September 2018 www.nautinst.org

Seaways

The International Journal of The Nautical Institute

Are you really where you think?

Position validation and resilient PNT **p08**

The Nautical Institute


STAYING IN TOUCH JUST GOT EASIER
FleetBroadband has been connecting seafarers worldwide for the past decade. Now Inmarsat introduces new voice services to help crew stay connected to their life ashore.
CHATCARD
Simple top-up cards keep crew in contact with friends and family
MULTI-VOICE
Easily separate business and crew calls with multiple phone lines
inmarsat
The mobile satellite company
Powering global connectivity
inmarsat.com/fleetbroadband

Contents

September 2018

Seaways
The International Journal of The Nautical Institute

The Nautical Institute
202 Lambeth Road
London SE1 7LQ
Tel:+44 (0)20 7928 1351
Fax:+44 (0)20 7401 2817
Website: www.nautinst.org

ISSN 01 44 1019

Editor: Lucy Budd
E-mail: editor@nautinst.org

Advertising manager:
John Payten
E-mail: jpayten@jpmediaservices.com
Tel: + 44 (0) 1737 852135

Nautical Institute Chief Executive:
John Lloyd FNI
Email: John.Lloyd@nautinst.org

The Nautical Institute President:
Captain N Nash FNI

Vice Presidents:
Captain Trevor Bailey FNI
Captain G H Livingstone FNI
Captain D A P McKelvie FNI
Jillian Carson-Jackson FNI
Captain A Le Goubin FNI
Mr W Vervloesem FNI

Treasurer: Captain D Telfer FNI

Publications sales: pubs@nautinst.org

Membership enquiries:
member@nautinst.org

DP Certification & Training email:
DP@nautinst.org

Seaways is posted to all Institute members. The subscription rate to others is £110.

The Nautical Institute is a company limited by guarantee No. 2570030 and a registered charity in the UK No 1004265.

Printed in the UK by
Stephens & George, Merthyr Tydfil

Diary

What's on?

Modern Cruise Ship Bridge Operations

03 October

Ireland Branch

1900, National Maritime College of Ireland, Ringaskiddy

Capt Nick Nash, President of The Nautical Institute and Training Captain with Princess Cruises gives a presentation on BRM and shiphandling on state of the art cruise ships

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'

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/

Contact: dpalyk@acieu.net, quoting MSSE9NI

15% discount for NI members

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 & 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

02 October

Singapore International Bunkering Conferences

Sentosa, Singapore

https://www.sibconsingapore.com

£200 discount for NI members

04 October

IALA

Solent Branch

Room TS101, East Park Terrace, Southampton Solent University (TBC)

www.nautinst.org/uk-solent

nisolentbranch.secretary@gmail.com

Captain John Lloyd FNI Chief Executive

Focus

Making technology work for us

> We need to ensure that we take a holistic approach to the integration of skills, technology and decision-making

The global nature of The Nautical Institute is reflected by our worldwide network of branches and I am delighted to see so many have been hard at work delivering technical discussions, seminars and conferences. Connecting with our maritime communities is the key point of delivery of member engagement.

Branches also underpin our recruitment activities and help maritime professionals receive the professional recognition they deserve. You may be interested to know that countries such as the UK, India and Australia have achieved spectacular growth in membership over the past two years.

Shipbuilding is another key element of the global maritime capability. It was my pleasure to be part of the proceedings as the Royal Fleet Auxiliary vessel *Tiderace* came into service in August. Built in Korea, it is a highly sophisticated platform designed to deploy to any part of the world.

Specialised in a different way is the Antarctic Research Ship *Sir David Attenborough*, which was launched recently in Birkenhead. In years to come it will lead research into matters of climate change that will affect us all and is a major addition to the international maritime research capability.

These ships, and our mariners, operate in some of the most challenging environments. It is so important that our seafarers are properly trained and encouraged to ensure they are up-to-date professionally and to take a real interest in their own personal professional development. With rapid changes in technology this is especially important.

Technology changes affect us all. I suspect few of us access news in the same way that we did 20 years ago. We have communication devices that work anywhere in the world, we shop in a different way by ordering goods online and we harness technology to improve our lifestyle and effectiveness at work and in our leisure time.

Providers of the technology know the importance of having user-friendly equipment that can be easily accessed by the customer. Few of us these days have the patience to wait for slow websites or phones and computers that will not 'talk' to each other.

It is really important that technology developments in support of our mariners are equally user-friendly. Joined-up systems that aid decision-making and improve analysis are key to getting the best out of our technology. This means joined-up technology for joined-up thinking, supported by joined-up training.

In our maritime training systems, we need to ensure that we take a holistic approach to the integration of skills, technology and decision-making. On some ships, planners and naval architects have carefully considered how the design and layout of the bridge can support the navigator. Ease of access, integration of compatible systems, good communications and visibility are themes strongly reflected in a good design. The subject is explored in our publication *Improving ship operational design*.

Our professional learning needs to take the same integrated approach and we need to help our mariners develop analytical skills that will help their decision-making.

In an era of rapid technical change having an adaptable and responsive critical thinker in charge of operations is especially important.

The Nautical Institute is here to support our members and other mariners through our branch network, through this journal and our technical publications as well as a range of other support materials through our website. Many members joined our live webinar on Marine Autonomous Surface Ships and still more have accessed the podcast downloadable from the website. Thank you for joining the debate.

Reflect on these issues and contribute your own thoughts and issues to us, so we can help focus our efforts where they can best support you.

With very best wishes

John

p04

p06

p08

p30

Captain Ivo Jutrovic AFNI

Captain's column

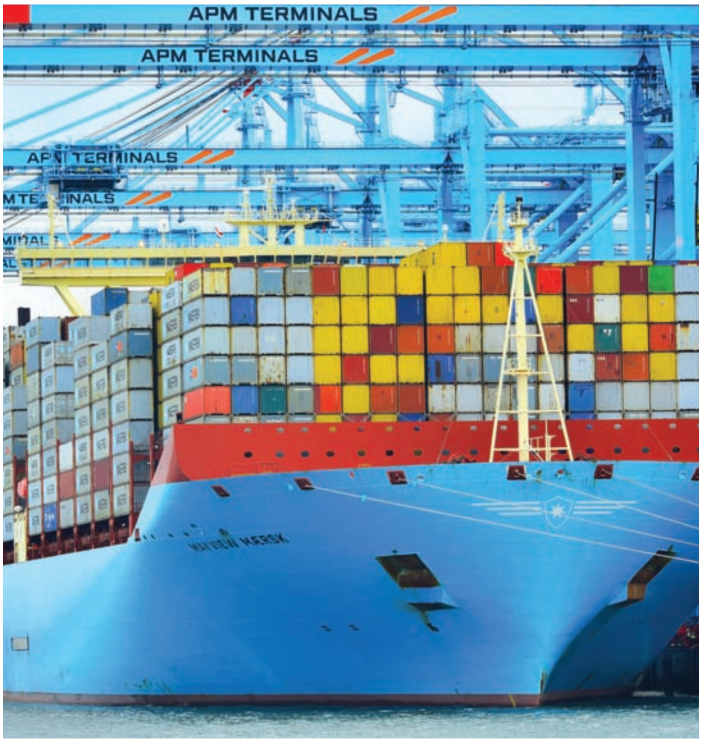
Rethinking collision avoidance

In recent years we have seen a considerable increase in the size of container ships. The term ultra-large container ship has come to join the existing very large crude carrier as a familiar designation. Terminals and cranes have become bigger as the ships they serve have become bigger. Waterways leading to terminals have sometimes been made deeper by dredging – but they have not become wider.

According to Rule 3(h) of the Colregs, a 'vessel constrained by her draught' means a power-driven vessel which, because of its draught in relation to the available depth and width of navigable water, is severely restricted in its ability to deviate from the course it is following.

Whether any given vessel is 'severely restricted' is left to the judgement and decision of the Master. In some cases, local regulations stipulate the minimum draught at which a vessel should be considered as 'constrained by her draught'. As yet, no such stipulation exists for a vessel constrained by its size.

The physics of shiphandling are known and size *does* matter: bigger vessels need more space and more time to manoeuvre. This is easy in open water, but on approaches to ports or anchorages, in coastal waters, in traffic separation schemes and deepwater routes and close to shallow waters, very large vessels are sometimes constrained by their size to execute manoeuvres within the available width of navigable water. This can bring them into close quarters situations and there may even be a risk of collision. In such cases, very large vessels and vessels constrained by draught are not able to execute proper manoeuvres in the available time and space, even if they are obliged to do so according to the Colregs.



Vessels may be constrained by their size as well as their draft

We assume that the bridge teams of very large vessels will have appropriate passage plans for transiting restricted navigable waters and will maintain good situational awareness during the transit. Dangerous situations develop when other vessels, unaware of the limitations of very large ships, enter in to close quarters situations and/or on a collision course with these very large vessels. If another vessel approaches within close range of a very large vessel due to a sudden and substantial course alteration that could not be anticipated in advance, collision may well be inevitable.

What are the potential solutions?

- Rule 2(b) stipulates that '… due regard shall be had to all dangers to navigation and collision and to any special circumstance including the limitations of the vessels involved…'. The size of the very large vessel is a limitation in given circumstances, but regardless of Rule 2(b) there is not much consideration of size in practice.
- Rule 10(i) 'A vessel engaged in fishing shall not impede the passage of any vessel following a traffic lane' is too often disregarded.
- Rule 10(j) 'A vessel of less than 20m in length or a sailing vessel shall not impede the safe passage of power-driven vessel following a traffic lane' is too often disregarded as well. Possibly, in Rule 10(j) the length of 20m should be replaced by a length of 50m.
- Consider introducing the designation 'very large vessel' to Colregs, with a meaning similar to 'vessel constrained by her draught'. The aim should not be to grant any privilege to very large vessels, but to ensure that Colregs takes into consideration manoeuvring constraints due to size as well as draught, and to provide that the passage of those vessels is not impeded.
- Coastal states should establish efficient control over port approaches, anchorages, traffic separation schemes and other areas where the size and draught of vessels could create problems for safety of navigation and collision avoidance. Some local practices may be convenient for local traffic but may impede the safe passage of oceangoing ships navigating through that area. Very large vessels should not be impeded in passage or engaged in close quarters situations, particularly not by small coastal or harbour craft. Rules 10(i) and (j) should be enforced, and the extension of these rules to port approaches, fairways and pilot stations should be considered.

Thought needs to be given to whether coastal traffic and fishing fleets are aware of the navigation and manoeuvring aspects of very large vessels and vessels constrained by their draught. If information about the navigation and manoeuvring aspect of these vessels is shared with coastal traffic and fishing communities it may well improve their understanding and lead to better situational awareness.

Safety of navigation is paramount. There are always two parties in collision avoidance and each has the obligation to avoid collision.

On board *NYK Hawk*, Red Sea, July 2018

Securing combination ladder arrangements

Some common mistakes in securing arrangements – and how to avoid them

Capt Kevin Vallance
MNI

One of the major changes contained within the SOLAS V regulation 23 implemented in July 2015 was the absolute requirement when using a combination ladder arrangement to secure the pilot ladder, the accommodation ladder and the manropes (where requested) to the ship's side. Combination ladder arrangements are mandatory where the vessel's freeboard is greater than 9 metres and no side door is available. Securing the combination arrangement to the vessel's hull helps to prevent uncontrolled movements.

Securing the lower platform

When utilising a combination ladder, the regulation specifically requires the lower platform of the accommodation ladder to be secured to the ship's side. The pilot ladder and manropes (where requested) should also be secured at a height of 1.5 metres above the bottom platform of the accommodation ladder. The pilot ladder should extend at least 2.0 metres above the height of the lower platform of the accommodation ladder.

Unfortunately, this amendment to the regulations did not meet with industry-wide approval. At the consultation stage the British Chamber of Shipping raised a series of objections in a written response to the Maritime and Coastguard Agency:

'Practically, we cannot see how this can be safely achieved. For example – if the ladder needs to be rigged at various levels dependent upon trim & draft of the vessel, this would mean that securing points on the vessel must be variable too. In our view, inset securing points for such a variable arrangement would be; a) impracticable to achieve and thereby impossible to comply in reality and, b) the hull side will not remain smooth/free of protrusion to avoid other issues e.g. fouling of fenders etc.'

Hull magnets

Another means of securing which is gaining industry acceptance is the use of movable anchor positions provided by hull magnets or suction pads.

Fig 1 Securing points inset to the vessel's hull are fairly common [Kevin Vallance]

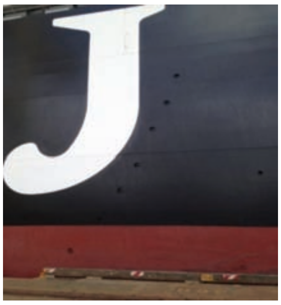


Fig 2 Insets at various heights in the hull can be a great advantage [Alex Amos]

Fig 3 Hull magnets in use, positioned correctly [Marine Safety Supplies]

Fig 4 Improperly positioned magnets – they should be outside the ladder [Giuseppe Raffa]

A pair of pilot ladder magnets can be used to provide the necessary movable anchor points to allow the pilot ladder to be safely secured to the vessel's hull at the correct height. These lightweight magnets require little maintenance and can provide a clamping force of 800kg on to any flat surface. Magnets should be placed outside the side ropes in order to maximise the magnetic force and to avoid getting in the way of the ladder user's hands during the climb. The handle of the magnet is a lever that enables easy, controlled release from the hull when the pilot transfer is completed.

Even where magnets are supplied to a vessel there is no guarantee that they will be deployed correctly. There have been serious accidents where magnets have been incorrectly used or subjected to improper onboard modifications that have resulted in injury.

Yellow magnets are normally sold in pairs and are intended to be used for securing the pilot ladder to the hull. It is considered that the weight of the accommodation ladder is too great to permit only one magnet to be used at the bottom platform of an accommodation ladder.

Suction pads

A Blue box suction pad connected to the vessel's onboard air supply can provide a secure point to fasten the lower platform of the accommodation ladder in position, resting firmly against the ship's side. The vessel's airline (shown in blue in Figure 5) is connected on deck to the Blue box and the unit is then lowered overboard to the correct height.

It should however be noted that any arrangements for securing the accommodation ladder to the vessel's hull are not intended to support the weight of the accommodation ladder. The weight should still be on the wire falls.

When supplied by a reputable manufacturer, both Blue boxes and magnets should contain clear and concise instructions for their correct deployment, cleaning, maintenance and stowage.

Rigging sequence with suction pads and magnets

The correct sequence of rigging a combination ladder should be:

- Break out and rig the accommodation ladder on deck, before swinging outboard and lowering;

- Attach the onboard airline to the Blue box suction pad;
- Descend the accommodation ladder (using appropriate PPE);
- Fit the Blue box suction pad to the ship's side;
- Secure the bottom platform of the accommodation ladder to the Blue box suction pad;
- Rig and secure the pilot ladder to the securing points on deck;
- Horizontally fasten the pair of magnets to the ship side at least 1.5 metres above the lower platform of the accommodation ladder;
- Secure the pilot ladder to the magnets, using the stainless steel swivel eye and quick snap lanyards provided;
- Under no circumstances should the accommodation ladder and the pilot ladder be lashed together.

Approved PPE should be worn by anyone working at the ship's side or outboard. This should include a properly donned lifejacket, a safety helmet, a safety line attached to the main deck and safety shoes. No one should work in such situations unattended.

This operation must be supervised by a 'responsible' officer – that is, qualified to at least OOW standard. Detailed instructions for the equipment and its deployment should be included within the vessel's safety management system.

When properly rigged and correctly positioned in accordance with manufacturer's operating instructions, both magnets and suction pads are easy to operate and provide a substantial holding force, which can positively improve pilot transfer operations.

If the above standards are fully complied with then the risk to vessel crew should also be minimised.

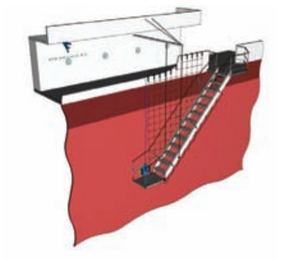


Fig 5 A correctly rigged accommodation ladder for use in a combination ladder arrangement [PTR Holland]

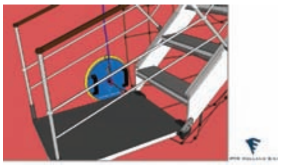


Fig 6 An enlarged diagram of the Blue box suction box in use [PTR Holland]

Position verification

Validating where you are and where you are heading

Captain Paul Chapman
FNI

Over-reliance on a single electronic navigation aid has become common practice, despite the sage advice contained in Marine Guidance Note 379 regarding the use of electronic navigation aids.

The electronic navigation aid most frequently relied upon is the electronic chart display. The chart display has increasingly become the sole source of navigation and situational awareness on the bridge. Generally, such equipment has proved to be pretty reliable and navigators have come to place great trust in it. However, as with all electronic equipment, sometimes it doesn't work. These systems are subject to total equipment failure, failure of important inputs or, as recently covered in *Seaways*, deliberate jamming or spoofing.

Causes of neglect

The risks to the vessel from such failures, especially in confined navigable waters, warrant trustworthy methods of validating the displayed information. Fortunately, all bridges are equipped with such tools. Unfortunately, the faith bestowed on the chart display often leads to the neglect of such other equipment.

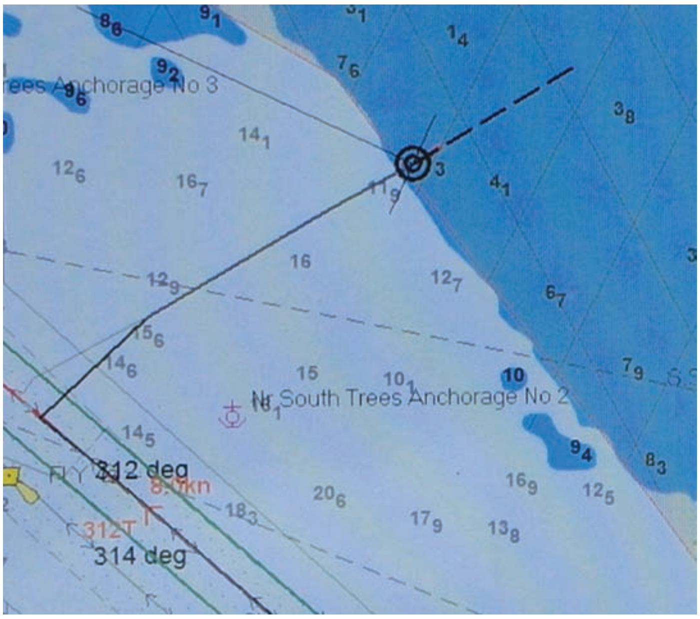
This neglect has many causes. Many vessel operators apply a low priority to maintenance and practice on equipment other than the ECDIS. Shore authorities opt for cheaper aids to navigation that rely on accurate GPS-derived vessel positions for their efficacy, such as virtual navaids. Also, there is perhaps undue reliance on portable pilot units (PPUs).

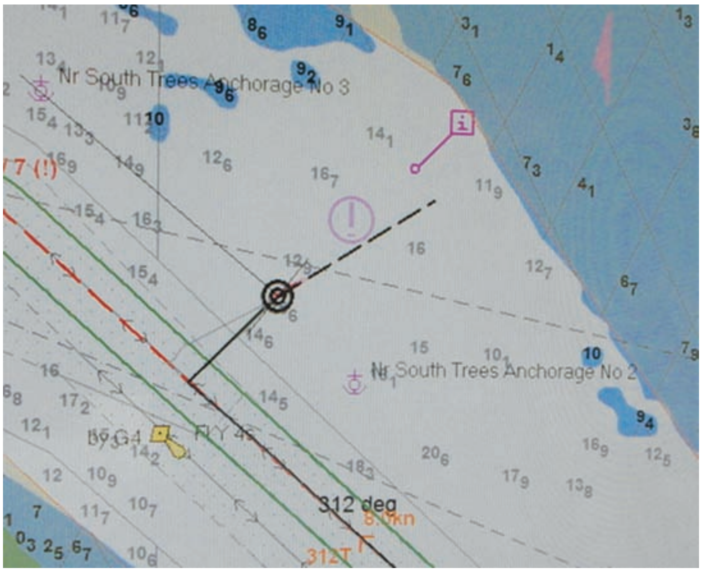
Which method to choose?

There are four trustworthy methods of validating where you are and where you are heading: eyes, radar, echo sounder and magnetic compass. Depending on the circumstances, the four methods may not be equally useful in validating the chart display.

As an illustration, below and left are screenshots of a chart display failure, falsely displaying a sharp alteration of course to starboard. The vessel track makes a significant departure from reality.

If the position on the chart display were viewed in isolation and relied upon, there would be real cause for concern. There are no alarms to suggest any failures, except for the cross track error alarm activated as the charted position goes outside the cross track limits. Using only this information, it would be fair to assume the gyro compass may have wandered, as the gyro heading hasn't changed but the track has. Regardless, a navigator relying solely on the virtual 'reality' of the position on the chart display would assume that the vessel needs to be brought around to port or stopped.





So much for the virtual world. The situation in the real world can be ascertained by applying one or more of the trustworthy validating methods that are firmly grounded in reality.

By eye: The fabled mark one eyeball is very good at picking up changes, particularly when there are things to see. Such a change in heading would be very apparent from looking at the seascape, especially in this instance, where there are real navigation aids marking the channel with leads (lit by night too!) and any departure from the track can immediately be picked up visually. Also, a change in heading as shown on the chart display would be clearly apparent if the wake were visible.

Radar: The radar is reliable at showing what is around the vessel. In this instance, such a change in heading would be detected by the movement of the echoes, especially if set to head-up for better situation awareness. Radar overlay on the chart display might also offer a good validation.

Depth sounder: Depth sounders are good at showing what is below the vessel and this is certainly useful, especially if nearing shoals or variances in charted depths. In this instance, the depth sounder would not agree with the chart display, alerting the navigator to a discrepancy. Depth sounders can also alert the navigator when the charted depth is not correct. There have been a few groundings where the chart display indicated sufficient under keel clearance.

Magnetic compass: With eyes and radar showing what is around the vessel and the echo sounder showing what is below the vessel, reliably knowing the heading of the vessel is also important for situation awareness in projecting where the vessel will be in the near future. The gyro compass, which receives GPS inputs, is subject to failure if the GPS signal is compromised, as shown on the GPS jamming trials conducted by the General Light House Authority (see *Seaways*, Dec 2010 for a detailed account of the trials). By contrast, the magnetic compass is fully independent of electronics and GPS, so it is probably the most reliable and trustworthy aid to navigation on the ship. If the ship's heading doesn't change, the magnetic compass heading won't change.

Designers and regulators of vessel navigational equipment are increasingly resorting to multiple units of equipment to allow for redundancy in the event of equipment failure. But duplication will only provide an alternative unit in the event that one box of electronics fails. It does not provide any useful redundancy in the event of a system failure or if the GPS signal becomes degraded or jammed.

It doesn't matter how many chart displays or gyro compasses are on the vessel; if the system inputs are wrong, all units will display the wrong information. For safe navigation, chart displays require validation through independent means: eyes, radar, depth sounder and magnetic compass.

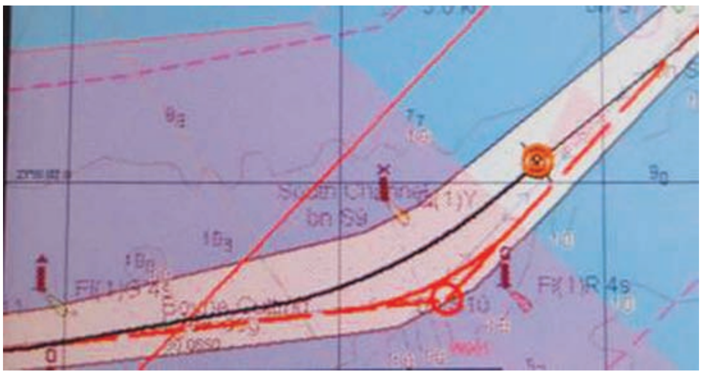
Traditional as well as electronic means must be used to validate position

See p34 for a round-up of the LinkedIn discussion on the recommended frequency of position verification

Irregularities in chart displays are not that uncommon:

Even small departures from reality can be concerning, especially during a critical part in the conduct of a vessel (above)

Chart display playing up on a turn



Same kit *not* playing up

Developing resilient PNT

A look at the projected timelines for the introduction of more resilient positioning technology, and the opportunities for mariners to benefit from it.

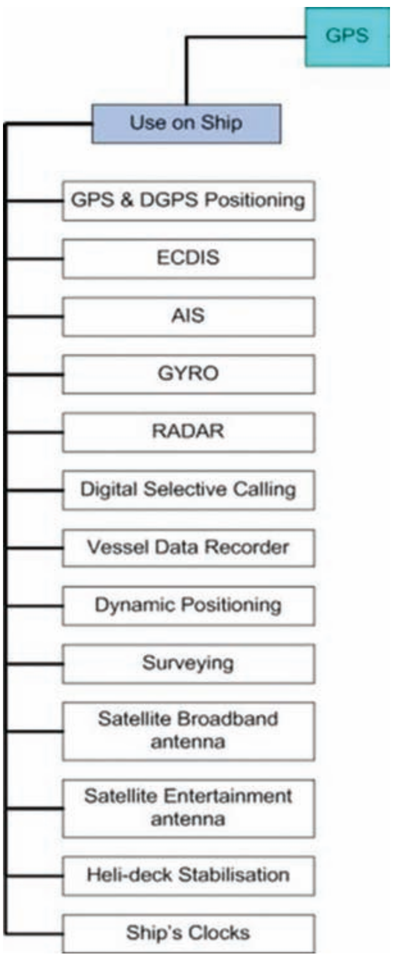
Nick Ward, Paul Williams & Martin Bransby
General Lighthouse Authority

Global navigation satellite systems (GNSS) are the primary means of surface maritime positioning. Most systems requiring position or time input in the marine environment are dependent on GPS, the GNSS provided by the USA. This effectively means dependence on a single system.

E-navigation and developments such as sea traffic management and autonomous vessels are heavily reliant on electronic position inputs, so resilience is essential for their deployment. Resilience is defined here as ability to continue functioning during disruption or ability to recover rapidly from disruption.

All GNSS are susceptible to disruption from natural and manmade causes, because of their extremely low signal strengths and shared frequency bands. This may be acceptable for conventional navigation, where, given adequate training and awareness, traditional navigation methods are possible, but increasing automation limits this option.

The diagram below left illustrates the number and variety of onboard systems that are dependent on GNSS.



Vulnerability

The vulnerability of GNSS to disruption has been known since its inception. Interference from natural causes, such as solar activity, accidental interference from faulty equipment and intentional and unintentional jamming have all been recorded many times over the past two decades. It is in the nature of satellite systems using solar power that signals at the Earth's surface from a distance of 20,000km are extremely weak. The fact that all GNSS share the same bands means they are all susceptible to disruption from the same sources.

> “All GNSS share the same bands, meaning that they are all susceptible to disruption from the same sources.”

Well-documented incidents of disruption in recent years include:

- False information from GLONASS (the Russian GNSS) over a period of several hours on two occasions;
- Interruptions to GPS from a solar flare;
- Loss of timing services from GPS when decommissioning a satellite;
- Local losses of GPS caused by jamming and sustained spoofing incidents giving false positions.

Jamming and space weather will affect all GNSS. System problems such as those that affected GLONASS and GPS timing can also degrade combined GNSS solutions. It is clear that GNSS outages are a real problem and that multiple GNSS do not provide resilience.

Combatting vulnerabilities

The aware and well-trained operator can appreciate this problem and should know how to deal with it. For a navigator faced with loss of GNSS, this can mean reverting to radar positioning, dead-reckoning or visual bearings. However, with increasing dependence on automated systems on board and ashore, combined with a decline in traditional skills, concern is mounting about the ability of today's mariners to cope with such disruption. DP operators need alternatives to GNSS to ensure continued safe working, and autonomous vessels will need backup systems if they are to be allowed to operate on anything other than a trial basis. Hence there is an interest in providing complementary alternatives that will allow operations to continue without interruption should GNSS be disrupted.

Complementary technologies

Several alternative backup technologies could be considered complementary to GNSS for future incorporation in maritime positioning systems. They have varying capabilities, different limitations and levels of maturity, which are summarised in Table 1.

Technology	Capability	Status
eLoran	Can provide resilient PNT and data cross-sector over large geographic areas. Proven as a technical solution.	Future is subject to cross-sector support from governments, regional agreements and/or viability of commercial operation.
R-mode	Maritime-only PNT and data within areas of co-operating infrastructure.	Feasibility of 24/7 capability to be established (depends on mitigation of debilitating skywave interference). Requires modified infrastructure, new standards and regulatory agreements.
Radar Absolute Positioning	Digital television (DVB-T) offers capability for positioning independent of GNSS and with similar accuracy. Range is limited to littoral navigation. AM broadcast is ideal for ranges of hundreds of kilometres, if available.	Opportunistic radio positioning feasible within a software-defined radio (SDR) incorporating other capabilities (eg R mode). AM is being switched off in many parts of the world.
Low Earth orbit (LEO) communication satellites	Ranging and Doppler measurements available for all phases of voyage. Few details on capability.	Many LEO satellites available. Boeing established positioning system with its Iridium satellites. Recent interest has been reported from Apple.
Onboard systems	Inertial systems. Bathymetric. Quantum, geomagnetic, gravity gradiometry.	Available, but limited duration backup. Military use, needs detailed surveys. Long-term development required, but efficacy uncertain.

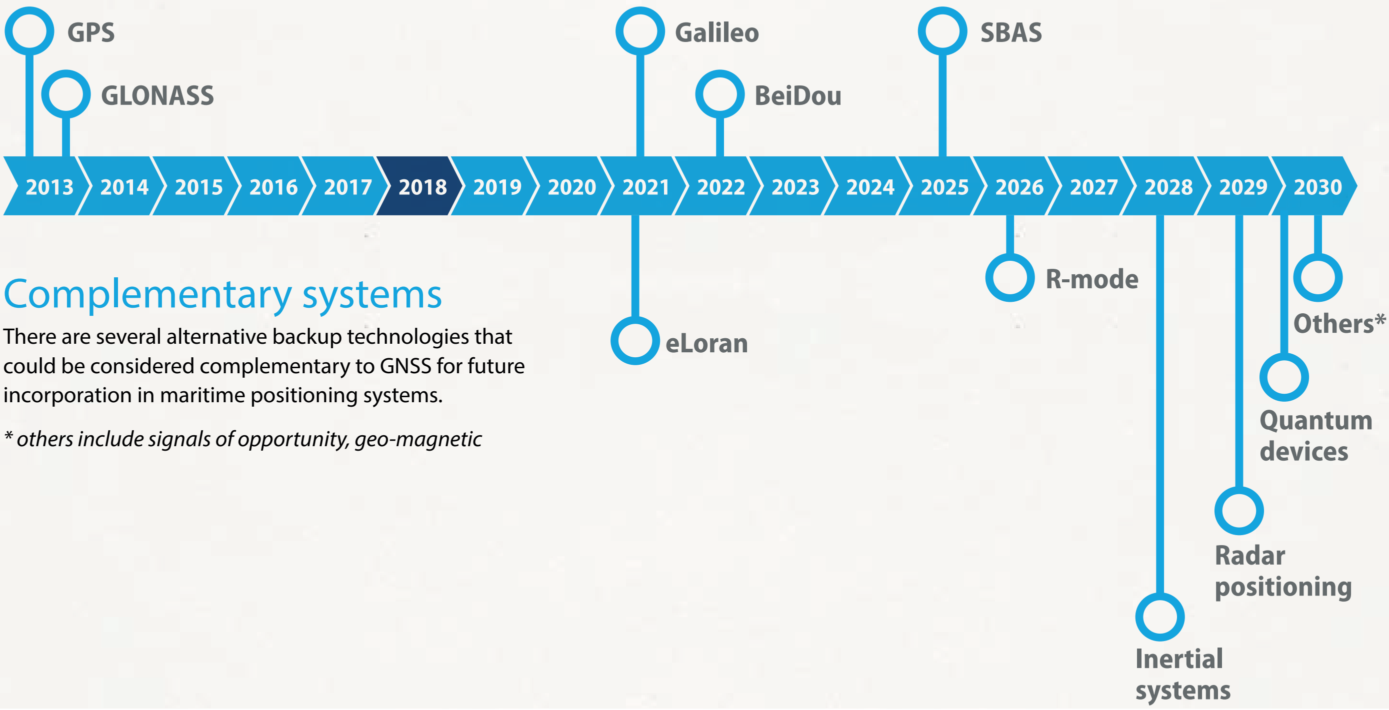
Table 1: Capability and status of complementary positioning technologies

The estimated timescales for development and implementation of these options are indicated below.

TIMELINE FOR RESILIENT PNT

GNSS systems

Global navigation satellite systems (GNSS) are the primary means of surface maritime positioning. Most systems requiring position or time input in the marine environment are dependent on GPS, the GNSS provided by the US. This means effective dependence on a single system.



Complementary systems

There are several alternative backup technologies that could be considered complementary to GNSS for future incorporation in maritime positioning systems.

** others include signals of opportunity, geo-magnetic* eLoran is the only complementary backup system that can be implemented within the short to medium term, but there are political obstacles to its implementation, at least in Europe.

R-mode and possibly radar positioning could be introduced in the medium to long term, but both have inherent coverage limitations. Feasibility studies are needed to assess their economic viability.

Other options, such as inertial systems and signals of opportunity, might emerge as viable alternatives in the long term, but there are large uncertainties about technical and regulatory matters. Quantum devices and options such as bathymetric and geomagnetic positioning are very long term and uncertain possibilities.

For more general positioning applications, not governed by international regulations, the choice of options will come down to cost-effectiveness, although some systems can only be established through inter-governmental co-operation.

Multi-system receivers

A multi-system solution may offer the best approach. For navigation, the IMO concept of the integrated navigation system aboard vessels, incorporating a multi-system receiver, provides flexibility for the inclusion of the above positioning technologies if and when they become available, at an affordable cost.

It is not yet clear how multi-system receivers will fit into the architecture specified by the IMO in MSC.401(95). MSC.401(95) talks about radionavigation receivers specifically, including requirements for at least two GNSS, with provisions in the standard for terrestrial radionavigation systems (eg eLoran, and perhaps R-mode if it is deemed suitable) and augmentations.

The IMO has also specified an architecture which illustrates that a multi-system receiver would itself be part of a modular PNT unit that would take input from other onboard sensors, including gyro, Doppler logs, radar positioning etc. This data would then be fed into a processing layer to provide best quality PNT data, integrity alerts/alarms etc. A higher-level resilient PNT unit of this kind is not yet commercially available.

Detecting unreliable systems

We aim to highlight the need for receiver autonomous integrity monitoring (RAIM) type algorithms within mariners' receivers to highlight potential PNT failure. These would be along the lines of the A-RAIM algorithms used in the aviation sector.

At present, the European Geostationary Navigation Overlay Service (EGNOS), for example, only provides integrity information at the system level, in the form of alerts on satellite failures etc, through the messaging system. The UK's General Lighthouse Authorities support the concept of user level integrity, whereby the receiver itself calculates integrity. The idea of fault detection and exclusion (FDE) is also being investigated.

The local radionavigation signal environment of a ship is quite complex, including the effects of badly installed antennas, signal blockage by ship's structure, reflections from sea surface, natural interference from solar activity, deliberate interference including jamming and spoofing, non-line-of-sight signal reception and other multi-path reflections. These cannot be handled at the system level by augmentation systems such as EGNOS, so a lot of the integrity work needs to be done by the onboard receiver.

Another example where a multi-source receiver would be beneficial is in the event of spoofing. One of the simplest solutions that has been proposed is to have multiple receivers mounted far apart on the ship's structure. If the position solutions from those receivers converge this could be an indication of signal spoofing. There needs to be some incentive for the shipowner/operator to invest in such technology, but there are lots of capabilities that can be achieved by a multi-system-based PNT system with central processing.

Multi-system receivers in use

Information about the types and capabilities of multi-receiver systems could be published in nautical almanacs, and government transport departments could promulgate such information to shipowners and ship operators.

For a mariner aboard a ship with a multi-system receiver I could imagine an e-Navigation service providing a directory of PNT systems. Picture a vessel approaching port. The onboard e-Navigation client software could look up the availability of systems using almanac searches. So for example, if a ship is approaching a region where there is eLoran, the onboard system would use an e-Navigation service (basically a web service) to locate and download the latest AFS data for the region. This could happen in the background with no input from the mariner apart from entering the voyage route plan. It could even be done during the voyage planning phase in the back office.

ePelorus

As discussed in Martin Bransby's article in last month's *Seaways*, the ePelorus offers another form of resilient PNT, and is useful for double-checking a position solution from GPS as plotted on a chart. Akin to taking bearings manually by magnetic compass, and drawing in pencil on a chart, or forming a dead reckoning solution in pencil using speed, heading and tidal information, this is a manual process that results in an electronic position. However, the fall-back to complementary/backup systems should be seamless and automatic, with information provided to the mariner by the resilient PNT system to indicate the systems in use, integrity levels and alerts.

DP operations

Part 2 – What is DP used for?

Captain David Bray
FNI

When DP was in its infancy, its use was restricted to deepwater drillships and other vessels engaged in the offshore oil and gas industries. The technique quickly became more widespread and today it is used in many other areas of commercial and military shipping. Dynamic positioning has become a standard feature in a variety of vessel types and the applications for which DP-capable vessels are employed have multiplied.

Helping drive this growth is the tendency for modern vessels to feature a fully integrated vessel control system, combining all vessel monitoring and control functions. DP itself is best described as an integration of vessel functions – position and heading reference, propulsion, power, environment – so it is comparatively simple and cheap to include DP at the design stage. All modern platform supply vessels and anchor-handling tugs incorporate DP capability. Here are some of the operations in which DP-capable vessels are regularly engaged, with detail on the practical application of DP.

FPSO and tanker offtake operations

Shuttle tanker operations may be divided into four groups:

- Systems with hawser moorings;
- Hawserless systems;
- Submerged turret loading (STL) systems;
- Vessels configured to load directly from floating production, storage and offtake (FPSO) installations.

An increasing number of offshore oilfields export oil in tankers, either because the distance to the beach is too great to warrant construction of a pipeline, or because the reserves will only support a short production period. In such cases the tanker may moor to an offshore loading terminal (OLT) and load via a bow manifold. In many areas, the OLT's exposed location means that mooring is not possible because of the environmental loads that may be imposed on the OLT structure. It is these areas that need DP-capable tankers.

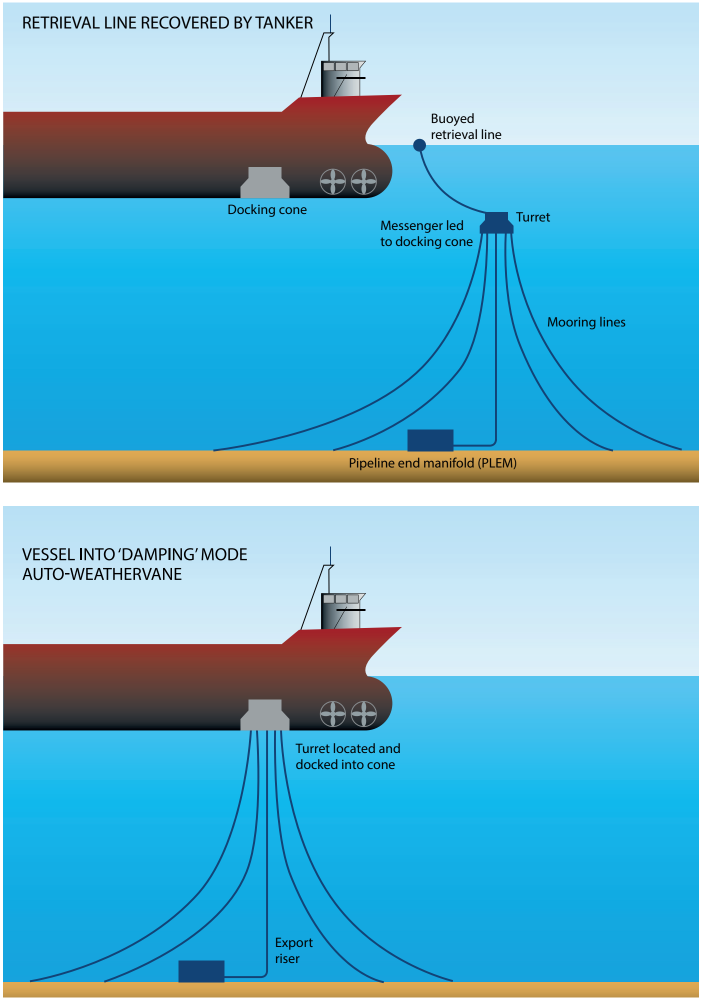
When engaged in offtake operations from OLT facilities, DP shuttle tankers operate on a position-circle/weathervaning principle. The vessel will position with its bows touching an imaginary circle, centred upon the OLT. The vessel is continuously weathervaning, or actively seeking a minimum-power heading, and adjusting its position to keep the OLT ahead. This allows the vessel's bow manifold to remain within specific maximum and minimum distances of the OLT reference point, ensuring that there is no risk of damage to the loading hose. This avoids imposing major environmental loads on the OLT, and the DP system ensures that the vessel's position and heading are maintained in all but the most severe weather.

Tankers built with this functionality are fitted with a conventional DP system configured to handle this weathervane ability. Typically, two or three tunnel thrusters are fitted at the bow and two aft, and single- or twin-screw main propellers.

Position references used may include DGNSS, HPR, a laser system, FMCW radar and Artemis. An important consideration here is the distinction between absolute position references and relative ones. A tanker loading from an offshore terminal needs to maintain position relative to the terminal. If the terminal is mobile in any way, the tanker must match that movement. Many OLTs are floating anchored spar buoys, which have motion characteristics. Other terminals are FPSOs (see below), which are also anchored in a weathervane mode. In both cases, the offtake tanker needs position reference relative to the moving OLT.

The shuttle tanker will transfer into DP mode early in the approach, allowing a controlled hawser pickup. Once within the position circle at the designated distance from the OLT, the hawser is latched and the hose connected.

A variation upon this theme is the submerged turret loading (STL) system, in which the loading is carried out from a conical subsea turret. This turret is anchored at a depth below keel level and carries the



Submerged turret loading operation

loading hose. The tanker has a docking cone forward, built into the bottom structure. The vessel manoeuvres over the turret, picking up a messenger line. The turret is located by means of acoustic beacons. The turret is hauled up into the docking cone and locked. Once this is complete, the vessel weathervanes around the turret location maintaining position and heading using DP.

A further variation is the FPSO tandem loading arrangement. A floating production, storage and offtake unit is usually a ship-shaped vessel moored to a turret arrangement. The tanker positions astern of the FPSO and loads through a bow manifold. Positioning strategy is as for OLT or STL arrangements, with the added complication that the reference point for positioning may be slowly moving – the FPSO will itself be weathervaning.

The DP system configured for loading from an FPSO facility will feature a position box, which is an imaginary area located astern of the FPSO. This box should contain the bow of the tanker. Only if the bow of the tanker breaks out of the box is the DP system triggered to adjust the tanker's position.

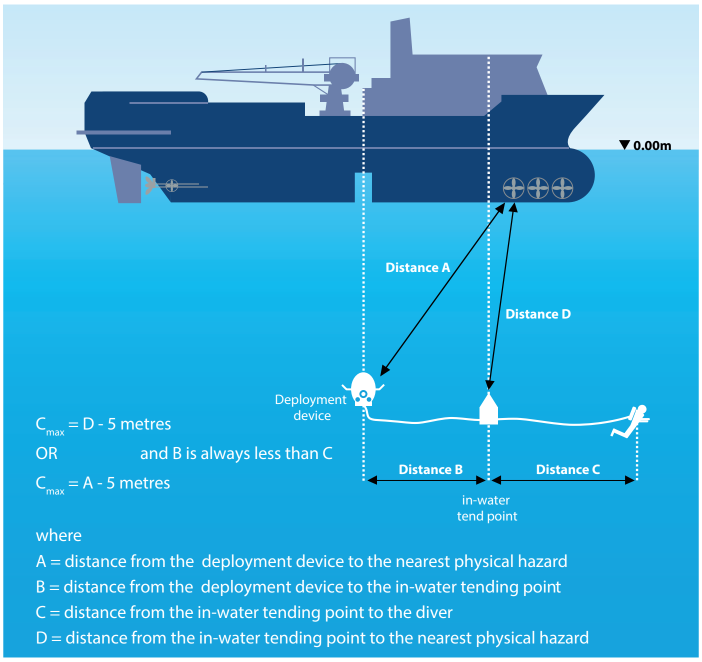
Diving and ROV support operations

A great many underwater tasks are conducted using a DP-capable vessel as the working platform. These operations range from routine tasks using a remotely operated vehicle (ROV) or unmanned submersible through to complex tasks involving seabed crawler vehicles or sophisticated ROVs. Despite the increasing sophistication of modern ROV technology, human divers still need to be deployed for some tasks.

Diving operations

Divers may be deployed in a number of ways. Up to 50m depth the technique is air diving, in which the breathing mixture is compressed air. On occasions, the compressed air may be supplemented with additional oxygen, enhancing the divers' work performance and bottom time; this is called nitrox diving. The divers descend in an enclosed diving basket or by means of a wet bell or mini-bell. Upon recovery, the basket or bell is recovered either direct to the surface or by a series of decompression stops.

By working close to running propellers and thrusters, divers face a serious risk of death or injury from being drawn in to propellers. Other hazards include water turbulence caused by thrusters, reduction in visibility, increased noise levels, tidal current and seawater intakes. Consideration of problems associated with DP operations in shallow water and strong tides forms a substantial part of any shore-based DP course.



Diving diagram

Beyond 50m depth, divers are deployed using a diving bell, which forms part of a saturation diving life-support complex. Divers remain at the pressure of the working depth for up to 28 days, shuttling back and forth in the bell between the worksite and the saturation chambers in the vessel. A diving bell may also be used instead of a basket in depths of less than 50m in position.

Divers in the water are especially vulnerable to vessel problems, particularly positioning difficulties. The diver's only way back to the surface is via the bell or basket. If divers are working in open water close to the bell they can return to the bell in just a few minutes. However, if divers are working inside an enclosed seabed structure or habitat it could take 20 minutes or more to return. During this period the vessel must maintain position irrespective of anything else.

ROV operations

An alternative for operations in deep water is the remotely operated vehicle (ROV).

As with diving operations, a ROV's umbilicals are susceptible to damage by thrusters and propellers, particularly where the ROV is launched and the umbilical fed over the ship's side or stern. A preferred method is to lower the ROV in a garage or tether management system (TMS) to the required water depth.

A recent development is the autonomous underwater vehicle (AUV). This is a free-swimming ROV operating without an umbilical on a pre-programmed task, which is deployed and recovered by its support vessel.

One big advantage of using ROVs instead of divers is the lower level of redundancy required for non-man-rated underwater operations.

Anchor-handling tugs and platform supply vessels

In the anchor-handling mode, DP may be used to advantage in manoeuvring to transfer the anchors to the tug from the barge or rig, and in the exact positioning for the laying of the anchors. In supply vessel mode, DP allows more reliable positioning of the vessel close to a platform for long periods of cargo-working time.

Construction vessels and crane barges

Some heavy-lift vessels routinely use DP to good advantage. The number of facilities capable of lifting in excess of 4,000 tonnes is increasing, and there are also vessels of lesser crane capacity but greater utility. Avoiding the need to lay an eight-point anchor spread considerably reduces the time required to complete a lifting operation.

Crane barges use DP to good advantage. Here *Thialf* is at work in the Captain field

The largest vessels in this class are mostly used for installation of large platform elements and subsequent pile-driving operations. They will also be used for platform removal operations as more fields reach the end of their working lives.

Drilling rigs

As drilling operations have been extended into deeper waters, demand has grown for DP-capable drilling facilities. The latest drillships are rated to work in water up to 3,500m depth. Many DP rigs are of the semi-submersible configuration, or may be very large monohulls. In deep water it is not sufficient simply to position the rig directly over the wellhead. Compensation must be made for tidal flow, because the all-important measurement is that of riser/stack angle. This is the angle between the riser (containing the drillstring) and the wellhead or lower marine riser package (LMRP). It is vital that this angle remains close to zero. Angle sensors are located on the stack, and on the riser immediately above the flex-joint. These sensors allow continuous monitoring of the riser/stack difference angle, with data being transmitted to the control room and input to the DP system. With a tidal stream, the riser will 'bow', necessitating the vessel moving in an up-tide direction to accommodate this riser angle. Some monohull drillships can drill two wells simultaneously, making it necessary to monitor two riser angle values.

A drilling rig using DP for these functions will usually employ dual DGNSS and long-baseline acoustic position references, as other references are often not available in deep water.

Dredging and rock dumping

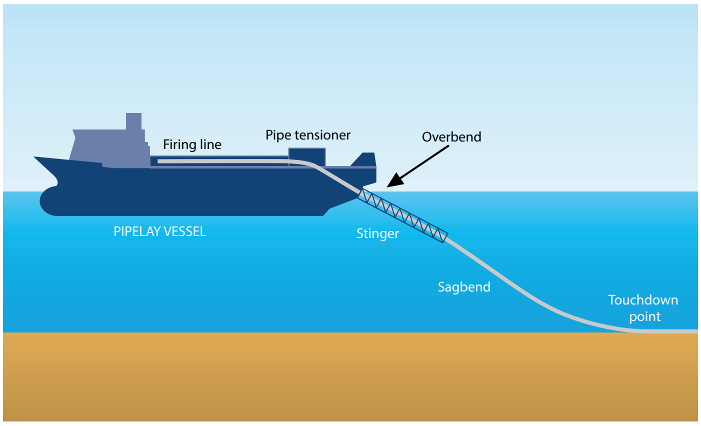
Many dredging operations make use of DP. Whether the dredging is for harbour or channel maintenance or for the recovery of aggregates, the precision positioning that DP offers makes it an attractive method of operation. A trailing suction dredger may follow a predetermined track with the reference point being located upon the draghead, so that the draghead is the element being positioned rather than the vessel. The DP system is configured to receive and compensate for measured draghead forces, determined from suitably located sensors.

Some vessels are configured for rock dumping, to provide protection for underwater elements, which can be an alternative to trenching for a pipeline. Alternatively, the rock dump may be to protect against erosion of platform foundations and the like. Rock dumping vessels are usually mini-bulk carriers, fitted for automatic discharge into a hopper adjacent to the fallpipe tower. The fallpipe system is deployed over the side of the vessel from the handling tower. At the lower end of the fallpipe is a ring ROV, which is able to direct the delivered rock accurately on the target corridor. The vessel uses autotrack facilities to follow accurately the required line at a precise velocity. Position reference may utilise conventional PRS and may be enhanced by a Smartwire system, the lower end of which is secured on to the ROV.

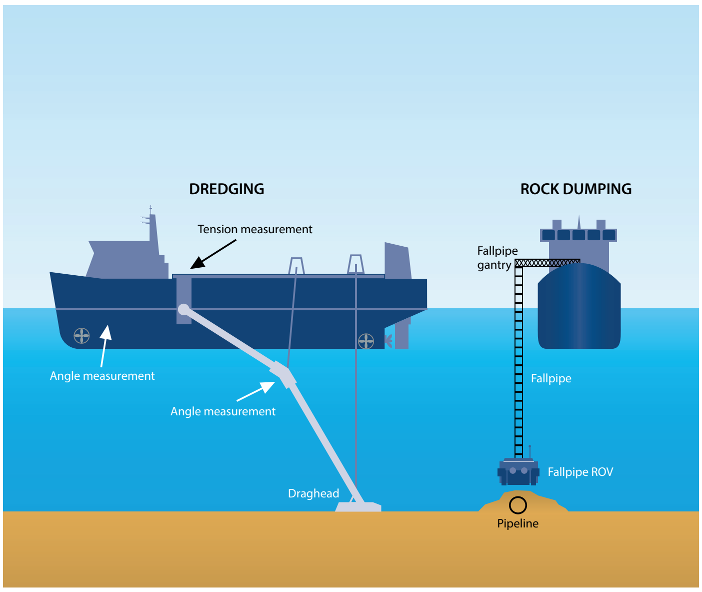
Pipelay and pipe-trenching operations

An ever-increasing number of DP pipelay vessels are in operation worldwide. Dispensing completely with anchors and moorings, these vessels are able to conduct pipelay more quickly and efficiently than the pipelay barges.

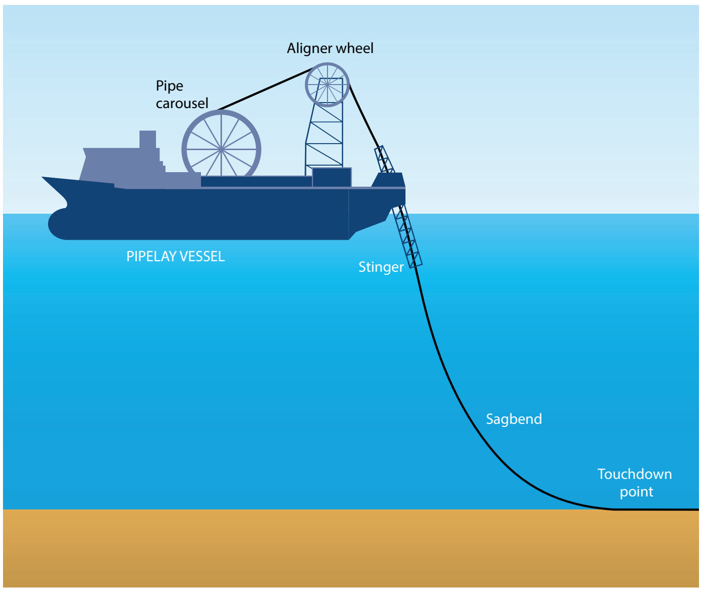
Three methods of pipelay are in use: S-lay, reel-lay and J-lay. In S-lay operations the pipe is constructed in a long narrow factory called the 'firing-line' at deck level. Pipe is fabricated, welded, coated and inspected at stations spaced at 12m intervals along the firing line (standard pipe spools are 12m in length). The pipe is controlled by caterpillar track pipe tensioners, which feed it down the 'stinger'. The stinger is a hefty ramp at the stern supporting the pipe in the overbend area. The pipe is supported by its own tension only in the span between the end of the stinger and the seabed touchdown point, or 'sagbend' zone. The DP system must allow the vessel precision positioning on a fixed heading, maintaining pipe tension and moving the vessel ahead an exact 12m on demand. These moves may occur every four



S-lay pipelay operation



Dredging and rock dumping operations



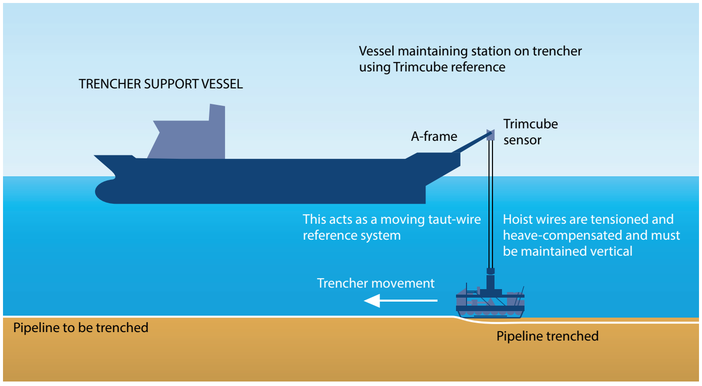
Reel/J-lay pipelay operation

minutes. Faster working may be achieved if double joints are worked, with the vessel moving 24m each time. Pipe tension is fed back into the DP from sensors on the tensioners and must be maintained within specification tonnages.

In reel-lay operations, the pipe is prefabricated and loaded on to a vertical carousel on the vessel. The pipe is laid by passing it from the carousel on to the lay-ramp and from there down the stinger. In very deep water, the only suitable method is J-lay. Here, the stinger is mounted close to vertical. The pipe is fabricated into triple-joint lengths, which are turned to the vertical at the stinger. Large forces are induced at the stinger because of the heavy weights of pipe involved, and these forces must be countered by the vessel's DP capability.

Pipelay vessels routinely conduct complicated evolutions using DP. The operations to begin and complete pipelay, conduct an in-water tie-in or to lay down the end of the pipe if necessary, all involve precision positioning and manoeuvring.

Pipelines need to be protected from damage. DP-capable vessels are used here too. A pipeline may be trench-buried by use of a specialist seabed crawler vehicle, which is deployed by A-frame over the stern of the trenching vessel. It follows the pipeline, excavating a trench of the required depth using ploughshare elements and waterjetting. Once a trench has been established, the vehicle is recovered and reconfigured for a backfill or cover operation. The DP vessel uses a specialist track-follow or vehicle-follow function to maintain station on the trencher.



Trenching operation

Cable-lay and repair operations

The use of fibre-optics in international communication cables has led to the requirement for greater precision in vessel positioning. Fibre-optic cables have very specific minimum bend radius (MBR) and loading limitations. If these are exceeded the cable may be damaged. Newbuild cableships are being fitted with a DP capability as standard. The facility is particularly useful when conducting cable repair operations or shore-end connections in shallow waters.

Cable-lay operations may involve a seabed crawler vehicle or a towed plough to compensate for the external forces of the plough hawser (tension feed forward).

Accommodation barge and service vessels

Various facilities are needed during periods of construction, reconstruction or repair of offshore installations. They may simply consist of accommodation for extra workers, but others are more complex. Accommodation can be provided on a simple flotel barge positioned close to a platform and connected to it by a gangway. However, in adverse weather conditions passage must be by helicopter. These barges are often DP semisubmersibles. If gangway-connected, the gangway itself may perform as a position reference; in effect, a form of horizontal taut wire.

These vessels may contain more than just accommodation and be able to conduct diving and ROV work, carry out fabrication, assembly or repair work in workshops, conduct crane operations and play a major role in emergency intervention (fire-fighting, evacuation, medical etc). A vessel of this kind may well be a semi-permanent support facility for one field or a group of adjacent fields.

Passenger vessels

Cruise ships are beginning to make use of DP capability as they increase in size and have ever-higher freeboards on ever-decreasing draughts. Cruise ships work to tight schedules and require precise manoeuvring in some of the smaller ports, so shiphandling can be very demanding. In many places dropping anchor is prohibited, to avoid damage to sensitive features such as coral reefs. DP capability also allows a ship to give a lee to one side. If the vessel is lying at anchor head to sea, the sea state may render tendering impossible, whereas use of DP to cant the vessel 20° or so to the wind can make boat embarkation considerably safer.

Research and survey vessels

Included in this category are hydrographic research and survey vessels, oceanographic and fisheries research vessels, and logistic vessels such as those operated by the British Antarctic Survey. The great variety of work conducted by vessels of this type often requires DP capability. Buoy tenders also use DP.

Military vessels

Naval vessels that employ DP to advantage include mine countermeasures (MCM) vessels, as it gives them a hover capability while an underwater contact is investigated. Another class of military vessel utilising DP is the underwater operations vessel. Increasingly, a form of DP is being utilised in amphibious assault vessels and the like.

Other applications

Further tasks to which DP capabilities are being put include seafloor mining, windfarm construction and maintenance. Semi-submersible heavy-lift vessels and the luxury yacht sector also employ DP.

Two unusual vessels with DP capability are the semi-submersible rocket launch platform *Sea Launch Odyssey* and its supporting assembly and command vessel. Both vessels are dynamically positioned. During fuelling and launch operations, the *Sea Launch Odyssey* platform is unmanned, so its DP is remotely controlled by telemetry from the command vessel.

The practical application of DP varies from allowing a vessel to maintain one position and heading for long periods, to permitting vessels to adjust position and heading continually for operational reasons. Many vessels' DP systems are specifically configured for the operations to be conducted. For example, a drillship will have riser angle mode facilities incorporated, whereas a shuttle tanker will have autoapproach and weathervane facilities.

Whatever functions and facilities are provided, DPOs must understand fully the operation of their system. A thorough study of the operational and system handbooks is essential. To a certain extent, DP systems are tailor-made to suit each vessel, and a newly joined DPO may not be familiar with the exact configuration of the system functions.

Mariners' Alerting and Reporting Scheme

MARS Report No. 311 September 2018

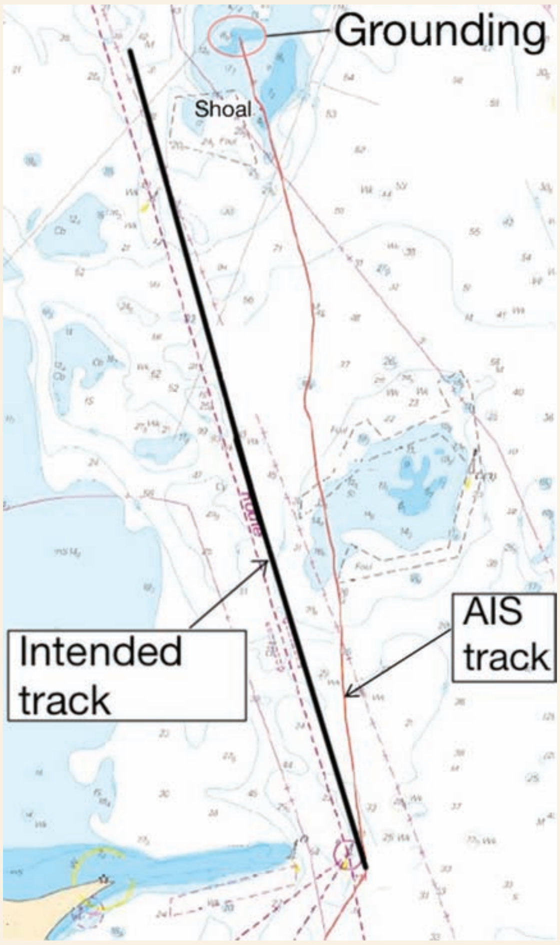
MARS 201853

Grounding on a charted shoal

Edited from official report RS2016:07e, Swedish Accident Investigation Authority

➔ A loaded bulk carrier was underway in coastal waters in good visibility. The bridge team was an OOW and a helmsman steering manually. According to the OOW, at one point a course alteration was undertaken to 340(G), although AIS recordings reveal the actual COG following the course change averaged 353(T). The vessel was not equipped with any sort of electronic chart nor an ECDIS and, according to crew, the radar was not helpful for position fixing due to clutter. The vessel's GPS was used as the primary position fixing tool.

After the course alteration, the OOW took a meal break and was replaced by another navigation officer. Having finished his meal, the OOW returned to the bridge and was informed by the other officer that no course changes had taken place and he had not put a position on the chart. About an hour and 50 minutes after having altered course the vessel ran aground on a charted shoal at a speed of about 12 knots. The vessel was severely damaged and needed lightering of fuel and cargo to be refloated.



The official investigation found, among other issues, that;

- No position fix had been taken for almost two hours before the grounding.
- The OOW was likely to have been fatigued and was attending to other duties while also navigating the vessel.

Lessons learned

- As with other such groundings and collisions, a lack of attention to the primary duty of navigation was a main contributing factor.
- A radar can be adjusted for clutter and should be used as a primary fixing instrument or as a check on GPS fixes.

MARS 201854

Heavy lift hurts back

➔ A trainee electrical officer was attending to some assigned tasks in the engine room. He needed to move a gas cylinder to another location, and decided to attempt the task alone. He tried lifting the cylinder by wrapping his arms around it but immediately experienced a sharp pain in his back.

First aid was administered and bed rest was prescribed. He was assigned restricted work for a period of time to assist in his recovery.

Lessons learned

- Always evaluate a task beforehand and think about the risks. Do you have the necessary tools? Personal protective equipment (PPE)? Can you safely do the task alone?
- Young trainee crew are very susceptible to a power difference with more senior officers. They should not hesitate to ask questions and ask for help.
- Senior officers should be open to questions and sensitive to the power difference.

MARS 201855

Detached hose under pressure injures crew member

➔ A chemical tanker was underway and tank cleaning operations were being carried out with a mobile tank cleaning unit. A deck crew member was standing near the unit ready to close a valve during changeover from one cargo hold to another when the cleaning hose suddenly detached from its coupling. The loose hose hit the back of the deck crew's left leg. First aid was promptly administered and the victim was sent to rest.

The company's tank cleaning procedures and check list only described generic hazards arising from the use of mobile tank cleaning equipment. The specific risk of a sudden detachment of the tank-cleaning hose had not been clearly identified and assessed. The company investigation found that the type of hose used, with split type

Visit www.nautinst.org/MARS for online database coupling secured by bolts, was inadequate and that no whip check device was being used.

During the investigation on board it was also ascertained that a best practice is to reduce the working pressure of the hose to up to 1-2 bar before handling any valves. At the time of the event, the crew member manually operated the valve when the working pressure was at normal working pressure of 10 bar.


Whip check

Lessons learned

- Hazard identification and subsequent risk assessment are key to reducing accidents and incidents.
- A 'whip check' device is an effective risk mitigation tool for hose connections under pressure.

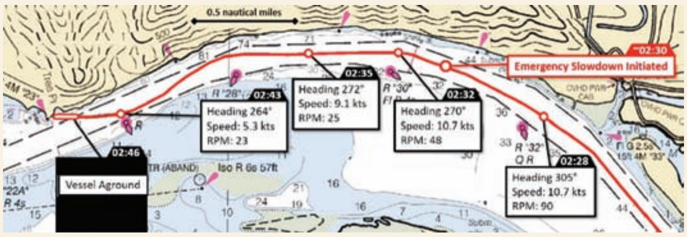
MARS 201856

Loss of power and inadequate communication contributes to grounding

As edited from official US NTSB report MAB-18/01

➔ A loaded bulk carrier was outbound in a river channel, in darkness and under pilotage. An OOW, helmsman and Master were also on the bridge. The vessel was stemming a 1 knot flood tide and making way at near 11 knots. At one point the engine RPM decreased from 90 to 48 under an automatic programme. The pilot asked what was happening. The Master spoke to the engine room personnel and responded that there was an engine problem, but they were fixing it.

For the next 10 minutes the pilot tried to keep the vessel in the channel using the reduced RPM while the Master talked to the engine room personnel on the phone in his native language, which the pilot did not understand. At one point the Master asked the pilot if they should anchor. The pilot responded that the location was not good as the current was reversing direction due to the ebb tide.



The Master continued to talk with the engine room personnel, with the vessel now slowing to about 6 knots. With no answers to his questions about the main engine, the pilot ordered both anchors away and emergency full astern. The vessel drifted nonetheless and grounded on the channel side. Damage to the vessel was estimated at approximately $4 million.

The investigation found that the engine failure was due to a cracked main engine cylinder cooling jacket that initiated an automatic reduction in engine speed.

Lessons learned

- In restricted waters, quick decision-making is necessary if the main engine is at fault. In hindsight, a cracked cooling jacket could not be fixed in the time available; the pilot should have been informed immediately that the main engine was unavailable.
- If one must go aground, apart from letting go the anchors, look for a soft spot to put the bow.
- Check your Master-Pilot exchange checklist. If your vessel has main engine automatic speed reduction programs, include these on the information given to the pilot.

MARS 201857

Emergency hatch blocked

As edited from Marine Safety Forum 18-05

➔ During a general walk around on a vessel a heavy electrical transformer was discovered on top of an emergency escape hatch. After investigation it was found that the transformer had been left by an outside contractor who had placed it on top of an escape hatch because the cable was too short to reach a power socket – even though the top of the hatch was marked 'Escape'.

The extra weight on top of the escape hatch would have made it extremely difficult if not impossible to open.

Lessons learned

When contractors work on board;

- Conduct a full and proper toolbox talk at the worksite; understand the scope of work and how the contractor intends to carry out the task, what tools they are going to use and any other requirements they may have.
- Conduct impromptu inspections of the worksite.
- Responsibility ultimately stops with you!

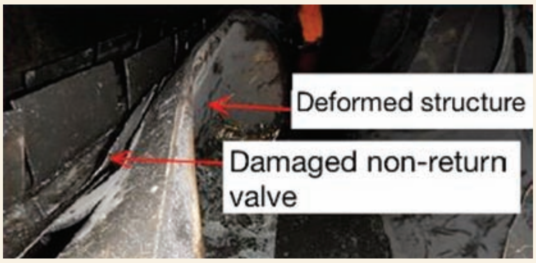
MARS 201858

Scavenging space explosion

➔ A cargo vessel was drifting, but preparations to start the engine and proceed for pilot pick-up were underway. Engine room crew proceeded to do an 'air blow' but soon afterwards smoke was seen coming from the indicator valve. They were then unable to start the main engine.

An investigation found that the scavenging space had been severely damaged by an explosion, especially the non-return valve manifold box. Further investigation found that ship's personnel had cleaned the scavenging space while the ship was drifting. It appears they had used flammable materials for the cleaning task. The cleaning materials vaporised forming a combustible atmosphere in the scavenging space. When the combustion wave in the cylinder propagated to the scavenging space, an explosion occurred.

Visit www.nautinst.org/MARS for online database



Lessons learned

- Never use flammable materials such as kerosene or gas oil to clean areas with high operating temperatures, eg the scavenging space.

MARS 201859

Little finger caught in rotating winch

➔ While at anchor in fair weather some deck crew were performing maintenance on the mooring winches. A crew member had just greased one of the winches. He asked another crew member to start the winch and rotate it so he could wipe out the excess grease.

The assisting crew member started the winch, but almost immediately the greasing crew member cried out to him to stop the winch. His finger had been caught in the machinery and even though he had gloves on, his small finger was severely injured. After first aid was administered he was evacuated ashore where the tip of his small finger had to be amputated.

The company investigation found that in previous manoeuvres to remove excess grease a long flat paint brush had been used. In this incident the crew member used a small piece of cloth to wipe out the excess grease, bringing his hand close to a known hazard.

Lessons learned

- Never cut corners for the sake of expediency – use the right tools for the job.
- Running risk assessments should become a matter of habit, but common sense should also be used in everything we do.

MARS 201860

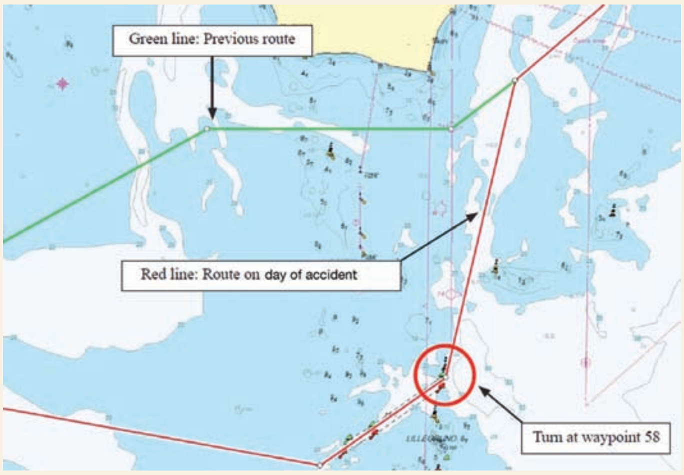
New route – new dangers

Edited from official 10 Feb 2017 Grounding Report from the Danish Maritime Accident Investigation Board

➔ A vessel was underway at about 16 knots in coastal waters and near darkness. The OOW was at the con with the Master present on the bridge and a helmsman at the wheel. The vessel was bound for a regular port of call but was using a different route from previous trips because of the vessel's draught.

At one point the OOW and the Master had a short discussion about the angle to the buoys at the entrance to the deepwater route, which was the next course change at waypoint 58. The channel was only approximately 0.2nm wide, with an area of shallow water north of the buoys. The angle of approach would make it difficult to execute a turn into the channel, from 192° to 237°.

They agreed to alter slightly to port to allow a larger turning circle, but the current and wind were affecting the ship in such a way that this slight alteration did not give the desired results. The vessel was still to the west of the planned route and coming close to a charted isolated danger near the buoys that marked the entrance to the deepwater route. Although the vessel was equipped with an ECS and radar, the bridge team were now navigating primarily by visual means.



Suddenly, the ship started to vibrate violently, the speed dropped from 16 to 7 knots and the ship's heading changed from 195° to 204°. Within a minute, the vibrations stopped and the ship's speed increased. The crew quickly realised that the ship had touched the seabed. The bottom of the hull had been breached in several places along the starboard side damaging several fuel oil tanks. Some local coastlines were polluted as a result.

Lessons learned

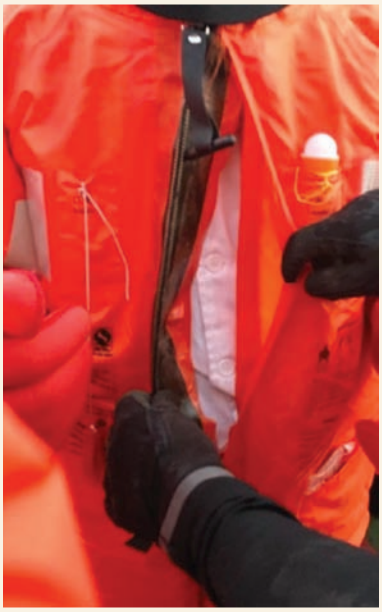
- Use all available means to navigate your ship.
- When in doubt, slow down.
- It proved to be difficult to make that course change at a speed of 16 knots, in near darkness and with a westerly current of approximately 1 to 1.4 knots. When passage plans are modified check for appropriateness of course changes and proximities to hazardous areas. In this case the angle of approach to the deepwater channel was inappropriate.

MARS 201861

Immersion suit defect

As edited from USCG Safety Alert 3-18

➔ During a recent inspection a significant flaw was discovered on approximately 87% of a vessel's immersion suits. The glue used to attach the main zipper to the body of the suit had failed. This defect will prevent the suit from achieving a watertight seal and will present serious risk to crew members in a survival situation.



Lessons learned

- Regularly inspect immersion suits for this and all potential unsafe conditions. Do not wait to discover the problem during a real emergency.
- Any replacement immersion suits need to be approved by the vessel's flag state.

Visit www.nautinst.org/MARS for online database

Thank you to all our Nautical Affiliates for their continued support

ABB
http://new.abb.com

ABC Maritime
www.abcmaritime.ch

AR Brink and Associates
www.arbrink.com

AMCOL
www.amcol.ac.th

AMSOL
https://www.amsol.co.za

Aqua Marine Maritime Academy
http://ammacademy.com

BMT Surveys
www.bmtsurveys.com

Britannia P&I Club
www.britanniapandi.com

Caledonian MacBrayne
www.calmac.co.uk

City of Glasgow College
www.cityofglasgowcollege.ac.uk

Carnival Corporation
www.carnivalcorp.com

Consult Maritime
www.consultmaritime.com

Chevron Shipping
www.chevron.com

Commissioners of Irish Lights
www.cil.ie

Constanta Maritime University
www.cmu-edu.eu

Constellation Marine Services
http://constellationms.com

Dokuz Eylul University
www.deu.edu.tr/en

Dracares
www.dracares.com.br

Epsilon Hellas
http://epsilonhellas.com

EuroShip Services
www.euroshipservices.com

Exmar
www.exmar.be

Gard
www.gard.no

GigaMare
https://www.gigamare.com/

The Gdynia Maritime School
http://morska.edu.pl/en

Glasgow Maritime Academy
www.glasgowmaritimeacademy.com

GNS
www.globalnavigationsolutions.com

HC Maritime Consulting Pty Ltd
www.hcmaritime.com

Hindustan Institute of Maritime Training
www.himtmarine.com

IAMI
http://iami.info

IMCS
www.imcs-group.com

InterManager
www.intermanager.org

International Salvage Union
www.marine-salvage.com

KASI GROUP
www.kasimalaysia.com

LOC Group
http://loc-group.com

Louis Dreyfus Armateurs
www.lda.fr

Maersk Training
www.maersktraining.com

Marine Society & Sea Cadets
www.ms-sc.org

Marlins
https://marlins.co.uk/

Martech Polar
http://martechpolar.com/

Masterbulk
www.masterbulk.com.sg

Menezes & Associates
www.menezesandassociates.com

MES
www.myanmarexcellentstars.com

MSI
www.msiships.com

Nea Gnosi
http://nea-gnosi.gr

North of England P&I Club
www.nepia.com

NorthLink Ferries
www.northlinkferries.co.uk

New Zealand Maritime School
www.manukau.ac.nz

Norwegian Hull Club
www.norclub.no

Paramount Nautical
http://paramountnautical.com

The Port of London Authority
www.pla.co.uk

The PTC Group
http://ptc.com.ph/

IHS Safety at Sea
http://magazines.ihs.com

SAIMI
saimi.co.za

SDT
www.sdtultrasound.com

Seagull Maritime AS
www.seagull.no

The Standard Club
www.standard-club.com

Steamship Mutual
www.steamshipmutual.com

The Shipowners' Club
www.shipownersclub.com

Stolt Tankers
www.stolt-nielsen.com

Southampton Solent University
www.solent.ac.uk

The Swedish Club
www.swedishclub.com

Swire Pacific Offshore
www.swire.com.sg

TMC Marine
http://tmcmarine.com/

Transas
www.transas.com

UK P&I Club
www.ukpandi.com

UK Hydrographic Office
www.gov.uk/UKHO

Vertex Oil Spill Supply
www.vertexoilspill.com.br

Videotel
www.videotel.com

Viswam Group
viswaminstituteofmaritimestudies.com

West of England P&I Club
www.westpandi.com

PHRS
www.phrs.gr

Seavie
http://seavie.com

Our Nautical Affiliates help us make a difference to the shipping community by ensuring that our MARS Scheme is available to the industry for free. Find out more at: www.nautinst.org/affiliate

IMO report

January – August 2018

Capt Ghulam Hussain FNI
Technical Manager & Head of Delegation

In its Strategic Plan for 2016-2020, The Nautical Institute states its aim of 'providing professional and practical input to the work of the International Maritime Organization (IMO), ensuring members' concerns are effectively addressed within the industry'.

This is part of our objective to 'represent the professional views of our members to and within the international, national and local bodies considering the safety and efficiency of shipping operations'.

Attendance at the IMO is a key part of delivering these aims, and we have worked with industry stakeholders in:

- Producing guidance, such as for the development of S-Mode;
- Providing input to IMO's eNavigation work programme, the IMO review of the STCW Convention and Code, and the development of Human Element Leadership and Management (HELM) training;
- Ensuring that the burden of compliance is considered and mitigated by the IMO when drafting new regulations.

This report gives a brief summary of our work at the IMO and some of the key decisions so far this year. Each section describes the work of a particular committee or sub-committee. To make a great deal of dense information more easily navigable, key issues and concepts have been highlighted in **bold text**.

Ship Design and Construction

Draft guidelines were agreed on **operational information for Masters in case of flooding** for passenger ships constructed before 1 January 2014. In addition, draft amendments were agreed to SOLAS regulations II-1/1 and II 1/8-1 on computerised stability support for the Master in case of flooding for existing passenger ships. The aim is to provide the Master with regularly updated operational information on the **residual damage stability** of the ship after a flooding casualty.

Draft amendments to the International Code on the Enhanced Programme of Inspections during Surveys of Bulk Carriers and Oil Tankers, 2011 (2011 ESP Code) have been prepared.

Proposed amendments to **safe mooring operations guidelines** would require ships to be provided with arrangements, equipment and fittings of sufficient safe working load to enable the safe conduct of all normal towing and mooring operations. These are aimed at preventing accidents and injury when ships are being secured at berth in a port.

Pollution Prevention and Response

The 0.50% limit on **sulphur in fuel oil** on board ships (outside designated emission control areas or ECAs, where the limit is 0.10%) will come into effect on 1 January 2020.

Ships fitted with an approved equivalent arrangement to meet the sulphur limit, such as an exhaust gas cleaning system (EGCS), known as a 'scrubber', are exempt. Scrubbers are already permitted under regulation 4.1 of MARPOL Annex VI.

Guidance on best practice for fuel oil purchasers/users for assuring the quality of fuel oil used on board ships is an IMO recommendation on best practices, helping ensure both compliance with the MARPOL requirements and the safe and efficient operation of the ship.

Draft guidelines for the use of **electronic record books** under MARPOL were discussed, as were guidelines for the use of dispersants for combating oil pollution at sea, focusing on sub-sea application.

The sub-committee completed the revision of the International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk (**IBC Code**), including revised product lists.

Navigation, communications and search and rescue

The sub-committee agreed to establish two-way routes, precautionary areas and areas to be avoided in the Bering Sea and Bering Strait. These waters are expected to see increased traffic due to rising economic activity in the Arctic. It also considered amended ships' routeing measures in the vicinity of Dangan Channel and Kattegat.

The Global Maritime Distress and Safety System (**GMDSS**) plan was discussed, with the aim of updating the provisions and incorporating new satellite communication services.

Draft interim guidelines were agreed for the harmonised display of navigation information received via communications equipment. These guidelines are part of the **eNavigation** work programme, and aim to ensure this information is displayed on ECDIS, radar and INS in an efficient, reliable and consistent format. The guidelines will be submitted to the MSC for approval.

The International Aeronautical and Maritime Search and Rescue (**IAMSAR**) **Manual**, which contains detailed guidance for a common aviation and maritime approach to organising and providing search and rescue services, was updated.

A correspondence group was re-established to develop guidance for navigation and communication equipment for use in **polar waters**.

Ship systems and equipment

Draft amendments were made to the LSA Code regarding **lifeboat ventilation**. A totally enclosed lifeboat must have means to achieve a ventilation rate of at least 5 m^3/h per person for not less than 24 hours.

Progress was also made in developing draft interim guidelines on life-saving appliances and arrangements for ships operating in polar waters.

Revised guidelines for the approval of fixed **water-based fire-fighting systems** for ro-ro spaces and special category spaces were discussed. The revision relates in particular to the position of sprinklers or nozzles to ensure adequate performance, and to ensuring reliable control.

Work also commenced on the safety aspects of on-shore power supply to ships, also known as '**cold ironing**', 'alternative maritime power' and 'shore-side electricity'. Using shore-side power instead of onboard generators may be one way of reducing air pollution from ships, as well as limiting local noise.

The sub-committee made further progress in developing draft SOLAS regulations and related guidance for **onboard lifting appliances** and **anchor handling winches**.

Marine Environment Protection Committee

The initial strategy for reducing **greenhouse gas emissions** envisages cutting emissions by at least 50% by 2050 compared with 2008, while pursuing efforts to phase them out entirely.

MARPOL amendments to make mandatory the **data collection system** for fuel oil consumption of ships entered into force on 1 March 2018. Data collection is to start from 1 January 2019.

Amendments to the BWM Convention were adopted. These amendments will enter into force on 13 October 2019. It was agreed that the next meeting of the Pollution Prevention and Response Sub-Committee should:

- develop a definition of HFO;
- prepare a set of guidelines on mitigation measures to reduce risks of use and carriage of heavy fuel oil by ships in Arctic waters;
- On the basis of an assessment of the impacts, develop a ban on HFO for use and carriage as fuel by ships in Arctic waters, on an appropriate timescale.

The MEPC agreed to include a new output on its agenda, to address the issue of **marine plastic litter** from shipping in the context of 2030 Sustainable Development Goal 14. Member governments and international organisations were invited to submit concrete proposals on the development of an action plan.

Legal Committee

The increase in the number of reported cases of **abandonment of seafarers** was highlighted. A joint International Labour Organization (ILO)/IMO database recorded 55 such cases during 2017, against between 12 and 19 cases annually from 2011 to 2016.

The 2014 amendments to the ILO Maritime Labour Convention (MLC 2006) require shipowners to have compulsory insurance to cover abandonment of seafarers, as well as claims for death or long-term disability of seafarers. The committee invited proposals to further improve the database and to improve the situation for seafarers.

The committee was updated on guidance which is being developed by the ITF and Seafarers' Rights International (SRI) to support the implementation of the 2006 IMO/ILO Guidelines on **fair treatment of seafarers** in the event of a maritime accident.

The committee added a new output to its agenda on measures to prevent unlawful practices associated with **fraudulent ship registration**, with a target completion date of 2021.

The committee added a new work programme item on maritime autonomous surface ships (**MASS**). The aim is to carry out a gap analysis of existing liability and compensation treaties and other instruments emanating from the Legal Committee. So far, CMI has analysed eight IMO conventions which need to be considered with respect to MASS. These are SOLAS, MARPOL, COLREG, STCW, FAL, SAR, SUA and SALVAGE.

Delegates highlighted the need to consider the impact of MASS on seafarers.

Maritime Safety Committee

This is usually a long meeting with a wide-ranging agenda. The NI made two interventions, one on MASS and one on IALA matters related to VTS.

The MSC looked at how safe, secure and environmentally sound Maritime Autonomous Surface Ships (**MASS**) operations may be addressed in IMO instruments. It endorsed a framework for a regulatory scoping exercise including preliminary definitions of MASS and degrees of autonomy.

The exercise will take into consideration human element aspects, interaction between conventional and autonomous ships, data and communication systems requirements and availability of related technologies in different countries. The target completion year is 2023.

The MSC adopted amendments to the following instruments, among others:

- SOLAS regulations II-1/1 and II-1/8-1, concerning **computerised stability support**. Expected to enter into force on 1 January 2020.
- Chapter IV of SOLAS and the appendix to the annex to the 1974 SOLAS Convention, replacing all references to **Inmarsat** with references to 'a recognised mobile satellite service'.
- **IMDG Code (Amendment 39-18)**, bringing it in line with the latest recommendations from the United Nations Recommendations on the Transport of Dangerous Goods, which sets the basic requirements for all transport modes. The amendments are expected to enter into force on 1 January 2020, with governments invited to apply them on a voluntary basis from 1 January 2019.
- Annex 3 to the code, concerning **fire protection materials** and required approval test methods for passenger ships and high-speed craft. Amendments are expected to enter into force on 1 January 2020.

The MSC received an update on reported incidents of **piracy and armed robbery against ships**. It stressed that the diligent application of IMO guidance and best management practices should be continued. Member states should continue to provide naval assets, and flag states must continue to monitor the threat and set appropriate security levels.

Iridium Satellite LLC has satisfied the established criteria to receive recognition as a mobile satellite communication service provider in the Global Maritime Distress and Safety System (GMDSS).

The NCSR Sub-Committee is to co-ordinate the **Revision of the Guidelines for Vessel Traffic Services**. The committee also noted support for the update of the IALA Standards for training and certification of Vessel Traffic Service (VTS) personnel.

Other important matters related to our membership are the formation of the **Polar Water Operational Manual**, the survey results on improved safety of **pilot transfer arrangements** and validation of all **maritime security-related model courses**, to be undertaken by the HTW Sub-Committee.

The Committee also dealt with Traffic Separation Schemes and safety measures for non-SOLAS ships operating in polar waters.

Facilitation

The Facilitations Committee approved a completely revised and updated structure for its **Compendium on Facilitation and Electronic Business**. This includes a new standard IMO reference data set, which will be used as basis for automated and digital systems for exchange of information when ships arrive at and depart from ports.

The committee adopted revised guidelines on the prevention of access by **stowaways** and the responsibility to resolve stowaway cases.

The committee approved a **revised list of publications** relevant to the ship/port interface (to update FAL.6/Circ.14).

The committee considered information on the negative impacts of **maritime corruption**, submitted by a number of industry organisations and associations. The NI co-sponsored this paper.

Human Element Training and Watchkeeping

The sub-committee agreed the draft set of revised IMO **Guidelines on Fatigue**. The guidelines provide information on the causes and consequences of fatigue, and the risks it poses to the safety and health of seafarers, operational safety, security and protection of the marine environment. The aim is to assist all stakeholders to contribute to the mitigation and management of fatigue. Companies will be strongly urged to take the issue of fatigue into account when developing safety management systems under the ISM Code.

The Sub-Committee continued its comprehensive review of the International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel (**STCW-F**), 1995, which entered into force in 2012.

Anchors and anchoring Part 2

Safe anchoring is vital – but there is no such thing as a safe anchorage

Captain Michael Lloyd
MNM, FNI

In the previous part of this series, I suggested that the main reason ships are anchoring in situations when it would be preferable to remain underway is that the crew do not understand the limitations of their anchoring equipment.

Of course, other factors come into play and must also be considered, not only by those anchoring their ships but also by those controlling other influences within the industry that are contributing to the overall problem.

Anchorages

While recognising that all anchorages present their own peculiarities, broadly speaking they fall into three main categories.

THE OPEN ANCHORAGE

An anchorage open to sea with a clear approach. This is more subject to weather and current but at least is easier to approach and leave.

THE DEFINED ANCHORAGE

An anchorage open to the sea with defined limits. Dependent on the wind direction, there might be some shelter, but the reverse might be true too, with weather forcing the ship on to the land. In estuaries, current can be a problem. The anchorage may also be too small for the traffic.

THE ENCLOSED ANCHORAGE

An anchorage confined on more than one side by natural or man-made hazards. Colón is an example of this type.

Of these three, the enclosed anchorage presents the most problems. Fortunately, as ships have become larger, the number of enclosed anchorages has decreased, but some still exist. Too often, ships enter enclosed anchorages, steam around and then, finding that the anchorage is full, have to extricate themselves and anchor elsewhere.

Port administration

A major problem with open and defined anchorages, and even some enclosed ones, is that some ports have little regard for the regulation of their anchorages. In the UK Port Marine Safety Code, for example, the only mention of port approaches is that the Harbour Master has day-to-day responsibility for managing the safe operation of navigation and other marine activities. Even the UK MCA's comprehensive *Guide to Good Practice on Port Marine Operations* fails to identify the anchorage as a specific subject, and anchors are mentioned only as being a problem for pipelines. I would suggest that the same applies to most national and port management guides around the world.

If there is no specific code of practice for port anchorages, then seafarers are completely reliant on the Harbour Master of each port. A code of practice or operational guide for ports regarding anchorages is urgently needed and I suggest that the following should be considered:

- Provide arriving vessels with designated anchoring positions. Ensure that these are within the port limits and designated for the size of ship. This would avoid the problem of anchoring a large ship in a safe place and then having a smaller ship anchor close by.
- Where possible, regularly update the designated port limits commensurate with the density of shipping and size of ships using the port. Many ports have not changed their port limits for years and in many cases they are too small.
- Do not require vessels to enter the anchorage or anchor in order to tender notice of readiness. Some ports wrongly insist that ships anchor before tendering notice of readiness. This forces ships to anchor in anchorages that can become overcrowded, which may place them in danger.
- Provide regular local weather reports to ships at anchor, especially in deteriorating conditions. This is rarely done, yet local weather can change rapidly in some parts of the world and the only warning may be from the port. I was caught off Livorno, Italy, when the weather went from calm to force 9 in just 20 minutes.
- Provide a marked channel through the anchorage to the port entrance. This would also designate a no-go area for ships anchoring, keeping the fairways clear for transiting ships and preventing them from wandering through an anchorage.
- Advise ships of all vessel movements within the anchorage and into and out of the port. A vessel approaching anchorage is likely to have slowed down and be sluggish to manoeuvre. It can easily find itself in a dangerous navigational situation if a ship close by has heaved anchor, is underway and crossing the intended track. Ships usually head into the current and/or wind to approach an anchoring position, so all the anchored ships are stern-on. In daylight, the little black ball hoisted forward is the sole indication that another vessel is anchored – and of course ships making their approach cannot see this. Even at night, many ships fail to switch off their navigation lights for some time, so again there is nothing to indicate whether the ship is at anchor or underway.
- Advise newly arrived ships of any local navigation hazards. Many ships find themselves looking for buoys and lights that have been moved or that have disappeared. They may even have to dodge recent wrecks that have not found their way on to the charts.

Port administrations must recognise that an anchorage is not a safe place, and that they must take some responsibility to assist ships by making their anchorage safer. In busy ports with large anchorages, the appointment of an experienced officer to deal solely with anchorage administration would be very helpful.

The notice of readiness

There is a misconception that vessels must have anchored before they are deemed to have 'arrived' and can tender notice of readiness. This has led to ships trying to anchor in a defined or enclosed anchorage in poor weather, or when the anchorage is already dense with shipping.

A vessel sailing under a port charter party must have reached *the place where vessels usually wait within the port limits* before it can tender notice of readiness. Legally, the port limits are the seaward boundaries of the area over which the port has jurisdiction over navigation and operational procedures. Within these limits, the vessel is considered to have arrived. If conditions are not safe to anchor, notice of readiness can still be served while the vessel is underway.

Company management

It is not just ports that treat anchorages casually. Many companies look on the anchorage as the equivalent of being alongside and arrange for all kinds of work to be done, especially if the anchorage period is expected to be prolonged. Engine repairs that incapacitate the ship are far too common. A request to undergo repairs at anchorage 'for a short time only' may mean the Master is in a difficult position with no engine should the weather deteriorate. The SMS should deter Masters from immobilising their engines at anchorages unless this cannot be avoided, in which case it should outline additional safeguards.

The psychology of anchoring

As any seaman knows, every ship is different. When a Master was appointed to command a ship they were not familiar with, it was common practice to require them to take a few hours at sea to manoeuvre the ship and gain an understanding of its handling characteristics. Those days seem to have gone. Too often, the anchorage is the only time a Master manoeuvres the ship, and indeed it may be the closest they navigate to other ships and to land.

Under such circumstances, it is not uncommon for Masters to approach an anchorage, especially a busy one, with trepidation. Once the ship is anchored there is a sense of relief at having arrived and anchored without any mishap. If a situation arises that should require the ship to move or leave the anchorage, there is often considerable reluctance to do this.

The answer is, of course, to accept that for safety, companies should require Masters to take time to manoeuvre their ships and gain some degree of confidence in the behaviour of the ship before practising in an anchorage. In addition, Masters should be well trained in anchoring before they take over the responsibility for themselves.

I always had my Chief Officer on the bridge for all port operations. Not only was this good for his training, but I also had the benefit of his experience and hopefully his confidence to suggest, when required, that I was wrong!

Final thoughts

- If there is any doubt as to the viability of the anchor position, don't anchor.
- Check the current, especially in open anchorages and in rivers. The farther up river you go, the greater the current and the worse the holding ground.
- If for any reason – such as fog or dense traffic – the ship would be at risk by anchoring at a port of arrival, declare notice of readiness underway off the port. If necessary, tender a note of protest.
- Always anchor with both anchors unless in an area of calm and in certainty of the existing weather continuing.
- Keep engines at instant readiness. At the first sign of the weather deteriorating place the engines on standby. If you are considering whether to stay or go, err on the side of safety and go.
- If you give shore leave, then make sure there are enough people left on board to get the ship underway if required.
- Never anchor with the winch in gear. In deep water walk back to a short distance above the ground and then use the brake.
- If the vessel is yawing in the sea or wind, remember this places up to three times the load on the cable. Until the ship can get underway, steer the ship in the direction of the anchor.
- Remember the winch capability controls the maximum length of cable that can be used.
- The ratio of depth to draught should be at least 2 to 1 and scope of cable to depth at least 6 to 1, better 8 to 1.
- Always, always maintain an anchor watch by a responsible officer.
- If you anchor in ice, you will drag in the direction of the ice movement.
- If you perceive the ship to be in any possible danger, it is your responsibility to place the ship into safety.

The industry as a whole treats anchorages and anchoring far too casually. There is no such thing as a 'safe' place at sea and, based purely on incidents alone, anchorages certainly do not qualify.

Anchoring a ship is an affair of pure seamanship, requiring high levels of ability, knowledge and confidence. While there are navigational aids to assist, it is a human action that rests solely with one person – the Master.

Does the company give the Master any support in making the decision whether to anchor or not? Is the Master confident that any decision to leave the anchorage owing to worsening weather will be supported by the company? Does the port have an anchorage support structure that can provide advice and guidance?

Regrettably, in many instances I think not.

As discussed in the last issue, the weight and size of anchors and chain has not kept pace with the increase in the size of vessels. This means that far more thought and ability is required to carry out a safe and successful anchoring operation than in the past. Unfortunately, it appears that seamanship is considered a background trade, rather than the evolving science that it once was, with electronic gadgetry somehow able to fill the gap. Until this attitude is corrected, ships will continue to drag their anchors, break their cables and hit other ships. All of this could be prevented – or at least considerably reduced – by recognising that anchoring is an essential part of seamanship and must continue to be taught.

Fouled cable syndrome

Look at any photo of a ship gone aground from an anchorage, and one thing stands out. Almost all ships in such a predicament still have one anchor in the hawse pipe.

As a young officer, I was told that if you put two anchors down and the ship turned, the cables would get fouled around each other. Bowing to experience, I accepted this, as did most others. Examiners delighted in asking about this and the standard answer was required.

On sailing ships that were subject to the vagaries of wind and current, there was indeed a danger of this and often ships had to slip their cables or lower boats to pull the ships around to untwist the cables. But where is the danger today? If there are two anchors down and the ship is veering the wrong way, this can be corrected by use of wheel and engine. Even if the ship does swing around without the duty officer noticing, simply drive the ship back around again and all is cleared.

With this said, it seems unprofessional to allow ships to go aground by using only one anchor rather than two. I would go further. When anchoring in any anchorage subject to weather change, we should, as a matter of course, use both anchors. At least then we have two chances to prevent grounding if for some reason we cannot haul off the anchorage into safer waters.

MASS – here we come, ready or not?

We must move fast if we are to keep ahead of developments in this sector

Captain Alexander Sagaydak
FNI

Some very interesting presentations and discussions during The Nautical Institute's Seminar and AGM in Malta and several good publications in *Seaways* have inspired me to put down some of my own thoughts on the subject, based on my own experience on testing autonomous software and hardware on board. Of course, there are more questions than answers at the moment, but hopefully it is worth asking them.

Why now?

The first question is: does this problem really merit our attention right now? It seems as if we have plenty of time before the first totally autonomous ship comes over the horizon. In the meantime there are many more immediate issues to deal with: fatigue, human element, climate change, and so on. Is it absolutely necessary to discuss unmanned ships now?

Experience shows that manufacturers are always ahead of industry, dictating their own rules and procedures (just look at ECDIS, where several of the technologies are anything but not user friendly, but we still have to use them and train our officers in their use, creating a giant opportunity for mistakes). Right now, we have the very rare opportunity to tell manufacturers to create their robots according to certain rules. And we can take part in developing these rules! This is the main reason for the NI to take part in these discussions. For once, we have the opportunity to write the rules, not just to play catch up after the event.

MASS and the charterer

From a sceptical point of view, even if marine autonomous surface ships (MASS, to use the established term) are tried and tried in the near future – will charterers take the risk of using them? Financially, they would certainly find it interesting, given that the minimum average monthly crew cost for an ocean going ship is between $70,000-100.000. A fully autonomous ship would mean no headaches with crew changes, delayed flights, sickness, or health and safety on board. And, potentially, with no humans on board – no human errors! It certainly seems likely that some of the larger companies will take this opportunity. It does present a huge task for P&I clubs, as there are no examples of such insurance in the past.

Ready or not?

If we agree that MASS are worth discussing, we can discuss what exactly we want to see at sea. Here are two questions: Are autonomous ships ready to sail right now? And are we ready for them?

Back in 1991-92, I was involved in one of the first attempts at developing autonomous ships, as an officer on the ship where the test system was installed. The task of the system was to keep the ship on route. This had good results: the ship moved from A to B, changing course properly at the waypoints and making course corrections where necessary without any interference from us. While correcting the course, the programme was continually deciding whether to plot a new course or return to the pre-plotted line, depending on the situation.

The project was closed due to lack of financing, but it gave me some new experience, and an opportunity to talk to the engineers, who had previous experience in remote and automatic control for aviation and space craft. According to them, a ship is the most difficult object to automate, as there are so many forces affecting the ship's movement. The system had to be 'taught' for quite a long time in order to gather sufficient data to react properly. The same problem arose when it came to tricky navigation – too little data, or too much volume of data, or poor interpretation led several times to the wrong decisions. The only way to avoid them was to 'train' the robot.

Both software and data processing capacity have moved on significantly since then, but even the best software can't predict everything. Technically, autonomous ships probably are ready to sail, but caution is required regarding particular weather and navigational conditions. And of course, any ship needs maintenance from time to time. That means we need to provide some accommodation for temporary crew (e.g. mooring crew or maintenance crew). And most important – we need to provide life saving equipment. An autonomous ship is not necessarily an unmanned ship.

Collision avoidance

Are we ready to see an oncoming robot at sea? Here, the answer, as far as I can understand is more negative – we don't know how the robot will react to oncoming traffic. One solution seems to be to limit the use of full autonomous mode to certain times and areas.

The scheme is quite simple: the ship leaves the port with almost full crew (mooring team). After the pilot point, the crew disembark (in some areas where navigation is difficult or traffic heavy, navigators may stay longer). The ship is under control of a Shore Control Centre (SCC) operator. Once on a defined route reserved only for autonomous ships, fully autonomous mode could be turned on. Human operated ships are to avoid these routes.

If a robot ship and a manned ship do meet, who should give way? It seems reasonable to create a special signal to identify MASS, but this signal should not give them priority! This is a task for software manufacturers – MASS should at all times manoeuvre as prescribed by Colregs [Editor's note: this is the position that The Nautical Institute has taken at the IMO].

Moreover, all MASS ships in full autonomous mode should follow similar protocols. That is, given the same navigational situation, similar MASS vessels should behave in the same way. For example, in a give way situation, where course, speed, angle, and CPA are the same, two similar MASS vessels will alter course on the same angle.

What if it all goes wrong?

Based on reports of accidents with autonomous cars, we can expect to see problem situations developing with MASS at an early stage of introduction – like mixing up landmarks or unpredictable behaviour in areas of intense traffic. An out of control ship approaching a major port is a real disaster. What can we do? Send a team of paratroopers on board in mid ocean? What if it is just sensor malfunction or wrong interpretation of data? Any ship's equipment on MASS should be doubly or even triply redundant.

To prevent accidents – and react to them if necessary – the following scheme might be used, particularly for shore controlled vessels.

Operators could be located at certain points on ship's route, rather like dispatchers in aviation. Emergency teams who will board the ship in case of necessity will be located at the same points. Needless to say, all shore control centre (SCC) operators and emergency teams must be professional seafarers with proper qualifications and specific training in autonomous ships. Every ship must come with a password protected 'red button' allowing the ship to be switched to manual mode. Better yet, have dual factor authorisation, with two emergency team members each having separate passcodes.

This leads inevitably to the next question. What about bad guys – pirates, smugglers? How can we prevent them from gaining access or control of the MASS? The 'red button' giving manual control is to be encrypted by all possible means. The construction of the ship should allow maximum protection from unauthorised access, with the situation around the ship continually monitored and recorded.

In some ways MASS offer considerable security advantages. The only value on board is the cargo and the ship itself – there are no hostages, and no cash. All doors could be closed and locked at all times, making the ship totally hardened.

This does seem to contradict search and rescue requirements. How can MASS help people in distress? First of all, by reporting their presence to the shore operator, and then launching life rafts. Further procedures must be developed.

Man vs machine?

Last but by no means least, how will MASS affect the labour market? Will it be a case of human mariners vs robots? I guess not. We still have many vacancies in the industry, and the profession of the seafarer is unfortunately becoming less and less popular. Robots will just fill the gaps. There will be enough new positions for humans who want to enter the industry as shore control centre operators, emergency team members, and so on.

On the legal side, IMO is already working on a scoping exercise to identify the dozens of international conventions and other documents to be updated.

In summary, and acknowledging that the list of matters to be considered is huge, a few points about the development of MASS that are worth bearing in mind:

- MASS vessels are real. Their appearance at sea is just a matter of time;
- An IMO Code for MASS oeprations must be developed as soon as possible;
- The Nautical Institute has a good opportunity to take part in creating rules for such ships in advance;
- It is The Nautical Institute's task to reflect the views of human mariners, not robots. The NI's participation in developing rules and regulations must remain focused on ensuring maximum comfort and safety on vessels operated by humans;
- MASS technology will need further development and correction based on results from the first ships;
- In order to avoid accidents, which will definitely happen in the initial stages, MASS operating in full automatic mode should be limited to areas away from usual routes and, if possible, away from heavy weather areas. Manned ships are advised to avoid these waters;
- Establish 'dispatcher' points for the SCC operators and emergency teams;
- SCC operators and emergency team members to be fully trained professional mariners;
- MASS vessels to be protected from unauthorised access. At the same time, they must enable easy embarkation for emergency teams;
- Search and rescue is a weak point at the moment. Special procedures must be developed;
- MASS vessels should include accommodation, food and water stores and life saving equipment for limited crew (eg maintenance, emergency team, or rescuees);
- Special signals to be created to identify MASS operating in shore control and fully autonomous mode. This signal should not give priority;
- MASS to obey all Colreg requirements;
- Navigation protocols to be standardised for similar MASS vessels (at least for standard situations);
- The labour market will not be affected by MASS in the foreseeable future.

Blue sky thinking

The most effective solution for mass ocean transport is not MASS as they are currently envisaged, but commercial submarines. After loading, the vessel is brought out of port by a human crew. The crew then disembark, and the vessel goes underwater, and moves through the ocean under a totally autonomous regime. No wind, no surface waves, and the environment is much more predictable. As there are no crew, no oxygen is needed, so compartments might be filled with inert gas to prevent fire. Ultra long radio and acoustic waves can be used for obtaining data and monitoring; batteries for moving the ship. Sounds fantastic? Twenty years ago, autonomous cars sounded fantastic. Several companies are already working on a commercial cargo submarine concept.

Improving Ship Operational Design

This book is aimed at making maritime operations safer and more effective – all through the work of the naval architect. Here is practical advice to help improve ship design, both for those just starting out and for experienced naval architects.

Naval architects have a lot of power at their fingertips, because bad ship design can kill people.

To give just one example: in far too many cases, the entrance to an enclosed space does not allow someone to enter if they are wearing protective gear. If they get into trouble, the restricted entry complicates and delays rescue. How long would this be tolerated in a mine or a factory on land?

The maritime industry has some catching up to do. This book is full of practical examples that will help naval architects make people's lives safer and more bearable on board vessels.

Unfortunately, naval architects rarely get the chance to go to sea; equally there are few avenues for seafarers to make their views known to designers. This book helps bring shipboard life to those onshore.

The authors believe that the more sea time naval architects can experience, the better their design will be. Ideally, sea time should be included in the naval architects' curriculum and be assisted by the shipowner community. The Royal Institution of Naval Architects (RINA) and its members have played a major part in bringing naval architects and users together – and in producing this book.

Human-centred design (HCD) is the watchword. When designers do not take this into account, users do adapt to the workplace when forced to – but this is a sign that the design should have been better.

We hope that the practical experiences outlined in this book will help naval architects to interpret seafarers' needs and translate them into design. Shipowners benefit as well, because safer and more efficient vessels save money.

This book was based on feedback from users and stakeholders through international non-governmental organisations and representative individuals. It includes input from 45 authors, covering a huge range of design and seafaring experience. We hope it starts a dialogue that will help improve the flow of information between naval architects and seafarers – and result in better designed, safer and more efficient ships.

Chapters include:

- Introduction to human-centred design
- What the ship designer needs from mariners and shipowners
- The maritime domain (context of use)
- Operational requirements of the Captain
- Operational requirements for pilots and tugmasters
- Operational requirements in the engine room
- Operational requirements for cargo operations
- Living requirements for onboard personnel
- The needs of the shipowner
- Role of HCD assessors

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

Safety and shipping review

Insurer Allianz (AGCS) recently published its annual safety and shipping review for 2018, highlighting what the company considers to be the most significant areas of risk across the maritime industry. The report states that human error continues to be a major driver of shipping incidents across the board. However, Allianz claims that better use of data and analytics could help change behaviour and substantially improve safety.

AGCS analysis of almost 15,000 marine liability insurance claims between 2011 and 2016 shows that human error is a primary factor in 75% of the value of all claims analysed – equivalent to over $1.6bn of losses. 'Incidents can have a common theme,' explained Captain Rahul Khanna, Global Head of Marine Risk Consulting at AGCS. 'Safety rules and regulations are in place and are mostly followed, but there are some aspects of human nature that we are not addressing as an industry.'

Overall, large shipping losses have declined by more than a third (38%) over the past decade, the review stated, with this downward trend continuing in 2017, when 94 large ships were lost worldwide. However, losses were up in certain accident hotspots, in particular South China and South East Asian waters, where 30 large ships were lost. Typhoons, traffic and safety on domestic routes were major factors. Shipping incidents in Arctic waters increased. Bad weather was involved in one in four losses.

'The decline in frequency and severity of total losses over the past year continues the positive trend of the past decade. Insurance claims have been relatively benign, reflecting improved ship design and the positive effects of risk management policy and safety regulation over time,' said Baptiste Ossena, Global Product Leader Hull & Marine Liabilities, AGCS. 'However, as the use of new technologies on board vessels grows, we expect to see changes in the maritime loss environment in future. The number of more technical claims will grow – such as cyber incidents or technological defects – in addition to traditional losses, such as collisions or groundings.'

The report also features articles on container ship fires, the record-breaking hurricane season, the opening of polar routes, new emission rules and cyber security. The full report can be downloaded from www.agcs.allianz.com

Zero CO_2 emissions

The International Chamber of Shipping (ICS) has launched a publication to endorse the recent adoption by the IMO of its ambitious strategy for phasing out CO_2 emissions from the international shipping sector.

Reducing CO_2 Emissions to Zero explains what the strategy could mean for international shipping. Targets include an average efficiency improvement of at least 40% across the world fleet compared with 2008, and a 50% cut of the sector's total greenhouse emissions by 2050, regardless of future trade growth.

The publication also explores possibilities for the development of zero CO_2 fuels that will almost certainly be required if a 50% total cut in GHG emissions is going to be delivered before 2050, as well as investigating policy options for short- and medium-term regulatory measures.

Reducing CO_2 Emissions to Zero sets out ICS's firm opposition to the concept of mandatory operational efficiency indexing of individual ships, which it argues would lead to serious market distortion.

In the introduction, ICS Chairman Esben Poulsson explained: 'We now expect discussions at IMO to begin in earnest on the development of additional CO_2 reduction measures, including those to be implemented before 2023. ICS will continue to participate constructively.'

Reducing CO_2 Emissions to Zero can be downloaded free of charge from the ICS website – www.ics-shipping.org

MARPOL will be focus of PSC CICs

Member states of the Paris and Tokyo MoUs on Port State Control carried out a joint concentrated inspection campaign (CIC) on safety of navigation including ECDIS between 1 September 2017 and 30 November 2017. The objective of the CIC was to check the conformity of safety regulations for ships and the competency of crew involved in navigation operations.

Navigation equipment has always been considered an inspection item for PSC inspections. Regulations on navigation equipment have undergone frequent changes, and deficiencies concerning navigation equipment have been noted as high – around 6.21% over a six-year period.

During the CIC, a total of 4,288 inspections were carried out involving 4,217 individual ships. A total of 32.2% of the detentions over the inspection period were related to the CIC topic. The Report concludes that the CIC has provided sound evidence that the industry has achieved a good level of compliance with the SOLAS Chapter V requirements pertaining to safety of navigation. The 1.2% rate for CIC-topic deficiency rates (average number of deficiencies reported per inspection) is satisfactory overall.

The next joint CIC will begin on 1 September and will focus on MARPOL Annex VI. The campaign's main objectives will be to:

- Establish the level of compliance with the requirements of MARPOL Annex VI within the shipping industry;
- Create awareness among ships' crew and shipowners of the importance of compliance with the provisions of MARPOL Annex VI and the prevention of air pollution;
- Send a signal to the industry that prevention of air pollution and enforcement of compliance with applicable requirements is high on the agenda of the member states of both MoUs;
- Underline the responsibility of the port state control regime with regard to harmonised enforcement of compliance with the requirements of MARPOL Annex VI.

Human Rights at Sea reports on flag states

Human Rights at Sea in partnership with University of Bristol Human Rights Clinic and Human Rights Implementation Centre have published the first report on 'Flag States and Human Rights'.

The report is a study on flag state practice in monitoring, reporting and enforcing human rights obligations on board vessels.

Human rights abuses occur within the maritime environment. This is a relatively unexplored, undiscussed and often ignored issue. The aim of the report is to understand how different flag states comply with their international human rights obligations and through these findings to increase awareness of human rights abuses occurring at sea and the challenges in effectively monitoring and reporting them.

In the Centre's second year working with Human Rights at Sea, the Flag State Research Project was established to explore how three key flag states meet their international human rights obligations aboard vessels registered under their flag.

The report can be downloaded free of charge or read online at www.humanrightsatsea.org.

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**

North of Scotland Branch

Roger Armstrong
Branch Chair

Tell us about the history of your branch?
The N of Scotland Branch celebrates its 40th anniversary this year. The Branch's first Chair was Angus McKay, with Robbie Middleton as seagoing Vice Chair. The strength of this team led to the creation of not only the branch but also the DP operator qualifications.

It is often sobering to introduce 'new' topics and be reminded that they were first introduced by members back in the 1980s. It is a testament to the success of The Nautical Institute that these people still attend and believe in the ethos.

The Branch had the honour of hosting the NI AGM in 2016, an event that was successful due to the fantastic efforts of all the Branch members, partners and our colleagues in Shetland who demonstrated Scottish hospitality at its best.

What sort of activities do you organise?
Our programme covers topics as diverse as a near miss in South East Asia and the lessons we can learn in the North Sea, through to renewables, 'Walk to Work', and the loss of marine skills on the installations. We are fortunate to have access to some of the marine technology companies who service the offshore sector, and try to have at least one lecture a year on developments in these technologies. Recognition should be given in particular to Guidance Marine and Kongsberg.

Earlier this year, for example, a presentation was made on the challenges of changing an anchor chain fairleader wheel on a semi-

submersible. The work was completed in October and done by rope access technicians. It was the first of its kind and was given to a larger than normal audience who appreciated the processes that led to the successful completion.

No Branch is without its membership issues. For the North of Scotland Branch, the challenge is to maintain our contacts despite frequent changes of company and personal email addresses. Some people maintain membership but do not attend the Branch Meetings. I suspect that readers will see this in their own regions and branches, but it is frustrating, and I have a sense of a missed opportunity to promote and strengthen the NI.

Looking forward
One of the hot topics for the Branch at present is the reactivation of vessels coming out of cold stack. In the last months we have seen an upturn in the oil price leading to more development and projects. It is not hard to understand that a shortage of seafarers and transfers to unfamiliar vessels presents a significant risk to the industry and installations. The NI has been engaging with the operators to identify and mitigate these issues.

Developing skills
The North Sea presents unique challenges to seafarers. The vessels are very sophisticated and need experience in a variety of propulsion characteristics. The average Master must be familiar with several types of thruster, thruster drive, power management and DP systems and then assume responsibility for his Bridge Team's continuing professional development.

These skill requirements have led to a collaborative exercise with the Marine Safety Forum to develop a practical CPD process for ship handling of specialised DP vessels. We aim to create a process that would allow the officers to regularly practise and develop their skills and remove some of the reliance on the DP systems – while recognising the difference in training requirements from, for example, a commercial trading tanker or containership. It should also offer some confidence for the Master to develop their team and create a bridge resource team ethos.

Social responsibility
The Branch has several regular charities, in particular the Seafarers' Centre in Aberdeen. The Chaplain Howard Drysdale is a regular Branch attendee and has been a force for good for the marine sector in Aberdeen. Recently, Howard supported the crew on Malaviya 7, an Indian registered supply vessel that was arrested due to non-payment of wages.

The Branch actively supports this mission, with volunteers who visit the vessels, and by providing financial assistance to help maintain the drop-in Centre. The location is popular with the multi-national crews who can use the internet, meet fellow crew members but mostly unwind from the stresses of seafaring for a few hours.

Branch fact file

Email: gaskin_claire@yahoo.com
Web: www.facebook.com/NINorthofScotland/

Founded: 1978
Members: 138

Chairman: Roger Armstrong
Secretary: Claire Gaskin MNI

Meetings:
The Branch has a regular venue at Woodbank, in a suburb of Aberdeen. We meet from September through to May with a summer vacation. Meetings are held on or around the third Tuesday of the month. Our full programme for 2018-19 starts in September with a visit to the new Aberdeen Harbour. For the first time ever, we have a dinner dance in collaboration with the IMarEST.

Proposed new harbour extension

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

LONDON BRANCH

Chemical tankers – operational challenges

→ London Branch presented the latest seminar in their series on specific ship types on board HQS *Wellington* on 2 July. This time the focus was on chemical tankers and, as usual, was held jointly with the HCMM, RIN, RINA, IMarEST, BACS and ICHCA.

London Branch Vice Chairman Steve Cameron presided over a panel comprising Janet Strode, General Manager of the International Parcel Tankers Association; John Bussell, an experienced Master and current vetting inspector; and Richard Barnes, a serving chemical tanker Master with Stolt Tankers, who kindly agreed to stand in at the last minute after being approached in the wardroom bar!

Sector overview

Janet Strode explained that the relative sophistication of the cargo systems compared with most oil tankers allows chemical tankers greater operating flexibility and means they can carry more variety of cargo. This enables the 'triangulation' of voyages, so that ships are always carrying cargo with no ballast legs. This means a high tempo of cargo operations, with vessels often backloading several parcels at the discharge port, while shifting berth and tank cleaning in between.

The main regulations applying to the trade are the International Bulk Chemical (IBC) Code and Annex II of the MARPOL Convention. Under the IBC, chemical tankers are assigned a ship type according to the degree of risk presented by the products carried. This takes into account environmental and safety hazards, including flammability, toxicity, corrosiveness and reactivity. Type 1 ships have the highest degree of damage stability and the best protected cargo tanks, while Type 3 ships could still be single hull. Very few Type 3 vessels remain in service. MARPOL Annex II sets out pollution categories, the associated stripping and pre-wash requirements and how the resulting washings must be disposed of.

Vetting inspections

John Bussell, a serving vetting inspector, reflected that there is no right way of running a ship, only a safe way. Achieving this is increasingly challenging given the pressure on crews – not least that imposed by vetting inspections.

Vetting inspections are called for and organised by owners in order to satisfy the requirements of charterers. Ships do not 'pass' or 'fail' an inspection, but the charterers using the reports may, or may not, accept a ship based on its findings.

Two principal organisations govern these inspections: the Oil Companies International Marine Forum (OCIMF) with its Ship Inspection Report Programme (SIRE), and the Chemical Distribution Institute (CDI) which deals specifically with chemical tankers.

John explained that although he was providing a service to the readers of his reports, he always tries to assist crews and work with them. Co-operation is essential, since his inspection is driven by 1,031 questions in 14 chapters of guidance. All this has to be covered in around eight to 10 hours during a port call that may also include bunkering, embarking stores or crew changes as well as cargo operations.

All findings must be based on objective evidence. For instance, an inspector could not report that something appeared to be a 'paper exercise' without providing evidence to substantiate that, regardless of how confident he felt about his findings.

Overall, it is accepted that vetting has improved safety in the chemical tanker sector, just as it has done for oil tankers. During a vetting inspection John enjoys giving back by discussing regulations and industry recommendations with crews and providing advice. He reflects that, although inspectors like him rely on checklists and paperwork for their evidence, there are indeed too many and too much for the small crews of chemical tankers.

The Master's view

Having listened to the other two speakers, Richard Barnes stepped up, with no notes or preparation, to give the Master's view. He agreed that life for modern chemical tanker crews was indeed complex. The key to safe and successful operations that keep the charterers and the office happy is teamwork. The Chief Officer must know all that the Master knows, and all the officers must play a full role. A lot of training is required for safe operation on board

these ships – much more than is required by STCW. Delivering this training, largely in the form of mentoring, is rewarding and engenders willing co-operation, which makes for a safe and happy ship.

Generally, Richard's ship would normally be subject to one CDI inspection in a year and two or three SIRE inspections. Richard said that the best way to deal with vetting was to perform your own. Striving to maintain the same standards all year is a lot more manageable than letting things slide and having to pick them up as an inspection approaches.

Richard mentioned that any modern Master needs to be culturally aware. His ship can have 11 or more nationalities among the crew.

Work and rest hours are a challenge, but with shore management support can be managed effectively. Richard's managers would support him if and when he needed to push back against charterers to remain compliant and prevent fatigue. However, he has never found a problem with this from charterers. It is to be hoped that other Masters and managers are also standing firm when required.

Q&A

The audience debate began with discussion about working hours, and the role of vetting in enforcing compliance with work and rest hour regulations. Vetting is a sampling process, but an experienced inspector has a reasonable chance of finding issues if looking in the right place. It is not possible to go into detail with cross-checks within the confines of a vetting inspection.

Richard mentioned that planning is key to compliance. If done well, with co-operative managers and charterers, the challenge of work and rest hours can be met. Janet said that owners do not want their crews fatigued and will generally seek solutions to the problem, rather than ignore it.

Another question addressed cleaning and inspecting tanks. Janet responded that since it is now possible to test for very low concentrations of previous cargo residues, some charterers test and retest before accepting a vessel, sometimes insisting on the tanks being re-cleaned. Other charterers are coming round to the idea of allowing trusted owners to confirm when the tanks are clean and ready for loading without the need for testing.

Richard mentioned that, unless venting alone will suffice, ships continue to water wash in most cases. Chemicals are mixed with water for dealing with stubborn residues. The amount of water, and the time taken, varies with the type of cargo being washed and the cleanliness and inspection criteria imposed by the next charterer for the next cargo.

During a turnaround with a full discharge and backload in Europe, there can be as many as 150 tank entries. This inevitably raised the issue of managing safety around so many enclosed space entries.

The prospect of shortcuts and poor atmosphere testing was brought up. Richard's experience was that this is less common these days, but he stressed that education is crucial. A well-trained AB working within a sound safety culture will refuse to enter a tank without the required permit and is often knowledgeable and confident enough to be able to verify checks are done properly and to use 'stop work' authority if they are not. Safety culture is improving, particularly on tankers, but the industry still has a way to go.

The speakers' presentations frequently mentioned the need for training above and beyond STCW requirements, and there was some discussion on potential standards for specialised training across the sector. Janet said that efforts to increase the sea time required for a chemical tanker endorsement had not been successful. Furthermore, there is no minimum variety of cargoes to which crew are exposed while gaining sea time for a chemical tanker endorsement, so crew could qualify while only carrying vegetable oil. CDI provides training materials and it seems many responsible operators provide extensive in-house training.

Further contributions from the floor included the importance of reflective learning, by which crew discussed accidents that occurred in situations to which they could directly relate.

As ever, the debate could have gone on, and indeed did so – in the wardroom bar!

Andrew Bell FNI

CYPRUS BRANCH

Ship managers and safe manning

➔ Capt Kuba Szymanski, Secretary General of InterManager, gave a presentation on the Sustainable Shipboard Resource Management Project. He asked: "Is safe manning good enough for the ship manager?" and raised a number of highly pertinent concerns.

Following the presentation, Capt Giles Heimann, Corporate Director, Fleet Personnel, BSM, Capt Vasilis Soteriou, NI Committee Member and seagoing Master, and Capt Prabhat Jha, Managing Director, MSC, were invited to share their opinions as part of a panel on the issue of safe manning. The moderator was Ms Yvonne Tsanos AFNI, Vice Chair of the Branch.

While flag states often indicate a small number for the minimum manning on specific vessel types, the reality is that the vessel needs a higher crew complement to meet the demands of owners, charterers and third parties. Crew numbers should be based on the vessel's trading pattern, ports of call, cargoes, reporting requirements, job priorities and many more factors. Over the last decade or so, positions such as radio officer, electrician and messman among others, have been removed. At the same time there has been rapid technological development on ship's equipment, as well as increased communication and reporting demands.

While flag states may very well have their own 'minimum' requirements, happily a majority of owners and managers certainly do not adopt this approach. Instead, they are evidently maintaining sufficient crew complements to accommodate ever-changing demands and to ensure not only safe but practical manning levels.

The conclusion was that, despite the low or even reducing numbers on the safe manning certificate, the industry has to embrace new developments and the implications these have for crewing requirements. We need to keep in mind the actual practical crewing needs on board without jeopardising the safety of the crew, cargo, vessel and the environment. It was observed that many owners and managers view the minimum manning certificate simply as a tool or indicator, rather than as a rule for the actual manning levels required to run the ship properly and safely.

The event was well attended by both members and friends of the NI Cyprus Branch. It was held at the fabulous BSM Maritime Training Centre, Limassol Marina, whom we thank for their support. A networking and social hour afterwards was generously sponsored by InterManager.

Yvonne Tsanos AFNI

READ ANY GOOD BOOKS LATELY?
Send us a review - editor@nautinst.org

Seaways looks at books, films and articles offering advice, information and general interest to Nautical Institute members

Tug Use in Port – Third Edition

The first edition of *Tug Use in Port* was published in 1997, covering the performance characteristics, capabilities and limitations of the various tug types in operation not only in Rotterdam but throughout the world.

So what is new in this third edition? It builds upon the work contained in the previous editions but its main focus is to bring tug development and towing practices up to date. For example container vessels have grown in size from 7,000 TEU when the first edition was published to 22,500 today. The profile of LNG carriers has followed a similar pattern, with vessels now being built regularly reaching over 300 metres in length. The high profile of cruise liners and car carriers mean that, though well provided with thrusters, they need tug assistance in strong winds. Shipping is operating increasingly at higher latitudes where ice and severe weather make new demands on tug design and operational practices.

Escort towing has come of age and improvements in design mean that escort tugs can now be deployed with increased capability. A whole chapter is devoted to this subject, providing a valuable study guide for those involved in this type of work. A new section looks at the economics of tug operations on the viability of ports. Cost effective towing services need to be provided if ship owners are not to use alternative ports where costs are lower – a reminder that tug design is influenced by commercial need.

In response to changing operational requirements many innovative new tugs and their capabilities are discussed in this edition which include, to mention a few, the Multratug 32 and 33 (Carousel RAVE tugs) where the towing point can move around the superstructure, the DOT (Dynamic Oval Towing Tug), the EDDY (Efficient Double Ended Dynamic) Tug, and the Giano Tug with two skegs and two azimuth thrusters, one forward and one aft with variable pitch propellors. Much attention has been given to environmental performance in new designs and the features of specially strengthened ice tugs are covered.

The publication is imaginatively laid out with exceptional photographic images of all the tug types in action, with clear and well placed illustrations and diagrams which demonstrate the author's practical experience as a former Pilot in the port of Rotterdam. All mariners will appreciate the way information is presented.

Several tragic accidents with loss of life are analysed, some due to lack of appropriate training or the unexpected effects of speed, particularly on larger vessels during hook ups near the bow where interaction effects increase exponentially. The salutary examples focus on the underlying causes and the lessons to be learnt are explained through clear text, diagrams and graphs.

Sections on training have been updated to address increased training needs and a new chapter added to demonstrate how to carry out risk assessments and provide safe working practices in line with the ISM code on safety management and the USA 46 Code of Federal Regulations subchapter M.

Each chapter is supported by a comprehensive bibliography.

The appendices cover guidelines for emergency towing, safety when handling tugs, stability rules for escort tugs, their evaluation and selection.

There is even a section on the operation of autonomous vessels and the possibility of using remotely controlled tugs for ship assistance. Conceptual models have been developed which raise entirely new speculations such as who is actually responsible and how remote controllers will gain their experience. Material enough for a fourth edition in due course.

In the meantime this authoritative third edition, sponsored by the Rotterdam pilots, certainly maintains its position as the leading industry guide to tug operations in ports, port approaches and offshore terminals. The book is published by The ABR Company Ltd.

Julian Parker OBE FNI

Tug Use in Port

Captain H Hensen FNI FITA

Letters

JOIN THE CONVERSATION

Send your views and opinions to us at **editor@nautinst.org**, write to us at **202 Lambeth Road, London SE1 7LQ, UK** or become part of our online community:

www.linkedin.com/groups/Nautical-Institute-1107227
www.twitter.com/NauticalInst
www.facebook.com/thenauticalinstitute
www.youtube.com/TheNauticalInstitute

Give us a mention on social media #NautInst

Positioning and GPS loss

Reading the Captain's Column about losing GPS, I was reminded of the many times when, as the navigating officer, I had sat with sextant poised to catch the emerging star or the clearing horizon. In those days our only aids were the moon, stars and sun plus the nautical tables, a chromometer and the star globe, plus my Navigator's Yeoman.

Of course, times move on, but sadly, material failures can happen, and when GPS goes off, I hope that the old rules and skills, which helped me – and Captain James Cook – will still be available.

Capt Brian Evans RN

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: INTERTANKO GUIDELINES ON ECDIS POSITION VERIFICATION

Capt Akash Saxena wrote: 'Intertanko's Guide to Safe Navigation (including ECDIS) recommends the following position verification intervals:

- *Open/Deep Sea: While the vessel is in open sea, the accuracy of position verification is checked once every watch.*
- *Coastal Passage/Approaching, Anchoring and Berthing /Unberthing: In these cases, ship's position on the ECDIS is compared with other means at least every one hour.*

Few senior professionals agree with this frequency, and some say this is very dangerous and could compromise the safety of vessel in coastal/ restricted waters. What are your expert views/experience regarding the feasibility of implementing these guidelines?'

THE INSTITUTE'S LINKEDIN COMMUNITY RESPONDED:

➔ It completely depends on the proficiency, skill and experience of the watchkeeper. ECDIS is still new for many senior Masters. In open seas position fixing should be done once an hour – the usual method for verification is by second GPS and occasionally by other means like astronomical methods. In coastal waters 30 mins, and approaching port 15 minutes minimum.

➔ Considering that not so long ago we were quite content with fixing the ship's position when deep sea once a day, I think verifying the position once a watch is more than adequate. As regards coastal navigation we should be using real-time (terrestrial, independent) methods to verify the ECDIS/GNSS position, including parallel indexing and radar overlay.

There is no practical value whatsoever to making officers specifically verify the position every hour. Real-time monitoring makes it redundant; moreover, an hourly interval will not generally catch the ship before it runs into danger.

For ECDIS, we are talking about position verification frequency – in other words integrity checking (essentially, comparing the displayed position of own ship for consistency with all other available navigational information). Position verification intervals are not similar to position fixing intervals. In the open sea, four-hourly position verification is a good practice.

In coastal water/port approaches it depends on the accuracy of the planned means of navigation and the availability of other navigational information.

➔ A good watchkeeper should be regularly cross-checking the data from the various navigational aids by independent means. Cross-checking position with a second satellite system using the same network is not independent, and there is more and more likelihood these days that if one satellite system is interfered with the others will also be.

Have we forgotten about the use of dead reckoning and estimated positions as means of knowing whether what the ECDIS is telling us is likely or not? A watchkeeper who is situationally aware should have some idea as to how to use set and drift to enhance the estimated position to make an even better comparison with the ECDIS.

➔ Surely the answer to this one should be that 'it depends'. The frequency of checking should be directly related to the proximity of 'danger' and how long it would take for the vessel to hit something lumpy or contravene a zone. In coastal waters with nearby navigational hazards I'd personally want to be very sure of my position ALL of the time.

➔ Position verification frequency when using ECDIS is a rather different thing from the position fixing frequency required when using paper charts. One of the basic principles of ECDIS was that it was intended to free watchkeeping officers from having to 'fix' at such intervals and enable them to concentrate on other watchkeeping tasks.

On a recent navigation assessment, we ran one ECDIS on DR and the other with a conventional GPS input. We ran the exercise for nearly eight hours. The ECDIS running on DR was using the ship's gyro heading and a twin-axis Doppler log on ground sensing. After eight hours, there was less than ½ cable between the positions on the two ECDIS. The fact is that a DR/EP generated from such sensors is vastly superior to anything we used to guesstimate when plotting on paper charts.

➔ To use the radar overlay and then fix on the ECDIS takes very little time, and can be done every 15 minutes on coast or whatever the Master deems appropriate.

➔ Such guidelines in my view are a mere tool for investigators to prove negligence from a bridge team if a position would have lapsed for that long without being verified. In practice, assumptions or guesswork spare no room when you are trusted with a multi-million-dollar property. As such, parallel index, range markers, visual reference points and the list is endless should keep an officer's watch busy enough. Mind also the fact of bridge team/manning.

➔ One should view vessel's position plotted by GPS on ECDIS with some amount of scepticism, which entails other means on a continual basis. These include parallel indexing, radar referencing, bearing lines, use of aids to navigation and echo sounder readings. The question of frequency of plotting a position by any of these secondary means is open to a discussion and may have only a 'compliance' value to it. One hour may be seen as being too long by many, while too frequent plotting is burdening the navigator and diluting the benefits of an ECDIS. In the case that use of alternate means on a regular basis can be demonstrated, then plotting at hourly intervals can be acceptable.

➔ The best thing is for the Master to define how he wants his ship to be navigated safely within the framework of his company's SMS. The overdose of regulations and instructions is confusing the command onboard and the end result is disastrous.

I have seen company instructions to compare ship's ECDIS position with the GPS position on regular basis. I am still trying to figure out the difference.

➔ It has to be the Master's decision and fixed in his standing order for the bridge duty officers. The Master has the overall responsibility and overriding rules in all safety and security matters.

On ocean passage two GPS position checks per four-hour watch are the minimum requirement under safety aspects. In coastal waters the main priority should be visual (terrestrial) and radar navigation, GPS should be used as back up.

➔ It has to be a balance of what's written in the SMS versus what becomes too cumbersome for your team on the bridge.

➔ GPS is more vulnerable to spoofing and jamming and so procedures must be put in place to quickly detect this offshore – electronic dead reckoning using course and speed and manual dead reckoning are key. The argument for eLoran as a cross-check for GPS is well made and should be progressed.

➔ If you check the accuracy of GPS every 15 minutes as has been mooted then you have a watchkeeper distracted every 15 minutes. Do we really want to impose such a regime in congested waters?

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

Honorary knighthood

Congratulations to long-time member of The Nautical Institute, Captain Winston G. Churchill, USCG (Ret.), FNI, who has been awarded an honorary knighthood in the Order of St. John by Queen Elizabeth II. This comes in recognition of many years of voluntary service to veterans' charity organisations in the UK (SSAFA and the RBL) and veterans' hospitals in the US.

Bookseller visit

Bridget Hogan and Jonathan Hunt had meetings in North Shields with GNS, one of the largest maritime booksellers in the world.

Bridget Hogan with Mike Bailey, Head of Navigational Products, GNS.

Getting afloat

The entire office staff from Nautical Institute HQ were invited by Capt Nick Nash FNI to visit onboard *Royal Princess* at Ocean Terminal in Southampton. Staff enjoyed a ship tour, including bridge visit and lunch, and meeting crew onboard

Chief Executive John Lloyd FNI receiving a plaque from Captain Nash in commemoration of the visit by NI staff to the ship in Southampton

Fellowships

Members will also know that each year we consider nominations for senior positions within our organisation such as members of Council, Executive Board and other committees. Appointments for key appointments related to governance are announced through the AGM papers and can be found in *Seaways*.

The Nominations Committee is also responsible for considering nominations for Fellowship. Fellowship is only conferred upon long-standing members who have reached the highest level in their careers and have made a significant contribution to The Nautical Institute and the wider maritime sector. It is a great honour to be recognised by Fellowship. In the past 12 months we are delighted to have awarded Fellowship to the following members:

Richard Leedham – UK/Solent Branch
Captain Venkat Padmanabhan – Singapore Branch
A. Jorgen Rasmussen – Denmark Branch
Michael Rowlands – UK/NW England Branch

Congratulations to all our new Fellows!

Port of Tyne

New director joins major UK port

Mike Comerford AFNI has been appointed to the board of the Port of Tyne as a non-executive director. Mike has over 30 years of experience in shipping, maritime safety and engineering, and previous senior roles within the Maritime and Coastguard Agency, Lloyd's Register and Bureau Veritas.

GDPR and member data

Captain John Lloyd FNI
Chief Executive

Members will know that in addition to being the leading professional body for those in control of ships, The Nautical Institute is a charity registered in the United Kingdom.

Many readers, especially those resident in Europe, will be aware of a change in data protection requirements under the so-called GDPR – General Data Protection Regulations – which came into force on 25 May 2018.

Under these regulations we have a responsibility to keep your data safe and not to share personal data with third parties. In the event you leave our organisation you have a 'right to be forgotten' in which case your personal details will be erased from our records. You also have the right to enquire what records are being held by The Nautical Institute.

Further information is detailed in our Privacy Policy which is on the website.

We are a membership organisation and the regulations recognise what is called 'legitimate interest'. Clearly, we have to contact our members with newsletters and membership reminders as well other news and correspondence relevant to our services and activities. We do this through Headquarters and through our branches, and use social media, electronic and traditional methods to contact you.

We look forward to maintaining our strong lines of communication with the membership and value your support in helping us continue to grow in size and influence.

The Nautical Institute

New members

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

Associate Fellow

Beck, J Captain/Director Marine Operations (U.S. Pacific Coast (N))
Belwal, P Captain/Master (UK/Solent)
Campbell, D A Captain/Master (UK/Forth)
Chopra, S Captain/General Manager (Singapore)
Clark, G W Captain/Retired Master (UK/Central Scotland)
Deknatel, J Mr/Managing Director (Thailand)
Doyle, G L Mr/Group Harbour Master (UK/NW Eng. & N Wales)
Fredriksson, P Captain/Master (Netherlands)
Gunes, O D Captain/Marine Training Manager (China P.R. (Mainland))
Hicks, T Captain/Marine Expertise Consultant (Thailand)
Komianos, A S Captain/Marine Consultant (GRC/Hellenic)
Koswara, C Captain/Master (Indonesia)
Lowell, J E Mr/Sr GEOINT Authority (U.S. East Coast (N))
Rogers, P Prof/Managing Partner (UK/SW Eng.)
Sadler, B M Captain/Pilot (UK/Solent)
Savaria, L M Captain/CEO/Managing Director (Cyprus)
Untailawan, H E Captain/Master Marine (Indonesia)

Upgrade to Associate Fellow

Davies, S Mr/General Manager (UK/Bristol Channel)
Douglas, A H Mr/Superintendent (AUS - VIC)
Leach-Smith, K G Mr/Fleet Manager (Singapore)

Member

Aras, E Captain/Maritime and Logistics Management (AUS - TAS)
Badejo, M O Mr/2nd Officer (Nigeria)
Bin Zubir, Z Mr/Chief Officer/DPO (Malaysia)
Boets, T Mr/Chief Mate/DPO (Belgium)
Bueso Baumgarten, M A Mr/SDPO (Mexico)
Burlacu, G Mr/Chief Officer (Romania)
Casey, N Captain/Master (UK/Central Scotland)
Clikas, P D Mr/Master (US Gulf (Florida))
Conlon, J R Captain/Marine Superintendent (Ireland)
Edirisinghe, L Mr/Associate Dean (Sri Lanka)
Filimon, D Mr/Expert Adviser (Romania)
Fitzpatrick, A Mr/Maritime Consultant (UK/Solent)
Gorringe, K A Mr/Chartered Ship Scientist & Surveyor (UK/Solent)
Gunn, A R Mr/Operations Manager (AUS - NSW)
Kite, H Mrs/Chief Officer (UK/Forth)
le Plat, P Mr/First Officer (Germany)
Luca, C Mr/Expert Adviser (Romania)
Maini, A Captain/Master (India (North))
Manjeshwar, S S Captain/Global Head of Marine L&D (India (West))
Nathan, J Captain/SDPO (CAN/British Columbia)
Palavesam, R Mr/Chief Officer (India)
Rampaul, R K Mr/Captain (Trinidad and Tobago)
Salvidge, W A Captain/Master (UK/Humber)
Sedgwick, P Mr/Operations Manager (AUS - QLD)
Smith, P J Mr/Chief Officer (AUS - QLD)
Svorinic, G Captain/Barge Master (Croatia)
Thondaiman, K S Mr/2nd Officer (India (South))
von Oppen, G Mr/Managing Partner (Cyprus)
Williams, M P Mr/Senior DPO (Japan)

Associate Member

Falzon, M Mr/Cadet (Malta)
Fielding, J P Mr/Deck Cadet (UK/NW Eng. & N Wales)
Gough, G H Mr/Deck Cadet (UK/Solent)
Gysbrechts, S Ms/Student (Belgium)
Landoeuer, P J Mr/Deck Cadet (France)
Panoutsopoulos, A Mr/Cadet Program Coordinator (Cyprus)
Rattenbury, M D Mr/Marine Operations Officer Apprentice (UK/Solent)

*Signifies members who have rejoined

Branch Secretaries and development contacts

AUSTRALIA

Queensland
www.niqld.net
Capt Richard Johnson MNI
Tel: (+61) 419 600 261
rich_tiss@bigpond.com

SE Australia
www.nisea.org
Cdr Kendall Carter AFNI
Tel: +61 458 310 803
sec@nisea.org

SE Australia (VIC)
Captain Roy Stanbrook FNI
Tel: +61 428 421 001
roy.stanbrook@vicports.vic.gov.au

SE Australia (SA)
Captain Nada Ganesan MNI
Tel: +61 3 9254 1631
carrmarine@bigpond.com

SE Australia (NSW)
Captain John Mann MNI
Tel: +61 400 700 001
john.mann.maritime@gmail.com

SE Australia (ACT)
Captain Joshua Smith MNI
Tel: +61 427 332 690
Joshua.Smith@amsa.gov.au

SE Australia (TAS)
Capt. Peter Martin AFNI
Tel: +61 408 077 522
pinchj@bigpond.com

Western Australia
Zubin Bhada, MNI
Tel: +61 8 9348 5837
Mobile: +61 0 408 165 306
zubin.bhada@woodside.com.au

BALTIC STATES
Capt. Boris Dunaevsky FNI
Tel: +372 56 12 27 57 (Mobile)
chairmanbsmsa@gmail.com

BANGLADESH
Capt Sheikh Md. Jalal Uddin Gazi, AFNI
Mobile : +880 1713 450252
nautinst.chittagong@gmail.com

Chittagong
Capt. Sheikh Md. Jalal Uddin Gazi, AFNI
Mobile : +880 1713 450252
nautinst.chittagong@gmail.com

Dhaka
Capt Anisur Rahman Khan, AFNI, MICS
Mobile : +880 1727 618242
nautinst.dhaka@gmail.com

BELGIUM
www.nautinst.org/belgium
Mr Frans Doomen MNI
info@nibb.be

BRAZIL
Capt. Vinicius Madruga Santos, FNI
Tel: +55 11 3515-5873
Mob: +55 11 964650066
madruga@flumar.com.br

BULGARIA
Capt. Andriyan Evtimov, FNI
Tel: 359 52 631 464 (o)
aevtimov@abv.bg

CANADA

British Columbia
nibcbranch.ca
Ryan Andresen
ahoynibc@gmail.com

Maritime Provinces
Capt. Angus McDonald FNI
Tel: +1 902 429 0644
Ar550@chebucto.ns.ca

St Lawrence
Mauricio Emiliani MNI
Tel: +1 647 955 6962
mauemiliani@gmail.com

CENTRAL EUROPE
Capt Juraj Boros, AFNI
Tel: +421 2 5262 2945
Mob: +421 904 063438
e-mail juraj.boros@tatramarine.sk

CHINA

Hong Kong SAR
www.nautinsthk.com
Capt Aalok Sharma, AFNI
Mobile : +852-6130 1377
secretary@nautinsthk.com

Shanghai
Sandy Lin, MNI
Tel: 86 21 68868389
sandylin@fcaremarine.com.cn

CROATIA
Capt Gordan Baraka MNI
Tel: + 38 522201161
Mobile: + 38 598445545
gb@adriamare.net

CYPRUS
http://www.nautinst-cyprus.org
Ms Anna Ruszczynska AMNI
Tel: +357 968 99 550
secretary@nautinst-cyprus.org

DENMARK
Capt Peter Rasmussen MNI
Tel: +45 44 366851
plr@bimco.org

EGYPT
Capt Eslam Zeid, AFNI
Tel: +20111660757
eslamzeid@gmail.com

FRANCE
Capt Guillaume Bourgeois de Boynes MNI
Tel: +33 (0)2 3292 9175 (o)
guillaume.deboynes@helvetia.fr

GEORGIA
Capt Mamuka Akhaladze AFNI
Tel: +995 422 270813
Mob: +995 577 221677
m.akhaladze@gmail.com

GERMANY
www.linkedin.com/groups?gid=3451665?
Jens Hansen MNI
Tel: +49 40 334 282 76
nautinst.germany@googlemail.com

GHANA
Capt William Amanhyia, AFNI
Tel: 233 2 4406 2438
w_amanhyia@msn.com

GREECE (HELLENIC)
Capt. Nikos Aslanis AFNI
Tel: +30 6944 370 023
nikos.aslanis@gmail.com

IBERIA
Capt. Mark Bull FNI
Tel: +350 5404 6600 (Mob)
mark.bull@trafalgarnav.com

INDIA

North & East (New Delhi)
Capt. Pawan K. Mittal, MNI
Mobile 91 98 1016 0883
Tel/Fax: 91 11 2508 6500
pkmittal@ariworld.com

North West (Chandigarh)
Capt M S Kahlon MNI
Tel: 9501036550
cdgnauticalinst@gmail.com

South (Chennai)
Captain Y D Misra MNI
Tel: 91 98401 15064 (Mob)
mail@nisi.org.in

South West (Kochi)
Capt. Abhijith Balakrishnan, AFNI
Mobile: + 91 944 786 1580
Tel 0484 2667644
nauticalinstituteindiasw@gmail.com

West (Mumbai)
Capt. Amol Deshmukh MNI
Tel: +91-98331 22343 (mob)
ad@amoldeshmukh.net

INDONESIA
Captain Akhmad Subaidi AFNI
Tel: +62 24 7628676 (H)
Tel: +62 21 30050000 (Ext 204)(O)
capt.akhmad@gmail.com

IRELAND
www.linkedin.com/pub/nauticalinstitute-ireland-branch/29/953/561
Capt Steve Malone AFNI
Mobile: +353 86 2297127
nautinst.ireland@gmail.com

ITALY (NORTH)
Tiziano Menconi MNI
Tel: +39 3397540138
menconitiziano@gmail.com

ITALY (SOUTH)
Capt Modestino Manfredi MNI
Tel: +39 339 1291042 (Mobile)
dariomanfredi@libero.it

JAPAN
Prof. Masao Furusho, MNI
Tel: 81 78 431 6246
Mobile 81 90 5362 2858
furusho@maritime.kobe-u.ac.jp

JORDAN
Capt. A.N. Al-Sheikh Yousef AFNI
Tel: +962-6-5240102
Mob:+962-7-95112123
nautical@jams.edu.jo

MALAYSIA
Capt. Adhil Rasheed MNI
Tel: + (960) 9998700
arasheed@mamaldives.edu.mv

MALDIVES
Capt. Adhil Rasheed MSc MNI
Tel: + 960 331 2014
Fax: + 960 331 2015
Mob: + 960 999 8700
arasheed@mamaldives.edu.mv

MALTA
Capt Mark Chapelle MNI
Tel: +356 9949 4318
info@maritimeconsultant.eu

MYANMAR
Capt Ba Nyan MNI
Tel: 95 9 511 0982 (Mobile)
banyan51@gmail.com

MONTENEGRO
Capt. Boro Lucic, AFNI
Tel: +382 (0)69 597 766 (Viber)
+382 (0)68 068 766
boro.lucic@gmail.com

NETHERLANDS
www.nautinst.nl
Capt Fredrik Van Wijnen MNI
Tel: +31 182 613231
cesma.vanwijnen@planet.nl

NEW ZEALAND
www.nautinst.org.nz
Capt. Kees Buckens, FNI
Tel: +64 9 579 4429
nznisec@xtra.co.nz

NIGERIA
Capt. Jerome Angyunwe AFNI
Tel: 234 1896 9401
Mobile 234 80 2831 6537
Jerome107@hotmail.com

NORWAY
Mr Viet Dung Vu MNI
Tel: +4798545022
Viet.Dung.Vu@hvl.no

OMAN
John Abercrombie AFNI
Tel: 968 91761095
johndavidabbers@gmail.com

PAKISTAN
Capt. S M A Mahmoodi, FNI
Tel: 92 21 285 8050-3 (o)
mahmoodi@mintship.com

PANAMA
Capt Orlando Allard MNI
Tel: (507) 2308285
Mobile: (507) 66714132
orlandoallard@me.com

PHILIPPINES
Angelica Baylon AFNI
Tel: 63472373355
ambaylon_maap11@yahoo.com

POLAND
Capt. Adam Weintrit, FNI
Tel: +48 6 0410 8017
weintrit@am.gdynia.pl

QATAR
Capt. Joe Coutinho, FNI
Tel: +974 4315 792
Mobile +974 5537 293
coutinho@qship.com

ROMANIA
Capt. Cristian E. Ciortan, MNI
Mobile: +40 722 393 464
ceciortan@me.com

RUSSIA

St. Petersburg
Captain Alexandr B Nosko MNI
Tel: + 7 812 334 51 61
Mobile + 7 921 945 65 39
abnosko@gmail.com
a.nosko@scf-group.ru

Moscow
Dr Alexei Moiseev AFNI
Mobile: +7 926 290 20 22
moiseevlaw@gmail.com

SAUDI ARABIA (JEDDAH)
Dr. Hattan A. Timraz, MNI
Tel: 0504599506 (Mob)
h.timraz@gmail.com

SINGAPORE
www.nautinst.org/singapore
Capt Yves Vandenborn AFNI
Tel : : +65 9879 8606
ni.singapore@yahoo.com

SOUTHERN AFRICA
www.nautinst.co.za
Ms Yvette de Klerk AMNI
Tel: +27 84 482 4444
Yvettedeklerk@icloud.com

SRI LANKA
Capt Nish Wijayakulathilaka, AFNI
Mob: +94773034142
wijayakulathilaka@gmail.com

SWEDEN
www.nautinst.org/swe-den
Capt Finn Wessel MNI
Tel: 46 411 55 51 52
Mob: 46 703 83 62 95
finn.wessel@outlook.com

TRINIDAD & TOBAGO
Yusuf Buckmire MNI
Tel: +18687699429
yubuck14@gmail.com

TURKEY
Capt. Mehmet Albayrak, MNI
Tel +90 216 474 6793
alia@topazmarine.com

UAE
www.niuae.ae
Capt Zarir S Irani AFNI
Mob: +971 50 8979103
nauticalinstitute.uae@gmail.com

UKRAINE
www.nautinst.com.ua
Professor Vladimir Torskiy, FNI
Tel/Fax: +38 (048) 733-48-36
Mobile: +38 (050) 390-12-87
torskiy@te.net.ua

U.S.A.

Gulf – Florida
Capt Ken Wahl MNI
Tel: 727 580-4576 (Mob)
kwahl@seaschool.com

Gulf – Houston
Fr Sinclair Oubre MNI
Tel: 409 749 0171 (Mob)
nigulfbranch@gmail.com

North East US Coast
Capt Craig Dalton AFNI
Tel: 508-830-5000
cdalton@maritime.edu

West Coast
http://nautinstuswestcoast.org
Capt James Haley MNI
Tel: 001 310 951 5638
James.Haley@jacobsenpilot.com

San Francisco
Dr Colin Dewey MNI
Tel: 707-654-1065
cdewey@csum.edu

UNITED KINGDOM

Bristol Channel
Capt John Rudd, MNI
Tel: 01179 772173
Mobile 07976 611547
john.ruddmni@googlemail.com

Central Scotland
http://nicentralscotland.org.uk
Gillan Locke AFNI
Secretary@nicentralscotland.org.uk

Humber
Capt Richard Coates FNI
Tel: 01482 634997
Mob 07850 943069
richard@swanmar.karoo.co.uk

London
www.nautinst.org/uk-london
Andrew Bell FNI
Tel: 07785586317
Andrew.Bell@shlegal.com

North East England
www.ninebranch.org
David Byrne, FNI
Tel: 07703490063
david.byrne@flag-c.com

North of Scotland
Claire Gaskin MNI
Tel: 07966150860
gaskin_claire@yahoo.com

North West England
www.ninw.org.uk
Mr Derek Gallagher MNI
Tel: 07477535255 (Mob)
sec@ninw.org.uk

Shetland
https://www.facebook.com/ShetlandNI
Laura Burden MNI
Tel: 07935919886 (Mob)
laura.burden1@hotmail.com

Solent
www.nautinst.org/uk-solent
Richard Brooks, AFNI
Tel: 07815 104419 (Mob)
nisolentbranch.secretary@gmail.com

South East England
Captain Simon Moore AFNI
Tel: 07915393473 (Mobile)
Email: simonmoore@sky.com

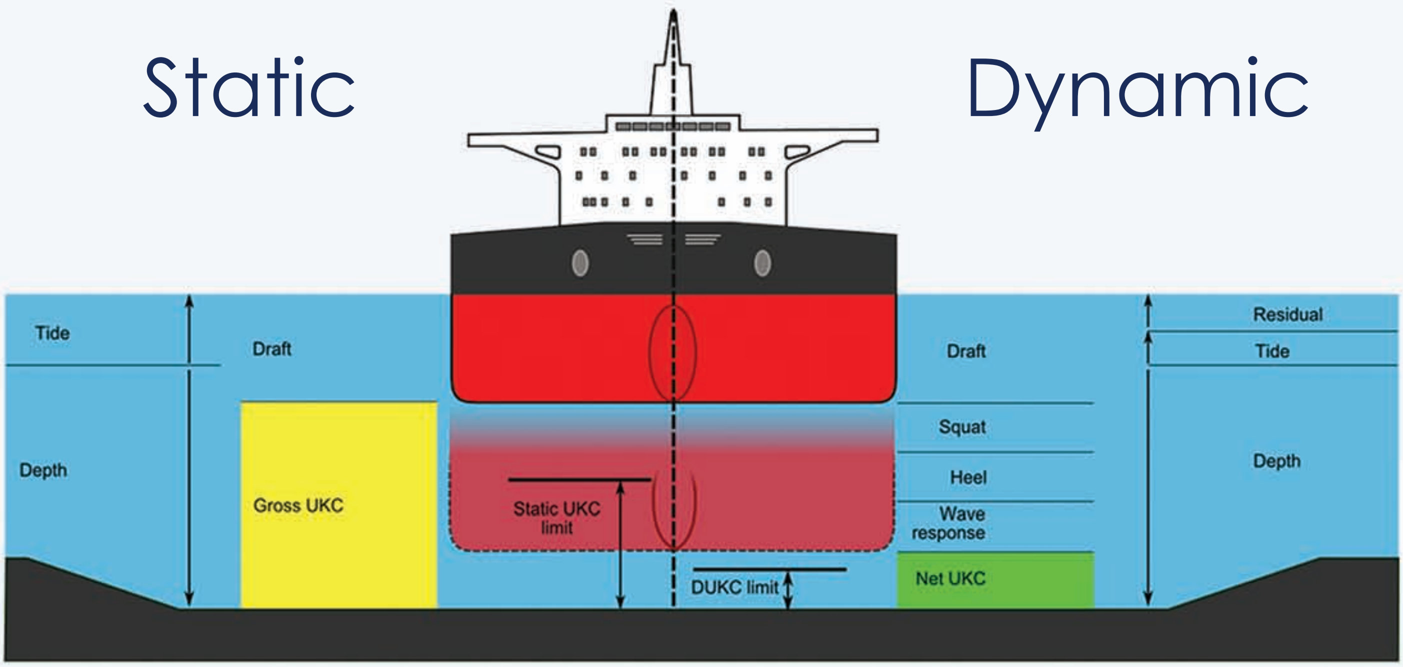
South West England
Capt Robert Hone FNI
Tel: 01752 862050 (h)
Tel: 01752 586163 (w)
robert.hone@plymouth.ac.uk
http://glang.me.uk/nisw.html

VENEZUELA
Capt Oscar Rodriguez MNI
Tel: (+58-212) 762.82.58
Mobile (+58-412) 335.47.77
orodriguez@consemargroup.com

As many of these email addresses are private accounts, please refrain from sending multiple messages with attachments

Safer & Smarter Under-keel Clearance

Traditional "static" UKC rules are:
Inefficient 95% of the time
Overly risky 1% of the time
Just right 4% of the time.



KEELCHECK

Step up from static

- Free to try
- Scientific aid to pilot judgement
- Safer UKC management

DUKC®

Ultimate in safety and efficiency

- Validated dynamic ship motion calculations
- Real-time environmental data
- Proven to deliver deeper drafts & wider windows for 160,000 transits

Contact us for an obligation free trial & get a better feel for what's under your keel!

FREE KEELCHECK TRIAL

Captain Jonathon Pearce UK : T +44 1202 840 999
sales@omcinternational.com M +44 7833 517 006
www.omcinternational.com AU +61 3 9412 6500

OMC INTERNATIONAL