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ELECTRONIC CHART DISPLAY AND INFORMATION SYSTEM (ECDIS) LEGAL ASPECTS AND CASE STUDY ON CSLTHAMES

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ABSTRACT

The current paper aims to analyse the main reasons of the likelihood of grounding accidents appearing nowadays. Accordingly, a full investigation of CSL Thames accident is reported to verify the main causes of such accidents. One of the main causes found is that either ECDIS is not used at all or it is used in the improper way. This means a serious problem in the quality of the ECDIS training provided at all levels.

KEYWORDS: CSL Thames, Marine, Marine Safety, Marine Accidents, Safety Settings, Display Information, ECDIS, ECDIS Training, Software Updates, Alarm Management, Electronic Navigational Charts

INTRODUCTION

Marine accidents mean one or more than one marine undesired incident which results in personal injury, damage or loss. Accidents include loss of life or major injury to any person on board, the actual or presumed loss of a ship, her abandonment or material damage to her, collision or grounding, disablement, and also material damage caused by a ship. It is the duty of every master or skipper to examine any accident occurring to, or onboard, his ship.

Accidents may result from several reasons; one of which is the proper use of Electronic Chart Display and Information System (ECDIS). It is a chart and complex system which is a real-time navigation concept. It is used to integrate electronic chart data of various types of positioning and navigation systems with the new generation of charts; Vector and Raster electronic charts. ECDIS is capable of integrating and displaying all the navigation equipments in the bridge in one display unit without any distortion or missing of data to ensure the safety of navigation and assist the Officer of the Watch (OOW) to take his right decision during his duty. It offers the Mariner what he always expects to make navigation easier and safer. It is capable to output more information and data according to the input sensors connected to it [1].

At this point, it should be highlighted that there is unapproved Electronic Chart System (ECS), as it performs many functions of ECDIS, which allows it to be used as situation awareness system only. It is not the legal equivalent and does not meet the regulations of the IMO [2].

In addition, Mates will not be able to know the proper use and limitation of ECDIS and ECS without efficient and legal training for that. IMO, which released resolution A817 (19), considered minimum requirements of ECDIS training and Model course (1.27), which is considered on the training, The International Convention on Standards of Training, Certification and Watch keeping for Seafarers (STCW)1978 and its amendments 2010. This form was declared on January 2012 training, to force to the Ship Owners, Officers of the watch, flag state control, port state control, all in his position, to ensure that all the officers of the watch are well familiar with and are using the ECDIS in the right way. Also, the new amendments to SOLAS Chapter V (Safety of Navigation) Regulation 'Carriage Requirements for Ship borne Navigational Systems and Equipment' require mandatory carriage of ECDIS for certain new ships built on or after 1 July 2012 and a subsequent timeline plan for retrofitting ECDIS to existing applicable ships [1].

Accordingly, it could be concluded that, with ECDIS, safety principles are achieved, as well as demonstrating in one display screen during watching from charts to targets overlay. This helps in enhancing the way the officer carries out the bridge watch without any waste of time and achieves the safety requirements and feel satisfied. This in turn will minimize number of accidents happening, and may prevent them at all.

In the current research, CSL Thames accident happened in 2011 will be analyzed to check the problems or accident events faced by officers, and how they deal with them, as well as a discussion of how ECDIS may be able to prevent such events from happening.

RESEARCH PROBLEM

Despite the fact that modern technology in merchant ships reach a high standard of information and technology, but still accidents are happening. One of the reasons beyond that may be the limitations in Navigational Aids knowledge, as well as the improper implementation of the known knowledge. It had been noticed that the quality of training needs to be reviewed according to the new generations of systems produced nowadays, as the trainer becomes confused with different software and options of different types and ways of use. The trainer carried out his training according to IMO model course number (1.27) and after that new amendment appears in STCW consists of two levels of courses; one is the operation level, and the other is the management level. There was no any declaration or release from the IMO with new model courses and the way of training for those levels. Also, nothing was mentioned regarding how the OOW will cope with all of these types of ECDIS systems, even after more than one accident, despite the fact that the route cause was weak, ECDIS training, as the OOW has only the general knowledge of the ECDIS use, but is not fully aware with the type already fitted onboard ship. Accordingly, a case study will be analysed to investigate the limitations faced and show how these limitations leads to crises, as well as the proposed solutions using ECDIS so as to prevent such accidents.

BACKGROUND

CSL THAMES is a ship with IMO: 9440447 and MMSI: 249605000. She is a Bulk carrier registered in Malta. She is currently sailing under the flag of Malta. She was built in 2010. On August, 9, 2011, CSL Thames was exposed to a grounding accident. The accident results in no personal injuries, the accident could be avoided by several actions according to the system updates that were supposed to be running in the proper way.

At this point, it should be mentioned that situation awareness of the watch keeper took the officer of the watch of one chemical tanker nineteen minutes to determine that the track he followed on the ECDIS display ran her aground. The main reason for running aground was failure of the watch keeper to use the software system properly. It was stated that over thirty manufacturers of ECDIS equipments, each with their own designs of user interface, and little evidence that a common approach is developing. However, even though the current generation of ECDIS systems is certified as complying with regulatory requirements, it can be operated at a very low level of functionality and with key safety features disabled or circumvented. Training and company culture may mitigate these shortcomings to some extent, but can only go so far. Generic ECDIS training is mandated by the International Maritime Organization (IMO), but it is left to Flag States and owners to decide whether or not type-specific training is necessary and, if so, how it should be delivered. As experience of

ECDIS systems improves, evidence indicates that many owners include that type-specific training is essential [3].

In 2014, the incident of the Vessel (Ovit) was in route from Rotterdam to Brindisi, Italy through the Dover Straits. She was fitted with ECDIS, at the time she was built, so as to comply with new IMO and flag state requirements for tankers. Installation was certified by Class DNV and all deck officers had received both IMO mandatory Generic ECDIS training as well as optional but recommended type- specific training. The fatal error made by the third Mate was to draw a course line on the chart which passed directly over a well-known hazard to navigation which is marked by a large light float and several light buoys at its extremities. He did this because he had not selected the correct scale of chart to show sufficient water depth, buoy marker detail and the ECDIS auto select function, designed to overcome such chart miss-selection, had been deliberately switched off. Later on, the third Mate selected the ECDIS check route and auto hazard detection function but did not understand how to interpret the several hazard warnings that were posted [4].

The vessel ran aground due to human errors, regulatory shortcomings and equipment faults (ECDIS alarm failure). ECDIS regulations allow critical alarms and auto functions to be shut off, the failure of ECDIS manufacturers to devise and agree standard controls, inadequate type specific operator training, the current ineffectiveness of flag state and other inspections to detect ECDIS failures and misuse as well as the shortcomings of the Dover Coast Guard. ECDIS training undertaken by the ship's master and deck officers had not cater them with the level of knowledge necessary to operate the system effectively, including the preparation of safe and effective passage plans [4].

CASE STUDY

Through this research, a case study of CSL Thames will be discussed, through which the accident is analysed, errors are reported and solutions are introduced as benefit of how to save such accidents using ECDIS.

Overview

The accident happened when CSL Thames, a Maltese registered self-discharging bulk carrier, grounded briefly in the Sound of Mull on 9 August 2011 through its way from Glensanda to Wilhelmshaven. The vessel sustained bottom damage to her hull, including a 3-metre fracture to one of her water ballast deep tanks, which flooded. There were no reported injuries or pollution. Of course, some actions were supposed to be taken to assist with navigation during CSL Thames transit. One of those actions was that the master used two radars and an ECDIS. Accordingly, it was supposed to set the ECDIS with the following safety parameters: a safety contour of 10 meters; a cross-track deviation limit of 0.2 mile either side of the planned track; and an anti-grounding warning zone that covered an arc 1º either side of the vessel's track out to a distance equivalent to 10 minutes steaming [6].

It should be highlighted that CSL Thames was fitted with two ECDIS units that were used as the primary means of navigation, thus removing the need for paper charts to be carried. All bridge officers, including the master, had completed a generic ECDIS training course in the Philippines. This course was based on IMO Model Course 1.27 with duration of 40 hours. Accordingly, Officers did not receive any training or orientation on the type of ECDIS fitted on board CSL Thames by the ship's management company (Alfa Ship & Crew Management GmbH) or by previous employers, as this is not a mandatory requirement for bridge officers to receive such 'equipment specific' training [6].

Accident Actions and Causes

By investigation, it was found that a number of actions had been taken by the officers;

First, the third officer had altered the vessel's course to starboard of the planned track, which leads CSL Thames to run aground.

Second, the master's and other watch keepers' knowledge of the vessel's ECDIS was insufficient to check the presence of the ECDIS audio alarm. The ECDIS anti-grounding warning zone alarm then activated on the display, but no audible alarm sounded [7].

After the accident, several actions had been taken. One of them was when the master steadied CSL Thames on a heading to return her to the planned track, as he asked the third officer to check the automated ballast tank sounding display located on the bridge. Soon afterwards, the chief engineer reported that all other tank soundings were stable and that there were no other signs of damage. On instruction from the master, the chief officer started to pump out water from the damaged deep tank; he reported that the ballast pump was able to cope with the rate of ingress and that the level of water in the tank was reducing. The master then instructed the chief officer and chief engineer to attempt to enter the tank to establish the extent of damage. When the sounding had reduced to about 50cm, the chief officer, chief engineer and a seaman entered the tank and identified a 3-metre longitudinal fracture in the hull bottom plating. The master then increased the vessel's speed to full ahead and CSL Thames continued her passage to Wilhelmshaven [7].

Errors Faced

The following events were significant leading up to the grounding of CSL Thames:

First; the third officer prematurely initiated a turn to starboard before CSL Thames's next planned waypoint and then continued to alter course to starboard for collision avoidance purposes.

Second; after initiating the course alteration, the third officer did not monitor CSL Thames's position and projected track on the ECDIS display.

Third; the third officer did not see the activated anti-grounding warning zone alarm on the ECDIS display.

Fourth; following the accident, CSL Thames's bridge team did not use the grounding checklist or record the times of follow-up actions taken on board, contrary to the company's instructions.

ECDIS Benefits in Saving Errors

The events mentioned above could be all prevented using ECDIS in different ways, which was supposed to prevent the accident from being happened.

This could be explained in details in the following points:

First Error: The third officer's decision to prematurely initiate a turn to starboard before CSL Thames's next waypoint was based on an assumption that the sailing vessel would follow an approximately reciprocal course to CSL Thames's next planned course. He perceived that the planned alteration of course would result in the two vessels being placed at risk of collision, and therefore he opted to alter course early to keep to the starboard side of the Sound. A course alteration to starboard might have been an appropriate action in open sea conditions. However, the third officer had prematurely initiated the turn to starboard in an area of restricted sea room, and the vessel was already heading further to starboard than the planned course. This should have prompted him to confirm CSL Thames's current position and projected track before deciding on an appropriate action.

Second Error: The third officer was unaware that CSL Thames was heading into danger, as he had last looked at the ECDIS display immediately before initiating CSL Thames's turn to starboard and did not notice the ECDIS display anti-grounding warning zone alarm activated. However, the focus of the third officer's attention was on collision avoidance. While the third officer relied on the ECDIS as the primary means of navigation, he did not appreciate the extent to which he needed to monitor CSL Thames's position and projected track in relation to the planned track and surrounding hazards. Although this might have been ergonomically satisfactory for routine navigational watch keeping, the third officer's overriding priority during the period leading up to the accident was collision avoidance, which required him to look ahead. As the ECDIS display been located in front of him, he would have been more likely to routinely consult it when monitoring the navigational situation. The ECDIS display provided the third officer with an ability to immediately identify the vessel's current position and projected track at any time without the need for regular plotting.

Third Error: the third officer did not see the activated anti-grounding warning zone alarm on the ECDIS display. Again, he did not set the suitable alarm for such collision. The ECDIS on board CSL Thames was originally configured to alarm through the bridge alarm monitoring system but this was found disconnected following the accident. On joining CSL Thames, neither the master nor the other bridge officers had questioned the absence of an ECDIS audible alarm.

Fourth Error: Although most of the required actions specified on the checklist were carried out, some important items were missed: sounding the general alarm, stopping the vessel after clearing the immediate danger to establish the extent of damage, and checking the vessel's damage stability and strength.

CONCLUSIONS AND RECOMMENDATIONS

It could be claimed that several problems could be prevented if ECDIS software is upgraded to read ENCs based on the latest version of the ENC Product Specification or to use the latest version of the S-52 Presentation Library. If an ECDIS is unable to interpret and draw any newly introduced chart symbol, it will display a question mark (?) instead. Additionally, there will be a possibility that alarms and indications for any newly introduced features may not be activated even though they have been included in the ENC. Because of this, the IMO have issued guidance on the maintenance of ECDIS software in Sn.1/Circ.266. A list of the current IHO standards relevant to ECDIS software is maintained in the ENC/ECDIS section of the IHO website (IHO Publication S-66). [7]

ECDIS users should ensure that their ECDIS software always conforms to the latest IHO standards. This can be accessed from the "about" function in the software or from the ECDIS manufacturer. An ECDIS anomaly is an unexpected or unintended behaviour of an ECDIS which may affect the use of the equipment or navigational decisions by the user. The UK Marine Information Note (MIN) 406 "Reporting Operating Anomalies Identified within ECDIS" describes the procedures for the reporting ECDIS anomalies in accordance with IMO MSC.1/Circ.1391. Navigators must use the quickest means of communication available to send the required information to the Maritime & Coastguard Agency in the UK or similar organizations overseas so that an appropriate action can be taken to rectify the anomalies. Some examples of the ECDIS anomalies are: [8]

- A failure to display a navigational feature correctly;
- A failure to activate alarm correctly;
- A failure to manage a number of alarms correctly.

In general, the main problem was shown to be that despite having attended training courses that met the standards of the IMO model course for ECDIS, CSL Thames's master and bridge watch keepers lacked an understanding of the ECDIS equipment's safety features and/or their value. ECDIS provides the officer of the watch with an efficient and effective means of navigation. However, its ability to continuously provide the vessel's current position and projected track, and to warn of approaching dangers, can lead to over-reliance and complacency. The officer of the watch still needs to monitor the vessel's position and projected track at regular intervals and to fully understand the equipment's safety features in order to make best use of them. Thus, the above shortfalls can be addressed through equipment-specific training and onboard instructions and guidance.

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