

Integration for safety

There are several practical advantages of using an Automatic Identification System (AIS) in combination with an Electronic Chart Display and Information System (ECDIS) onboard ships, as compared to just a standalone AIS, writes Mikhail Andrianov, project manager for Integrated Navigation Systems, Transas

When faced with the problems of collision avoidance and surveillance, AIS-ECDIS system has several advantages over other navigation aids such as Automatic Radar Plotting Aid (ARPA) or radar. Firstly, the AIS system operating range is the VHF range in the area, which is almost equivalent to the range in which the ARPA or radar operate in. Secondly, the ARPA/radar can only show relative target marks on the screen by the bearing and range from its own ship, whereas the ECDIS allows the target coordinates, its actual dimensions, full list of identifiers (Name, Call Sign, Mobile Maritime Service Identifier (MMSI) and IMO number) to be accurately determined and the collision avoidance information for this target (bearing and range to the target, CPA distance and TCPA time) promptly obtained.

It is also possible to rapidly view additional information (Voyage Data) on the target for any moment in time. If there is a risk of collision with a target or of getting dangerously close to it, the ECDIS operator can quickly identify dangerous targets, obtain their parameters and promptly establish communication with these targets by transmitting a message via the AIS (safety message) should the target fail to respond to the voice call on the VHF.

Data on the messages transmitted from the ECDIS via AIS communication is archived in the ECDIS and will prove to be useful should an accident be considered in a court of law.

Furthermore, the ECDIS allows target identification not by the AIS only. For instance, the Transas Navi-Sailor 3000 system has three layers of targets on display. These are targets from the ARPA connected to the ECDIS, targets from the digital radar board (Radar Integrator), which processes targets from the radar scanner, and targets from the AIS. All the three target layers can be turned on simultaneously and plotted on the electronic chart. If a navigator acquires an important ARPA target by the range and bearing, with the use of ECDIS it will be a matter of seconds to identify this target and obtain all the necessary additional identification information if this target has an AIS system on board.

Ship identifiers

The recognition data does not only include the ship identifiers, but also the ship type, cargo type, port of destination and time of arrival, and motion status.

In ECDIS targets are explicitly displayed on an electronic chart, which makes their identification easier. The ECDIS screen size allows monitoring of all the AIS targets within the VHF range, as well as prompt identification of new targets. Moreover, ECDIS always displays two vectors of AIS targets: COG (Course Over Ground) and HDG (Gyrocompass) if the target's compass is connected to the AIS. Combining this capability with the AIS-transmitted actual ship dimensions allows AIS targets to be plotted on the ECDIS chart with the utmost accuracy.

ECDIS allows simultaneous monitoring of the route and AIS targets. In the case of a dangerous closure to a target, the navigator can use his or her ECDIS for selecting the most suitable collision avoidance decision with regard to the dangerous target. For instance, when selecting the manoeuvre, the navigator will not be distracted due to the need to analyse navigational situation on the paper chart (where he/she will first have to plot the own ship position), if he/she has an updated electronic chart in the ECDIS. This is because ECDIS permanently displays the ship's symbol.

Whenever a course manoeuvre results in a deviation from the route, where the lack of knowledge of the navigational situation may bring about serious damage (i.e., grounding, collision with a danger, etc.), the advantage offered by the prompt analysis of navigational situation in the ECDIS, is valuable when compared to conditions whereby the MKD only is installed on the bridge. When MKDs by known manufacturers either do not show route data at all, or the display of the route data (including graphic display) is provided on a screen other than that showing the AIS targets as well, the MKD operator will always have to switch screens on the MKD, when it is necessary to obtain different kinds of information: route data or data on the AIS targets.

Great Lakes success

In the respect of local information services, the AIS-ECDIS integration offers unlimited possibilities. As far as the author knows, the VTS services of the USA and Canada engaged in ship pilotage in the Great Lakes (Seaway Authorities) were the first to gain significant benefits through utilising these services. Without coming into conflict with the international AIS standards, these services transmit information on the lock passage schedules, weather information and water level data in the reference points to the ships via an AIS system. The entire data flow is promptly shown on the ECDIS electronic chart of the ships in this area, allowing their navigators to make immediate use of it.

Advantages inherent in the use of AIS systems as a tool for VTS and pilot services are clear. In this case, port services have the capability to provide timely and efficient monitoring of the ship traffic flow in waters under their responsibility. Prompt ship identification by its MMSI number, Call Sign or name, as well as fast search in the target ship list, have been made possible owing to the AIS. Availability of differential GPS systems built into the AIS allows sufficiently high accuracy detection of targets (up to 10 miles). Provided the data on their dimensions is available, targets can be plotted with an utmost accuracy on an electronic chart in the port office's stationary ECDIS or Electronic Chart System (ECS).

In the case of inadequate understanding in the voice communication between the VTS operator and watch officer, or if there is some noise in the VHF radio station, the AIS allows the communication to be established in the shortest possible time, exchange to be made accurately and laconically in the English language, by using the message exchange system similar to that which is used by paging communication in every-day life. With an adequate user-friendly interface of ECDIS or ECS, the navigator can be involved in such communication, at the same time constantly monitoring the progress of own ship and targets on the electronic chart, which is a great benefit in the aspect of navigational safety.