

Research on a lubricating grease print process for cylindrical cylinder

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Abstract. In vehicle braking system and clutch system of transmission, there is always a kind of cylindrical component dose reciprocating motion. The main working method is the reciprocating motion between the rubber sealing parts and cylindrical parts, the main factor affects the service life of the product is the lubricating performance of the moving parts. So the lubricating performance between cylinders and rubber sealing rings is particularly important, same as the quality of the grease applies on the surface of the surface of cylinder. Traditional method of manually applying grease has some defects such as applying unevenly, applying tools like brush and cloth easily falls off and affect the cleanness of products, contact skin easily cause allergy, waste grease due to the uncontrollable of grease quantity using in applying, low efficiency of manual operation. An automatic, quantitative and high pressure applying equipment is introduced in this document to replace the traditional manually applying method, which can guarantee the applying quality of the grease which are painted on the surface of cylinder and bring economic benefits to the company.

1. Introduction

In vehicle braking system and clutch system of transmission, there is always a kind of cylindrical component dose reciprocating motion. For example, the spring braking chamber which are used for parking brake in commercial car air braking system, clutch booster for the separation of clutch in clutch system. The main working method is the reciprocating motion between the rubber sealing parts and cylindrical parts, the main factor affects the service life of the product is the lubricating performance of the moving parts. So the lubricating performance between cylinders and rubber sealing rings is particularly important, same as the quality of the grease applies on the surface of the surface of cylinder. Actually, manual painting technology is widely used in producing, the main problems of the technology are shown as following: applying unevenly, applying tools like brush and cloth easily falls off and affect the cleanness of products, contact skin easily cause allergy, waste grease due to the uncontrollable of grease quantity using in applying, low efficiency of manual operation. In order to improve the painting method thoroughly, we collect information from several people and consider the question from reality, an automatic, quantitative and high pressure applying equipment is adopted. It can guarantee the applying quality of the grease which are painted on the surface of cylinder and bring economic benefits to the company.

2. Description of automatic and quantitative equipment

Automatic and quantitative equipment is mainly consisted of oil supply system, nozzle device, quantitative device, pressure regulating valve and so on. Rotary spraying with high pressure air is used



to replace the traditional and manual method of painting. In this way, we can ensure the uniformity of applying and the applying ration of each products by accuracy ration valve. Oil supply system adopts fully enclosed container to ensure that lubricating grease won't be polluted, to deliver the lubricating grease by high pressure oil pump and to hold the output pressure of the pipe by pressure regulating valve.

Oil supply system: Shown as figure 1, oil drum in 5 gallons/ 20 liters is applicative. The system works when the staffs put the oil into the oil supply system. It saves the cost of oil, because the staffs needn't to fill the oil by themselves. The input pressure is 0.3-0.8 Mpa, output oil pressure is 12-32 Mpa, output flow is 500-900 CC/min. Alarm of low position. Oil supply system closes automatically when pump groups are out of oil. So the pump won't work if there are no oil supplies. Components out of oil and unstable quantity of oil won't occur. Pneumatic lifting method to replace the oil with double upright: It can keep the incremental speed in balance and provide grease normally even through the hardness of grease increased due to the variation of weather. Plunger type pump: Pressure ratio 1:50, the function of this pump is to provide sufficient pressure.

Nozzle device: Shown as figure 2, bore diameter 75mm-120mm is applicative. Spout oil bases on the bottom of cylinder. The below distance of nozzle is constant. Nozzle and inductive switch starts to drop when device opens, nozzle starts to spout oil when inductor senses upper part of the cylinder and closes when the nozzle reaches to the below distance.

Quantitative device: Shown as figure 3, a high accuracy quantitative valve, mounted in the input side of grease of nozzle device. The range of ration is 1-10cc with the function of automatic adjustment. The deviation of injecting oil is 2%, it can not only save the waste of grease but also ensure the minimum quantity of oil. Reducing the reject ratio of the products, improving the maximum working frequency to 200 times/hour.

Pressure regulating valve: Shown as figure 4, the functions of this valve is to keep the output oil pressure and flow constant. The output pressure and flow of plunger type pump changes a lot, input pressure ≤ 40 Mpa, output pressure is 8-12 Mpa

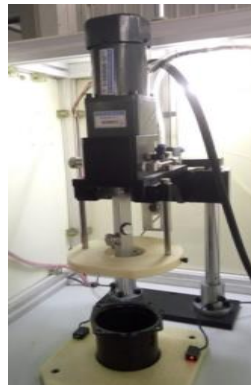
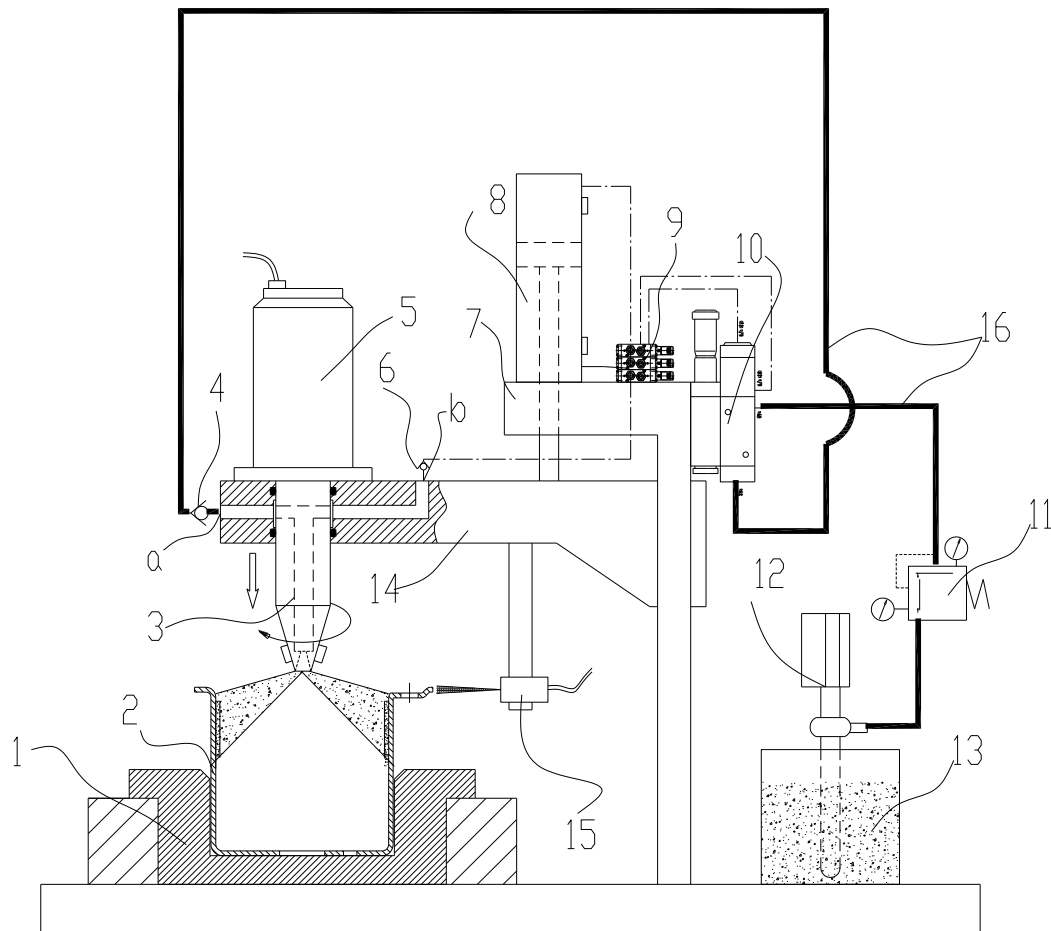


Figure 1 Nozzle device **Figure 2** Nozzle device **Figure 3** Nozzle device **Figure 4** Nozzle device



1.Seat, 2.workpiece, 3.nozzle, 4,6. check valve, 5.motor, 7. Structure, 8. Cylinder(with distance switch), 9.magnet valve group, 10. Quantitative valve, 11.pressure regulating valve, 12.oil pump, 13.oil drum, 14.oil distribution board, 15.inductive switch, 16.high pressure oil pipe

Figure 5 Working Principle Sketch

Preparation: oil pump 12 presses the lubricating grease from oil drum 13 to high pressure oil pipe 16, the high pressure grease pumped by oil pump 12 goes through pressure regulating valve 11, then output stable pressure grease to quantitative valve 10.

Automatic painting progress: Put workpiece 2 on the seat 1, quantitative valve 10 is controlled by magnet valve group 9, after going through quantitative valve 10 and check valve 4, a certain quantity of grease is injected into oil distribution board 14 from entrance a. Cylinder 8 is controlled by magnet valve group 9 and moves downward together with oil distribution board 14. Inductive switch 15 is in energized position when it reaches to the specified position of workpiece 2. Then a certain quantity of compressed air goes through magnet valve group 9 and check valve 6 to the entrance b of oil distribution board 14. Start up motor 5, the grease inside the oil distribution board 14 is sprayed from nozzle 3, eventually, the requested surface forms a coating of grease under the actions of cylinder 8 and motor 5.

Finish the progress of spraying: Magnet valve group 9 switches when cylinder 8 goes down to the position of limitative switch, then cylinder 8 drives oil distribution board 14 to move upward to the initial position, Exhaust the air in the universal check valve 6, motor 5 turns to de-energized position.

3. Conclusion

Through the innovation of the technology of applying lubricating grease on the inner surface of a cylindrical cylinder with the automatic and quantitative device can solve a series of problems caused

by traditional spraying methods. The inner surface of cylinder is evenly sprayed with a thin layer of lubricating grease, in the meanwhile, all of the spraying progress is carried out by automatic and quantitative devices with nozzle. The single duty of staffs are adding and taking out materials. A barrel of grease is injected into oil supply system directly, which can guarantee the cleanness of lubricating grease, improve the spraying quality of the inner surface of cylinder, enlarge the service life of products, reduce the working fatigue of staffs, improve the efficiency, save the cost, and improve the competitiveness of products.

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