Research on Aging of the LNG Powered Ship Based on Computer Technology and Influence on Engine Performance

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Abstract. The ship's LNG power system is a key part to ensure the normal operation of the ship. Every key part of the ship will be commanded by the LNG power system. In the part that this article focuses on, the main components of the marine engine LNG power technology are the LNG power ignition system, electronic fuel injection system and idle speed control system. The working principle of marine engine LNG power technology first controls the commands issued by the control system through internal sensors, converts the commands into electrical signals through the command input device and transmits them to various electronic control units. Then the control unit processes the signals and finally the actuator Turn each command from the LNG power unit into a specific control operation for the ship. LNG power technology has a huge impact on the entire shipbuilding industry, improving the performance and kinetic energy of ship engines, reducing ship energy consumption, reducing exhaust gas emissions and reducing pollution. This article studies them.

Keywords: Computer Technology, Power, Ship

1. Introduction

The engine is the "heart" of the ship. Its working state directly determines the ship's operating level and its production and processing and daily maintenance technical requirements are extremely high. Especially the engine structure is complex and the fault is concealed. Once it occurs, it is very difficult to diagnose and maintain. In daily practical work, maintenance companies should pay attention to continuously drawing experience from practice and actively absorb the advanced technology of the shipbuilding industry to keep pace with the development of the industry. From all aspects of personnel, equipment and technology, we must ensure that we can promote the healthy development of China's shipbuilding industry.

2. Computer simulation technology analysis
Computer virtualization technology means that the computer does not run under real conditions, but completes the work through virtualization technology. Various information needed in life can be integrated and collected through computer virtualization technology. Computer virtualization technology can run multiple operating systems on the same platform at the same time. These applications can independently complete operations under virtualization technology without affecting each other[1]. This can significantly improve the efficiency of the computer. In actual production work, virtualization technology can solve the problem of the replacement of old and new hardware facilities and reintegrate it with the help of virtualization technology according to users' needs. Computer virtualization technology has many advantages and also has certain disadvantages. Therefore, when using computer virtualization technology, it is necessary to fully study and analyze this technology. The computer virtual simulation experiment platform is built on the basis of Web technology and virtual reality technology and its experiment system is relatively networked. The teaching laboratory completed the digitization and virtualization operations under the virtual experiment system. Many schools have begun to conduct more in-depth research on the computer virtual simulation experiment platform. With the implementation of the new curriculum reform program, colleges and universities pay more attention to computer virtual experiment teaching, strengthen research and development efforts and various computer virtual simulation experiment platforms have also been constructed.

3. The LNG-powered ship engine aging analysis

3.1. Failure caused by excessive oil quantity

Motor oil is one of the indispensable conditions for the normal operation of marine equipment, but it is not that the more the amount of addition, the better. With the increase in the amount of oil added, the amount of oil that will fly when the engine runs at high speed will also increase. If the oil scraping capacity of the piston ring is exceeded, the excess oil will gradually enter the combustion chamber. The simulation curve of the oil composition is shown in the figure 1.

![Simulation curve of the oil composition](image)

**Figure 1.** Simulation curve of the oil composition

3.2. Failure caused by poor state of crank connecting rod mechanism
Due to the poor state of the crank connecting rod mechanism, there are two main types of oil blow-out failures: First, the piston ring is seriously worn. As the most intensely moving part in the piston connecting rod group, the piston ring wear rate is very bad, especially the first piston ring wear rate is the fastest. When the cylinder is working, the air pressure in the cylinder is very large and the back of the piston ring is under great load. This helps the piston ring to achieve sealing and also promotes the aging and wear of the piston ring. When the piston ring is aged and worn to a certain degree, it cannot provide the proper sealing effect. The problem of increased opening gap, side clearance and backlash occurs\cite{2}. The engine oil enters the cylinder combustion chamber along the gap, Which leads to undesirable consequences such as increased oil consumption and reduced engine performance. At the same time, due to the decrease in the combustion efficiency of the mixed gas, a large amount of soot is generated, resulting in serious surface area carbon in the combustion chamber. Secondly, the piston wears seriously. As far as the piston itself is concerned, the wear of the piston ring groove and the piston pin seat hole ring groove is the most prominent. According to the order from top to bottom, the top ring groove wears the fastest and the bottom wear rate gradually slows down. When the ring groove wears to a certain extent, the clearance in the piston ring groove exceeds the standard, causing oil leakage and oil leakage.

3.3. Failure caused by cylinder wear

The wear of the cylinder is mainly caused by the friction between the piston and the cylinder wall during movement. Among them, the most severely worn part is located at the top dead center of the piston. When the gas mixture enters the cylinder, it is directly impacted here, so the wear rate is fast.

4. Analysis of the technology of preventing aging of power ships based on computer simulation technology

4.1. Strengthen the investigation of the propeller

In the ship's mechanical equipment, the propeller is an important mechanical inheritance element. If the propeller fails, it will definitely affect the normal operating speed of the ship. If the propeller breaks under bad weather conditions, it is generally difficult for the staff to find the problem in time. Therefore, in the process of inspecting the ship, the propeller should be checked in time. If a problem is found, there will be a problem of slow acceleration and outstanding anomalies. If the propeller breaks, it will cause the hull to lose stability and produce violent vibrations. At this time, the speed of the ship can only be reduced to slow down the vibration. The fluctuation trend of the propeller is shown in the figure 2.
4.2. Guarantee the quality of lubricants and replace them regularly

During the trial of the ship, there will be a sound of friction and this sound can only be completely stopped when the driving speed of the diesel engine is reduced. At the same time, it will be accompanied by the continuous increase of the temperature of the diesel engine lubricant, exhaust temperature and cooling water, causing the diesel engine Pull cylinder problem. There are many reasons for this problem[3]. To eliminate the problem of pulling cylinders of diesel engines, we must try to ensure the quality of lubricating oil, so as to further reduce the problems caused by the failure of the lubricating oil to meet the standards. For example, the oil pressure of the diesel engine should be checked and the lubricating oil should be replaced regularly to reduce the wear problems caused by the deterioration of the diesel. Aiming at this kind of failure, it can be solved by the following methods: First, under the technical requirements of marine machinery and equipment, we must select the correct lubricant and reduce the use of multi-grade lubricants. Secondly, it is necessary to replace the lubricant within a limited time to reduce friction problems caused by impurities in the lubricant. When a ship is driving a diesel engine, it is necessary to complete the lubrication work carefully to reduce the problem of sudden acceleration of the ship, keep the diesel engine running normally, check the temperature of the lubricant and reduce the problem of overheating of the diesel engine. Finally, the diesel engine should be inspected and repaired in time to ensure that the lubricant meets the gap requirements between each equipment[4].

4.3. To reduce the problem of low inflation pressure

During the trial of the ship, it is necessary to minimize the continuous failure of driving. In most cases, this kind of problem is caused by equipped with known inflation facilities and low pressure. If you want to better solve these problems, you can solve it in the following ways: to add two inflatable facilities in the ship to ensure sufficient pressure. According to the relevant requirements of ship construction, more than two inflatable facilities need to be equipped and the external power of the main engine should be used to control one of the facilities. When the main engine power is too small, one of the facilities will be converted into artificial air[5].

5. Conclusion
The LNG-powered marine engine is a very important content in the current industrial production process. At the same time, the safety and stability of the operation of the LNG-powered marine engine are more and more valued by society and people. However, various failures will occur in the operation of the LNG-powered ship engines, which seriously affects the schedule and efficiency of industrial production. The fault diagnosis technology of the LNG-powered ship engine has become an important content of relevant scholars and the use of reasonable diagnosis technology to ensure the normal operation of the LNG-powered ship engine will have more room for development.

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