

## **Navigating into the future**

**When new navigation technology is being introduced by IMO the tanker can be singled out as having to be fitted in advance of most other vessel types. This happened notably with ARPA's in the mid 1980s and is happening now with Automatic Identification Systems (AIS). However, with established technology, IMO carriage requirements for the navigation fit of tankers follow the gross tonnage breaks applicable to all vessels, as specified in SOLAS Chapter V, writes Andy Norris.**

Marine navigation technology and IMO navigation requirements tend to advance hand-in-hand. There is not an army of boffins 'out there' inventing ship's navigation technology for its own sake, and we see relatively little new navigational technology introduced into shipping outside of IMO requirements.

Maybe this is because the engineers and specialists involved in marine navigation technology are aware of the direction of IMO thinking and themselves help contribute to IMO requirements through formal participation within IMO observer groups.

IMO procedures to develop new procedures are lengthy and tedious and sometimes end in compromises in order to get international agreement. It can therefore take many years to get new technology onto vessels. Sometimes the specifications arising from this process can turn out to be over-prescriptive, its detail unwittingly prohibiting more innovative approaches.

Nevertheless, the conservative approach of IMO results in a steady improvement to the safety of navigation, with an absence of retrograde steps. It also means that in the short to medium term the future of marine navigation is fairly well prescribed.

The most recent major IMO development in navigation has been the revision of SOLAS Chapter V (Safety of Navigation), which came into force on 1 July 2002 and incorporates requirements for newer systems such as Voyage Data Recorders (VDR) and Automatic Identification Systems (AIS), as well as referencing electronic chart technology.

### **Automatic Identification Systems**

IMO regulations incorporating the fit of new technology to vessels are commonly phased in over many years. AIS has to be fitted to tankers no later than the first safety survey after 1 July 2003. (The US has mandated a stricter implementation; tankers operating in their waters have to have AIS fitted by 1 July 2003).

All new tankers constructed since 1 July 2002 have been required to have AIS fitted as part of the original fit. Compared to some other vessel categories this is an early requirement; for instance most ships of less than 3,000 gross tonnage do not have to be fitted until 1 July 2007.

AIS has the eventual capability of becoming a most useful supplement to radar-derived information to improve collision avoidance. The present implementation is more directed to VTS use and the ship's own display, as required by the current regulations, is basic, giving the parameters of responding vessels in alphanumeric form on a simple text screen. This is perhaps next to useless as a ship's navigation aid.

Because of this manufacturers of both radar and electronic chart equipment are taking steps for AIS 'targets' to be shown on their displays, in the correct geographic position complete with heading/course vectors etc transmitted by the target vessel. By clicking on a target its AIS information can be alphanumerically displayed on a side panel of the screen. IMO recognised the benefits of this presentation and issued interim guidelines in 2001 as to how the information should be displayed and used. The basic graphical display symbol for an AIS target is a triangle, as can be seen in the illustrated radar screen display. This is taken from a simulation on a Kelvin

Hughes Nucleus 2 radar. Kelvin Hughes is one of the first companies to get formal type approval for the display of AIS targets on radar. The (only) target in the simulation has been selected, as seen by the white box around the AIS symbol. The AIS derived information concerning the target is shown in the box towards the bottom right of the screen.

In principle an AIS system, linked to radar information and chart data, give many potential navigational advantages, including the following:

Two independent target acquisition methods, significantly reducing the likelihood of missed targets include alphanumeric data that uniquely identifies the target for possible radio contact.

But this practice will continue to remain controversial, even with the positive identification that AIS gives.

A second source of target vectors that would identify discrepancies with ARPA derived information are target derived vectors which should show target vessel manoeuvres more rapidly than with an ARPA.

The nominal data rate of an AIS report is every 3.3 seconds (for a 0-14 knot vessel changing course) and 2 seconds (for a greater than 14 knots target), both are similar to radar but since target heading is gyro determined on the target ship, the change in ship's heading will be more rapidly registered on the display of the observing ship. AIS becomes an increasingly powerful tool as more vessels are fitted. However to include all vessels poses problems. For instance, 'all vessels' really needs to include all leisure vessels. But then, what would be a sensible definition for such inclusion and how much reliance should a tanker make on AIS information sent by leisure vessels?

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