnes)
50,000	60	130
100,000	90	190
150,000	110	230
200,000	130	270
250,000	150	315

With such a large difference between the holding power of the two types of anchor, it is strange that relatively few shipowners and managers fit HHP anchors, particularly in view of the number of accidents that have been occurring.

The cable

As ships have become larger, the chain, on paper at least, has become more reliable than the anchor. This is reflected in the increased number of reports of windlasses slipping brakes and anchors dragging rather than the chain breaking.

The cable has different grades as shown below:

Dwt	Anchor weight (kg)		Chain length (metres)	Load (tonnes)	
	SS	HP		Grade 2	Grade 3
25,000	6,450	4,837	605	263	300
50,000	8,700	6,525	632	368	407
100,000	12,300	9,225	687	477	561
250,000	18,800	14,100	742	694	812

The windlass

The windlass is too often forgotten when making any anchorage calculations. One of the central criteria for a windlass is that it will not collapse under a load equivalent to that which will break the cable. For this calculation, the pulling power (Z) of the windlass is a constant based on the chain grade × the chain diameter. Grades 2 and 3 both have a constant of 4.25.

This is most important for large vessels anchoring in deep water.

For example, take a 250,000dwt vessel with a grade 2.12 cable and an HHP anchor. This gives us $Z = 4.25 \times 120^2$ kg = 61.2 tonnes.

If for example, the anchor weighs 16 tonnes and the cable weighs .6008 per fathom, the vessel would only be able to lift a maximum of 5 shackles of cable in a vertical lift. This means the ship would be limited to anchoring in a depth of 75 fathoms.

Under IACS rules, the length of chain carried is 405.7 fathoms. Based on a ratio of cable to a depth of 6 to 10 this means that the effective anchoring depth is now limited to 40–67 fathoms.

The brake

Two other factors govern the efficiency of the anchor. The first is the brake. The hydraulically operated fail-safe brake is undoubtedly more reliable than the standard manually operated band brake, especially for larger vessels. Most vessels today employ the standard asbestos-free band brake, although some asbestos-lined brakes are also still in use. Whatever brake band is fitted, it will need to be adjusted as it wears down to ensure that firm braking is maintained. Wear takes place more quickly if the cable is allowed to run unchecked. It is recommended that the cable be checked every half shackle if free-running. This will keep the temperature of the brake lining under control.

It is also important to ensure that the brake is being fully applied, especially with manual braking. A common problem here is the amount of grease applied – either too little or too much. When grease is applied to the brake spindle, it is often put on top of existing grease. Debris, especially from bulk cargoes or sandblasting, becomes embedded in the grease and can form a solid hard layer on the spindle, mostly around the base. When the operator then applies the brake, it seems as if the brake is fully applied when in fact it is not.

Compression bar and stoppers

The compression bar and stoppers are equally important in the ground tackle arsenal. Compression bars can become worn, particularly at the edges. This increases the possibility of them working out from their holding position on the cable, especially if the forecastle is subject to vibration. When the anchor is hove up and in the hawsepipe, the stoppers, often called devils claws, will hold the anchor in the hawsepipe. It is essential that the bottle screws can be tightened and that the shackles holding the stoppers to the deck are well secured.

I leave the final statement on ground tackle on large vessels to a section of the Donaldson report published in 1994 following the grounding of the *Braer* in Scotland in 1993:

Section 7.86: 'Conventional anchoring systems are extremely limited in what they can do. Indeed it was suggested to us that anchors on most VLCCs are of little more than ornamental value. The standards specified in classification society rules are for systems that are little more than the equivalent of a car handbrake: their purpose is to secure a vessel that has been 'parked' under control. Whilst they may be useful in stopping or manoeuvring a ship drifting at very slow speeds of less than 1 knot (0.5 m/sec), they are of no use in an emergency when a ship may be drifting without power at speeds of several knots.' Twenty-five years later, not a lot has changed.

Shaping the future

One of the major challenges faced by the shipping industry during a period of rapidly developing technology is how to take decisions that will affect the future when we do not yet know what the key drivers of the future will be.

Commissioners of Irish Lights

The sea has always posed unique challenges to even the most experienced mariners because of the risks associated with its physical – often unpredictable – characteristics. While technology is recognised as a key enabler for safety at sea, the advance of technologies also brings with it new challenges. Technological solutions are progressing at an increasing rate and the digital age has revolutionised communication and the distribution of information, disrupting traditional business models in shipping and global transport logistics.

These complex changes coincide with a challenging period for shipping as the principal global trade carrier. These challenges will continue throughout the next five years, and new challenges and opportunities will also emerge. If, as forecast, the world economy doubles by 2040 it is likely to result in the growth of vessel numbers, with implications for maritime safety services such as the provision of AtoN, vessel traffic services and shipping traffic management and monitoring. The digital age is making enhanced ship-shore and shore-ship connectivity a reality, stimulating growth in communication and data services and in the use of technology for ship navigation, asset control and for AtoN and related services.

Impact on maritime safety

The impact on maritime safety is multi-faceted. As the size and complexity of ships has increased, the size of ships' crews has declined. Proper consideration of human factors remains all-important. The effective use of technology, watchkeeping standards and human-centred design of ship bridges are all emerging as significant safety issues. The deployment of marine autonomous surface vessels (MASS) is on the horizon with implications for traditional manned vessels and for overall shipping traffic safety.

Vessels that are not covered by SOLAS or other mandatory carriage requirements can take advantage of emerging technologies and systems. However, the use of non-type-approved systems can also present a safety risk if the information provided is incorrect or poorly presented. The availability and functionality of such systems will continue to increase and users recognise that formal standards are needed, particularly in relation to charting. There is also concern that rapid technological developments such as mobile applications and other electronic service devices lack reliable verification of their compatibility with generally accepted standards. Furthermore, they could distract from the vital role of critical core safety systems such as GMDSS as the last lifeline for seafarers in peril at sea. Providing the correct mix of navigation services to these sectors is critical, especially considering that statistically they present the highest risk of incidents.

Sustainable development

Safeguarding ocean health and sustainable development have become closely intertwined policy goals at the global level, as reflected in the 17 sustainable development goals (SDGs) outlined by the United Nations in 2015. Goal 14 calls on countries to 'conserve and sustainably use the oceans, seas and marine resources for sustainable development'. Irish Lights has an important role to play in the provision of technologically advanced AtoN and associated data and monitoring systems to support safety of navigation and future-proofed maritime services for all stakeholders. Access to a robust and resilient AtoN infrastructure will allow the development of additional value-added services at incremental cost (see box, p15). Existing AtoN infrastructure can also be used as an adaptable platform from which to deploy distributed environmental monitoring solutions and support the realisation of UN sustainable development goals.

The economy

An extensive and growing spectrum of activity is taking place in multiple arenas of the maritime economy in Ireland and the UK. The ongoing increase in maritime activity, the resulting impact on safety of navigation and the potential for delivery of new services are key factors in the design of the five-year strategy.

Stakeholder feedback

An extensive stakeholder consultation was undertaken to inform the preparation of the five-year strategy. Groups that took part included operators of commercial SOLAS vessels, the fishing and aquaculture sector, leisure users, local authorities and local lighthouse authorities and government departments and agencies. Commercial users strongly endorsed the need for continued provision of visual AtoN and the requirement for officers to be trained in visual navigation techniques.

The five year strategy looks to the future while upgrading existing infrastructure

Concern was firmly expressed about ECDIS standards, and the proper use of ECDIS, ergonomic bridge design, data presentation and data overload are all continuing issues. The group was adamant about the need for more effective training, particularly in the use of new equipment. There was also a call for industry guidance on cyber-security.

Stakeholders had mixed views on e-navigation, with vessel owners looking for tangible value to be demonstrated by way of enhanced vessel efficiency or safety. It was considered that there is likely to be a future need for improved surveillance and management of vessel traffic and that vessel traffic services could increasingly contribute to efficient information management.

The fear of collision worried the fishing sector. There was a view that near misses are not always reported. An annual forum that brings together representatives of all sectors could discuss safety concerns and provide a fuller understanding of each sector's vulnerabilities.

Local lighthouse authorities all recognised the importance of local AtoN and the role they play in ensuring safe navigation. Several local lighthouse authorities also identified the need for specialist navigation expertise and consultancy from time to time, as a service to support them to provide quality navigation services that are efficient, fit for purpose, functional and meet the needs of the modern mariner. Such services could also aim to support procurement specifications for AtoN selection, provide specialist engineering consultancy around upgrading and modernising lighthouses and navigation lights and contribute to navigation risk assessments as part of any port/pier developments.

Overall, feedback from a broad spread of key stakeholders contained clear and consistent messages:

- All stakeholders attach a priority to the need for both visual and electronic AtoN;
- There is a consensus on key technologies, issues and emerging solutions;
- The impact of new technology will need to be carefully monitored and understood to inform regulation, development and practice;
- International partners and the commercial shipping sector emphasised the need to progress the delivery of tangible e-navigation benefits;
- There was strong support for training and a focus on human factors across all sectors;
- A forum for the exchange of navigation and safety issues encompassing all sectors would be welcomed;
- Mechanisms to increase practical co-operation between agencies and the wider maritime sector are needed to leverage expertise, data infrastructure and technical resources;
- Data-sharing across the sector is essential to generate added value and inform decisions;
- There is a demand for specialist navigation safety advice and risk assessment services to support a range of policy and commercial activities;
- Strong interest was shown in the development of maritime heritage assets at the local level.

Value-added services

Irish Lights provides a limited metereological and coast data service, which will be further developed as part of its future strategy, with existing services and infrastructure upgraded to enhance the current offering. This service leverages the core AtoN infrastructure and AIS network at 12 locations around the coast of Ireland to provide reliable access to accurate, near-real-time weather and sea state observations.

Feedback from users clearly indicated a growing proportion of people and businesses involved in coastal and maritime activities are actively using the MetOcean data service and value it as a source of useful information.

Access to timely and accurate weather observations – in addition to forecasts – was identified as an important input for passage planning, 'sail/no sail' decisions and pilot services to determine boarding and disembarkation plans. The data could also be used to enhance operational efficiencies for offshore activities, to provide information for leisure activities and to assess the accuracy of current forecasts.

Other value-added services include maritime spatial planning, surveying and charting – where new technology has greatly improved the arrangements for the update of charts and publications – and maritime incident response.

Resilience

A mix of satellite navigation systems and visual/radar AtoN is seen as sufficient for resilience in navigation, but there is a shared interested in the development of other AtoN, navaids and data services. Cyber-security and effective use of technology are seen as major emerging issues with a shared view that human factors, training standards and good operational practices are key to risk reduction and/or mitigation.

Advances in space-based augmentation systems (SBAS) prompted mixed views on the extent of future requirements for differential GNSS (DGNSS), which is a ground-based solution. As the requirement for resilient positioning evolves, a role may develop for a combination of ground- and space-based augmentation solutions.

Hydrography and charting

The importance of hydrography and charging for the future use of our maritime space emerged strongly from the consultations. Key areas of potential co-operation in survey (including resurvey programmes), risk assessment and data provision, standardisation and integration were identified. A collaborative approach to these issues will be important to the delivery of safer navigation and future e-navigation services such as dynamic charting.

What's changing?

Irish Lights' previous strategy was structured under three pillars:

- Streamline marine AtoN provision and delivery;
- Deliver new commercial services;
- Exploit Irish Lights' coastal technology and communication networks.

The first of these reflected the core safety mission of the organisation and was the primary focus of the strategy, with the other two points focusing on commercial and value-added services. In light of the developments and requirements outlined above, a new strategy has been developed, broadening the focus to five key areas of activity:

- Provision of general aids to navigation around the island of Ireland;
- Local aids and other navigation services;
- Commercial services;
- Valued-added services to contribute to the wider maritime economy;
- Tourism, heritage and community engagement.

Operational implementation

Key elements of the operational implementation programme include:

- Lighthouse Capital Programme;
- Consolidating stations to achieve a minimum operational footprint with energy-efficient light sources;
- Solar/battery or mains/battery power.

Consolidation delivers improved service to the mariner, substantially reduced running costs and improved environmental performance through the removal of diesel generators and mercury.

Our strategic maintenance objective is to achieve a maximum of one day routine annual maintenance

at all consolidate stations. Close attention will also be paid to the potential benefits of using unmanned aircraft (drones) and surface craft to support our work.

Buoys remain at sea for eight years subject to condition-based assessment. Key strategic considerations for the buoy network include assessment of use of plastic buoys, further extension of time at sea, provision of MetOcean or other sensors, use of self-contained lanterns/AIS, further improvements in the use of renewable energy and power storage and the selective use of virtual and synthetic AtoN where appropriate.

Monitoring, tracking and reporting on status performance and availability is a key enabler of our core services. Irish Lights infrastructure has been migrating towards AIS-based monitoring and this strategy will see completion of that process and the implementation of a new monitoring system.

Our ship, ILV *Granuaile*, is a critical asset for the delivery of our strategic objectives. Other activities include buoy maintenance, outage response, lighthouse replenishment, hydrographic survey, wreck and risk response, AtoN confirmation and navaid testbed activities.

Successful implementation of the AtoN and data services will require targeted research and development activity both in-house and in collaboration with IALA and other national and international partners. Our R&D strategic roadmap includes activity on LED light sources, adaptive visual signals, R-mode, VDES, data standards, unmanned devices and navigation aids.

Future developments

Key to improving the provision of general aids to navigation is the innovative use of new technology to deliver reliable, low-maintenance visual and electronic systems. Analysis indicates that no new IALA-approved systems will become operational in the next five years. Nevertheless, it is anticipated that new systems will come on stream over the next 10 to 15 years, and Irish Lights will continue to work with research and industry partners to inform the development and implementation of new technology and service solutions. This might include space-based satellite navigation systems, terrestrial back-up for satellite navigation systems, visual AtoN, communications and data services and other navigation aids.

This article is based on *Irish Lights Strategy 2018-2023 Safe Seas – Connected Coasts*. The full document can be downloaded from www.irishlights.ie

Mariners' Alerting and Reporting Scheme

MARS Report No. 310 August 2018

MARS 201847

A brush with a buoy

➔ A tanker had finished discharging cargo and moved to an anchorage to wash tanks and prepare for the next load. After washing, the Master received orders to change anchorage to allow delivery of the washing water to a slop barge. Once at the new anchorage, Port Control told the bridge team (Master, OOW and helmsman) that they were too close to the port fairway.

The crew weighed anchor to reposition the vessel, but this introduced delays. The Master was aware that the washing water should be delivered as soon as possible in order to respect the loading schedule at the next port. He expedited the manoeuvre to save time, but in the process the vessel came into contact with the fairway buoy. Although the buoy and vessel were damaged, there were no injuries or pollution.

The Master was invited to the company office to assist the investigation team and help understand the causal factors of the incident. He was subsequently enrolled in a shiphandling course for large vessels. The OOW was replaced at the first convenient port and was subsequently enrolled in a BRM course to refresh his knowledge on participating in the bridge team during decision making.

The company investigation team found that:

- The Master was experienced, but possibly complacent and time-pressed in undertaking the manoeuvre
- The OOW had failed to challenge the Master properly during the decision-making process.

Lessons learned

- There is no such thing as a trivial shiphandling operation; all manoeuvres should be carefully prepared and communicated to the bridge team. Masters should welcome any comments from the team.
- Complacency and over-confidence can negatively affect outcomes.

■ **Editor's note:** It is especially refreshing to see the company involve the Master in the investigation and to respond with additional training for both the Master and OOW rather than searching for a guilty party.

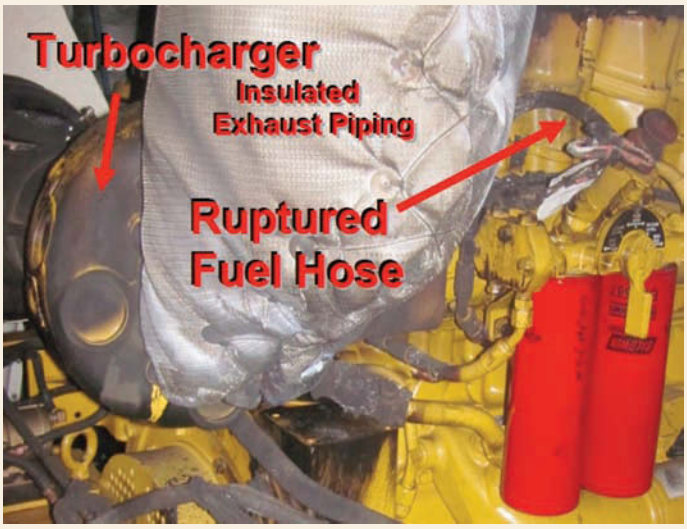
MARS 201848

Fuel spray on hot surface = fire

Edited from USCG Marine Safety Alert 06-17

➔ While underway a main engine low fuel pressure alarm sounded on the bridge. The crew member on watch entered the unmanned engine room and identified a high-pressure fuel leak spraying on the port engine's turbocharger. There was also a large quantity of diesel fuel in the bilge. The Master arrived on scene just as the fuel ignited and began a fire. He attempted to extinguish the fire using a portable fire extinguisher, but without success. He activated the general alarm, secured the hatches, had crew members secure the ventilation dampers and closed the remote fuel shut-off valves to the engine room. The fire then quickly self-extinguished.

The investigation identified the source of the fuel leak as a rupture on a flexible fuel hose connected to the fuel filter assembly. The fuel filter assembly and its components were installed relatively close to the turbocharger on the inboard side of the engine. The heat radiating from the turbocharger components was very high and probably led to the degradation of the rubberised hoses nearby. However, the installation was in accordance with the manufacturer's marine engine manual.



Lessons learned

- Closely inspect fuel and lubricating systems, from source tanks to system end points. Think about system vulnerabilities such as loose or missing pipe clamps and securing devices, wear or chafing from vibration that is affecting hoses, and pipes or tubes that may be poorly secured. Make sure that plastic piping is not close to hot spots.
- Ensure all insulation, blankets and lagging are maintained and kept tight. Look for areas where released fluids may make contact. Where spray shielding is used, check that it is kept in place; if it is not used, consider adding shielding.
- Minimise the use of non-metallic flexible hoses in systems carrying flammable liquids, particularly around engine areas where leakage or spray may reach hot spots capable of igniting the fluids. Consult with engine representatives if modifications are needed.

MARS 201849

Waxy deposits in low-sulphur MGOs

MAIB Safety Bulletin SB1/2017 and Japan Transport Safety Board Report MA2017-12

➔ A container vessel had been operating in the North Sea Sulphur Emission Control Area (SECA) for several days. The auxiliary boiler fuel supply had been switched from heavy fuel oil (HFO) to marine gas oil (MGO) to comply with emission regulations in the area. The boiler had cut out several times due to flame or ignition failures. On each occasion, the fault was investigated and the boiler reset by the second engineer.

The second engineer and the oiler were trying to restart the boiler burner unit when an explosion occurred. The force of the explosion blew the boiler burner unit door open and propelled the air diffuser into

the engine room, killing the oiler who was standing directly in front of the burner unit. The second engineer was close by and sustained non-life-threatening injuries.

Examination of the boiler fuel system identified a build-up of waxy deposits in the supply filter, sufficient to restrict the fuel flow. Samples of the MGO being burnt at the time of the accident were sent to a laboratory for analysis. The tests found that the fuel had a cold filter plugging point (CFPP) of 14°C and a pour point (PP) of less than -9°C; it therefore required a minimum fuel operating temperature of 15°C. The ambient air temperature at the accident location was about 4°C, low enough for wax to form.

Safety issue

Since the more stringent sulphur emissions limit was introduced, there has been an increased incidence of boiler and marine diesel engine problems in colder waters, industry reports suggest. This has been attributed to the increased paraffin content found in some low-sulphur MGOs, which leads to the formation of waxy deposits or crystals as the fuel temperature falls. Restricted fuel flow due to wax deposits in filters and pipework can cause intermittent and incomplete combustion to the point of flame failure. This could have unintended consequences, as in this case.

The paraffin content of MGOs varies globally due to disparate regional crude oil composition and refinery processes. Prior to March 2017, the often-used ISO 8217 standard focused on pour point. But this specification does not provide any indication of the temperature at which filtration issues may occur.

Lessons learned

- When purchasing low-sulphur MGO bunkers, give careful consideration to the ambient air and sea temperatures likely to be experienced during the voyage. The required cold flow characteristics of the fuel being supplied using cloud point (CP) and CFPP must be appropriate.
- If necessary, the CP and CFPP of the fuels carried on board can be tested through sample testing.

When operating in cold climates, the risk of waxy residue developing in the vessel's fuel lines can be controlled by:

- Closely monitoring the visual appearance of low-sulphur MGO bunkers for signs of wax precipitation
- Conducting regular fuel filter inspections and close monitoring of fuel system pressures.
- Maintaining the temperature of the low-sulphur MGO in the vessel's tanks and pipework above the CP and CFPP temperatures to avoid the possibility of filter blocking.

The addition of cold-flow improver chemicals to the low-sulphur MGO in the vessel's storage tanks should only be considered as a last resort, and then only under the strict guidance of an additive supplier.

MARS 201850

Mooring line mishap

➔ A tanker was in the process of mooring in a river berth. Two headlines were rigged on the same shore bollard (hooks), while the third was positioned on a second bollard. As the fore mooring party started to shorten up the lines, it was noted that one of the three headlines was twisted on the other two. The linesmen were called back to attend the vessel and to rearrange the fore headlines.

Two linesmen arrived. Once the line was slacked the linesmen started to haul in the line in order to have some slack to move it easily, using the winch positioned on top of the bollard. The fore mooring party was watching, waiting for the order from linesman to haul up.

When enough line had been hauled ashore, the linesmen shifted the eye of the rope on the hook. The linesman was in the process of removing the layer on the drum when the slacked rope suddenly moved ahead on the left, hitting the linesman and throwing him down the embankment and into the water.

Immediately the alarm was raised and the linesman was quickly recovered from the water. First aid was administered and the linesman was declared fit soon after.

Lessons learned

- When working with mooring lines, always be situationally aware of the forces and direction of tension that are in play – both on board and ashore.
- It is always good practice to keep linesmen in view while they are working your lines. If an accident happens to them, you are well placed to raise the alarm quickly.

MARS 201851

Unmarked crushing hazard claims a victim

As edited from official report of the Bureau d'Enquêtes sur les Événements de Mer (BEAMer, France), 26 July 2017

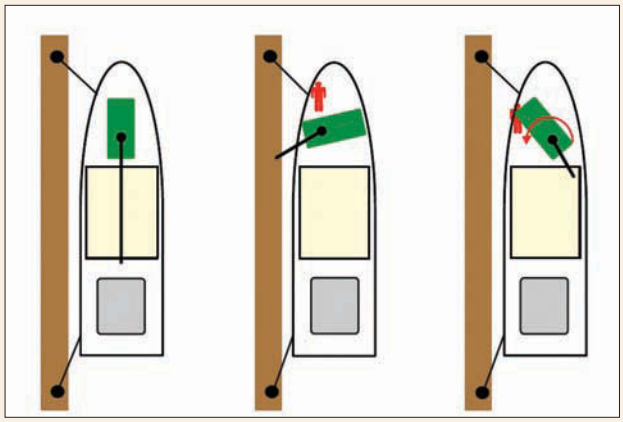
➔ A small dredger was in port and a crew member was discharging a load of sand on the foredeck, using the vessel's deck crane and grab. Meanwhile, another crew member was assembling some containers of old oil on the port foredeck in preparation for disembarking the oil ashore.

The sand offloading moved to the middle of the hold, and the crane's counterweight swung over the starboard railing. The crane operator then swung the counterweight to port to access the sand on the starboard side of the hold. In this position, he could not see the port side of the deck.

The crew member who was assembling the containers was in a vulnerable position on the port side, where the crane operator could not see him. He was trapped by the counterweight against the ship's bulwark. He collapsed and was quickly attended to but was later declared deceased.

The official investigation found, among others that:

- The victim was relatively inexperienced, and had probably not been made aware of the dangers of the foredeck while the crane was in operation
- The victim was not wearing hi-vis clothing nor a hard hat
- There were no barriers nor indications around the swing radius of the counterweight to warn persons of the danger.



■ **Editor's note:** This really was an accident waiting to happen. An inexperienced crew member was put into a dangerous environment where hazards were unmarked and unprotected.

MARS 201852

Weak planning and BRM breakdown leads to grounding

As edited from official UK Marine Accident Investigation Branch (MAIB) report 23/2017

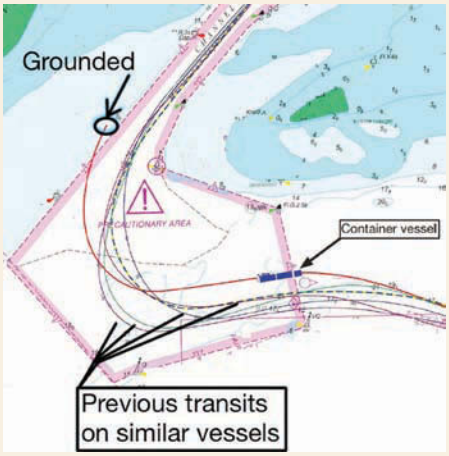
➔ An ultra-large container vessel (399m LOA) was inbound in a restricted channel under pilotage, in darkness and on a rising tide. The bridge team included two pilots, an OOW and helmsman as well as the Master and a lookout. The lead pilot was using a portable pilot unit (PPU) to con the vessel while the Master exchanged information with the assistant pilot. The assistant pilot used a partly completed port passage plan form and the port's generic passage plan guidance leaflets to help explain the pilotage and berthing plans.

At one point the lead pilot received a call to his mobile telephone from the pilot on an outbound vessel to discuss how and where they would execute the meeting manoeuvre between the two vessels. Both pilots agreed to a conventional port to port meeting, with the speed of the container ship being adjusted to ensure the meeting took place to the east of the precautionary area, a place in the channel where a large turn to starboard was required.

The container vessel was now making 12kt and the lead pilot informed the Master of his planned manoeuvre into the precautionary area in order to make a turn first to port to allow for more sea room and then to large starboard. To combat the strong flood tide and prevailing headwind, the lead pilot stated that he intended to navigate the vessel 'deep' into the precautionary area before beginning the starboard turn.

The lead pilot gave the helmsman a series of courses to steer that, over the next four minutes, brought the vessel on to a heading of 260°. Shortly afterwards, the lead pilot ordered the starboard turn and the engine set to full ahead. Soon, he expressed concern to the assistant pilot about the turn. At the same time, the Master expressed similar concern to the OOW in his native language, Romanian.

Soon after, the container vessel grounded with the engine at full ahead. The Master implemented the vessel's emergency procedures. The crew's initial inspections and tank soundings indicated that the vessel's hull had not been breached. Tugs quickly freed the vessel on the rising tide.



Some of the report's findings include:

- The intended route through the precautionary area was not charted, and key decision points, wheel-over points and abort options were not identified.
- The absence of a charted pilotage plan meant that the Master, his bridge team and the assistant pilot were unable to monitor the lead pilot's actions and the vessel's progress during the execution of the turn in the precautionary area.
- The lack of a shared understanding of the pilot's intentions prevented the bridge team from providing the support to challenge or seek to clarify the pilot's actions.
- The bridge team became disengaged from the pilotage process and allowed the lead pilot to become an isolated decision-maker and a single point of failure.

Lessons learned

- If you have concerns about the conduct of the vessel, discuss them with the entire bridge team.
- For critical turns or other manoeuvres, have key decision points established in advance. In this case, when compared with past trips, the vessel was obviously too far north as it entered the precautionary area and prior to making the starboard turn. This should have triggered an abort decision.

■ **Editor's note:** The report also states: 'It is accepted that detailed plans for complex pilotages cannot always be produced by navigating officers and ports prior to a vessel's arrival at a pilotage station, and that vessels often need to deviate from planned tracks in busy and congested waters. However, realistic intended tracks need to be plotted and key decision points identified.'

This basic premise has been identified by other investigative agencies. In Canada, for example, the Transportation Safety Board published a recommendation with similar ideals in 1994.

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A life at sea

Laura Nicholls talks to new President Captain Nick Nash FNI

How did you first hear about The Nautical Institute?
I first heard about The Nautical Institute when I was studying for my first mate's certificate back in 1984 at Warsash, or as it was called back then the Southampton School of Navigation. Somebody said there was a Solent Branch meeting and there would be free drinks, so being students we thought this was a great idea. Four of us went along and found it quite fascinating. I was given a membership leaflet, so I signed up and have been a member ever since!

Tell us a bit about your experience at sea before you became a Captain?
I ran away to sea at 17 years old. I really did run away – my parents wanted me to go back to school, but instead I stayed on the train down to my grandmother who was my legal guardian and signed the indentures. She thought I would look nice in a uniform.

I travelled back to London and joined a cargo ship with Port Line going down to Australia and picking up lamb. After that I was on banana boats and then container ships and North Atlantic ro-ros.

I was involved in the South Atlantic campaign in 1982 on one of the Ships Taken Up From Trade (STUFT) down in South Georgia which was fascinating. That's where I saw how interesting and efficient the Royal Fleet Auxiliary was. The whole Merchant Navy was on a downturn during that period and the RFA looked like an interesting place to go, so I joined as a third officer, and then spent another eight months down on South Georgia. I got a bit bored sitting in port for a long time and decided I'd like to go back to the commercial world, and joined Princess Cruises, and worked my way up through the ranks.

I brought out what was then the biggest cruise ship in the world in 1998 as staff captain on the *Grand Princess*, 109,000 tonnes, 3,000 passengers (we were overtaken by Royal Caribbean about a year later). I was promoted to Captain in 2002, and gradually commanded most of the Princess vessels. I'm now Senior Master of the Royal Princess, our new vessel, which is 144,000 tonnes and 330 metres long.

Tell us about your work as a trainer?
While trying to keep updated in our industry, I've found that it's good to go back and share knowledge with young people. It's all very well having training colleges, but you need to hear from serving Masters. When I go back to [Carnival's] training facility at CSmart, we can input some practical reality into the courses they operate. My particular subject is BRM and shiphandling, and in particular keeping updated with all the latest technology and how it is put into practice out at sea.

What are some of the things you enjoy about working with The Nautical Institute?
It's fascinating to see a cross-section of the world at one table, and to see how decisions which are central to the way we operate are taken, although we are from every country in the world. That internationalism is the great thing about the maritime industry.

In June, 11 cadets from The National Maritime College of Ireland in Cork visited the *Royal Princess* during a port call, along with their two lecturers and training manager James Halle. They had a bridge visit with Capt Nash (centre), followed by a tour of the machinery spaces and control room with the Chief Engineer, and then a tour of the ship and lunch.

DP operations

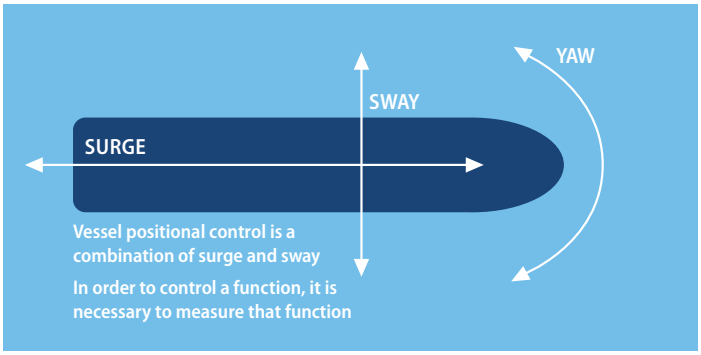
Part I – basic principles and systems

Those who have worked for all or most of their career on conventional vessels might not be aware what DP can do, or how powerful and sophisticated a system it is – or of its limitations. In a series of articles, *Seaways* looks at how DP operates, some of its many applications, and at what to do when the system doesn't work as it should.

Captain David Bray
FNI

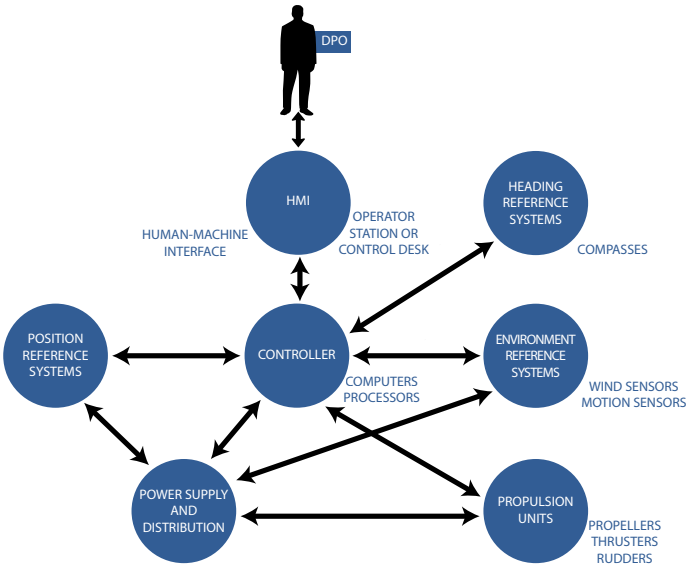
Dynamic positioning is a vessel capability provided through the integration of a variety of individual systems and functions. Dynamic positioning ability can be defined as a system that automatically controls a vessel's position and heading exclusively by means of active thrust.

The hearts and brains of DP systems are the computers, usually referred to as *controllers*. These receive feedback data from a great variety of sources and generate propulsion commands by which the vessel is controlled and manoeuvred. In any control-engineering scenario there is a *set-point* value, which is the desired value. In DP operation there is set-point position and set-point heading, both input by the watchkeeping officer or DP operator (DPO). Measured values of position and heading are continually fed back into the controllers, while the difference between set point and feedback is termed *error* or *deviation*. The controller computers continually adjust thrust commands to reduce these errors to – or maintain them at – zero. The variables under the control of the DP system are the position of the vessel in both alongships (surge) and athwartships (sway) directions, and the vessel heading (yaw).



Vessel movements controlled by dynamic positioning

All modern complex control systems, such as DP, use mathematical modelling techniques as part of their control functionality. The system contains a mathematical model, or description, of the vessel's dynamics. This is used for continuous prediction of future vessel positions, headings and velocities. The data are continually compared with the corresponding measured values, allowing the computation of corrective thrust commands. A DP system is an example of an automatic closed-loop control function.



Elements of a DP system

The mathematical model contains static data on the vessel parameters, but it is also an adaptive feature. The analogy is that of steering a vessel by hand. Although skilled at steering, a helmsman will take five minutes or so to get the feel of the vessel after taking the wheel. The DP system does the same: the mathematical model takes up to 30 minutes to adapt fully to the vessel configuration and the present environment. Subsequently, the system adapts to changes in the vessel or environment, just as helmsmen will adapt their steering to changing sea states. It is normal to allow 30 minutes as a model-building period, or settling time, to reduce oscillations in position and/or heading. In recent years some system manufacturers have shortened the modelling period to 10-20 minutes. In safety-critical operations 30 minutes is still recognised as a standard settling period.

In modern vessels, controllers are often configured as part of a fully integrated local area network covering all vessel control and monitoring functions and facilities. The controller facility may be provided either by one processor operating alone or, to provide a level of redundancy, by an array of two, three or more. If two processors are provided, then one is online while the other acts as a back-up. If three are installed, then there exists the possibility of 'voting' or triple-modular redundancy, with one unit online and two backups. All critical computations are thus triplicated and compared.

The system is controlled and operated using the DP console, or desk, containing operational controls, buttons, screens and manual joystick. This console should be located in a position affording a good view of

the surrounding sea area, and is usually on the bridge or pilot house. Most modern systems function under a version of Windows so will be a familiar environment to the PC-literate DPO. DPOs are a vitally important part of the DP system. They are, of course, required to be fully competent to conduct DP operations.

Position reference systems

For any variable function to be controlled, the variable needs to be accurately measured. The controllers therefore require accurate and reliable data on vessel position and heading, so DP systems are interfaced with gyro compasses and a variety of position reference systems (PRS). Gyro compasses are fitted in duplicate or triplicate according to the level of redundancy desired. A more recent development is the fibre-optic compass. This device provides a full compass facility from a solid-state (ie with no moving parts) unit. Solid-state units are often configured to provide other vessel attitude data such as roll and pitch.

DP needs a greater level of precision than is required for conventional navigation. Accuracy of vessel positioning is limited by the precision of the PRS, and typical positioning accuracy of a DP vessel is within 1–2 metres. Position reference is therefore required to be in the area of 1 metre or better. The PRS can be satellite-based (GNSS, DGPS, GLONASS, Galileo), optical laser (Fanbeam, CyScan, Spot Track), microwave-based (Artemis, RADius and RadaScan), underwater hydroacoustic (HPR) or mechanical (taut wire). DP systems are enabled to receive and pool data from two or more PRSs, determining a 'best-fix' position from all monitored data. The more PRSs that are in use at any one time, the greater is the precision of this best fix and the lesser is the impact of the loss of any one.

Power and propulsion

The vessel is ultimately under the control of the propulsion units – propellers, rudders and thrusters – so all these need to be interfaced into the DP system. Propulsion commands are sent in respect of pitch, rpm, azimuth and rudder angle, while feedback from all units is continually monitored. The DPO must continually monitor the set-point and feedback values for each propulsion unit, because although a discrepancy ought to generate the appropriate warnings and alarms, a failed thruster does not necessarily trigger an alarm. This is because in stable conditions the commands may not vary by much.

The power supply is very much part of the DP system. A power problem will have an immediate knock-on effect to the DP system and vessel capability. Most DP-capable vessels are diesel-electric, thus the diesels, alternators, switchboards, cabling, propulsion motors and power-management system all form part of the DP system. Diesel upstream systems – cooling, lube, control and fuel – must also be regarded as part of the DP system. A water-contaminated fuel day-tank may cause one or more diesels to stop, resulting in an immediate power shortage. The vessel may not have sufficient power for all the thrusters and propellers, so a position loss may occur.

Sensors and peripherals

The DP controllers need feedback about the environment in which the vessel is operating, especially continuous and accurate data on vessel roll and pitch angular values. The data are provided by an inertial motion sensor called a motion reference unit (MRU). This device outputs not only roll and pitch data, but also heave values, together with rate (velocity) data on each of the three measured values.

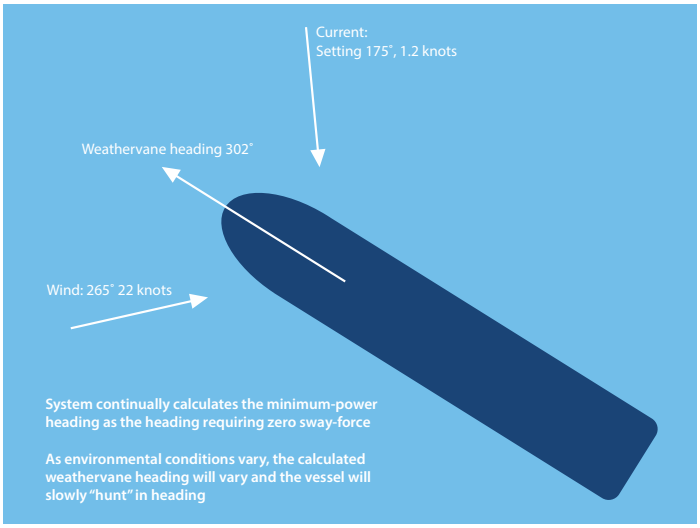
Another element of the environment requiring measurement is the wind, and a number of transmitting anemometers are installed. It is not unusual to find three wind sensors installed, using two different principles.

The system needs to be able to react rapidly to large changes in wind speed and direction, and the mathematical model is not always able to respond rapidly enough. For this reason, a function known as 'wind feed-forward' will bypass the mathematical model in the case of radical changes in wind speed and/or direction and generate compensating thrust directly.

A further environmental value needed is current. It is not possible to obtain representative values for the current from any vessel-mounted sensor, so values are deduced or estimated. In effect, the current value shown on screen is what forces remain when all known measured forces are accounted for. A continuous discrepancy between predicted position within the mathematical model and measured position derived from the PRS indicates a current. This 'current' value is only a *deduced* value and not a real measurement, so it is subject to error.

System functions

The main function of DP is to enable the vessel to maintain a fixed position and heading, and to make changes to that position and/or heading in a controlled manner. To that end, facilities are provided to allow the DPO to select a new position. This may be defined as a range/bearing from the present position, or in global coordinates such as UTM northings and eastings, or lat/long. Alternatively, a simple input of metres ahead/astern/port/starboard may be utilised. The vessel may then be moved to that new position at a specific speed. Likewise, the heading of the vessel can be adjusted to a new value at the desired rate of turn. A further heading-related facility is the optimum heading, or 'weathervane' function, in which the vessel's minimum-power heading is continually calculated in relation to the combined wind and current vectors, and the vessel 'hunts' this continually changing value. This facility may be of value in some situations, but not in others.



Weathervane or optimum heading facility

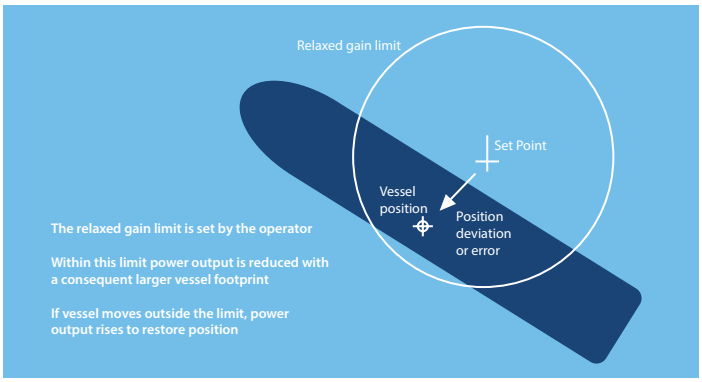
This relates to the *auto positioning* function of the DP. The system also allows the vessel to be controlled by means of a joystick. This facility enables automatic integration of propulsion units, letting the DPO use a single joystick to control position and/or heading manually. Additionally, many vessels have an independent joystick facility (IJS), separate from the DP system and controllers.

System gain

Gain, sometimes referred to as 'sensitivity', is the relationship between the vessel's positioning situation and the power used. Many DP systems have three gain settings, low, medium and high, resulting in a choice of response time. In general, low gain is employed in calm weather, or where positional precision is not a prime concern. Low gain settings may reduce fuel consumption. In a high gain setting, proportionally more power is used in order to maintain a tighter position, for example in position-critical operations or in more severe weather. Another function is known as 'relaxed gain' in which the vessel's set-point

position is expanded into a disc of specific radius (selected by the operator). Within this area the vessel is allowed greater freedom of movement, power being increased only when the vessel approaches or passes the limit of the area.

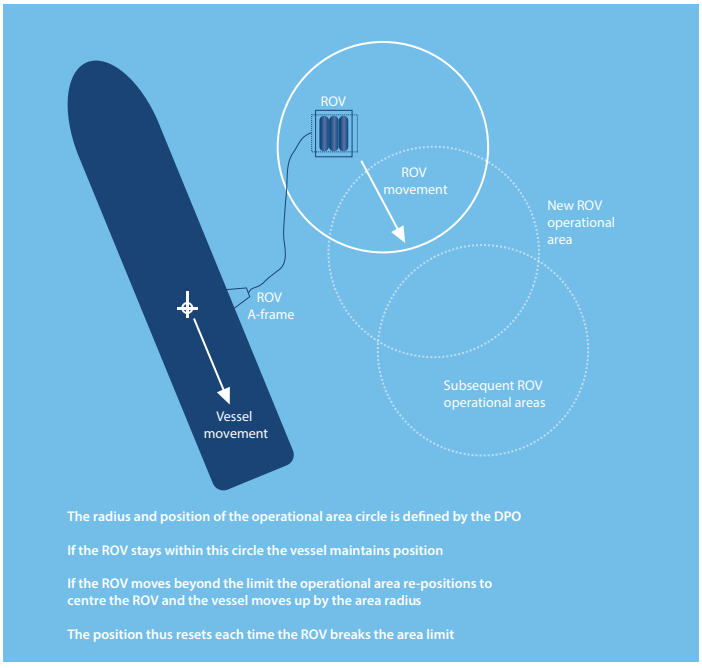
In modern DP systems, further adjustment may be made to the positioning ability in order to conserve power and fuel. A gain setting is also applied to the joystick control, with a variety of alternative control selections.



The relaxed-gain facility

The follow-target facility

The follow-target facility is often employed by vessels that need to maintain position relative to a moving target rather than to a geographical location, such as ROV support vessels and vessels operating pipe-trencher units. A common method of conducting such operations is known as 'dog-on-a-lead'. With this method, the DP system is configured to use a single PRS, which is an acoustic beacon located on the ROV or trencher. To the DP system, the vessel is stationary, as the beacon is a fixed entity, whereas the vessel is actually trying to maintain position relative to a moving target. However, because problems can arise from this procedure, it is not recommended. Often, the agility of the vehicle is greater than that of the vessel, which struggles to keep up. The DP system generates a false current within the model. Also, it puts control of the vessel's movements into the hands of the ROV pilot rather than the DPO.



The follow-target facility

To overcome these problems, system manufacturers provide a specific 'follow-target' or 'follow-sub' mode of operation. In follow-target mode the ROV acoustic beacon is designated 'mobile', so the DP system does not include it in the PRS pool. Instead, that beacon is designated the 'follow' beacon. The DP system must be configured with other PRSs (eg DGPS) in the normal manner. A geographically fixed circle (radius defined by the DPO) is placed around the ROV and this becomes the ROV's operational area. The ROV (with beacon) can move freely with the vessel on a fixed location. If the ROV breaks out of the circle, the DP reacts by adjusting the vessel position by an amount equal to the radius in the appropriate direction and generating a new circle. This continues as many times as necessary. The DP system avoids generating a false current value, while the DPO retains full positional control of the vessel.

Another way in which the follow-target facility may be used is where the vessel has to be positioned relative to a slow-moving target such as a DP offtake tanker loading from an FPSO. Variations on this theme may be referred to as 'follow rig' or 'follow ship'. Because the FPSO is anchored and weathervaning, the offtake tanker loading in tandem must match this movement. In this case, the operational area consists of a target box located on the FPSO's stern reference point. The tanker carries an imaginary bowsprit, the end of which must be maintained within the target box. Provided the bowsprit end point remains within the box, the tanker maintains a fixed position. This position is adjusted when the bowsprit end breaks out of the box as the FPSO moves. A similar facility may be used by a DP supply vessel working the FPSO.

Autotrack or track-follow

The autotrack facility allows a vessel to track slowly along a predefined line, itself defined by waypoints. This facility may be useful in vessels conducting cable-laying or pipelay operations, dredging, rock dumping or surveying. Whatever the type of operation, a comprehensive plan of the track will be compiled, with full details of vessel speed and heading on each leg of the track and points where the tracking may need to be temporarily suspended. A numbered listing of the track waypoints and their coordinates is compiled, with attention paid to such details as chart datum and co-ordinate frame in use. The track file may be compiled by the surveyor, away from the bridge, and imported into the DP system.

The autotrack facility

DPOs will need to familiarise themselves with all the permutations of autotrack settings and configurations. They should know the exact reaction of the vessel to each of the menu choices. The DPO specifies how the vessel will handle a waypoint passing (does the vessel stop on the waypoint or proceed around a radiused turn, and does it slow down on the turn?) and any track offset. Offset facilities may be useful for making small adjustments to the track placement while the tracking is in progress. Alternative offset strategies are available.

A further variation on the autotrack theme is the 'move-up' function. If operating a pipelay vessel, it may be necessary to move the vessel

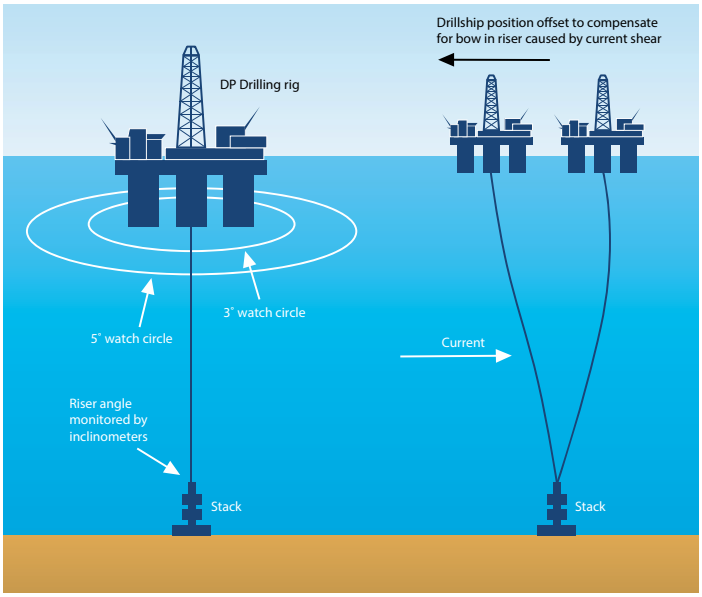
forward a distance equal to one or two pipe-joints (12m or 24m) at frequent intervals. Having compiled the autotrack, the vessel can be operated in the move-up mode, with a single move of the required distance initiated at the push of a button.

The commonest mode of autotrack operation is the low-speed option. Here, vessel heading is under the full control of the operator. The vessel does not necessarily sail along the track in a conventional bow-first manner. The vessel heading may be adjusted to give a lee for the operational elements, or the vessel may maintain a weathervane or minimum-power heading during the tracking. Vessel speed is limited to 3 or 4 knots in this configuration. An alternative option is high-speed autotrack, or 'auto-sail', in which the full cruising speed of the vessel is available. In this configuration, vessel heading is dictated by the system, the vessel navigating in a more conventional bow-first manner on main propulsion only.

Riser angle or riser follow mode

This function is of great importance in deepwater drilling operations in which the critical factor is the management of riser angle. The riser is the pipe containing the drillstring, supported from the drillship and connected to the seafloor wellhead or stack assembly. This connection is known as the lower flex joint (LFJ) and conducts the rotating drillstring through to the well. It is vital that the riser be perpendicular to the stack, otherwise damage will occur to the drillstring and wellhead components. Riser difference angle is monitored via sensors located above and below the LFJ and fed back to the pilothouse and the DP system. Typical angular criteria are 3° (amber) and 5° (red), although these values will vary from ship to ship. Up to 3° riser difference angle, drilling proceeds normally. If the riser difference angle reaches 3°, drilling stops and preparations are made for a riser disconnect operation; this must be initiated if the riser angle reaches 5°.

Riser difference angle is affected by tidal flow, as the riser bows



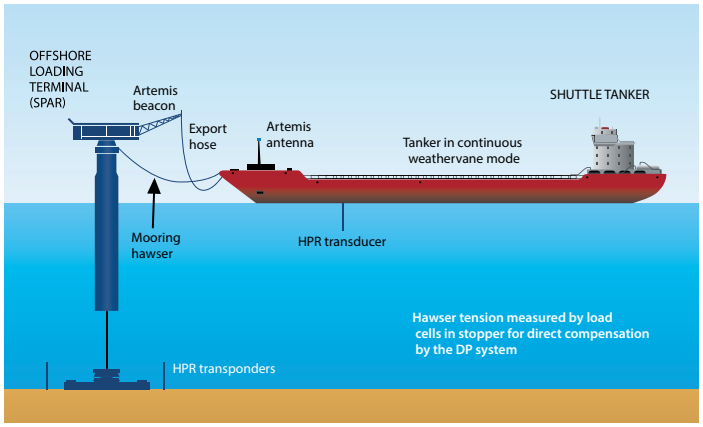
Riser angle mode of operation for drillships

down-tide. The DPO compensates for this by moving the vessel. In deep water there may be a complex tidal shear pattern, resulting in an irregular riser profile. In 'riser angle' mode, the DP system receives feedback from the riser-management system, and displays the 3° and 5° watch circles on screen. These circles will drift on screen as tidal conditions change, and the DPO will adjust the vessel position and heading to maintain angles within limits. In this type of operation, therefore, the DPO is less concerned with the vessel's actual position than with the riser feedback.

Shuttle tanker functions

This is a specialist DP configuration, not found in or required for other types of vessel, and many of the DP functions are specialised too. A shuttle tanker will almost always work in a weathervane mode, as the power-to-weight ratio of these vessels precludes adopting any other heading. The tanker will be configured to load from one or more specific offshore loading terminals (OLTs), which may be fixed tower structures, floating towers, submerged turrets or FPSOs. The position and other characteristics of the OLT are contained within a file in the DP system, accessed from a 'select OLT' menu.

The vessel will approach from a downwind or down-tide direction, keeping the OLT ahead, transferring into DP control at an appropriate point (usually outside the 500m zone). The DP system will have an 'auto-approach' function, allowing the DPO progressively to reduce the distance from the OLT. All the time the vessel is maintaining a weathervane or minimum-power heading. Once on the defined position circle, at the correct distance from the OLT for the loading phase, the DP is selected into the 'loading' function. With the loading hose connected, the vessel is maintaining a fixed distance from the OLT, while weathervaning around that point. Position is continually adjusted to keep the OLT ahead and the vessel on the minimum-power heading.



OLT loading

Auto-area mode

A further variation on the automatic control of positioning is 'auto-area'. In this function, the DPO is able to specify a geographical area of any size, usually circular though it may also be elliptical. This becomes a 'loiter' area, in which the vessel drifts. When the vessel crosses the area boundary, power is gently applied, and the vessel is slowly restored to the centre of the area.

External force compensation

Some vessels under DP control experience a variety of external forces that need to be compensated for. An example of this is the pipe construction vessel, laying pipe using a stinger assembly at the stern. The stinger is a rigid support ramp taking the pipe from the pipe deck into the water. From the end of the stinger to the pipe touchdown point on the sea floor the pipe is unsupported and must be kept under tension to maintain the correct catenary profile. To enable pipe tension to be maintained, the pipelay engine is programmed to feed pipe tension values back to the DP system. Thus the DP system and DPO are able to manage the thrust requirements for compensation.

Loss of stability

Recognising the problem – and what to do next

Captain Murdo MacLeod
FNI

For the qualified maritime officer or Master, stability does not, in itself, create any difficulties. But how many are prepared for the reality of losing stability? Or even to recognise when they might be approaching such an event – let alone considering what they might do should it actually happen to them?

A bulk carrier loaded with iron ore would be 'stiff', with a roll period of under 10 seconds, while a bulk carrier loaded with a timber cargo stacked several metres high on deck with a roll period of 30 seconds would be 'tender'. Both can run into stability problems. The Master of the vessel carrying iron ore must take care that the amount of moisture contained in the ore cargo is safe to load and transport safely to the discharge port. The timber cargo may absorb a substantial amount of water if the ship runs into inclement weather; the Master has to manage this and balance it against fuel and water consumption.

If in command of a vessel in a 'tender' condition, or with a small GM, and the roll period begins to lengthen significantly, you might well have a problem. If you also have a lot of tanks with free surface, whether ballast, fresh water or oil, the vessel could well be on the cusp of losing stability. Both iron ore and timber carriers have easy stability calculations and also give relatively easy ways of showing when they are heading for trouble: the roll period starts to increase.

Knowledge of suspect cargoes such as grain, ores, cement and timber is a must

On a general cargo vessel, care must be taken when loading cargo such as heavy machinery where you are unsure of the actual weight loaded or the height of the centre of gravity above the deck. Working out the vessel's stability is a must. When the required data is not available, or calculating time is running out, then common sense can help ensure you don't run into loss of stability issues. If when you load a piece of equipment the vessel lists or rolls, that is the first sign of danger. If you have no draught restrictions and have some double-bottom (DB) tanks empty, to fill one tank on each side would remove all stability doubts. However, while DB ballast tanks are the easiest way of addressing the issue, one must pay attention to free surface.

When a vessel loses stability it is sudden and unforgiving. It is too late to start thinking about things. There is only one way out of the problem: you must regain stability.

"When a vessel loses stability it is sudden and unforgiving. It is too late to start thinking about things. There is only one way out of the problem: you must regain stability."

What happens when you lose stability?

When a vessel loses stability, the GM has reached zero. The vessel will not remain stable or upright; you will no longer have a GZ lever trying to regain that position. All you have left is buoyancy. The centre of gravity no longer dominates; it has been usurped by the centre of buoyance – and it will remain this way until you regain stability.

The ship will roll or loll one way or the other. There is no control over which way, because the vessel's buoyancy dictates the position. This is the 'angle of loll' – a very precarious position. Whatever angle you end up at – say, 20° to port – you have nothing to stop you going from one side to the other – a roll of 40°. Only when you pass the angle of loll on the other side will you again start to get a righting lever, which will pull you back to the last angle of loll position. Again, there is nothing to stop you when you get there. If you thought a 10-second roll period was difficult to cope with, imagine doing a 50° roll in a couple of seconds, then another and another.

However far over your angle of loll, you can roll again, and in an instant. If the crew remain unhurt and on their feet, they will be lucky. But they won't know when the next loll will occur, as it will depend on factors such as weather, rudder and other outside events.

To give you some idea of what everyone on board is up against,

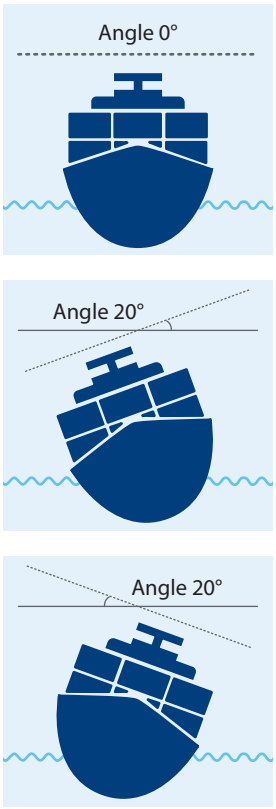
imagine you have an angle of loll of 10° and loll to the opposite side. The vessel will go through an arc of 20° before it encounters any righting lever.

Say you were 5 metres above the centre of buoyancy, the position under your feet would move approximately 2.5 metres. There would be no way you would keep your feet, or for that matter prevent yourself from being thrown across the vessel, unless you had a firm hold on something. And if you increase the height, increase the distance. On the largest cruise liners, some of which have the bridge 40 metres above the water line, with a draught of 9 metres, the forces generated could easily cause serious injury.

Regaining stability

If a ship has a list, it can easily be corrected with ballast. If you lose stability, the vessel will heel, but it will no longer be a list; it will be an angle of loll (AOL), which is a very different matter.

To recover from an AOL, there is only one solution: regain positive stability. If you can, get someone to open a valve to a double-bottom tank, always starting with the low side. Your loll will increase initially, which shows you are on the right track to regain positive stability and control. By the time the tank is full, you should have regained stability. The ship will no longer be swinging like a pendulum; it will have regained stability, albeit with a list. Then fill the opposite DB tank until the vessel is upright.



The importance of speed

Once a ship has started to loll, the time you have to react to save yourself, your crew and your ship is very limited. You will have no time to ask for advice or check anything. If you have time to react to the first loll, do so immediately. Sound the alarm. If you have crew or passengers to save, take immediate action.

On 6 March 1987 the *Herald of Free Enterprise* went through the process of losing stability, angle of loll, touching bottom and sinking in a matter of minutes, having sailed with the bow door open. It happened so fast that nobody could have prevented it once the first cubic metre of water had entered the vessel.

Prevention will always be better than any cure. Knowledge of suspect cargoes is a must, in which I would include, grain, ores, cement and timber. On all other vessels, poor stowage or lack of proper information about cargo loaded can be a problem. Collisions, groundings or any other incidents that allow the ingress of water, as occurred in the case of the *Herald of Free Enterprise* and *Costa Concordia*, can also lead to loss of stability. It is always better to be prepared for the situation if your hull is damaged or you suspect it of being damaged.

Conferences

Reporting back from conferences, seminars and discussions across the maritime world. Join the discussion at LinkedIn, or email **editor@nautinst.org**

OIL SPILL INDIA

➔ The Oil Spill India conference in New Delhi was an impressive gathering of more than 100 delegates from the Indian coast, including several Indian oil majors, the IOPC Fund, the International Group of P&I Clubs, and several vendors, including one accredited by The Nautical Institute for Marine Oil Spill Response.

Oil spill response infrastructure does not appear to be a priority area for the Indian government and there is no unified command structure and jurisdictional clarity, though the Coast Guard has assumed national responsibility. Sadly, it will probably take an actual oil spill or two to shake the establishment out of its slumber – but there is an alternative. Speaking on behalf of The Nautical Institute as an ex-President, I spoke about mitigating navigational risk: preventing spills as a preferred option to responding to them.

Navigational risk in Indian ports

There are many ways in which oil can spill into water. The most common way for this to happen is from a ship's fuel or cargo tanks in the course of navigational or oil custody transfer accidents. Spills from ship accidents can be intense, though they are not on the same scale as a spill from a platform such as the *Deepwater Horizon*.

Marine traffic around the Indian coast is getting increasingly heavy, especially close to the busy ports and harbours. We need to put together an effective, efficient national response structure. This has to be done urgently. Another key step in preventing pollution risk is to tackle navigational risk in Indian ports.

When it comes to preventing pollution risk, the rest of the world has a head start of a couple of decades over India. The International Maritime Organization (IMO) has mandated double-hull oil tankers, e-Navigation, and upgraded seafarer competency certification. Flag and port states have ensured enforcement of marine pollution regulations. Client inspections of ships by oil majors and RightShip have enhanced ship safety beyond minimum statutory standards, and while Indian fleets struggle a bit with these inspection regimes, they have managed to keep up. Overall, there is no major safety concern in the way ships are maintained and managed. The survival of the shipping industry is determined by its ability to meet the highest international benchmarks.

The port industry is a different matter. By its very nature, a port thrives on local protection in every sense of the word. It is a capital-intensive, long-term venture. It enjoys geographical advantage with minimal competition. Ports do not easily adapt to change, anywhere in the world. Another significant feature of the port sector, especially in India is its so-called autonomy and self-regulation. There is no effective regulatory body to ensure compliance with international standards. To give you an analogy, even the best operated aircraft in the world will be at risk if the airport infrastructure is outdated and rickety.

OSR regimes worldwide

Over 25 years, I have travelled over every ocean in the world. There are four distinct regional trends in how port states mitigate the risk of oil spills.

- The American way:

  US pollution risk management tends to focus on response and clean-up, and is punctuated by clean-up cost liability regimes, financial guarantees, expensive oil spill response infrastructure, penal action, arrest of ships and mariners. Not much is done in terms of preventive action.
- The European approach:

  The emphasis shifts from response to prevention, with sound vessel traffic management services (eg: the traffic separation scheme in the English Channel), adequate port infrastructure in terms of pilotage, tugs, navigational aids, under-keel clearance, channel width protocols. Europe also mitigates risk through vessel age restrictions, a robust port state regime and high discharge/emission norms for ships.
- The Japanese mind-set:

  A combination of American and European standards plus a high level of operational control. Most Japanese ports place experienced mariners on every tanker ship to minutely oversee all operations from arrival to safe departure. This is done with clockwork precision and near zero uncertainty of schedules.
- The Indian philosophy:

  This is based on a Karmic approach of 'What has to happen will happen'. There is little strategic depth. Planning is undermined by poor execution.

This means the Indian port sector is in a high risk situation with marine traffic increasing as trade grows steadily. The port infrastructure is not geared up to meet the demand for volume and quality of port operations, especially in the navigation of ships in ports and fairways. Some of the key issues are:

- Hydrographic data and under-keel clearance policies are not shared with ships.
- Inadequate tug support – low power, not enough tugs attending, push but do not pull.
- Jetties and terminals are unsafe in some ports.
- Vessel traffic management is ineffective. Navigation channels are clogged at times of peak traffic.
- Pilots disembark and sometimes embark far too close to the ports and breakwaters instead of at the designated pilot boarding points.
- Standard operating procedures are not comprehensive and do not conform to any benchmarks.

The silver lining is the human element in the form of high pilot and mariner competency, mitigating risk through sheer experience.

Prevention is better than cure

Prescriptions for Indian port sector:

- Structural reforms in port sector governance and regulation. They will benefit hugely when headed by persons with operational background in ports and shipping.
- Benchmark global standards in port operations. After all, Indian port tariffs are often two or three times those of the world's best-run.
- Invest in infrastructure – modern terminals and jetties, better navigational aids, effective tug and VTS support, oil spill response kits.
- Coastal regulation of marine traffic.

In the big picture, upgrading the port sector will lead to safer ship operations. This in turn will help mitigate the risk of maritime incidents, including the dreaded oil spill. Isn't prevention much less painful than cure?

Captain Sivaraman Krishnamurthi FNI

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David Patraiko FNI rounds up the latest news, releases and events affecting the maritime professional throughout the world

Manning costs

The cost of ship operations grew considerably in 2018, compared with a very small increase in 2017, according to the latest Manning Annual Review and Forecast report from shipping consultancy Drewry. Part of the cost was due to a modest rise in seafarer pay, which is predicted to continue based on a continued shortfall in officer numbers.

Manning costs have risen moderately in 2018 following several years of stagnation as a recovery in most cargo shipping markets has taken some pressure off vessel operators, enabling employers to lift wage levels.

'This follows several years when average seafarer pay had flat lined because the depressed state of most cargo markets had made wage increases almost unaffordable,' said Drewry's director of research products Martin Dixon. 'Owners were forced to make all attempts to stem rising financial losses.'

The return to wage growth has occurred despite the shortfall in officer numbers receding to more manageable levels. But the shortage is expected to continue for the foreseeable future despite projected stagnation in the vessel fleet, as longer leave and shorter tours of duty increase man-berth ratio requirements. Meanwhile, officer supply growth is projected to slow further. By contrast, ratings supply has always been in surplus and is anticipated to remain so.

'The growth in supply of seafarers has been slowing and is projected to slacken further over the next five years,' added Dixon. 'This slowdown in the available maritime workforce has important implications for shipowners, particularly in terms of recruitment, retention and wage costs.'

Looking ahead Drewry expects the pressure on vessel operators' costs to continue to dampen wage inflation. The International Transport Workers' Federation (ITF) is yet to agree new wage scales with employer organisations to take effect from January 2019. But Drewry does not expect the award to lead to a notable rise in average salaries as many seafarers are already paid above these minimum levels.

Drewry expects average manning costs will rise moderately over the next five years. Stronger vessel earnings and competition for scarce officers certified to crew specialist ships will also be drivers of slightly higher wage growth in this period.

Seafarer happiness

The Crewtoo's biannual Seafarers Happiness Index survey showed a decline in happiness since the last survey in 2016, with isolation and poor working practices posing serious threats to the reputation of the profession and the ability to recruit.

Seafarers, nearly 60% of whom were from South East Asia and the Indian Subcontinent, were asked to mark their happiness out of 10 on a variety of measures. Total happiness among seafarers declined from 6.41 in 2016 to 6.25 in 2017. Workload and onshore facilities presented the largest setbacks, while onboard interactions and friendships were seen as the best part of the job. The most divided issue was connectivity with family and home. Where internet access was available to seafarers, happiness was marked very highly, but without it, connectivity was a significant source of discontent.

According to Steven Jones FNI: 'We often see discussions around the recruitment, retention, training and provision for seafarers in the shipping industry. However, these conversations are too often based on assumption and anecdote rather than real data. By re-launching the *Seafarers Happiness Index* we are working to provide reliable information so that the industry can build a sustainable workforce for the future of the industry.

'Seafarer happiness is a key measure of progress and growth, as well as a tool to understand how we safeguard the future of the industry. Already we have seen patterns emerge when it comes to making a career at sea appealing. Seafarers don't shirk from hard work for fair pay, but like all of us they need mental and physical down-time. Too often it seems seafarers lack outlets like the opportunity to talk to family, exercise, take a break onshore, or even get enough rest. On board, a seafarer gives their entire work-life balance over to the schedule and facilities provided for them. Without respite from work and colleagues, problems and pressures build and fester. We must work to make life at sea happier.'

For more information visit https://www.missiontoseafarers.org/news/progress-and-growth

Engine damage

Statistically a vessel will suffer between one and two instances of main engine damage during its lifetime, states a report from the Swedish Club. Considering the costly consequences for shipowners and their hull insurers, it is important to identify the main causes of this damage and examine how they can be prevented.

The report identifies that main engine claims account for 28% of all machinery claims and 34% of the costs, with an average claims cost close to $650,000. Lubrication oil related failure is the most common cause of damage. The most expensive type of damage is on crankshafts and associated bearings with an average cost of $1.2 million per claim.

Peter Stålberg, Senior Technical Advisor, explains: 'Our research shows that bulkers and tankers are the best performers for claims cost in comparison with club entry. Most of these vessels have slow-speed engines. Conversely, passenger vessels/ferries have the highest frequency of main engine claims – 0.066 claims per vessel and year. Often these vessels have multiple medium-speed engine installations. The same is also true for ro-ro vessels.'

The publication also includes loss prevention advice from the major engine manufacturers, MAN and Wärtsilä. The full report can be downloaded from https://www.swedishclub.com

In this feature we take a close up look at a NI branch. If you'd like your branch to be featured in this section email **editor@nautinst.org**

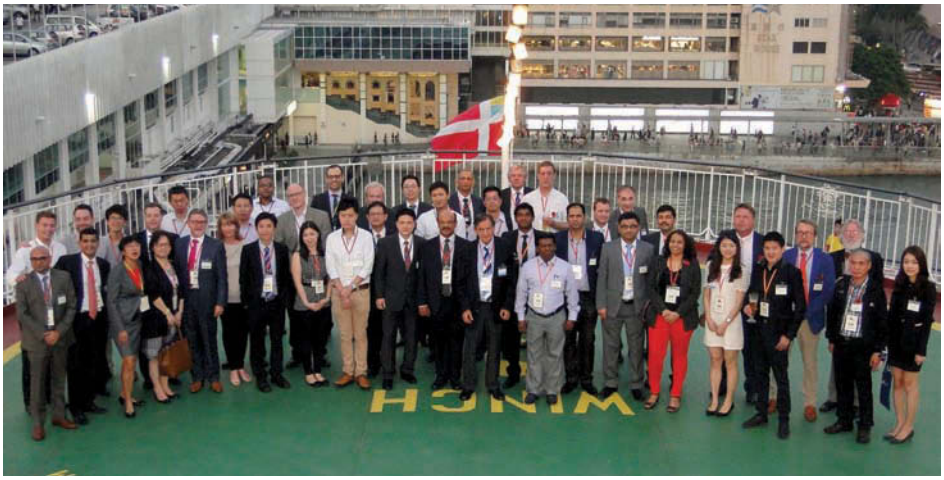
What keeps the Hong Kong SAR branch ticking?

Tell me a bit about your branch – when was it formed, how many members do you have?
The branch was formed officially in 1985, and generally has around 100 members. This figure has been fairly stable, but now that Hong Kong is training cadets again, we hope to see a gradual increase in our membership. We also expect to see an increase in both seagoing and female members.

How often does your branch meet?
Meetings tend to be organised whenever an interesting speaker is going to be in town, or whenever an interesting topic presents itself. We aim for a meeting every six weeks. All our events are free, and open to anyone who is interested, and we maintain a list of friends of the branch who regularly attend without necessarily being members. We normally expect between 50 and 60 people at our presentations

Food and drink are normally provided free of charge, and paid for either through sponsorship or from branch funds. These funds are replenished every two years when we organise a major full-day seminar on a topic of interest to the wider maritime community. This raises enough money to fund the branch, and also permits us to make donations to the three charities we support.

What sort of activities do you organise? Are there any topics of particular interest to your members?
Most of our events are presentations on a topic of interest. The speaker is given one hour to present and answer questions, then we adjourn for refreshments.



Delegates at a Hong Kong Branch seminar on Competencies of a Future Mariner

Tales of maritime disaster are always popular, so an insider's account of the *Costa Concordia* wreck and recovery guaranteed us a full house, but it is often the more practical subjects which gain the biggest audience. A recent talk on the maintenance of wires and the consequences of improper maintenance was one of our most popular presentations ever, with a member of the audience even suggesting that our speaker should write a book on the subject. Older members, as always, shook their heads in dismay and pointed out that 'once upon a time' seafarers were taught these things and would not have needed to be told how to maintain a wire.

Saturday morning visits are also popular, and we try to arrange occasional visits to the MRCC, Vessel Traffic Centre, Marine Police and the like. Perhaps the best-attended are trips to local lighthouses, some of which are in truly spectacular locations.

What kind of event do you find most successful?
Our AGM is always a great success, mainly because we incorporate a wine tasting session. The wine supplier returns every year, so he must benefit as well!

How do you engage with your local maritime community?
Our members come from a wide cross-section of the maritime community, so we have excellent links to government, ship managers and owners, surveying companies and maritime lawyers, among others. Several committee members are also appointed to government bodies such as the Pilotage Advisory Committee. Other members are active in voluntary work such as promoting maritime careers in local schools, and preparing local cadets for job interviews. We do our best to maintain a high profile, and the reputation of the NI in Hong Kong remains very good.

Whether this is because of, or in spite of the wine tasting, we have never been sure…

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Founded: 1985
Members: 100

Chairman: Paul Walton AFNI
Vice-chairman: Amit Bhargava AFNI
Secretary: Aalok Sharma AFNI

Upcoming events:
The Hong Kong branch will be hosting The Nautical Institute AGM and Technical Seminar in mid-2019. Keep an eye on *Seaways* for more information on dates and programme!

A round-up of news and events from NI branches across the world. Send your updates to **gh@nautinst.org**

UK SOLENT BRANCH

Annual round-up

The past 12 months have seen a good variety of meetings, some of which were joint affairs with the Royal Institute of Navigation. The meetings were held at the Warsash Maritime Academy, Solent University, Seawork, Red Funnel and Whale Island.

Perhaps the highlight of the year was the evening 'seminar' held on board the *Red Osprey* ro-ro on the Southampton/Cowes crossing. This event was a sell out, with the branch having exclusive use of the Signature Lounge. The Master, Captain Alice Duncan, and the senior Master, Captain Russ Hodgson, made us most welcome and permitted bridge visits during the Cowes turnaround. I am grateful to Martin Phipps MBE and Matthew Parker, the speakers, and Captains Aqeel Hyder and Alwyn Rees, who organised this event. Hopefully, the visit can be repeated next year.

The meeting at Whale Island was very well attended, with over 70 members present to hear Captain Chris Wells, Master of the Queen Mary 2, enthrall the audience with accounts of his handling the QM2 in sometimes challenging circumstances.

In other meetings, Andy Norris looked at the development of autonomous vessels and recounted the work currently being undertaken by the International Maritime Organization.

A sail training meeting was sparsely attended, but the subject was most enlightening.

Looking ahead, we are now being offered venues that can be designated depending on topic, such as Lloyd's Register, Solent University, Red Funnel and Seawork, and I am optimistic for an eventful year ahead.

I would like to thank Henry Rawclif, as Branch Treasurer, Richard Brooks, Secretary, for his sterling efforts, notwithstanding work and family commitments and the other active committee members. Their efforts are most appreciated.

John Noble FNI

US GULF BRANCH

Seafarer mental health seminar

On 20 April, the US Gulf Branch held a seminar on seafarer mental health. The seminar was held in association with the West Gulf Maritime Association, Apostleship of the Sea USA and the North American Maritime Ministry Association. The key speaker was Ray Barker, Head of Operations for the International Seafarers Welfare & Assistance Network (ISWAN).

The hotline typically receives calls about labour matters (employment, non-payment of wages, etc.) and emotional problems, but calls on issues relating to mental wellness are rising, Barker said. While ISWAN's hotline staff are trained on awareness in counselling skills they are not formally trained counsellors, and refer seafarers to a qualified formal counsellor in their language if further help is required. They do have some people from the former Maritime Piracy Humanitarian Response Program on their team. These staff members have more advanced skills in dealing with seafarers who have been affected by piracy.

Factors affecting mental wellbeing

The UK P&I Club estimates seafarer suicides have tripled since 2014, and 15% of identified mental health cases result in suicide. One study estimates that 6% of seafarer deaths were suicide. However, while suicide is more common than we would like to think, the number of seafarers and other individuals with mental health issues is far greater in number than suicide. Mental health is a particular problem for cadets at sea, especially Indian cadets. Social isolation is a key factor here.

Social isolation – defined as the subjective state of being apart from others – is a particular issue for seafarers. Social isolation is as potent a cause of early death as smoking 15 cigarettes a day. Factors contributing to it can include:

- Long voyages;
- Fatigue – watch system;
- Separation from family and friends;
- Crew numbers falling;
- Lack of crew cohesion;
- Lack of shore leave;
- Harassment and bullying;
- Boredom;
- Precarious employment.

Social media

The greater availability of connectivity via social media in recent years is having some effect on reducing social isolation, and many seafarers now expect access to the internet as a matter of course. While this has many benefits, it is not inevitably positive. On the up side, greater connectivity enables better links with family and friends on shore, gives seafarers increased ability to solve problems or ask for solutions, and gives access to news and sports. On the down side, it means that problems that were previously confined to home come aboard, long online sessions can infringe on rest time, and it removes crew from communal areas – causing exactly the social isolation that it should be combatting.

Breaking down the stigma

There is an increasing awareness of mental health issues both at sea and ashore, and it is now accepted that 27% of adult Americans will experience some mental health issue in a 12-month period. This is not a question of 'us and them'.

This message is not necessarily getting through on board ship, where a recent survey by the Sailors' Society found that 45% of those who had symptoms of depression didn't ask for help. Of those who did, 33% spoke to family, and 21% spoke to colleagues. The good news is that we can do something about it. We can help seafarers build resistance, emphasising the importance of:

- Physical exercise;
- Good nutrition;
- Social bonding;
- Mindfulness;
- Positive psychology;
- Pursuit of happiness.

When dealing with stressful problems, seafarers should consider whether they are responding to facts or opinions, and develop a 'helicopter view', taking an overview of problems rather than becoming overwhelmed in detail.

The shipmanager's role

Shipowners and managers should look at factors affecting mental wellbeing, including living conditions, crewing levels and lack of crew cohesion, and seek ways to improve social interaction. Masters and senior officers can play a key role in this. Ensuring access to exercise and healthy nutrition are also important. The Sailors' Society survey found that quality and amount of food are very important for mental health.

Where mental wellness issues have arisen, owners must ensure they provide proper support for crew. While much more research is needed into the best ways to support seafarer mental health, this includes:

- Providing support for crew with mental health issues.
- Creating an environment that encourages the accurate self-disclosure of medical and mental health conditions.
- Mental wellness reviews following traumatic incidents – with long-term monitoring post-incident and follow up where necessary.
- Advocacy campaigns to raise awareness of mental health and to reduce stigma.
- Programmes to train crew to recognise the symptoms of mental health problems in other crew members.

More information can be downloaded at http://www.seafarerswelfare.org.

Fr Sinclair Oubré MNI

The Nautical Institute LinkedIn forum

JOIN THE CONVERSATION

The Nautical Institute has a lively discussion group on LinkedIn
http://www.linkedin.com/groups/Nautical-Institute-1107227

THIS MONTH WE LOOK AT: RISK IN MOORING OPERATIONS

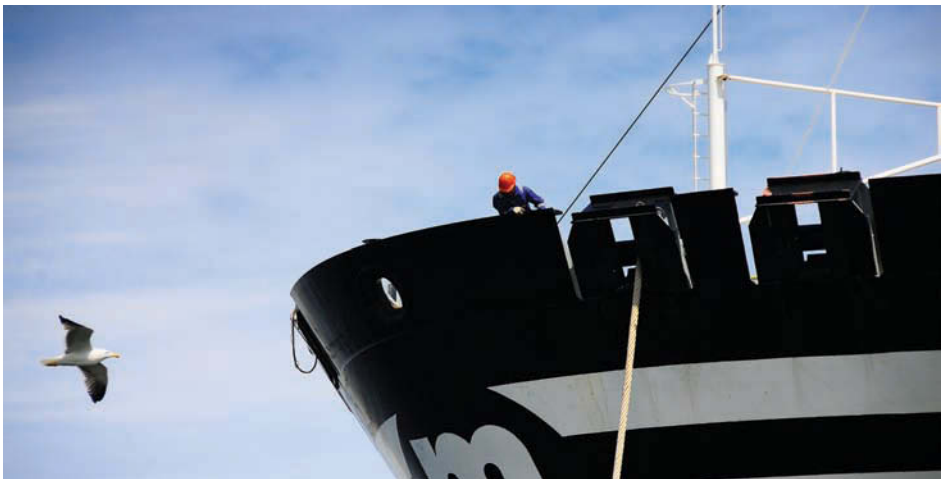
Capt Andilan Era MSM AFNI wrote: We read about many mooring accidents. Engineering design, maintenance, procedures and safety markings such as for snapback zones are involved in some incidents, but we rarely hear questions concerning the crew's proficiency in handling the mooring process.

STCW 2010 introduced the new regulation II/5, which includes proficiency in mooring. However, we have no regulations on minimum number of crew for mooring. There are no statistics giving the number of crew assigned forward and aft when an accident happened. The reduction of crew numbers is forcing some vessels to include engine crew in mooring operations on deck, even without proficiency under regulation II/5 and/or without familiarisation. For sure it affects the engineer's duties and responsibilities as well. How do flag states approve safe manning levels when it comes to mooring?

THE INSTITUTE'S LINKEDIN COMMUNITY RESPONDED:

➔ MSN 1868 explains the UK's requirements for safe manning. These now take a less prescriptive approach. Safe mooring is one of the considerations to be taken into account. Significantly, in view of your question, mooring is listed under 'navigational' rather than 'marine engineering' tasks. One ship I sailed on (very many years ago) it was the cook who used to pop down aft as we approached berths! In fairness I think he had an AB's ticket. I suppose a subsidiary question might be: does STCW preclude a ship's crew's tasks being to some extent interchangeable even if training is given on board? Provided that it does not (and given that some of the most horrific accidents on board occur on mooring decks), such matters should in any event be fully set out in the particular ship's and company's SMS, based on properly conducted risk assessments.

➔ The fourth edition of *Mooring Equipment Guidelines* has just been published by OCIMF. Go to the website at OCIMF.org for details of MEG4.



➔ Give any job to insufficiently experienced personnel and mistakes will be made, we all know that. One day insurers may also come to that conclusion.

➔ Accidents and stress levels are on a steep rise. The above-mentioned problems have only one solution. Manning on ships has become unsafe. At the very least, the MLC should bring in strict regulations with manning requirements.

➔ There is little consideration for the vessel's requirements in the overall picture of a day or a series of days where several ports/mooring stations are undertaken, often several times a day. In this situation, the shortage of competent manning on deck is very telling and leads to a ridiculous degree of juggling and substitution of personnel from other departments. Together with poor knowledge, poor design and poor judgement a further factor is the premature failure of mooring ropes of all types – inevitable due to the use of under-diameter rollers and fairleads on vessels. Furthermore, there is a significant lack of mooring machinery and equipment on vessels, which also leads to over-stressing of ropes and largely under-maintained machinery. Whatever happened to storm wires and storm bollards?

➔ On tankers, the STS booklet gives a minimum number of crew for STS mooring operations (on my last ship, it was six). Again it depends on owners whether to use inexperienced engine/saloon crew for mooring so that they complete the required number. Flag states should come up with rules regarding operational manning rather than safe manning.

➔ Safe manning numbers should include sufficient safe mooring teams at stations fore and aft. Handling of harbour-tug lines should also be taken into consideration. Nowadays I hardly ever see an officer look over the side to communicate with the tug crew. The officer in charge is controlling the winch used and looking more inside than outside!

Received an email from PageSuite?
If you recently received an email from a company called PageSuite (sent on behalf of The Nautical Institute) we can confirm that the email is legitimate and you need take no action.

PageSuite manages the Institute's apps and sent the email to comply with the new General Data Protection Regulation (GDPR).

Our apologies for any confusion this may have caused.

This report attempts to give a representative summary of the discussion – it is not possible to include all comments. To see the discussion in full, please visit LinkedIn.

Representing The Nautical Institute to the maritime industry and beyond

Apostleship of the Sea

Captain Esteban Pacha FNI has been appointed as Vice Chair of the Apostleship of the Sea (AoS).

'As the only seafarer currently serving at AoS's Board level, and also as Fellow of the NI, this is an opportunity for me to contribute to enhance its mission,' Capt Pacha says. 'I will be working to improve the provision of practical assistance and wellbeing to seafarers visiting our ports in the UK and around the globe where AoS is present, contributing to the efforts undertaken this year by IMO and other maritime shareholders to promote seafarers' welfare internationally. I will also endeavour to promote the values of the NI from this new position.'

Harbourmaster appointment

Congratulations to Captain Rene Sirol AFNI, who has been appointed Habourmaster of the Port of Sillamae in Estonia. Capt Sirol is Chairman of the Baltic Branch.

Honorary doctorate

Congratulations to Captain Kuba Szymanski FNI, who has been awarded the honorary degree of Doctor of Maritime Studies by Solent University. Captain Szymanski became involved with the university after witnessing the experiments being carried out at the Warsash Campus for the HORIZON project on seafarer fatigue. InterManager became a partner on the subsequent MARTHA project, and he was directly responsible for the dissemination of the findings to the shipping industry. He has also endorsed the recent Solent-led Effective Crew Project and the Mentoring Seafarers Project.

NI at the IMO

George Hoyt FNI, IMO Ambassador, with IMO Secretary General Kitack Lim at the 120th Session of the IMO Council. George has recently visited classrooms and shelters in India, Philippines, Greece, Cyprus and the United States to promote an understanding of the IMO and the shipping industry.

Visiting Fleetwood

Editorial assistant Laura Nicholls and Assistant Manager Kelly Healey gave a presentation on the benefits of Nautical Institute membership to cadets at Fleetwood Nautical Campus.

Sovereign's medal

Long-time member of The Nautical Institute Captain Angus McDonald FNI has been awarded the Sovereign's Medal for Volunteers by the Governor General of Canada. Captain McDonald was awarded this honour in recognition of his volunteer services with numerous community organisations. Since his retirement Angus has been deeply involved in organising international conferences and seminars on a wide range of shipping issues from cleaner seas to criminalisation of seafarers to Arctic shipping concerns and autonomous shipping.

Smart Shipping Symposium

Chief Executive John Lloyd spoke at the City of Glasgow College's Smart Shipping Symposium in June.

New members

The Nominations Committee has nominated the following for election by Council:

Associate Fellow

Badior, D Captain/Chief Instructor (CAN/British Columbia)
Bathgate, D Captain/Master (UK/Solent)
Bhalla, N S Captain/Master (India (West))
Chowdhury, M H R Captain/Master (Bangladesh (Chittagong))
Glover, B A Lt Cmdr/Maritime Warfare Officer (AUS - QLD)
Iqbal, M K Rear Adm/Master (Bangladesh (Dhaka))
Jara, J Captain/Master (Philippines)
Joshi, A Dr/Senior Lecturer (UK/Solent)
Mehdi, H Captain/Superintendent (India)
Papanelopoulos, G A Captain/Master (GRC/Hellenic)
Porthouse, E Mr/Superintendent (UK/London)
Randhawa, S P S Captain/Director (UAE)
Stirling, D Mr/Marine Consultant/Lead Tow Master (UK/Central Scotland)
Van Schaeren, R Mr/General Manager (Belgium)

Upgrade to Associate Fellow

Korevaar, W T Captain/Master (AUS - VIC)
McEvoy, S P Captain/Maritime Consultant (AUS - NSW)
Michael, A C Captain/Managing Director (Cyprus)
Pigott Jr, D E Captain/Master (U.S. Gulf (Florida))

Member

Bariacto, M J Captain/Master (Philippines)
Benigay, R B Captain/Master (Philippines)
Blamires, J S Mr/2nd Officer (UK/NE England)
Fitch, R M Mr/2nd Officer (AUS - WA)
Gaspar Lopez Mr/SDPO (Mexico)
Innes, G R Mr/Master (UK/Solent)
Judd, J W Mr/DPO (U.S. Pacific Coast (C))
Kostenko, K Mr/Director (Ukraine)
Macleod, J M Mr/Chief Officer (UK/N of Scotland)
McCluskey, L Miss/3rd Officer (UK/NW Eng. & N Wales)
Mendoza Torres, R Mr/DPO (Mexico)
Morrison, C M Ms/3rd Officer (UK/N of Scotland)
Pacheco, A Captain/Master (Philippines)
Prasetyana, H Mr/CO/DPO (Indonesia)
Rahim, M S Captain/Master (Malaysia)
Scarlett, G J Mr/2nd Mate (UK/London)
Short, J Mr/Mate (UK/SW England)
Sumbanon, J D Mr/2nd Officer (Philippines)
Taylor, B L Mr/Master (UK/NW Eng. & N Wales)
Vetrych, V Captain/Marine Manager (Ukraine)

Associate Member

Gandy, J Mrs/Director (AUS - NSW)
Gillanders, J Mr/Deck Officer Cadet (UK/N of Scotland)
Kent, A Miss/Officer Cadet (UK/NW Eng & N Wales)
Mahamed, M D Mr/Cadet/Student (UK/SE England)
Niemiec, G A Mr/Deck Cadet (UK/Solent)
Smith, A D Mr/Deck Cadet (UK/SW England)
Srivastava, A Mr/Deck Cadet (India)
Tulça, C E Mr/Deck Cadet (Turkey)

*Signifies members who have rejoined

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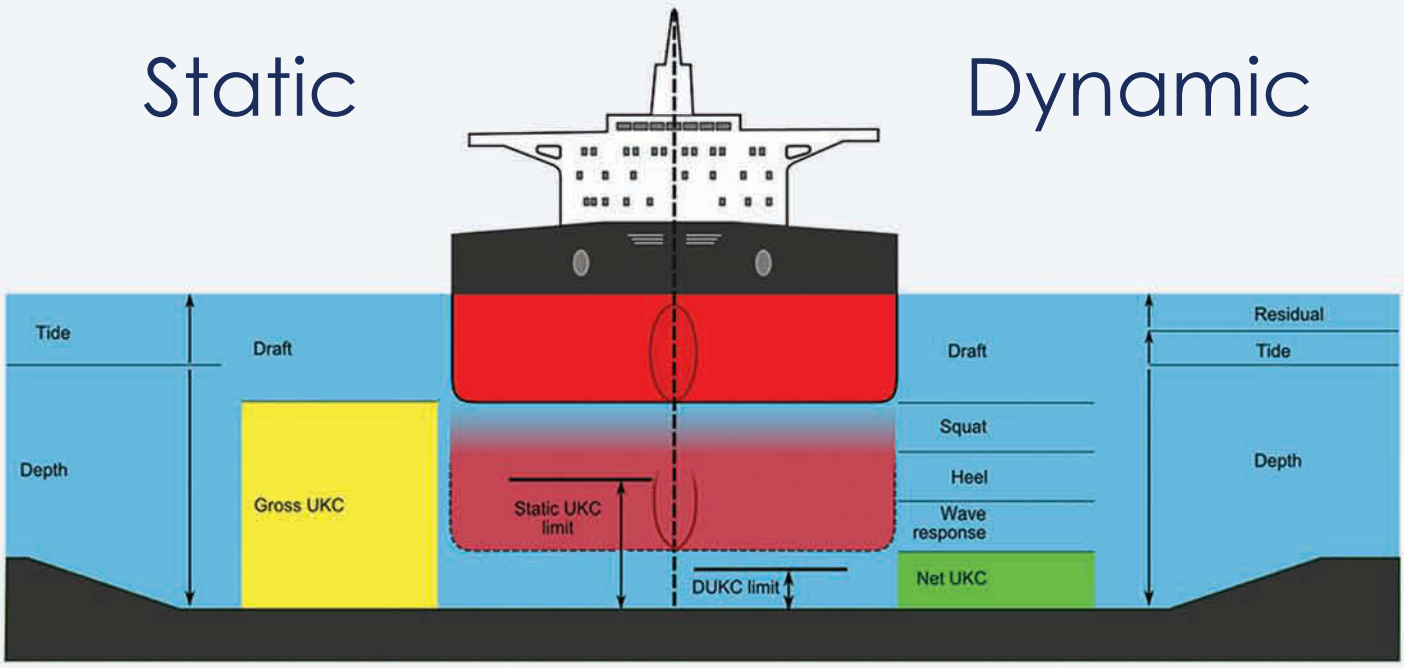

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