Research on Double Fork Hydraulic Lift Platform

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Abstract

With the rapid development of China's logistics industry, the demand of large container weight rapidly, the traditional container lifting equipment of large volume, high purchase cost, speed is also slow, largely hindered the speed of container transportation. In order to solve the above problems, which makes the platform move faster, larger lifting load and lower cost. Expounds the present situation and development trend of hydraulic lifting platform, and then analyzed each part and the hydraulic design of hydraulic pressure drive system. Finally, the control system is selected. Through practice, the project is feasible.

Keywords

Double fork type, hydraulic lift table, hydraulic system, pumping station.

1. Introduction

In the twentieth century, the world has seen spurt development in both the economy and science and technology, and multinational companies have become prevalent in the world. This has led to the rapid development of the logistics industry. As the primary equipment for the shipment of goods, containers are increasingly welcomed by people [1]. Most of the terminals, roads, airports and other places are shipped by container, and large-scale lifting equipment is used to ship these containers. These devices have a large footprint, high single-piece costs, and are very limited. If there is no special lifting equipment, the container can only be put in place after it arrives at the destination [2]. This will not only occupy the place but also delay the time for transporting the goods, and cannot effectively recycle the containers. This has seriously hampered the advantages of rapid and efficient container transportation. Greatly reduce the efficiency of transportation [3]. For the above problems, this paper designs the hydraulic part of the double-fork hydraulic lifting platform, reduces its area, has good equipment stability, high safety, low cost, and greatly improves the transportation efficiency. The main problem to be solved in designing the hydraulic part of the double-fork hydraulic lifting platform is to design the principle of its hydraulic system, understand the matters that should be paid attention to when designing the entire hydraulic system, grasp the functions of each hydraulic component, and finally analyze and integrate the final product [4]. Hydraulic schematics are presented. The design of this paper has greatly improved the working efficiency of the hydraulic lifting platform, and the workload has also been greatly improved. It has a certain significance for the development of the logistics industry in China [5].

2. Overall design of hydraulic part of hydraulic lifting platform

2.1 Overall composition of the hydraulic part of the hydraulic lifting platform

Hydraulic cylinder straight top lift platform structure diagram shown in Fig.1 the overall composition of the hydraulic part is divided into two parts: mechanical transmission unit, hydraulic drive unit[6].

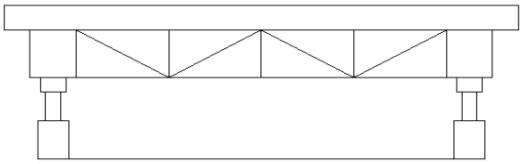

Fig. 1 Structure diagram of hydraulic cylinder vertical lift platform

2.2 General design and requirements of hydraulic part of hydraulic lifting plat- form

Analyze the advantages and disadvantages of the double-fork hydraulic lifting platform, summarize the previous experience, consider the economy and feasibility, and determine the overall design idea: (1) Minimize the weight of the equipment under the condition of ensuring the rigidity; (2) The foundation pit Being as shallow as possible, with a small footprint; (3) Closed-loop control is used to ensure that the entire system can accurately perform work and feedback work.

3. Hydraulic Drive Unit Analysis and Design

3.1 Hydraulic cylinder structure selection

After determining the main dimensions of the hydraulic cylinder, the structure of each part is then selected. Including: cylinder block and cylinder head connection structure, piston rod guide part structure, piston rod and piston connection structure, sealing device, buffer device, and hydraulic cylinder installation and connection structure [7]. Select according to working conditions. Working pressure, cylinder material and working conditions determine the connection between the end of the cylinder block and the cylinder head. Comprehensive consideration of the actual needs of the hydraulic lifting platform and inquiries related technical manuals, select the threaded connection structure.

3.2 Piston rod and piston connection structure selection

The connecting structure of the piston rod and the piston is of integral type and combination type. Combined structure is divided into threaded connection, semi-ring connection and taper pin connection. Based on the actual needs, the design of the connecting structure of the piston rod and the piston selects the threaded connection method.

3.3 Hydraulic drive system design

The design of the hydraulic drive system is the core of the hydraulic part of the double-fork hydraulic lifting platform. Under the premise of maintaining high efficiency, high safety, and simple structure, it also needs to meet the work requirements. To this end, to achieve the mutual cooperation of the machine, electricity, and liquid, so that the performance of double-fork hydraulic lifting platform to play its best. According to the working conditions of the hydraulic lifting platform, the following problems should be solved in the hydraulic drive system: (1) It must be stable during the operation of the equipment, and no impact due to speed changes; (2) High synchronization control accuracy; (3) It is necessary to control the phenomenon of weight loss caused by reverse load, especially on large-scale lifting equipment. If the loss of control is extremely dangerous, serious consequences will occur[8]. According to the above selection, the control system, flow distributor, and control speed valve are used in the hydraulic system of this paper to achieve the above requirements. Hydraulic drive system schematic design shown in Fig.2.

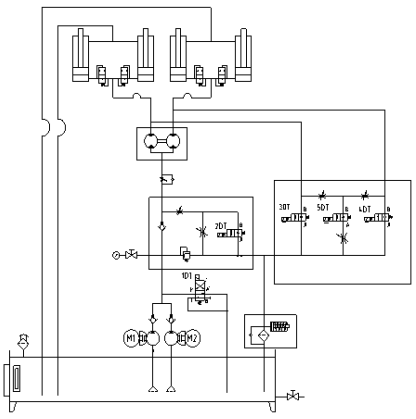

Fig. 2 Hydraulic schematic

4. Lubrication and sealing system options

4.1 The choice of lubrication system

All mechanical equipment has to be lubricated. They are all to reduce the friction on the working surface, indirectly reduce the loss of energy, improve the product life, let the machine maintain a higher working accuracy and improve the working efficiency of the machine; In addition, many lubricants Features such as flushing dirt, corrosion protection, etc. In machinery and equipment, commonly used lubricant materials can be divided into: mineral oil, grease (commonly known as butter), in addition to water and solid lubricants [9]. Lubrication methods of lubricants include: 1. manual oiling device 2. drip oil 3. dip lubrication 4. spray lubrication. Comprehensive consideration of this topic uses drip lubrication. Lubricate oil droplets with the oil cup to provide lubrication.

4.2 The choice of sealing system

The sealability directly influences the working efficiency of the entire hydraulic lifting platform, and the sealing performance of the entire hydraulic system must be ensured for this purpose[10]. Commonly used sealing methods: rubber oil seals, felt seals, oil groove seals, etc. The choice of sealing method at the sealing point is selected according to the circumferential speed of the sealing surface, working temperature, and environment. In summary, this topic selects the two methods of felt seal and rubber seal to ensure the system's tightness.

5. Conclusion

Through the overall design of the hydraulic part of the double-fork hydraulic lifting platform, and its hydraulic system schematic design and hydraulic cylinder design calculation, the following conclusions are drawn: (1) The application of hydraulic transmission technology in lifts has great potential for development. It is necessary to combine mechanical, hydraulic and automatic control technologies to overcome the difficulties encountered, give full play to their advantages, and increase work efficiency. (2) The double-fork hydraulic lifting platform has high precision and can fully meet the working requirements. It compensates for the shortcomings of traditional lifting equipment with low working accuracy and the inability to complete lifting tasks according to job requirements. (3) Double-fork hydraulic lifting platform adopts hydraulic transmission technology and can achieve stepless speed regulation. The entire working distance is smooth without significant vibration. (4) Double-fork type hydraulic lifting platform adopts hydraulic transmission technology, which has little pollution to the environment and responds to the green and pollution-free call.

Through this design, I understand that with the development of China's science and technology, traditional mechanical design methods can no longer meet the needs of our society's rapid development, so we continue to learn advanced design and manufacturing methods on the basis of inheriting excellent traditional techniques. improve work efficiency, keep up with the pace of social development.

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