International Core Journal of Engineering Volume 8 Issue 7, 2022
ISSN: 2414-1895 DOI: 10.6919/ICJE.202207_8(7).0093

Design of Marine Medium-high Frequency Combined Radio Simulator in Navigation Universities Applied Research in Popularization

Zihan Yang*, Zitong Lin[a], Yuning Zhang[b], Conglin Cai[c], Huimei Lin[d], Zhaoqi Ci[e], Haipeng Wang[f], Xing Lang[g]

School of Navigation and Naval Architecture, Dalian ocean university, Dalian 116000, China

*2682595652@qq.com,[a]lzt950214@163.com, [b]605704114@qq.com, [c]2237957997@qq.com, [d]2679574277@qq.com, [e]1275337179@qq.com, [f]whp@dlou.edu.cn, [g]842332325@qq.com

Abstract

In order to solve many problems, such as limited time and space conditions for navigation students to learn based on GMDSS (Global Maritime Distress and Safety System) training theory and experimental content, improving the professional quality of professional seafarers and training significance, etc., this paper puts forward a method to popularize the design of marine medium and high frequency combined radio simulator in colleges and universities.Using this simulator, Simulate the medium and high frequency combined radio station of real ships, so that students can better participate in vocational training courses.Through the use of the dual-end entrance of education between teachers and students, the purpose of simultaneous teaching practice can be better achieved, and the dual purpose of exercises and tests can be achieved through different instructions from teachers, which has the function of assessment.Based on the above factors, it also shows to some extent the general demand of the society and some universities for the knowledge update of this simulator and navigation students.

Keywords

Medium and High Frequency; Simulator Design; Popularization.

1. Introduction

It is understood that according to the requirements of IMO (International Maritime Organization) related conventions, ship pilots must attend GMDSS special training and obtain their competency certificates through the examination of the State Maritime Safety Administration. However, due to the variety and high price of real machines equipped in GMDSS system, it can't be equipped in a large number in crew training institutions. At this stage, many universities or training institutions at the social level do not have such simulators or the simulator models used are old. This type of aircraft has changed greatly from the current marine equipment in terms of function and interface, and can't be operated by the marine real machine. Because the signal will interfere with the normal use of ships on the sea surface, At the same time, limited by the electronic dongle of simulator software, students can only carry out equipment experiment training in a fixed laboratory, and can't practice freely after class. The above-mentioned situations greatly reduce the training significance of professional seafarers, and students majoring in navigation need to re-learn the use of new equipment after boarding the ship. To a certain extent, it also shows that the simulators of the society and some universities can't meet the general needs of the current navigation students' knowledge updating. The original intention of our design is to change this solidified training method. This kind of simulator is

ISSN: 2414-1895 DOI: 10.6919/ICJE.202207_8(7).0093

based on web page design, and has two-terminal entrance mode for students and teachers, which realizes the purpose of teaching practice at the same time. It is not only convenient and fast, but also more realistic and feasible to simulate all kinds of situations when sailing at sea. It also breaks through various limitations such as time and space, and truly realizes many times of use without restrictions. This has established a solid foundation for the implementation of navigation students' teaching activities and provided a good education and teaching environment for students' daily learning and training.

2. Problems in the Popularization of Marine Medium and High Frequency Combined Radio Simulator

At present, the model of the teaching equipment equipped by some seamen training institutions at the social level is different from the model of the equipment simulated by the simulator, which makes the real machine equipment and the simulation equipment separate from each other, and the simulation equipment loses its use significance and practical value, and cannot be used in the teaching and training process, which directly affects the teaching effect. The simulator still needs to be gradually completed, It should be constantly updated with the development and progress of the actual shipping industry, and it is necessary to put an end to the imperfect or incomplete functions of simulation, for example; The time of the device cannot be set or corrected; Third, the ship position can't be input or remains unchanged after input. At the same time, the knowledge about MF/HF in GMDSS system has little contact with other specialized courses, and it is a relatively independent module. This also leads to the students' lack of perceptual knowledge and experience of maritime communication, the need to improve the professional English level of communication due to the lack of relevant professional knowledge, and the lack of understanding of the actual situation of maritime communication [1].

3. For the Perfect Method of Simulator Design

The GMDSS simulator can simulate the telex communication from ship to ship, from ship to ship, and from ship to all radio stations, with emphasis on improving the simulation of telex communication and voice communication functions from ship to land users, which can greatly improve the simulation environment and improve the quality of GMDSS equipment operation training. With the aid of the design of the ship medium-high frequency combined radio simulator, It is of great significance to the training of navigation talents. We can simulate different actual scenes at sea with this equipment, and we can reasonably, correctly and timely select the equipment to complete all kinds of communication at sea through repeated exercises, and we can also randomly set different scenes at the teacher's side to strengthen students' adaptability to emergencies. The establishment of MF/HF simulator practical training question bank can help trainees to judge the mastery of the knowledge they have learned well during practical training. The perfection of the design is of exploratory significance to the practical education and teaching of navigation students and sailors trained in the society. And universities and training institutions can make full use of a small number of real machines and equipment, In order to improve the students' intuitive sense of equipment, and at the same time, combined with a large number of training of virtual simulation network training system, establish the students' proficiency in equipment operation. This not only provides abundant teaching resources for practical teaching, but also has great significance for the rational distribution and application of teaching resources. During the period when students can't be at school, Through this system, distance practical teaching can be achieved, and "zero delay" can be realized for education and teaching. In addition, during the period of school, students can also meet the needs of each classmate to operate and practice in person, greatly expanding education and teaching resources[2].

ISSN: 2414-1895 DOI: 10.6919/ICJE.202207_8(7).0093

4. The Idealized Future Prospect of the Simulator Design of Ship's Medium and High Frequency Combined Radio Station

At present, the operation panel of the simulator is mostly limited to plane graphics, and the reality is not strong when the mouse is used to operate on the computer. Therefore, it is necessary to constantly improve and break through the hardware, using the real case and keys, and the inner movement is replaced by software. The function of the software is to make the external equipment (display screen, antenna, buzzer, printer) show the real machine effect when the operator operates it. Secondly, the functions of each part of the equipment should be as complete as possible in the software. When upgrading the software, we should consider the common equipment models currently used on ships. Ideally, it's best to encourage cooperation with shipping companies to participate in the research and development of simulators. As simulators are mainly realized by computer technology, The company or ship can be equipped with a set of stand-alone training software, and the cost is not great. The crew can practice at any time when they are at rest or free, and the drivers who don't understand can also be explained and taught by the certified personnel, so as to get twice the result with half the effort, and make the ship personnel use GMDSS equipment as well as mobile phones, thus truly ensuring the navigation safety of the ship [4,5].

5. Discussion and Innovation

Through the investigation, it is found that compared with the traditional teaching methods, using GMDSS simulator to teach can make trainees master the marine skills better, including fully tuning the selected frequency before transmitting when using the medium and high frequency combination radio station, doing daily tests and inspections on the radio station, and improving trainees' satisfaction. Therefore, The use of simulator in teaching is a practical method to strengthen the training effect.

This study also has certain limitations, and the original simulator has certain geographical limitations. In view of the local area network limitations of the original simulator at present, the next step will be to optimize the wide area of simulator training courses and bring more benefits to trainees as much as possible.

(1) Strengthening the functions of the ground communication system: The application of the ground communication system in GMDSS has been relatively mature, but in order to better adapt to the continuous development of the times, it is inevitable to update the technical means, and the innovation areas are mainly focused on the strengthening and research and development of the system functions. Firstly, E-MAIL equipment is introduced into the system to update the communication mode. At present, Many coastal radio stations have been unable to support the traditional NBDP communication mode. The application of new communication technologies such as E-MAIL can not only increase the communication efficiency, but also greatly reduce the difficulty of operation. At the same time, some systems can already realize the transmission of pictures, videos and other information data through the application of E-MAIL communication. It provides a good guarantee for the safe operation of ships. In addition, in order to ensure the efficient use of traditional text communication, it is necessary to develop new functions. Secondly, by simplifying the operation steps of digital selective calling system, the accuracy of alarm is improved. The main function of the selective call system is to send out distress alarm, The high error rate is a very significant disadvantage. In recent years, affected by this shortcoming, the development environment of the system has become worse and worse. In order to effectively improve the accuracy of its alarm, its operating procedures must be simplified. At the same time, satellite system alarm will become a new trend in the future.

(2) Research and development of new maritime safety information system: the maritime safety information broadcasting system is an important tool to ensure maritime safety. With the development of the times, the traditional NAVTEX system can no longer meet the requirements of the in-depth development of electronic navigation strategy. First of all, we should innovate the way of broadcasting safety information and speed up the research and development of new systems. In recent

ISSN: 2414-1895 DOI: 10.6919/ICJE.202207_8(7).0093

years, In some developed countries, the research and development of new navigation safety information system has never stopped, and digitalization and high-speed are the new trends of this type of system modernization. At present, a navigation safety information system named NAVDATA has attracted wide attention in the world. Compared with the traditional system, this system is more applicable. It can broadcast the safety information of a single ship or all ships. Secondly, integrate NAVTEX and EGC data. NAVTEX used at this stage can only cover sea areas A1 and A2, while EGC system is responsible for other areas. Therefore, in order to ensure the comprehensive coverage of the navigation safety system, it is necessary to organically integrate the two and realize the integration of MSI information. Only in this way can the intensity of MSI information work be effectively reduced.

(3) Explore the development trend of positioning system: First, expand the scope of maritime search and rescue through the application of AIS-SART equipment. SART equipment locates by its own radar device, but there are some defects in coverage and accuracy. AIS-SART equipment has greatly expanded the communication distance, improved the accuracy of positioning, and added new functions such as information identification. Secondly, MOB equipment is installed on the life jacket. MOB equipment plays the role of beacon, which is installed on the life jacket, and can accurately determine the position of the drowning person through the corresponding detection equipment, thus effectively improving the success rate of search and rescue. However, the performance, quality and safety of MOB equipment must be guaranteed, so strict equipment production standards can be formulated.

In short, compared with traditional training, GMDSS simulator training provides a good education and teaching environment for students' daily learning and training, establishes a solid basic technology for the implementation of students' teaching activities and improves students' satisfaction, which is worthy of popularization and application. Our simulator will also conform to the development of the times. According to the new situation of the current shipping industry, we will continue to develop and follow up, explore and discover in an aggressive way, and make a contribution to the great cause of building a maritime power [3].

6. Conclusion

In this paper, the popularization and application of marine medium and high frequency combined radio simulator in maritime universities are studied. It is proved that the marine medium and high frequency combination radio simulator has many advantages when it is applied to maritime universities. It can not only meet the requirements of students majoring in navigation for mastering navigation communication equipment, but also simulate and change the corresponding environment according to personal requirements. It can also achieve the function of assessment and monitoring based on the double-end entrance of teacher-student education. However, in view of the application of the marine medium and high frequency combination radio simulator in the navigation field, and the development, operation and compilation of the simulator all belong to the current frontier research. Therefore, this paper only comprehensively discusses the popularization and application of marine medium and high frequency combination radio simulator in maritime colleges and universities. In the future, with the progress of China's shipping industry and the increasing demand of maritime universities for training and teaching purposes, the simulator of ship's medium and high frequency combined radio station will be continuously improved and updated, and constantly improved and developed.

Acknowledgments

This work was financially supported by Innovation and entrepreneurship training program for college students in Dalian Ocean University in 2022 fund(national level, 202110158011).

ISSN: 2414-1895 DOI: 10.6919/ICJE.202207_8(7).0093

References

[1] Problems and Countermeasures of GMDSS Simulator in Teaching Process[J]. Huang Liqing. Journal of Jimei University (Education Science Edition) .2014 (03).

[2] Scene practice training of GMDSS training for driving students[J]. Wang Zhichang. Vocational Technology .2009 (06).

[3] Prospect of GMDSS system development trend under electronic navigation strategy[J]. Wang Jing. Xueyuan. 2017 (06).

[4] Application of GMDSS simulator in navigation teaching[J]. Chen Junhua. Journal of Zhejiang Jiaotong Vocational and Technical College 2006(S1).

[5] Application of Navigation Simulator in China's Navigation Education and Training[J]. Jie Junwu, Li Donglou, Miao Congjin. China Water Transport (the second half of the month) .2017 (08).