ISO 19379

The ISO Standard for the ECS Database

The Electronic Chart situation has developed in an unexpected way. When the first standards for chart systems were being written, the concentration was on those installations which would become the legal equivalent of a paper nautical chart. IMO produced a Performance Standard for ECDIS, and IHO prepared a companion standard for the ECDIS display; both were intended to define systems that would replace paper charts on board SOLAS vessels. IEC then produced a test standard to demonstrate compliance with these standards. All of these were completed in the late 1990s, and one would expect that by 2002 the world's shipping fleet would be fully fitted with an electronic system of nautical charts, replacing paper once and for all. But that is not the case.

For many proper and understandable reasons, the Hydrographic Offices of the world have not supplied the essential databases that the ECDIS standards require, making it difficult, if not impossible to operate ECDIS on most of the world's shipping routes. Electronic Chart Systems (ECS) have filled this vacuum. ECS is now being used in all the world's waters, supplied by many companies, and fitted with both vector and raster databases which cover virtually all of the world's routes. However, since IHO and IMO have decided that they will not produce standards for ECS, these thousands of installations are functioning without the benefit of any standard of performance, and their databases are not covered by any standard of content, quality or updating. This is a dangerous situation.

Even as hydrographic offices gear up to produce the Electronic Nautical Charts (ENC) databases required by the IMO and IHO ECDIS standards, the underlying situation will remain unchanged, for by far the largest part of the world's fleet will not use ECDIS. Most vessels will use ECS because they are either not covered by the SOLAS convention, or for reasons of cost or size, they will not install the larger, more expensive ECDIS. At this time ECDIS is not mandatory carriage anywhere, hence ECS is always an optional choice.

As a reaction to this situation, the ISO Project for the ECS database began during the year 2000 to apply to the electronic chart databases being prepared for shipboard use on vessels using ECS. Maritime authorities will be able to employ this standard on any vessel under their jurisdiction in all waters. Its purpose is to control the quality, contents and updating of the database used to create chart displays in ECS. ISO was asked to establish a project for the writing of this standard, and after an international vote of approval of the proposal, a Working Group was established for this purpose. Work was started on an appropriate standard for the database, and a companion Performance Standard for ECS was in preparation by RTCM.

Adding to the urgency of the need for this standard is the fact that IMO has recently mandated the use of AIS on board all ships. First installation of AIS will be effective with new construction, with retrofitting of the systems on all vessels phased over a period of years. Most of these vessels will be using ECS rather than ECDIS, and many of them will use their ECS screens as the display for AIS. As a result, the authorities which are regulating the use of AIS will have to insure a safe chart display as the background for AIS graphics and data Ã hence the need and value of the ECS database standard.

The electronic chart provided by ECS is not considered to be a legal chart as required by the SOLAS Convention. Hence a suite of paper nautical charts which are up to date and which cover the intended voyage must accompany every ECS. In most cases the database from which the chart display is constructed is provided by a private company, but is usually based on government-produced data. Because of these factors, the standard applied to the database must carefully test the accuracy, overall quality, completeness of content, and the updating of the data. What is needed is a means to ensure that the electronic chart display being viewed is as accurate, complete, and up to date as the paper chart. The material that follows explains how the new database standard will make this possible.

Status of the Standard
The new ISO ECS database standard is now in the form of a Draft International Standard (DIS). It is presently being circulated among the P (Voting) members of the group of countries associated with ISO Technical Committee 8, Sub-Committee 6 (Navigation). These countries include Germany, Russia, Japan, Italy, The Netherlands, Norway, Sweden, Denmark, China, South Korea, the United Kingdom and the United States. The voting is to be concluded by October 2002.

When the results of the voting are published, a new Working Group meeting will be held to review the comments received with the vote, and to consider any revisions proposed by members of the working group. The next meeting of the Working Group is scheduled to be held in Genoa on 5-6 December 2002.

The Final Draft International Standard is due to be distributed in January 2003, and the International Standard is to be completed by August 2003.

Contents of the Standard
The standard applies to both Vector and Raster charts and the ISO ECS database standard is organised into four principal parts:

Contents of the Chart:

1. Information above and below high Water Line
2. Navigation aids

3. Areas of Special Conditions
4. Restricted Areas
5. Textual Information, including notes and names
6. Metadata

Quality:

1. Product Specification
2. Process Control, as in ISO 9000
3. Identification of Source Documents and Data
4. Reproduction Accuracy
5. Correctness and completeness of encoding

Updating:

1. Producer of database is responsible for making updates available to his customers[1]
2. Updates to be issued at least once per month
3. Producer will publish a list of current updates once per month

Testing for compliance with the provisions of this standard:

1. Testing of the product submitted for certification will be based on sampling in accordance with recognised procedures, e.g. ISO 2859
2. Testing will be performed on an ECS Testing Device supplied by the database producer. This will be either a special-purpose computer or a PC programmed to run the test
3. Third party auditors, e.g. Classification Societies, will perform testing
4. Provisions will be made for re-testing

Certification Procedures

A number of companies who may act as auditors will be interviewed in order to prepare certification procedures under the provisions of the standard. These will include Classification Societies which are already engaged in various testing operations and any other companies suitably qualified. Chart producing companies will make individual arrangements with an auditor to obtain certification. Certificates of Compliance will be issued for those products that meet the requirements of the test procedures.

Use of the Standard

It is expected that a number of national maritime administrations will employ the standard as they write regulations concerning the use of ECS in their waters. This will be the case especially when AIS regulations permit the use of ECS as its display platform. In these cases, the need to assure a safe chart background for this anti-collision data will make obvious the need for standardised levels of quality, content and updating of the database. Each country is expected to write its own regulations calling for application of the standard.

The standard is intended to make ECS chart displays as safe as the paper charts in use today, and as safe as the corresponding ECDIS displays. Every effort is being made to produce content and accuracy levels on a par with that of the ENC of the same area. Considering the fact that in the future the ECS database will most likely be derived from a digital database produced by national administrations, this goal of safety is logical and readily attainable.

In addition, it is expected that shipping companies which are purchasing databases will require compliance with the ISO standard as a qualification for supplying the product.

Conclusions

There is no doubt that the original intentions of the IMO and IHO have not materialised as quickly as were expected in 1987 when their standards were first proposed. As a result, the intervening thirteen years (more than a generation in this computer age) have seen considerable progress beyond the state of the art which existed when the initiative began. The advantage of the ECS database standard is that it does not exclude these advances. Its only concern is that the content be consistent with navigation safety. It does not consider the way in which data is formatted nor require any particular cartographic style. The only test is: "is it safe?" Thus the appearance of a compliant chart may change, but with the assurance that safety is preserved.

Secondly, the ISO database standard allows maritime authorities the ability to regulate and even mandate the use of ECS under conditions which promote safety. This has not been the case up until now, where the large bulk of installed systems of electronic charts have been used without the benefit of any acceptable standard.

With time we expect that the ISO database standard will be used and accepted throughout the maritime world. With that being the case, it should be possible to look forward to a time when an ECS database compliant with this standard produces a display that is treated as a legal chart, without the need for the simultaneous presence of a paper chart on board.