

# NAVIGATOR

THE

Inspiring professionalism in marine navigators

FREE



# Aids to Navigation

Casting light on the issues



A free publication by **The Nautical Institute** in association with the **Royal Institute of Navigation**



## AtoN awareness

Finding and safely navigating a narrow channel in a wide expanse of water has always been a challenge for navigators and those ashore with an interest in safe navigation. For hundreds of years, authorities have marked safe water with buoys and beacons. Originally, these were to support commerce and improve safety, but they now also protect the environment.

Providing buoys and beacons may seem a simple task, but it is not. The structures need to be reliable, internationally recognisable and able to withstand some very harsh environments. The task of ensuring they are reliable and recognisable around the world has fallen into the capable hands of the International Association of Lighthouse Authorities (IALA). Mariners will be very familiar with the standard IALA buoyage systems, A&B (reduced from more than 40 different systems at one time).

Building lighthouses has always been one of the most advanced engineering challenges, and one which

continues today. Authorities providing aids to navigation use the most modern technology to meet modern demands, including fast-flowing water, ice, far greater amounts of background light and heavier traffic. Some solutions include the use of LED lights, renewable energy, automation, connectivity and even the ability to provide a 'virtual' buoy via radio signals.

Navigators will increasingly see changes in the appearance and performance of physical aids to navigation. LED lights not only reduce power consumption, but improve visibility and appearance. Linked with a radio signal or GPS timing, pairs of buoys can blink together (synchronised), or a range of channel markers can flash in sequence, creating a 'runway' effect to improve the identification of a channel, particularly where there is considerable background light. Aids to navigation are also increasingly being fitted with sensors that can detect and transmit the flow rate of wind and water, greatly assisting decision-making for navigators who need to

predict accurate set and drift.

Virtual aids to navigation are under development too, and are being used by a number of administrations around the world. The IMO has recently agreed their symbology and some guidance on their use. As navigators, you are likely to see a variety of them in your travels. They can mark temporary channels, be deployed rapidly to mark wrecks, are ideal for dynamic channels in ice and can even provide mariners with additional knowledge, e.g. reporting points. They can be associated with physical aids to navigation (buoys and beacons) or used in isolation. However, not all onboard navigation systems are capable of displaying virtual aids to navigation and this, too, needs to be taken into account by providers.

Aids to navigation remain absolutely essential to the safety of navigation. This edition of *The Navigator* explores how our familiar buoys and beacons are being improved with technology, and will offer guidance on how to keep up with these changes in the future. Further information is available in The Nautical Institute book '*The use of visual aids to navigation*'.

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We reserve the right to edit letters for space reasons if necessary. Views expressed by letter contributors do not necessarily reflect those held by The Nautical Institute.

I am currently sailing as a third officer onboard the bulk carrier, *MV Federal Tambo*. I have been sailing with the company for about six years now. A positive point about bulk carriers is that you get to see the world. Longer port stays help us get to know much more about the country we are in. Our last port was Ghent in Belgium and we are currently heading to Mombasa in Kenya.

**Croydyn D'Cruz**  
Third Officer

I work as an ordinary seaman onboard *MV WMS Groningen*, MarDimond Shipping, and have my third mate certificate. I am very pleased that there are people out there who appreciate our work at sea!

**Denys Snigrov**  
Third Mate

Keeping yourself up-to-date and checking things regularly and diligently are key to safe operations onboard. Knowledge alone is not enough; doing the maintenance work is also important. Many people cannot locate the filters on the air line to the foghorn. Let's have a picture of someone cleaning them in the next issue of *The Navigator*, or carrying out maintenance on gangways. When a contractor comes to service the elevators, we should learn from him.

**Mahendra Singh**  
Chief Engineer

I am working as a navigator on container feeders, currently as a Second Officer on the Antigua & Barbuda-flagged ship, *Karin Schepers*, owned by Heinrich Schepers Schiffahrt. Each issue of *The Navigator* is an additional step in my personal development. It fills me with the desire to seek new knowledge to prove that you can keep your brain well-oiled, have responsibility for other people and become well-experienced as a nautical mate. I sincerely hope that more and more young navigators will become

interested in self-development, not just in the money they can earn.

**Andrei Sharpilo**  
Second Officer

Given the title of the main article, and *The Navigator's* own tagline "Inspiring professionalism in maritime navigators", we were a bit shocked to see ten people on a steep gangway with no safety net rigged on the front cover of issue No. 9 of *The Navigator*.

This is a well-documented issue, and The Nautical Institute itself has numerous articles and publications written about the issue. This is a fairly shocking oversight in a publication promoting professionalism in the industry. Perhaps next issue you would consider an article on gangway safety?

**Capt. C Fayrair**

**Editor's note:** Capt. Fayrair is correct to

point out the danger of overloading the gangway. The photo was intended as an illustration of a concept; not as a recommendation of practice!

Professional development is a continuous process. I have seen two different generations of professionals during my service at sea. Type1: When I was a cadet and junior officer - a generation without much knowledge of automation or electronic equipment. Basic knowledge and principles were sound. Type2: When I became a Master - a new generation of officers, more into electronic appliances, relying too much on electronic navigational equipment.

The basic cause of most of accidents is human failure - in many cases, the failure to understand equipment errors. Accident case studies, discussions, near-miss reports etc. are free learning tools that help us learn from the mistakes of others. We should all keep our eyes and ears open.

**Capt. Thomas Mattathil**



# Putting the mariner in the picture

*The Navigator* looks at innovations in the field of visual aids to navigation, including LED lights and ‘smart buoys’ that can broadcast their own position. How do they benefit the mariner – and what’s coming next?

**T**he development of visual aids to navigation has been a process of ongoing innovation, from a piece of wood moored to a block of stone some 2,500 years ago, to today’s high-tech intelligent lantern or floodlight, capable of switching itself on when needed.

Aid to navigation engineers have continuously worked to ensure high reliability, simplicity, maintainability and long service life at minimal cost.

## Seeing the (LED) light

The introduction of LED (Light Emitting Diodes) as an aid to navigation light source has been one of the greatest achievements in recent navigation history. This is due to their long service life, low power consumption, robustness and reliability in rough environments, as well as their high level of visual conspicuity – in other words, they are very easily seen and identified.

From the mariner’s point of view, LED lights often seem more conspicuous, compared with traditional incandescent lights. This is due to their narrow spectral

distribution. LEDs emit near-monochromatic light while incandescent light sources are more broad-banded. The colour emitted from an LED appears more pure, making it less likely that the mariner will mistake one light for another. When they flash, LEDs produce a rectangular flash intensity profile. They do not have the glow-up and glow-down period of incandescent lights, which further enhances their performance.

Today, LED lanterns are used in almost all buoys. LED lanterns and LED sector lanterns are also available for short- and medium-range beacons. High-power white LED lanterns with a range of up to 20 NM are also available, and some aid to navigation authorities have replaced old revolving optics with this type of lantern. This, however, means that the sweeping characteristic (the sweeping loom of the light) of traditional revolving optics is lost.

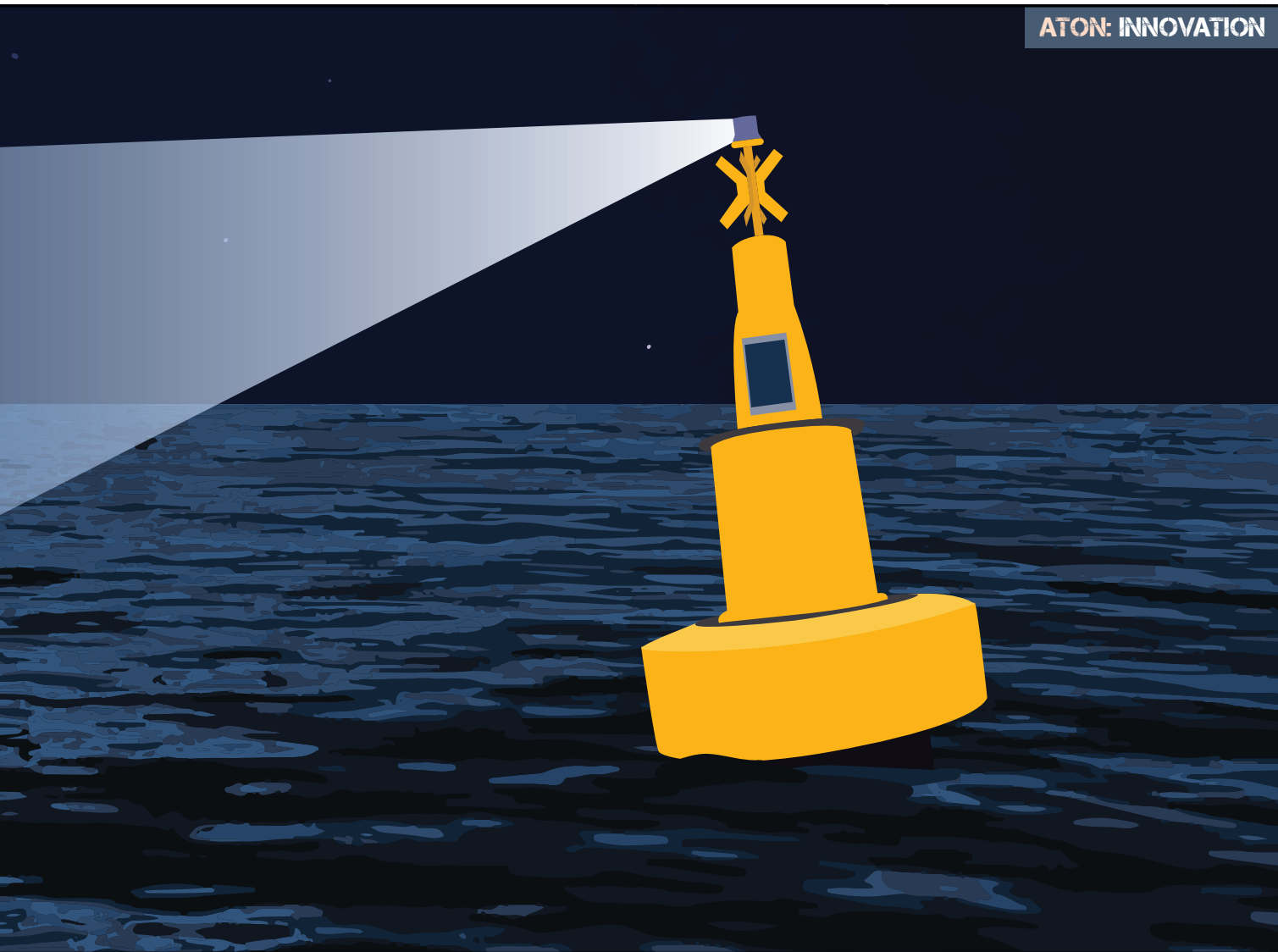
Other authorities have chosen to retrofit tungsten filament lamps with very high intensity LED light sources within the original revolving optics, thus retaining the high luminous intensity from the large lens and the sweeping loom of the light.

## New technology in practice

The new yellow/blue emergency wreck marking buoy is another example of taking advantage of LED technology. At night, this type of buoy alternates between a blue and yellow light, making it very different from other marine signal lights.

Satellite-based positioning and precision-timing services have enabled automatic position monitoring of buoy positions, as well as synchronisation and sequencing of lights. Synchronising and sequencing the flashes of a group of aids is now commonly used in many fairways and channels. This increases the conspicuity of the aids, particularly in high background light conditions.

An example of the effective use of synchronised lights can be found in the Danish Great Belt. When passing Hatter Barn/Hatter Reef, outgoing vessels must take a hard starboard turn. In this area there used to be two to four groundings of vessels missing the turn every year. Since the Danish Maritime Authority (DMA) introduced a “wall” of synchronised LED lights marking the reef, the groundings have ceased entirely.



Sequencing light is another way of strengthening the conspicuity of a group of lights. Sequenced lights are seen as a 'runway' marking safe passage through a channel. Synchronising and sequencing of lights is particularly valuable in high background light conditions with a lot of rivaling lights. Visit

*The Navigator* blog at [www.nautinst.org/navinspire](http://www.nautinst.org/navinspire) to see a You Tube video showing the advantages of sequencing lights.

**Broadcasting the benefits**

The reduced power requirement of LED lanterns provides surplus electrical power for other services, such as meteorological and hydrographic sensors. There are a number of sensor-equipped buoys in the Great Belt area. Information is broadcast by radio to the shore every ten minutes



and published on the internet. In future, information services like this are expected to be part of the e-navigation services.

The introduction of AIS (Automatic Identification System), and in particular AIS aids to navigation, now makes it possible to broadcast the

operational status of any aid to navigation, either directly from the aid, or indirectly using a shore-based base station (synthetic AIS aid to navigation). The information can be viewed on AIS-enabled ECDIS, Radar or other navigation displays, appearing at the location of the charted aid to navigation object.

Another option is the so-called virtual aid to navigation. This comprises a signal broadcast to a location in a waterway where there is no physical aid present. Virtual aids to navigation are very useful when an

unexpected situation occurs and requires immediate marking, e.g. a wreck.

At the moment, authorities are looking into whether and to what degree these "electronic" aids can replace their real physical counterparts. It is the opinion of the authors of this article that electronic "synthetic" or "virtual" aids to navigation will never fully replace existing visual aids; their role will merely be to augment and supplement them. The primary purpose of visual aids is to provide unambiguous confirmation of what the navigator can see, no matter how many electronic gadgets are available.

That is why operational reliability has been at the core of the development of aids to navigation since the beginning of time, and why it will continue to be the primary design criteria for the foreseeable future.

**Authors: Jørgen Royal Petersen, Senior Aids to Navigation Engineer and Omar Frits Eriksson, Director, Maritime Technology, Danish Maritime Authority**

# Virtual Reality?

## Exploring virtual aids to navigation

Virtual aids to navigation can be used in situations where it is not practical to use physical aids to navigation, or where information is needed faster than a buoy can be placed. The information they give should be treated in the same way. **Deidre Lane MNI**, Navigation Services, Commissioners of Irish Lights explains

A virtual aid to navigation can be described as digital information, broadcast from an Automatic Identification System (AIS) station, to place an aid to navigation that does not physically exist in the water. Virtual aids to navigation are visible on the AIS Minimum Keyboard and Display (MKD), or as a symbol on appropriate display systems.

Virtual aids to navigation inform navigators about dangers to navigation and safe waterways, as well as areas where extra caution is needed, or which must be avoided. Information from virtual aids to navigation should be considered in the same way as information from physical aids to navigation.

Virtual aids to navigation can be used in the following situations:

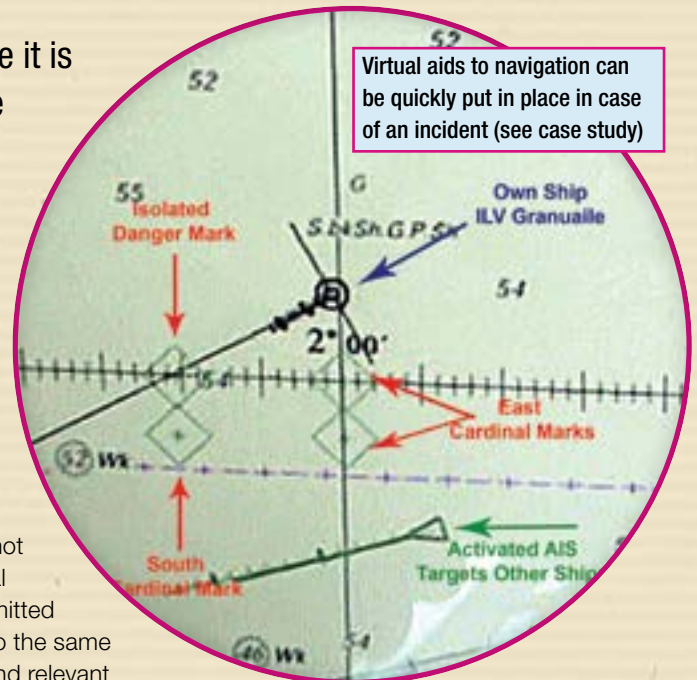
- > To immediately mark a wreck or new danger
- > In areas where it is impossible to place a physical aid to navigation
- > Where buoys are seasonally lifted due to ice
- > When a physical buoy is off-station, e.g. due to a natural disaster
- > Where a physical aid to navigation could conflict with other navigational requirements, and a virtual one meets the needs of the target group

Virtual aids to navigation are not intended to replace physical buoys or

beacons. However, they may be permanently deployed, following risk assessment, for example to mark a hazard that cannot be marked using a physical equivalent. They are transmitted using AIS, and are prone to the same weaknesses. Navigators and relevant shore-based personnel should be introduced to AIS aids to navigation as an extension of their training on the IALA Maritime Buoyage System.

Aids to navigation transmitted using AIS are implemented in the following ways:

- > Real AIS – the AIS unit is physically fitted on the aid to navigation
- > Synthetic AIS – this transmits the position of a physical aid to navigation, but the signal originates from a transmitter located elsewhere. Used where it is impossible to retain an AIS unit on a buoy or beacon due to local environmental conditions (in the rare event that the physical buoy may have shifted or be off-station, a navigator may notice a discrepancy in the locations)
- > Virtual AIS – in this case, there is no physical aid to navigation at all. The transmitter is located elsewhere i.e. for marking a new danger





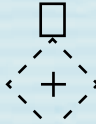









### Virtual advantages and disadvantages

Using virtual aids to navigation brings several advantages, chief of which are greater clarity of information and immediate positive identification. They offer improvements in first response time to wrecks and other new dangers, as well as a greater range (VHF) on Radar overlay than physical aid to navigation targets, thus giving an earlier warning of danger.

Virtual aids to navigation are not prone to the weather and will always display on MKD or Electronic Chart Display and Information System (ECDIS)/ Radar overlay. They can be detected around bends and behind islands and offer a more accurate positioning.

However, they are also subject to disadvantages, mainly the fact that not all vessels are fitted with AIS. AIS is dependent on Global Navigation Satellite Systems (GNSS), and unusual atmospheric

# Symbols: What you need to know

<p><b>NOT SPECIFIED</b></p>  <p>Dotted diamond with cross hair centred at the reported position</p>	<p><b>VIRTUAL STARBOARD HAND MARK</b></p>  <p>Dotted diamond with cross hair centred at reported position and triangle points upward on top of the diamond</p>	<p><b>VIRTUAL PORT HAND MARK</b></p>  <p>Dotted diamond with cross hair centred at reported position and rectangle, short side up on top of the diamond</p>	<p><b>VIRTUAL NORTH CARDINAL MARK</b></p>  <p>Dotted diamond with cross hair centred at reported position and two triangles, pointed upwards on top of the diamond</p>	<p><b>VIRTUAL EAST CARDINAL MARK</b></p>  <p>Dotted diamond with cross hair centred at reported position and two triangles, base to base on top of the diamond</p>	<p><b>VIRTUAL SOUTH CARDINAL MARK</b></p>  <p>Dotted diamond with cross hair centred at reported position and two triangles, pointing downwards on top of the diamond</p>
<p><b>VIRTUAL WEST CARDINAL MARK</b></p>  <p>Dotted diamond with cross hair centred at reported position and two triangles, point to point on top of the diamond</p>	<p><b>VIRTUAL ISOLATED DANGER MARK</b></p>  <p>Dotted diamond with cross hair centred at reported position and two circles on top of the diamond</p>	<p><b>VIRTUAL SAFE WATER MARK</b></p>  <p>Dotted diamond with cross hair centred at reported position and circle on top of the diamond</p>	<p><b>VIRTUAL SPECIAL MARK</b></p>  <p>Dotted diamond with cross hair centred at reported position and bold outlined "X" on top of the diamond</p>	<p><b>VIRTUAL EMERGENCY WRECK MARK</b></p>  <p>Dotted diamond with cross hair centred at reported position and cross on top of diamond</p>	<p>Permanent virtual aids to navigation should be charted as follows:</p>  <p>The topmark indicates its navigational purpose All parts of the symbol to be magenta. Position is identified by the small magenta position circle with a central dot, surrounded by a magenta circle, indicating that it is a radio transmission. Legend "V-AIS" beside symbol</p>

Source: IEC 62288

Note: There can be a variance on information displayed by different manufacturers on ECDIS or Radar equipment

conditions could have an effect on range. Virtual aids to navigation systems can be vulnerable to intentional and unintentional interference or inaccuracies. For example, if a vessel's AIS unit is malfunctioning or incorrectly installed, the mariner may not be aware of the position of a virtual aid to navigation, or may receive incorrect data.

In addition, users will not be able to fully utilise AIS aid to navigation functionality if there is no ECDIS or Radar overlay. Care must be taken where AIS is overlaid on Radar or ECDIS, as some manufacturers have chosen only to overlay ship messages.

## Case Study: virtual buoys in the English Channel

On 15 January 2008, the *MV Ice Prince* foundered 26 miles off Portland Bill at the entrance to the Traffic Separation Scheme (TSS) off Les Casquets, after losing more

than 2,000 tonnes of its timber cargo. Although the wreck lay on the United Kingdom side of the median line, the area was within the French Vessel Traffic Services (VTS) coverage area of Joborg traffic.

On 17 January, *ILV Granuaile* commenced guard vessel duties 0.6 nautical miles north east of the wreck. The following precautions were put in place for mariners to indicate the wreck's position:

- > Navigational warnings stating the wreck's position broadcast by the Maritime and Coastguard Agency and French Coastguard
- > 1000-metre exclusion zone
- > *ILV Granuaile* transmitting RACON morse code "D"
- > South west bound traffic, on making their two nautical mile report, notified verbally of the position of the wreck by Joborg traffic

On 18 January, four virtual buoys were deployed: two east cardinals, one south cardinal and one isolated danger mark. The virtual buoys marked the wreck using the French Coastguard's AIS base station network.

In this case, there were many accent and language barrier issues; some vessels still headed straight for the exclusion zone even after stating to Joborg traffic that they were aware of the position of the wreck.

The virtual buoys were useful because they:

- > Gave early warning of the position of the wreck
- > Helped alleviate language barriers providing clear information in the form of text on the MKD and overlay on ECDIS/Radar where available
- > Were easily deployed and easily removed when the wreck was no longer considered a danger to navigation

# WATCHOUT

In this series, we take a look at maritime accident reports and the lessons that can be learned

## Reef grounding reveals Aid to Navigation challenges

### What happened?

A container ship was underway at night. Estimated time of arrival had been calculated using the passage plan, but this failed to account for unfavourable currents. Once the Master became aware, he instructed the watch-keeper to deviate from the planned course lines to shorten the distance and seek out a route less affected by the currents.

The originally planned route would have taken the vessel two nautical miles north of a large reef. However, the watch-keeper reduced this to one mile to save time. The course was then altered further without anyone making allowances for compass error or sideways 'drift'. As a result, the ship headed directly for the reef. The reef had not been programmed into the ship's radar, nor were there any light beacons or other physical aids to navigation on it. The Master, having resumed command to guide the vessel into port, received virtually no information on her position, nor any warnings about the reef and its danger to navigation.

The ship ran aground at full speed. The hull was severely damaged, causing the vessel to break in two. Around 200 tonnes of heavy fuel oil leaked into the sea and a substantial amount of cargo was lost.

### Why did it happen?

While the container grounding was mainly attributed to poor navigational techniques and lack of training, it also raised questions about local procedures regarding aids to navigation. An inquiry found that a new type of virtual aid to navigation was being used locally, but had not yet been fully tested and endorsed by the International Association of Marine Aids to Navigation and Lighthouse Authorities.

### The issues

- > The crew failed to follow standard good practice for planning or navigation watch-keeping
- > The handover to the Master was managed incorrectly, with inadequate information provided
- > Better provision of physical or virtual aids to navigation on or around the reef could have offered an earlier warning and prevented the grounding.

### What changes have been made?

- > The ship's company has re-evaluated its safety management systems and navigational and handover procedures
- > The maritime authority of the country where the grounding took place is collecting data on shipping movements around its coast and closely controlling the use of virtual aids to navigation.

**THE CONTAINER SHIP GROUNDING... RAISED QUESTIONS ABOUT LOCAL PROCEDURES REGARDING AIDS TO NAVIGATION. AIDS TO NAVIGATION ARE VALUABLE - BUT DON'T USE THEM AS YOUR ONLY SOURCE OF INFORMATION**



*The report and conclusions are taken from New Zealand Transport Accident Investigation 11-204*

If you find our accident reports useful, check out The Nautical Institute's Mariners' Alerting and Reporting Scheme (MARS). A fully searchable database of incident reports and lessons, updated every month. Seen a problem yourself? Email the editor at [mars@nautinst.org](mailto:mars@nautinst.org) and help others learn from your experience. All reports are confidential – we will never identify you or your ship.



## Strengthening multi-cultural links

Chief Officer Vladimir Torskiy AMNI talks about his training and working life at sea

### Tell us about your training?

I studied for five and a half years at Odessa National Maritime Academy, with one and a half years dedicated to seamanship. I can say without a doubt that this period was the most carefree time in my life. Like most of the students, I knew why I was there and what I wanted to achieve after graduation. We were taught discipline and self-organisation.

### How did you feel when you first went to sea?

It can be very difficult to go on a voyage for the first time. The first vessel on which I crossed the ocean, working on the Northern Europe-Asia lines, was a 331-metre long container ship. I had to fly to Hong Kong via three transfers. Taking into account that I had never been on a plane before, it was a little scary. I would never have flown to Hong Kong if I hadn't been able to speak English!

### What does your average working day at sea look like?

A working day usually lasts twelve hours, divided into watches. Although there are stringent international rules surrounding rest periods onboard a vessel, you can

**Name:** Vladimir Torskiy

**Current position:** Chief Officer

**Training:** Odessa National Maritime Academy, Ukraine (Master of Navigation, Specialist in Maritime Law)

often sleep up to five or six hours. Some operations take higher priority, such as mooring, inspections, different checks and preparation of inward documentation. Duties are strictly scheduled; you can't just ask for a few "hours off.

### What do you like best about life at sea?

Visiting new countries is one of the most interesting parts of this profession. I keep a list of all the countries I have visited – at the last count it was 32. When you work, for example, on passenger vessels going around the world, you can take in almost every place in the world within a very short timescale. Some places make you fall in love with them forever. For me, such places are Cape Town in South Africa and Havana in Cuba.

### What are the benefits of working with an international crew?

I really like working in a multi-national crew. There was one vessel where I worked with 50 people from 12 separate nationalities. When you travel and communicate with so many different people, you perceive the world around you completely differently. It starts to look really small, and you realise that different cultures don't divide people, but unite them instead.

### What are some of the harder aspects of the job?

Sea sickness can become a serious problem. It's important to prepare yourself emotionally and physically for possible adverse weather and ship motions. It helps to eat fish or toast; I know this from my own experience! It can also be hard to leave family, relatives and friends behind, but it's also much easier nowadays to keep in touch with people at home via the Internet, telephone and e-mail. Happiness for me is a strong family and the job I really enjoy.

**HAPPINESS FOR ME IS  
A STRONG FAMILY AND  
THE JOB I REALLY ENJOY**





# WAYPOINT

Dr Andy Norris FRIN FNI

## Integrity and the Aid to Navigation

Dr Andy Norris, an active Fellow of the Nautical Institute and the Royal Institute of Navigation, examines the strengths and weaknesses of common aids to navigation

Aids to navigation have a long history. Lighthouses go back to Roman times at least. Undoubtedly, well before then, enterprising sea users would have erected primitive marks, both onshore and in shallow waters. Today, they continue to evolve, underlining their immense significance to safe navigation.

Perhaps the best definition of the term 'aid to navigation' is given by IALA:

*'Any device or system, external to a vessel, which is provided to help a mariner determine position and course, to warn of dangers or of obstructions, or to give advice about the location of a best or preferred route.'*

Understanding the strengths and weaknesses of aids to navigation is key to being a successful navigator. Traditional aids, such as buoys, beacons and lighthouses, enhance awareness of the boundaries between safe and dangerous areas.

Together with a compass and appropriate chart, they allow the navigator to determine the vessel's absolute position. They provide a valuable independent method of checking the accuracy of information received from systems like GNSS and Radar – provided they are visible.

### Radar reflectors and racons

Radar reflectors on traditional aids to navigation enhance a Radar's ability to indicate them on the display, making it easy to assess their ranges and bearings from the vessel. Visually comparing the Radar image of an area containing several aids to

navigation with charted data helps ensure they are identified correctly.

If an aid to navigation has an installed Radar beacon (racon), this further assists the correct identification of its position on the Radar display. With care, it allows the position of your vessel to be estimated with reasonable integrity from just one aid to navigation. Any appreciable difference from the position indicated by the GNSS shows that there is a problem, potentially with GNSS or the Radar.

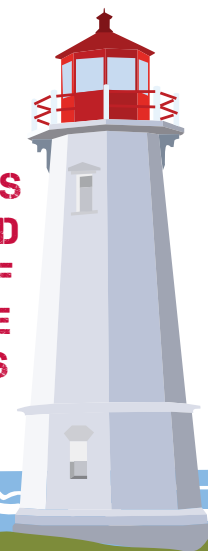
### AIS

AIS aids to navigation have different attributes to racons. On a GNSS-stabilised Radar display, with all related systems correctly set up and functioning, calculated aid to navigation positions will be clearly indicated and should show a good tie-up with Radar responses from physical aids to navigation, assisting situational awareness. A lack of Radar response from an indicated AIS position may mean it is currently out of Radar range – or that there is a significant positional or Radar error.

Importantly, an AIS aid to navigation can either transmit its GNSS continuously-derived position (typically from GNSS) showing where it actually is, or its surveyed position showing where it *ought* to be. In this case, a GNSS error over the local area should be visible. To be sure, you must trawl through the data within the transmitted AIS Message 21, which can get very complicated!

Virtual AIS aids to navigation need careful attention. They are invaluable in using Radar or ECDIS to show critical data that is not clearly visible to the eye, nor plotted on a chart, such as the position of a recent wreck. However, if there is no other supporting information available, be ultra-cautious about the accuracy of this information. For instance, positional data contained within the transmissions may be inaccurate, due to authorities needing to react quickly in an emergency situation. AIS data is also easy to spoof and this is virtually impossible to detect without supporting visual or documented information.

**TRADITIONAL AIDS, SUCH AS BUOYS, BEACONS, LIGHTHOUSES AND MARKERS, ENHANCE AWARENESS OF THE BOUNDARIES BETWEEN SAFE AND DANGEROUS AREAS**



# TAKE 10

In this issue of *The Navigator*, articles have focused on aids to navigation, their challenges and developments. Here are ten key points to bear in mind

## 1

### Physical presence

Physical aids to navigation are still essential for visual reference and situational awareness at sea

## 2

### The LED look

Aids to navigation are often enhanced with modern LED lights, which can change the way they look and operate

## 3

### Double data

Aids to navigation can be enhanced with sensors and communication technology, allowing them to transmit hydrographical and meteorological data in real time

## 4

### AIS augmentation

Virtual aids to navigation can be augmented by AIS technology to provide additional information, confirm position or allow an aid to navigation to be represented where physical aids cannot be established

## 5

### GNSS/GPS weakness warning

Virtual aids to navigation using AIS technology can suffer from the weaknesses of the GNSS/GPS systems and VHF capability

## 6

### Symbol awareness

Virtual aids to navigation have a variety of symbols and functions. Navigators must make themselves familiar with them all, just as they do with their physical equivalents

## 7

### Wrecking havoc?

Every effort is made by authorities to mark recent wrecks with aids to navigation, both virtual and physical. Navigators must remember though, that in the early hours or days of a wreck, not all hazards may have been identified or reported accurately

## 8

### Aid to team talk

Discussing the use and function of aids to navigation offers a great platform for mentoring and bridge team discussions

## 9

### IALA information

IALA is the international body coordinating and harmonising the use of all aids to navigation. A wide range of free resources and publications are available online at [www.iala-aism.org](http://www.iala-aism.org)

## 10

### Express your opinion

Many government authorities around the world are experimenting with the use and presentation of physical and virtual aids to navigation. Navigators who wish to comment on their use are encouraged to contact those authorities, or The Nautical Institute via LinkedIn (<http://www.linkedin.com/groups/Nautical-Institute-1107227>) or by sending an email: [mars@nautinst.org](mailto:mars@nautinst.org)

# ARE YOU INSPIRED?

Visit *The Navigator* blog at [www.nautinst.org/navinspire](http://www.nautinst.org/navinspire)

## #NavInspire



# WIN AN IPAD

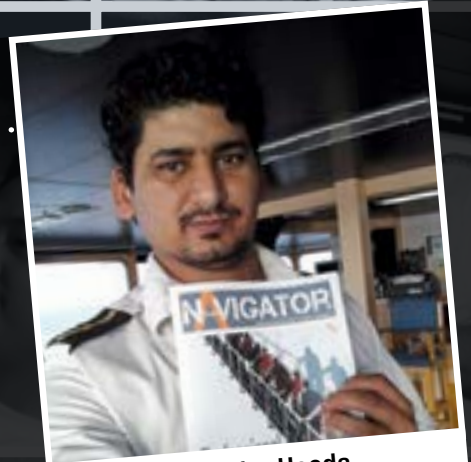


We want to see who is reading *The Navigator*! Just post a picture of you with your Navigator on Twitter, including the hashtag #NAVsnap, or send us a message on Facebook with your photo attached ([www.facebook.com/thenauticalinstitute](http://www.facebook.com/thenauticalinstitute)) and tell us the name of your ship or your college, if you have one. Or send us the information in an email! One reader per issue will win an iPad mini as a thank you.

## AND THE WINNER THIS ISSUE IS...

Thank you to everyone who entered our Navigator competition – we have loved seeing all the photos of you reading *The Navigator*. Congratulations to our lucky winner Surender Hooda. Surender says:

“Hello to my seafarer family. I hope every one is enjoying the voyage. I am trainee navigation officer Surender, working on the VLCC MT BOSTON, a Liberian flagged tanker trading world wide. I read the Navigator all the time. It's an amazing magazine to have onboard. It gives important knowledge for our work on a daily basis. I would like to tell my all friends. It might be useful to have a topic specially for new joiners. Thanks a lot for providing the magazine!”



Surender Hooda  
**NAVIGATOR CHAMPION**

