Study on Typhoon Resistance Measures at the Wharf of Large Unpowered Ships

Wei Ji*, Yu-rou Zheng, Sha-sha Zhu, Dian-tian Mei, Tian-ming Ding and Wan-zheng Ai

Marine College of Zhejiang Ocean University, Zhoushan 316000, P.R.China

*Corresponding author

Keywords: Large unpowered ship, Typhoon resistance measures, Moored at wharf.

Abstract. With the continuous development of the shipping industry, China, a country with a long and tortuous coastline, has a superior geographical position. The emergence of more unpowered ships is promoted by the continuous development of the shipbuilding industry. At the same time, China's coastal areas are also inevitably affected by the typhoon disaster. Although there are relevant countermeasures about typhoon resistance technology at the wharf of large unpowered ships in China, there are still many shortcomings. The purpose of this paper was to put forward more perfect suggestions on measures through the research on typhoon resistance measures at the wharf of large unpowered ships.

Based on the existing mooring against typhoon measures of large unpowered ships, this paper aims to analyze and study the existing mooring against typhoon measures of large unpowered ships, and put forward relevant countermeasures to improve the mooring against typhoon measures of large unpowered ships.

The Present Situation and Measures of Typhoon Resistance Technology of Large Unpowered Ships

Unpowered ships refer to ships without driving ability, including ships which are launched into water after built new marine outfitting while the main engine power is still unable to use, floating docks which are anchored in stationary waters for a long time, as well as ships which lose power due to main engine failure and ships to be repaired (main engine equipment needs to be repaired, power lifting), etc. Therefore, when typhoon comes, large unpowered ships usually mooring directly at the wharf to fight typhoon. However, due to the uncertainty of typhoon prediction, the towing time of large unpowered ships into the shelter anchorage is limited. In addition, large unpowered ships can only enter the typhoon anchorage by relying on the harbor for tugboat. Therefore, when typhoon comes, large unpowered ships usually mooring directly at the wharf.

Considering the safety of mooring ships against typhoon for large unpowered ships, the time and strength of typhoon should be predicted timely and accurately in the first place, so as to make preparations for typhoon resistance in advance. To choose good unpowered ships suitable anchorage waters in advance, anchorage ground needs to have the right address, make the anchor maximum holding power, to avoid the walk anchor accident, at the same time for large unpowered ships without driving ability, anchorage ground should have enough depth and have a certain amount of wiggle room, prevent the ship from bumping into the dangerous obstacles or other ships berthing for shelter when encountering typhoon. Secondly, adopt the corresponding mooring mode and anchoring mode of the wharf of the unpowered ship to ensure the stability of the expected strength of the unpowered ship when the typhoon hits. For example, the single point mooring system against typhoon is an effective way to solve the problem of mooring against typhoon for large unpowered ships, but the key is to design a set of practical and reliable mooring technology.

The Drawback of Typhoon Resistance Measures at the Wharf of Large Unpowered Ships

Due to insufficient monitoring of typhoons, the arrival time and intensity of typhoons cannot be
predicted accurately. As a result, the anchoring and mooring preparation time of ships is insufficient, and it is difficult to complete the mooring and anchoring operation of large unpowered ships in a short time. The prediction of typhoon running path is not timely, and the mooring anchorage with certain shielding function cannot be selected according to the running path of typhoon.

The information communication between the execution department and the command department is not flexible enough, and the information transmission is lagging behind. It is difficult to communicate and deal with it in the first time, and the solution of urgent problems is not timely enough. As the information transmission is not timely, it is easy to cause the operation is not in place or not accurate, thus increasing the difficulty of mooring unpowered ship at the wharf.

The technology of avoiding wind and anchoring is not mature when typhoon comes. When a typhoon approaches head-on large unpowered ships which in towing process, anchoring or mooring buoys can easily lead to anchor walking or chain breaking accidents, eventually, the ships may run aground or collide, posing a threat to the safety of the ship itself, terminal operators and ships berthing nearby which are against typhoon. As the basic mooring mode of ships, the effectiveness of this mooring mode depends on the mooring mode adopted and the corresponding cable configuration. The existing mooring measures of unpowered ship wharf, lacking scientific and reasonable mooring mode and cable configuration, lead to the ship's ability to resist typhoon is greatly reduced, and there are great safety risks.

**Relevant Countermeasures to Improve Typhoon Resistance Measures at the Wharf of Large Unpowered Ships**

Firstly, the information service system of the port should be improved, based on big meteorological data, form a perfect dynamic meteorological network through real-time monitoring and uploading of meteorological changes, constantly improve the accuracy and precision of typhoon prediction. Accurate typhoon time prediction can obtain sufficient preparation time for mooring operation of unpowered ships. And establish an information service system, which make the communication between field operators and backstage supervisors more precise. Monitor the mooring technology for unpowered ships real-timely, operate neatly and simplify operation process, to save time in information flow between command and execution, as well as strive for more practical operation time.

Although at present, there are few researches on the anchoring and wharf mooring technology related to the mooring of large and unpowered ships, the actual mooring and anchoring operation of the wharf lacks feasible technical support, with the development of shipping industry, the research on mooring cable is increasing at home and abroad, therefore, relevant ship simulation experiments should be carried out for different mooring cable models. Use actual model test and computer modeling to analyze the wind area and wave force of different ships in typhoon, and obtain the mooring chain parameters and mooring model of different unpowered ships. Through the comprehensive analysis of mooring medium, mooring ring and mooring technology, obtain a set of mooring technology suitable for mooring against typhoon system. In this way, different mooring mooring cable typhoon resistance measures will be adopted for different ship types of large unpowered ships, which avoid uniform cable inapplicability and chain parameters and mooring model to different ships, and make the safety of mooring improved greatly. At the same time, we should pay attention to the dynamic change of ships in the typhoon, according to different stages of the typhoon and different wind directions, timely and accurately adjust the length of the ship's anchor chain, so that the ship can be balanced and in a relatively stable state.

Perfect the establishment of the infrastructure of mooring berth, such as the setting of a special observation platform, use radar equipment to set the guard circle, monitor the ship's anchorage changes in range and bearing, ensure that the ship is within safe anchorage ground. When the position of the unpowered ship is abnormal, take conservative circumvention measures.
Conclusion

Perfect effective typhoon resistance measures of large unpowered ships is very important for the safety in the typhoon weather, from information collection, technical development, constantly improve the typhoon resistance measures of unpowered ships, forming a set of targeted and effective typhoon resistance measures system, to ensure the unpowered ships mooring safety.

Acknowledgment

Zhejiang Ocean University funding support for innovation and entrepreneurship programme for undergraduate Number: 201910340033.

Reference


