

# ECDIS Operator Training

J. Rudolph

*Transas Marine, Hamburg, Germany*

An Electronic Chart Display and Information System (ECDIS) is a highly advanced and powerful navigational aid, specifically designed for enhancing safety at sea. With the growing adoption of ECDIS (ECS) there is an increasing number of Officers who need to be trained in its use. Given the flexibility of the labor market, it is highly likely that Officers may arrive onboard a ship without experience or training. To adequately train responsible personnel, Transas has developed specialized ECDIS Operator Training Equipment. In the papers Jochen Rudolph focuses on the requirements set out by existing IMO regulations for ECDIS operators and outlines the distinctive features of the ECDIS Operator Training.

## 1 INTRODUCTION

Today a number of National Administrations have recognized the possible need for type-approved ECDIS training. Common sense and maritime expertise combined with the tenets of the ISM Code clearly indicates that familiarization training on such vital equipment as ECDIS is a necessity, considering that incompetent operation on ECDIS could impact adversely on the safety of life and protection of the marine environment.

In the STCW'95 Convention no particular formal emphasis is placed on ECDIS system. Following the functional approach the officer in charge of the navigational watch must have 'thorough knowledge of and ability to use navigational charts and publications'. Criteria for evaluating the competency is stated as: 'The charts selected are the largest scale suitable for the area of navigation and charts and publications are corrected in accordance with the latest information available'. Due to the section B-II/1 of STCW'95 (Assessment of abilities and skills in navigation watchkeeping), a candidate for certification must provide evidence of skills and ability to prepare for and conduct a passage 'including interpretation and applying information from charts'.

In IMO Model Course 'The operational use of Electronic Chart Display and Information Systems' it is clearly stated that 'every master, chief mate and officer in charge of a navigational watch on a ship fitted with ECDIS should have completed a course in the use of ECDIS'.

But although minimum performance standards for ECDIS are adopted by IMO (Performance standards for ECDIS, IMO Resolution A.817 (19)), it is not an easy task to design and implement an operational training course for the ECDIS operator. For one thing, carriage requirements for ECDIS are not mandatory. As such, mariner training is voluntary. Another thing is the complexity of the type-approved ECDIS equipment when compared with ARPA or GMDSS equipment. Furthermore, IMO Model Course 1.27 "The Operational Use of ECDIS" specifies an extremely broad range of topics to be developed by the trainer and mastered by the trainee within a very condensed time period.

Under the International Safety Management (ISM) Code the shipping company has a responsibility to 'establish procedures to ensure that the new personnel and personnel transferred to new assignments related to safety and protection of the marine environment are given proper familiarization with their duties. Instructions which are essential to be provided prior to sailing should be identified, documented and given'.

For the vessels that must comply with the ISM Code it would therefore appear that in the absence of specific legislation for ECDIS training there is a clear obligation on shipowners to ensure that mariners sailing with ECDIS are properly trained to safely use this equipment.

The overall objective of the ECDIS training is to enhance the navigational safety. The skills gained with the course include the safe operation of ECDIS equipment, proper use of various types of ECDIS-

related information, and knowledge of the capability and limitations of ECDIS.

To achieve these objectives, the mariner is required to:

- 1) Acquire a thorough knowledge and functional understanding of the basic principles governing EN data and its proper display in the ECDIS.
- 2) Demonstrate proper use of the ECDIS equipment, including the use of navigational functions associated with route planning and monitoring; the ability to select, display, and interpret relevant information, and knowing what proper action to take in case of malfunction.
- 3) Be aware of ECDIS-related limitations, particularly those associated with errors of interpretation, over-reliance, and complacency.

## 2 ECDIS TRAINING IMPLEMENTATION WITH TRANSAS

Transas, in cooperation with Transas Training and Consulting has supported several maritime Academies across Europe, to develop the ECDIS Operator Training Course fully compliant with the IMO and STCW'95 requirements during which the participants are trained on effective proficient ECDIS operation by means of presentations and practical exercises on real ECDIS equipment and simulators.

The course is based on the Transas Navi-Sailor ECDIS 3000 system which is ideally suited for the purposes of operational ECDIS training for the several key reasons:

- Transas was granted the first in the world type-approval certificate for an IMO-compliant ECDIS
- Transas ECDIS has a major presence in worldwide fleets with currently some 7000 systems in operation throughout the world
- Transas is able to offer the class-rooms with the high-tech simulation product – Navi-Trainer Professional simulator which incorporates Transas ECDIS as a part of the simulated ship's bridge and is therefore highly adaptable to proficiency-based training in ECDIS.



Fig. 1. ECDIS Class

The ECDIS Training can be carried out on the Transas navigational simulator Navi-Trainer Professional 4000 (NTPro) which include real ship controls or with the use of computer programs suitable for shipboard training (CBT). The real electronic chart system included in the simulator allows familiarization with all the details of electronic chart operation, including route generating and editing, electronic chart updating and principles of displaying various information. The scenarios for training are located in the fictitious sea. Situations, functions and actions for different learning objectives occurring in different sea areas, can be integrated into one exercise and experienced in real time. This gives the ability to produce the greatest impression of realism.



Fig. 2. ECDIS Training with Transas NTPro 4000



Fig. 3. Visualisation in Transas NTPro (ice conditions)

ECDIS can be installed on the simulated bridge as Master and Back Up station, while Instructor's workplace can include Slave station to observe trainee's behavior online; supervise his actions and

collect the information for the further analysis and debriefing.

When used as a part of Transas NTPro simulator, Navi-Sailor ECDIS gives a unique possibility not only of Operational training but also the Management training enabling the trainee to select the most reliable and precise sensor for vessel position defining, to overlay the radar image on electronic navigation chart, use UAIS information, make records in the log book, record and playback vessel progress and navigation environment data coming from navigation sensors during the training session. Furthermore ECDIS training, provided by Transas customers in case of joint application of NTPro and GMDSS /VTMS equipment, guarantees the opportunity to obtain experience in operation with coastal control stations and ship service radio stations and allows the additional training in E-navigation which is now widely demanded in the maritime industry.

Another important fact is that Transas simulator users allow a flexible course syllabus fine-tuned to meet specific requirements of different types of ECDIS users. The practical experience shows, for instance, that commercial mariners are most interested in exploiting such ECDIS capabilities as Voyage Planning and Route Monitoring. At the same time, workboat operators prefer to learn more about User Charts and existing options for presentation of coastal charts. Customs and police authorities tend to put special emphasis on the existing facilities for full documentation of voyage details to be able to present these as evidence in court if necessary.

Taking into account different preferences of course participants, Transas and the training site can tailor the ECDIS training program to meet the specific interests of the following types of users:

- Commercial shipping
- Tug operators
- Fishery fleets
- Naval fleets
- Research vessels and other specialized applications
- Coast Guard, Police and Customs vessels

Because of the voluntary contents of the course, every user can specify its program in accordance with the particular needs and level of professional knowledge. Specialized topics that can be selected for training purposes include:

- ECDIS module
- Familiarisation and Principle Aspects
- Sensors and Vessel Positioning (GPS, DGPS, Loran-C, Echo Reference or DR sensors) and Vessel Positioning

- Chart Operation (including electronic and manual ENC update)
- Voyage Monitoring
- ARPA Operation
- Radar Overlay
- UAIS functionality
- Route Planning and Route Monitoring
- Navigational Tasks
- Ships' Logbook Function
- Indicators and Alarms
- User Charts and Graphic Editor
- Utilities (including Chart manager, Datum transformation, Navtex Receiver /Navtex Viewer, Playback and Weather forecast)

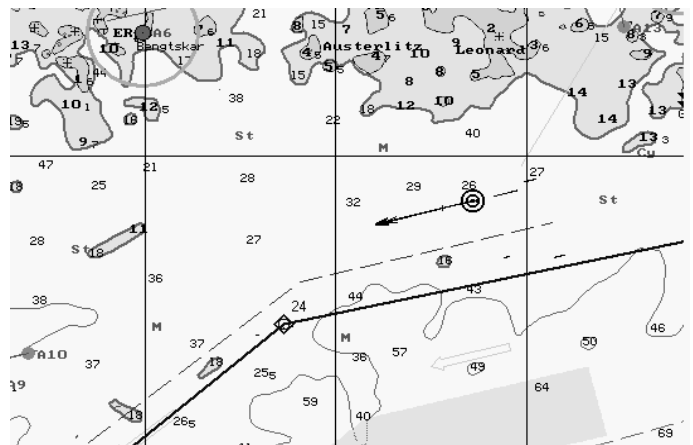


Fig. 4. Route Planning in ECDIS

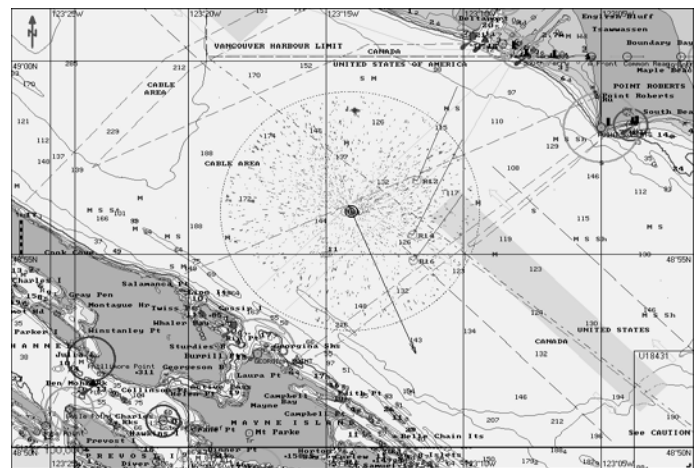


Fig. 5. Radar Overlay

Hard- and software, network and trouble shooting (Optional)

Train-the-Trainer (Optional)

- General
- Teaching Techniques
- Curriculum Development
- Assessment of training results

By the end of the course the trainees are able to:

- Operate ECDIS equipment

- Use the navigational functions of ECDIS
- Select and assess all relevant information and take proper action in the case of a malfunction
- State the potential errors of displayed data and the usual errors of interpretation
- Explain why ECDIS should not be relied upon as the sole trustworthy navigational aid

### 3 INSIGHT GAINED

#### 3.1 *Train on One ECDIS System*

It is important that training is carried out on one type of the system for all the trainees. During the course, trainees are often inclined to share their discoveries and solutions when trying to perform a new task. This exchange would be limited if some trainees had one type of ECDIS and others in the same class had another. That prospect would likely be overly taxing to the trainer, as well. Another point here is that it is really impossible to teach “ECDIS in general”. Proficiency with complex equipment is a specific task. What can be emphasized to trainees who expect to find a different brand of ECDIS on board ship is that, thanks to the type-approval process, basic functions will be available even if the Officer faces a different user interface or menu structure from another manufacturer.



Fig. 6. Trainee operating ECDIS

#### 3.2 *Walk before Running*

It is vital to convey that ECDIS is a “system” that is meant to help the user make informed decisions. It is not infallible, nor a replacement for sound judgment. In the ECDIS training like in any other supervised learning process, Instructor’s guidance is the key. The challenge here is to allow the progress of lesson plans and task sheets to meet the particular interests of the trainees. Since a trainee’s interest may unfold in unexpected ways, exposure to a topic does not necessarily mean overall proficiency. To preserve that interest while adhering to the course structure,

the Instructor should be clear about the purpose at all times and focus of the topics being discussed.

#### 3.3 *Knowledge vs. Proficiency*

For a person to be granted a certificate of approved training, all required proficiencies must be met and all important concepts grasped. In this regard, there is a big difference in telling a person what is important or what to do, and actually allowing trainees to do it. During an ECDIS course trainees should become familiar with the following:

- Selection of display layers,
- complexity of safety values and alarm settings,
- importance of keeping the display uncluttered,
- switching between automatic and manual selection of charts,
- creating and managing user files,
- creating and managing routes and schedules,
- the unusual appearance of S-57 data (compared to paper charts),
- configuring sensors,
- correctly setting own ship values.

Thus the trainee will understand his responsibilities in the operational use of ECDIS in all safety-relevant aspects and is thoroughly familiar with the used system and equipment.

#### 3.4 *Functions and Scenarios*

Trainees seem to get the most out of training time when several specific functions can be applied to the simulation exercises. Mastered topics can include: developing routes, selecting what kind of chart data to use, and editing route plan schedules. Personalized scenarios can be easily transported from the simulator to the ECDIS by floppy disk, memory stick or e-mail, with the added emphasis that many customer-tailored ECDIS projects can be moved from ship to ship, as well as archived and protected from modification.

#### 3.5 *Situational Awareness*

Trainees, for the most part, want to practice situational awareness in bridge simulation. In the past, simulation has meant contending with traffic while position-keeping and handling the vessel in real-life scenarios. The addition of ECDIS into this activity effectively shifts position-keeping away from ARPA, position plotting from the paper chart, and offers primary detection of set and drift. Furthermore ECDIS makes easy work of collision awareness (trial maneuver) revising ETA’s to check points and waypoints, not to mention heightened awareness of the safe water around the vessel and

weather conditions at all times. Therefore the simulator-based situational awareness training is the natural and correct direction for ECDIS training.

### 3.6 ECDIS Literature

Certainly, Transas is a supporter of adequate literature being written by experts in the field of ECDIS training in order to accompany the ECDIS simulation programmes as well as the system's daily use aboard. Such literature, in the form of handbooks, can be a useful – or even necessary – tool for the learning process as well as support the user well after the training. Considering this, Transas was very pleased to hear about a new ECDIS Handbook being completed by Prof. Adam Weintrit of the Gdynia Maritime University and looks forward to the publishing date and its availability to the public.

## 4 CONCLUSION

In certified ECDIS training, the ECDIS performance standards must be conveyed to the operational community while meeting the existing standards in proficiency-based training. The focus of the ECDIS operator simulation is to transfer necessary theoretical knowledge, and to provide maximum practice in the use of ECDIS. The success of the training is determined by the trainees' structured discoveries of the capabilities and limitations of the system. Evidently, mastery of all ECDIS functions requires continual use. However, if properly trained, even infrequent use will provide the experience of having learned how to use the system. After having graduated from this course its participants will be able to use ECDIS as it was designed - as a tool to increase the safety of navigation.

## REFERENCES

IMO. Model Course 1.27 The Operational Use of Electronic Chart Display and Information Systems (ECDIS) 2000.  
Resolution IMO A.817 (19) 1995. Performance standards for electronic chart display and information systems (ECDIS).

Resolution MSC.64(67) 1996. Annex 5. Amendment to resolution A.817(19) Performance standards for electronic chart display and information systems (ECDIS). Appendix 6. Back-up requirements.  
Resolution MSC.86(70) 1998. Annex 4 Amendments to the recommendation on performance standards for electronic chart display and information systems (ECDISs)  
IHO Transfer Standard for Digital Hydrographic Data S-57 Edition 3.1 November 2000.  
IHO S-52. Specifications for Chart Content and Display Aspects of ECDIS. (Edition 5, December 1996).  
S-52 Appendix 1 – Guidance on Updating the ENC (Edition 3, Dec 1996).  
IEC Standard 61174 Ed.2.0. 2001. Maritime navigation and radio communication equipment and systems – Electronic chart display and information system (ECDIS) – Operational and performance requirements, methods of testing and required test results.  
IEC Standard 61924 Ed.1.0. 2006 Maritime navigation and radio communication equipment and systems – Integrated navigation systems – Operational and performance requirements, methods of testing and required test results.  
IEC Standard 60936-3 Ed.1.0. 2002. Maritime navigation and radio communication equipment and systems. Radar . Part 3: Radar with chart facilities . Performance requirements . Methods of testing and required test results.  
Standard ISO 19379 Database. 2003. Ships and marine technology — ECS databases — Content, quality, updating and testing.  
The Standard of the Radio Technical Commission For Maritime Services. RTCM. 2003.  
MSC 81/23/10. Development of an E-Navigation strategy. Submitted by Japan, Marshall Islands, the Netherlands, Norway, Singapore, the United Kingdom and the United States. 2005.  
IMO STCW.7/Circ.10, 2001. Interim guidance on training and assessment in the operational use of the electronic chart display and information system (ECDIS) simulators.  
SN.1/Circ.255, 2006. Additional guidance on chart datum and the accuracy of positions on chart.  
Resolution MSC.221(82), 2006. Adoption of amendments to the International Code of safety for high-speed craft (1994 HSC Code).  
Resolution MSC.222(82), 2006. Adoption of amendments to the International Code of safety for high-speed craft, 2000.  
Resolution MSC.232(82), 2006. Adoption of the revised Performance Standards for Electronic Chart Display and Information Systems (ECDIS).  
Transas Navi-Sailor 3000 ECDIS (version 4.00.07) User Manual, 2006.