

Development and Design of Microcomputer Control System to Ship Power Station

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Abstract: The ship power station is the core part of the ship's power system. It can maintain high power quality while ensuring continuous power supply of the ship under different environments. Based on the two perspectives of hardware and software system, this paper develops and designs the computer control system of ship power station, and explains the system performance and function, in order to provide theoretical basis for shipbuilding research.

1. Research background

1.1 Literature review

In order to promote the effective operation and management of ships, it is imperative for enterprises to improve the automation of communication. Based on the basic performance of the microprocessor (ARM), Shi Jiahui and Zhang Min research and design the embedded ship power station control device, which plays an important role in improving the degree of system integration and reliability, and is conducive to the synchronization of diesel generator automation standards. Combine the car and improve the performance of the machine equipment (Shi and Zhang, 2008).Chen Bing and Liu Jiakuan are based on the principle of economics and reliability, and conduct in-depth research on the design method of ship power station management system. By analyzing the relevant functions of the ship power station management system, and then from the two perspectives of software and hardware, a new design idea is drawn to provide reference for related fields (Chen and Liu, 2015). Feng Zhiyong focused on the parallel operation of the ship power station by expounding the basic working principle of the ship power station. Then use the graphical method to analyze the operation process of the control panel power station on the switchboard and provide theoretical support for ship operation (Feng, 2015).In view of the shortcomings in the current ship power station training system, Chen Rui et al. proposed a virtual reality technology to carry out the total framework of the ship power plant microcomputer control system, and explained the related functions. Finally, the corresponding training system was obtained, which is stable for the ship power station. Performance proposition plays an important role (Chen et al, 2015).

1.2 Purpose of research

The ship power plant microcomputer control system is an important part of the overall ship power system, providing basic power support for ship operation (Li, 2012). Compared with land-related systems, the ship power plant microcomputer control system has the characteristics of small installed capacity, and can change state with different environmental changes, which is conducive to improving the ship's adaptability to the harsh environment at sea (Zhang, 2013). Affected by natural conditions, the marine environment is relatively complex and variable. Some ships have relatively more power systems carried inside, and the internal automatic adjustment function of the equipment is relatively large. These pose great challenges to the ship's power control system. At present, relevant Chinese scholars have conducted in-depth research on ship automation power plants and achieved good research results. However, in the related research, the computer control system of the ship power station is not clearly defined, and the hardware and software equipment of the system are not studied from the design point of view, and there is no theoretical

support for the operation of the marine ship. Therefore, this paper deeply studies the computer control system of the ship power station, which can make up for the academic research vacancies to a certain extent.

2. Development and design principles of microcomputer control system for ship power station

The development and design of the microcomputer control system for ship power stations will design practical problems in many aspects. Among them, each part of the microcomputer control system of the ship power station does not exist independently, and only the comprehensive consideration of the working performance and structure of different components can ensure the effectiveness of the overall operation of the ship. For ships, the root cause of the microcomputer control system of the power station is to ensure the stability and reliability of the ship's power supply, and at the same time to meet the economics of the ship's enterprise operation. Therefore, in the development and design of the ship power plant microcomputer control system, the following principles need to be followed.

First, in the initial design of the microcomputer control system of the ship power station, it is necessary to comprehensively consider the overall requirements and basic guidelines of the power station and the "Code for Classification and Construction of Steel Sea-going Ships 96" issued by the CPC Classification Society. The link meets the corresponding standard requirements.

Second, the advanced distributed control method is adopted to design the computer control system of the ship power station, and the ship's automatic system must be satisfied. After the design, the ship is required to control the bridge and the console when driving unmanned. Moreover, the relevant information in the microcomputer control system of the ship power station can effectively use the information platform, perform function management and processing, ensure ship production scheduling, statistical decision-making and quality control, and realize the integrated operation of the ship and the system.

Third, in the actual design process, advanced industrial control machines should be selected as the core of the computer power plant control system to meet the system's functions for information acquisition and control.

Fourth, after the design of the microcomputer control system of the ship power station, multi-mode configuration control is required. On the basis of ensuring the real-time control of the ship, it is necessary to improve the utilization rate of the software related to the microcomputer control system of the ship power station, reduce some redundant programming, and improve the operating efficiency of the system.

Fifth, it satisfies the requirements of simple operation and convenient identification. When designing the microcomputer control system of the ship power station, it is necessary to meet the requirements of the operator's simple operation, thereby ensuring the convenience of the system operation. Moreover, the ship power station microcomputer control system as the ship power control system, the future exploration direction, mainly provides technical reserves for relevant personnel. Therefore, the design of the microcomputer control system of the ship power station needs to pay attention to the survivability of the operation in a complex environment in the future, and pay attention to certain practicability.

Sixth, in the system design, it is necessary to comprehensively consider the complex environment that may be encountered on the sea surface, and to find the complex factors that may be encountered. Therefore, in the design of the microcomputer control system system of the ship power station, it is necessary to consider the stability of the later use and the effectiveness of the operation in a complex environment.

Seventh, when designing the microcomputer control system of the ship power station, it is necessary to fully utilize the advantages of advanced equipment such as computers to improve the production tasks. And with the help of computer technology, it is necessary to find suitable and replaceable equipment in the microcomputer control system of the ship power station to ensure that the system operation has the function of switching functions at any time.

3. Hardware system development and design

At present, the development speed of the shipbuilding industry is gradually accelerating. Some ships with high maneuverability, function and efficiency in the market are gradually emerging, especially some large container ships are emerging. On this basis, based on the above development and design principles, designing the computer power plant microcomputer control system is of great significance for the future development of the manufacturing industry.

Inside the computer power plant microcomputer control system, the hardware system mainly consists of upper and lower machines, as shown in Figure 1. For the lower computer, the hardware system is mainly composed of hardware devices used by the computer for tour detection, and then performing data processing and monitoring. For ships, the requirements of relevant fields and personnel for the hardware and equipment of the microcomputer control system of the ship power station are higher than those of the land system and the conditions are relatively harsh, mainly reflected in the following aspects. First, due to the implementation of navigation work at sea, mainly affected by sea breeze and waves, some hardware equipment will suffer from back and forth bumps, and under the action of sea water, sometimes corrosion will occur, which will easily adversely affect the hull. Second, when the ship is sailing on the sea, the requirements for speed and heading are very strict. Once an error occurs, the hull will hit the rocks or cause major accidents, which will bring more serious economic losses, which is not conducive to the orderly development of the shipbuilding industry. . Therefore, in the design of the microcomputer control system of the ship power station, the requirements for the hardware equipment are much higher than those of the land. In the equipment selection, the hardware equipment with long life and high reliability is mainly selected. At the same time, for each node of the hardware device, it is necessary to base on the current device, and consider setting up two sets of devices on each node. When a set of devices has problems, the other device can be replaced in the shortest time to ensure the overall system. Orderly operation.

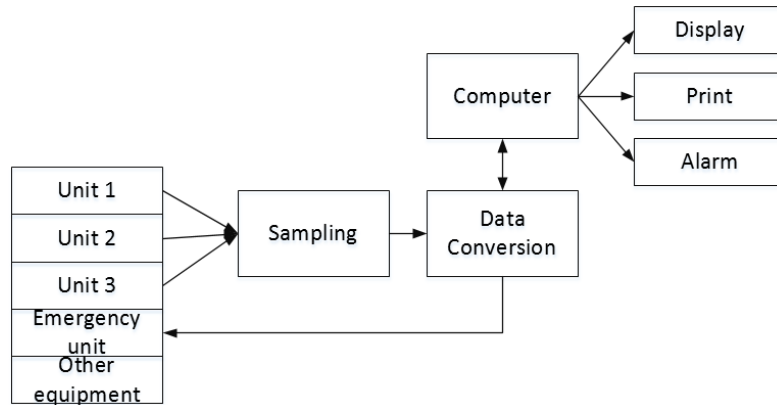


Figure 1. Hardware System

In addition, it should be noted that in the hardware devices in the microcomputer control system of the ship power station, useful on-site information must be picked up. For example, voltage, pressure, frequency, liquid level and temperature. The main task of data collection on site is to accurately and realistically reflect the monitored objects, including the practicality and authenticity of the measured data. At the same time, it is also necessary to effectively connect the measurement signal with the microcomputer system to meet the requirements of the overall system reliability.

4. Software system development and design

For the computer power plant control system, the software system is mainly to improve the overall ship's work efficiency and function, while ensuring the overall application and computer, can automatically start and run within the scope of monitoring, bring workers Great convenience, as shown in Figure 2. In the software selection of the microcomputer control system of the ship power station, the configuration software of the "GENI3E.O" version developed by ADvANTEch

company is mainly selected. The software mainly realizes asynchronous or synchronous transmission of related data on the basis of data acquisition of WINDOwS system, and then plays the role of controlling equipment. This software has full-featured, compact and comprehensive data collection functions. It contains various data acquisition cards and is widely used in the industry.

In the microcomputer control system of the ship power station, the software system is mainly applicable to the programming environment of VB and C, and can provide a relatively complex multimedia exchange platform, greatly increasing the interface of the human-machine docking interface, and facilitating the control of the system equipment by relevant personnel. In the actual use process, the user only needs to configure the frame, and can connect to the corresponding interface, dock with other programming, and gradually establish the data center inside the system. The data center can realize real-time collection and on-site monitoring of relevant data, which is convenient for the operator to execute corresponding program control content after data analysis, convert multiple tasks into industrial control, and improve the corresponding speed of the system.

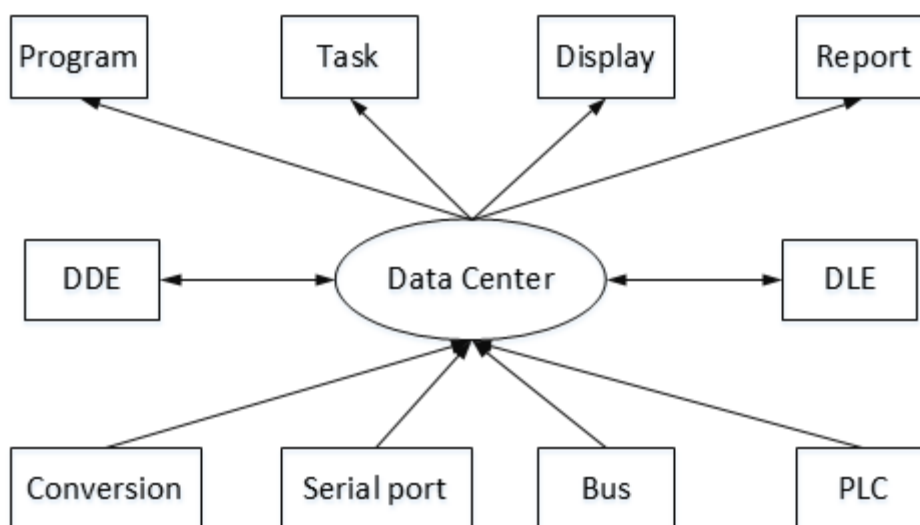


Figure 2. Software System

5. Conclusion

The stability of the computer control system of the ship power station is the key to ensuring the safe operation of the ship. In the traditional ship power plant microcomputer control system, in the process of use, because of the long time and power difference, the burden of the staff is greatly increased, and the actual running condition of the ship cannot be accurately reflected. Based on this problem, this paper develops and designs the computer power plant microcomputer control system from the hardware system and the software system, which can realize the intelligent monitoring of the ship power station and ensure the stability and reliability of the ship operation.

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