

Current Situation and Development of Marine Environment Simulation Technology

Sunqing Xu*, Qi Liu

Unit 92493, Huludao, Liaoning 125000, China

*Corresponding author: Sunqing Xu

Abstract: Marine environment simulation technology mainly studies the ocean of various environment with artificial simulation of similar environment and applied on the product technology, to check whether the product performance and quality meet the standard. With the development of human society and the progress of scientific and technological level, this technology is also developing. Countries have developed different functions, different models, different volumes of Marine environment simulation equipment to test and reflect the environmental adaptability and reliability performance of products. The environment faced by maritime ships is very complex, which poses a serious test for the adaptability of ships and various products. Marine environmental simulation technology is through the sample Environmental tests to detect the quality characteristics of the product. Environmental test is an essential part of the equipment development work, which plays a very important role in detecting the deficiencies of the products and ensuring their reliability and quality. In the new era, gradually improving the ability of Marine simulation technology is of great practical significance for the construction of the military and the development of people's livelihood.

Keywords: Marine environment; simulation technology; reliability; equipment development

1. Introduction

The Marine environment simulation technology mainly studies the artificial reproduction technology of various Marine environment and the reliability and adaptability technology of the products in the marine simulation environment. Environmental simulation technology is a comprehensive technical theory system involving a variety of specialties, and marine environmental simulation technology is an important component and an important way to improve the quality and characteristics of various marine ship equipment. Marine environmental simulation technology is conducted through environmental tests. Environmental testing is the exposure of the product to a natural, actual use, or artificial laboratory simulation environment to maintain its work in all environments during the intended use Activities with good ability and good performance.

2. Current status of Marine simulation technology

With the rapid development of social science and technology, people have a more urgent demand for the environmental adaptability and reliability of marine ship equipment. Designers are more concerned about product performance, reliability, and safety in complex marine environments. To ensure the normal use of the product, environmental testing must be conducted. All countries have established various Marine environment simulation equipment of different types, different functions, different sizes and different functions, obtained a variety of single element simulation environmental conditions or multiple dimensional simulation environmental conditions, and carry out environmental adaptability and reliability tests.

Many new technological achievements in the ocean simulation technology have been adopted abroad. Test data acquisition and data processing have been fully automated, and have a considerable number of large and comprehensive environmental testing equipment. Since the 1970s, in order to meet the development needs of ship equipment, China has independently developed and produced a considerable number of different types of Marine environment simulation equipment. For the past ten years. A number of Marine environment simulation equipment with international advanced capabilities and their own characteristics have been built.

3. Marine Environment Simulation Classification

The impact of environmental factors on human life and work are important on the quality of the product when people work and live on the ocean. In 1968, a year of fault cause analysis of the equipment contained in the ship concluded that more than 50% was caused due to environmental factors. Therefore, it is of great practical significance to study the different properties and characteristics of the Marine environment, and to analyze the impact on human production and life and the adverse impact on products. Environmental types are usually divided into the following categories: climate environment, mechanical environment, electromagnetic environment and compound environment. Marine environment is usually divided into the following categories according to environmental parameters: temperature environment, Hot and humid environment, impact environment, salt fog environment, mold environment, and solar irradiation environment, vibration

environment, rain environment, pressure environment, noise environment, and multi-parameter comprehensive environment. For climate conditions, the current common Marine environment standards are GJB 440.1-1988 Environmental Parameter Classification of Ship Equipment and Its Severe Grade Climate, Biological, Chemical Active Materials and Mechanical Substances [1],

GJB 1060.2-1991 Ship Environmental Conditions Requirements [2], GJB 1446.50-1992 Ship System Interface Requirements for Climate Environment [3], GJB 3617.1-1999 Marine climate and hydrological extremes of military equipment [4]. These military standards have authoritative, the corresponding environmental extremities and other data are more in line with the real Marine environment, which can better analyze the situation of the real Marine atmosphere environment [5].

4. Marine Environment Simulation Equipment

Marine environment simulation equipment mainly includes low temperature environment simulation equipment, impregnated environment simulation equipment, mold environment simulation equipment, rain environment simulation equipment, high temperature environment simulation equipment, acid environment simulation equipment, solar radiation environment simulation equipment, ice accumulation / freezing rain environment simulation equipment and hot and humid environment simulation equipment, etc.

The main development goal of the current Marine environmental simulation experiment is the multi-parameter comprehensive environmental simulation experiment. This requires a more comprehensive environmental simulation equipment. As early as 1949, the United States established a famous McKinley Meteorological Laboratory in Florida Air Force Base (the laboratory can test and test the battlefield effectiveness of weapons and current combat performance through various climate and celestial conditions, and train the troops to carry out unaffected operations in complex weather conditions.). Since the 1970 s, the US military began to emphasize mechanical and climate environment tests while developing the original climate laboratories Comprehensive combination of testing. In the same period, the British Ministry of Defense in the face of some large and complex product test tasks, spent a lot of money to set up some comprehensive environmental laboratory with advanced test ability, Germany, Italy, the former Soviet Union and other companies and departments, the comprehensive environmental test have carried on a lot of work, the test equipment also carried out and developed a lot of research.

The development of comprehensive environmental test equipment in China started late compared with that of foreign countries. By the 1980 s, due to the heavy environmental test task, the research of comprehensive environmental test equipment was carried out in China and obtained some results. In the 1980 s, the China Institute of Launch Vehicle Technology basically had the

comprehensive environmental test ability mainly simulating the climate environment. In the middle and late 1990 s, through the introduction of foreign equipment and technology and the establishment of many joint venture factories, the development and design level of environmental test equipment in China has made a lot of progress. For example, Wen, jointly developed by German Weiss Company and Aerospace 702 Three comprehensive large environmental test boxes, degree, humidity and vibration, can meet the environmental simulation needs of a large number of weapons and equipment such as missiles, space equipment and aircraft, and have been widely used in the development of model. Entering the new century, Beijing Helicopter Design and Research Institute and Beijing Oriental Measurement and Testing Research Institute have jointly developed a number of comprehensive environmental test equipment for the localization of equipment.

5. The Development of the Marine Environment Simulation Technology

In the face of the current treacherous international situation, China should gradually strengthen the basic research work and gradually accumulate the basic data on the environmental adaptability and reliability of the ship equipment. China's ship equipment is in the stage of rapid development, and it is impossible to wait for the required data to accumulate to a certain extent to study, verify and apply environmental test methods more in line with the characteristics of ship equipment use. Therefore, it is hoped to carry out these basic studies from the following aspects and accumulate basic research data on environmental adaptability and reliability of ship equipment: carry out the actual environmental test operation under the ship surface environment, accumulate environmental data bit by bit, and be the environmental model Provide necessary reference and credentials; conduct hull exposure test of various model structures, materials, protective technology, electronic components, and ship equipment, obtain and accumulate environmental effect data; pay attention to the accumulation and utilization of fault data during ship service, and provide reliable data for environmental test method demonstration and environmental assessment requirements; Conduct a lot of environmental analysis and test scheme demonstration work. For the tasks during the life of the equipment, boldly adopt new environmental test methods in the design and manufacturing, accumulate while developing, verify while using, and in practice Constantly enrich data resources, refining data analysis and application methods.

6. Conclusion

To sum up, the Marine environment simulation test technology and the Marine environment simulation test equipment have gone through the process from single element simulation test to multiple element simulation tests, and developed from static simulation test to dynamic simulation test. The research and development direction is to carry out collecting multiple dimensional

comprehensive dynamic simulation environmental tests. This technology can reflect the complex conditions in the environment equipment, and test the environmental adaptability and reliability of the product.

China should accelerate the research on Marine environment simulation technology and comprehensive Marine environment simulation equipment to reach the international advanced level and contribute to the development and construction of national defense and the development of people's livelihood and economy

References

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- [5] GJB 150A-2009 Environmental test method for military equipment laboratory.