

Analysis of Key Points of Ship Construction Inspection

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Abstract

With the continuous development of China's marine transport industry in recent years, the construction quality of ships is becoming more and more demanding. The ship construction inspection is the main body to guarantee the quality of the ship construction. Its function is to ensure that the ship is in accordance with the design drawings and relevant standards, specifications, etc. therefore, The inspection of ships must be strengthened in the course of their construction. In order to further improve the quality of ship construction, the article analyzes the inspection points of each stage in the process of ship construction in detail.

Keywords

Key points; ship construction; inspection.

1. Introduction

After entering the 21st century, China's maritime transport industry has also been unprecedented development, which also led to the progress and development of China's shipbuilding industry. At present, there are more and more types of ships in our country, and the size of ships has changed greatly, from small to hundreds of tons of ships to hundreds of thousands of tons of ships. However, the ship construction process needs to go through many processes, involving a large number of operators, the construction period is relatively long, And the structure of the hull is relatively complex, in order to ensure that the quality of the constructed ships is excellent, in accordance with the relevant regulations and requirements, It is necessary to strictly control the inspection work of ship construction, especially the inspection points in the construction process.

2. Analysis of Key Points of Construction Ship Inspection

In the process of ship construction, due to the long period of its inspection, there are many kinds of inspection items related to ship construction, the frequency of inspection is more, and the various standards to be implemented are many. Thus, During the construction of ships, the corresponding inspectors must have certain professional technical ability and comprehensive quality, and should also have certain experience in the construction of ship inspection. On the one hand, In the construction of ship industry in our country, the task quantity of inspectors is increasing rapidly every year, and the number of inspectors has obviously been unable to meet the work demand of the construction ship industry, which is the present situation of the construction ship inspection in our country at this stage. On the other hand, The main factors affecting the quality of the ship are cost, load and speed. In view of the key points in the on-site inspection of ship construction in our country at present, the surveyor must follow the requirements and rules of ship construction in effect. As well as the corresponding conventions and regulations on the construction of ships in the precision control, welding quality and final acceptance and other aspects of the requirements of scientific quality management and quality control.

3. Current Status of Ship Inspection

3.1. Insufficient Number of Surveyors

Because most of the ship inspection institutions in our country belong to the establishment units, the number of surveyors is strictly limited. However, in recent years, the number of ships in our country has increased sharply, the tonnage of ships built has been increasing, and the number of ships has basically started at more than 100,000 tons. And the work of the ship inspector is not only to inspect the quality of the ship, but also to be responsible for the design drawings and operational inspection of the ship during construction. In this situation, the number of ship inspectors in our country is seriously lacking, which leads to its overload work, so it is difficult to ensure the quality and level of its inspection work, and it is inevitable that there will be no quality problems and safety hidden danger after the ship is launched.

3.2. Increased Volume of Ship Inspection Operations

In recent years, with the deepening of China's reform and opening up and economic globalization, China's ship construction industry has been developing rapidly, and the business volume of ship inspection related work has also increased sharply. According to the data, since the mid-1990s, The average annual business volume of our surveyor is far less than 10,000 gross tonnage, and by the beginning of this century the average annual business volume of our surveyor has exceeded 10,000 gross tonnage, which is only the average level of our country. In some areas, the annual business volume of surveyor has even exceeded 50,000 gross tonnage. The increase of the business volume of ship construction inspection is bound to cause more problems and deficiencies in ship construction inspection, which will seriously affect the safety of ship use in the later stage.

4. Factors Affecting the Shape of the Hull

4.1. Cost

The cost of a ship is related to the construction of the ship's outer surface plate and the cost of steel plate bending. If it is necessary to build a high-speed ship, then the ship's hull needs more shapes of the outer surface bending steel plate, which increases the operation process of the outer surface steel plate during processing and bending, and increases the cost of building the ship. At the same time, If the ship is a large ship, then more steel plates will be needed, but compared with the small ship construction, the processing cost of the large ship will be relatively reduced as a proportion of the total cost. Thus, Using the cost price of the steel plate to obtain the larger loading capacity of the built ship, the larger ship is relatively low compared with the smaller ship's unit loading capacity.

4.2. Cargo Loading

In order for the ship to have a greater capacity for cargo loading, it is generally necessary to choose the hull construction as a rectangle. The larger the size of a ship with a larger square coefficient, the greater the capacity of its cabin to load cargo, but the shape of the hull is more suitable for bulk carriers. If the ship with high speed is built, it is not suitable to choose the shape of the hull with excessive square coefficient, which is mainly related to the hydrodynamic characteristics. Because the bow and stern of the large square hull are mostly flat, and the bow and stern have raised edges, such a design will interfere with the smooth flow of water. at the same time will also produce greater resistance, therefore, the larger square coefficient of the hull is generally suitable for ships with low speed.

4.3. Speed

The shape of the hull constructed by ships with relatively high speeds is quite different from that of ships with large loads. High-speed ships are slender shapes of the hull, the bow will be built into a pointed shape, the stern into a circular shape. Such a ship's construction shape allows the bow to cut directly into the water, reducing the resistance of the ship's navigation, and the slender hull has no raised edges and does not cause additional resistance to the water to cause an unstable flow of water. The circular stern reduces the swirl of the ship's hull off the water. However, because the hull's inner cabin is affected by the shape of the hull, this type of slender ship loading cargo is relatively small.

5. Inspection of Ship Construction Site

5.1. Significance of Ship Construction Precision Control

It is very important for ship construction to control the precision in the process of ship construction. On the one hand, By studying the precision control technology of ship construction, the transformation of ship construction mode can be realized, and it is also an important basis for the integration of shell, outfitting and coating in the process of ship construction. On the other hand, From the point of view of the ship construction technology in our country at present, a major reason that restricts the development of the ship market in our country is that the ship construction precision control technology is not advanced enough, which is also a difficult problem to be solved to realize the leapfrog development of the ship construction industry in our country. Besides, The precision control technology of ship construction can effectively reduce the workload of relevant operators in the process of ship construction. Improving the efficiency of the ship's construction process, improving the quality of the ship's construction, reducing the cost of the ship's construction and further reducing the period required for the ship's construction, It is also one of the effective means to enhance the competitiveness of shipbuilding industry in the international market.

5.2. Inspection and Control of Welding Quality of Ships

At present, the vast majority of ships are welded to each other at the time of construction, It can be seen that the welding quality will have a serious influence on the quality of the whole hull structure during the construction of the ship, and the quality of the welding will be related to the compactness and effective strength of the hull. In order to better ensure the quality of ship construction, the inspection of welding quality should be strengthened in the course of ship construction. The inspection of weld seam includes contents, pre-weld inspection, welding specification and surface quality inspection of weld seam, and internal quality inspection of weld seam to ensure that welding quality meets the requirements of relevant standards and specifications.

5.3. Handle the Results of On-site Inspection

After the on-site inspection of the ship construction process is completed, the corresponding inspection results should be issued in time according to the relevant regulations and requirements, and the corresponding unit rewards and punishments should be implemented for the shipyard at the same time. If there are too many unqualified items in the process of ship construction, it is necessary for the shipyard to stop the shipbuilding work immediately and make scientific and reasonable rectification measures for the unqualified items to carry out all-round rectification. If a very small number of substandard items appear in the course of the ship's construction, and these substandard items do not significantly affect the overall results of the ship's construction, Then shipyards can be required to continue to produce and build ships while developing the overall measures. In addition, The surveyor should further

expand the inspection scope and inspection items on the ship construction site so as to better ensure the overall quality of the ship construction.

5.4. Follow-up Inspection after Completion of Ship Construction

Upon completion of the construction of the ship, the ship quality inspection body shall conduct a comprehensive quality assessment of the completed ship. It is necessary to analyze the quality problems and defects in the process of ship construction in a timely manner, and formulate measures to deal with these quality problems and defects, and do the relevant work in a timely manner. The quality problems and defects found by the ship quality inspection organization in the construction process of the shipyard should be timely requested by the shipyard to correct the quality problems and defects in time, and then to carry out the second inspection after the completion of the rectification of the shipyard, only in this way can the overall quality of the ship construction be better guaranteed.

6. Issues to Focus on in the Inspection

The shipyard should focus on the inspection of the hull before carrying out the ship construction, and ensure that the ship to be built by the shipyard is matched with the selected ship platform. For example, The length and width of the selected platform can meet the requirements of the length and width of the ship construction, and the pressure strength of the platform should be greater than the weight of the ship to be built. Furthermore, the sinking of the ship's platform should be checked and recorded in time during the course of the ship's construction to avoid the impact of the ship's subsequent construction due to the sinking of the ship's platform. Besides, Since the ship's construction process, most of the hull is completed by the welding process, Therefore, it is necessary to strictly check whether the welding process meets the standard and specification requirements of the maritime bureau system, and submit the welding process plan to the ship inspection organization for examination and approval and approval. In addition, the surveyor shall conduct tests on the welding process used according to the actual paving conditions in the course of the ship's construction, and the test results are reviewed, only in this way can we better confirm that the selected welding process meets the needs of ship construction.

7. Conclusion

Because of some structural characteristics of the ship itself, it is necessary for the shipyard to strengthen the quality of each link when building the ship. In order to improve the quality of the ship during the construction of the shipyard and ensure that the ship is in accordance with the requirements of the relevant standards and specifications, the quality inspection of the ship construction process must be carried out in a timely manner. For the problems and defects found in the inspection, the relevant departments of the shipyard should make timely rectification to ensure the overall quality of the ship construction and the safety of the later use.

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References

- [1] Huang Yan Wan Qiang. Analysis of key points for construction inspection of ships. [J]. China Water Transport. 2017(12).

- [2] Li Chengdong. Discussion on Key Points and Measures of Ship Construction [J]. Heilongjiang Science. 2015(07).
- [3] Liu Honglin. Key Points for Construction Inspection of LNG Fuel-powered Ships [J]. Chemical management.
- [4] Song Han. Discussion on the control points of welding quality inspection in hull construction. Shandong Industrial Technology 2015(06).
- [5] Li Guangwu, Huang Jun, Wei xiaoqiang. Key Points for the Construction Inspection of Multi-functional Marine Vessels for Environmental Protection [J]. ship and marine engineering. 2016(03).
- [6] Song Han, Xing Jiandong. Discussion on Control Points of Welding Quality Inspection in Hull Construction [J]. Shandong industrial technology. 2018(10).