Application of Electronic Diagnosis Technology in New Energy Vehicle Maintenance

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Abstract—With the continuous development of modern society and economy, the speed of new energy vehicles is also rapid, and the number is increasing rapidly. To determine the fault content in a short period of time during maintenance of this type of car, the application of electronic diagnostic technology is essential. This article summarizes the advantages of applying electronic diagnostic technology in the maintenance of new energy vehicles based on previous work experience. The author discusses the specific aspects of electronic diagnosis technology in the maintenance of new energy vehicles from four aspects: application in chassis output power detection, application in automobile circuit maintenance, application in automobile electric motor maintenance, and application in automobile power battery maintenance application content.

1. INTRODUCTION
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2. ELECTRONIC DIAGNOSIS TECHNOLOGY CONTENT

2.1. Overview of Electronic Diagnosis Technology
In the application process of electronic diagnosis technology, various forms of electronic instruments are mainly used to carry out corresponding circuit analysis, information data analysis and other...
operations, and to troubleshoot faults in automotive components, parts and equipment. In contrast, the biggest application feature of electronic diagnosis technology is to achieve a full range of fault diagnosis operations for automotive components without disassembling the automotive system. Compared with traditional automobiles, new energy automobile electronic systems are more complicated. If the traditional detection method is applied, it cannot show high detection efficiency, and its accuracy rate is also extremely low, and it may even cause damage to automobile components and power systems. At this stage, with the improvement of electronic diagnostic technology, many auto companies and maintenance units have introduced this technology and established a complete information maintenance management system based on electronic diagnostic technology. This can ensure that the system automatically generates various data related to the user. It can also be seen from this that electronic diagnostic technology is not only an important content in the future development of automobile repair and maintenance, but also a prerequisite for the development of the service upgrade of the automobile repair and maintenance industry [1].

2.2. Basic Application of Electronic Diagnosis Technology
At this stage, the main source of driving force in the production and use of new energy vehicles is electricity. It needs to install many electronic components and circuits in the car, and the actual voltage and current equipment is also more complicated. If traditional maintenance methods are used for maintenance, it is easy to damage delicate components during disassembly. Therefore, in comparison with traditional manual operation, it can be seen that new energy vehicles are more suitable for application of electronic diagnostic technology for maintenance, and their speed and accuracy are also beyond the reach of traditional operation methods. What we need to pay attention to is that electronic diagnostic technology cannot detect all internal components of new energy vehicles. Therefore, not all problems can be clarified when using electronic diagnostic technology to check new energy vehicle faults. In order to avoid this kind of situation, new energy manufacturers can transfer specific car accessories data and information to the electronic diagnosis system when producing cars, so that car data can be broadened. Furthermore, it is ensured that the electronic diagnosis technology has comprehensive inspection data, and the deficiencies in the inspection of new energy vehicles are improved as much as possible. In the subsequent development of electronic diagnosis technology, with the improvement of the technical research system, all internal fault maintenance of new energy vehicles can be achieved through this technology.

3. ADVANTAGES OF APPLYING ELECTRONIC DIAGNOSTIC TECHNOLOGY IN NEW ENERGY VEHICLES

3.1. Intelligent Fault Diagnosis and Maintenance
Among the new energy vehicles, the electronic system itself is more complicated, it involves many electric components, and its circuits are also more. The application of electronic diagnosis technology can realize real-time detection of the internal structure and components of the system with the help of a variety of instruments. At the same time, the computer terminal data is mainly displayed in the form of images, which can ensure that the maintenance personnel can have an intuitive understanding of the relevant information. At this stage, electronic diagnosis technology has been gradually upgraded in related fields and combined with intelligent diagnosis technology. Through the in-depth analysis of the detection data, the expansion of the fault characteristic parameters of the new energy vehicle can be realized. Finally, we can establish a corresponding database to effectively judge the type of failure. On this basis, we can also generate fault solutions through computer terminals to help maintenance personnel to implement fault handling in a better way. Obviously, the introduction of electronic diagnosis technology in the maintenance of new energy vehicles can ensure intelligent fault diagnosis. This has positive significance for the subsequent development of the auto repair industry [2].
3.2. Promote Comprehensive Maintenance Management

Except to troubleshooting and troubleshooting, the entire new energy vehicle maintenance process also involves the inspection of maintenance process records, as well as parts procurement and electronic program upgrades. Different types of workers need to be applied in different links. During management, once there is a situation of poor communication between personnel in different sectors, it will lead to chaos in the entire new energy vehicle maintenance process, and hidden problems cannot be solved. This reduces the maintenance efficiency and quality of the main body. If electronic diagnosis technology can be applied, computer systems and automobile maintenance management can be combined. Relying on the existing new energy vehicle fault information database and related data accumulated during previous maintenance can make the fault information database more complete. To this end, each maintenance organization should rely on scientific internal management to ensure that staff in different sectors can quickly obtain relevant information through the computer platform. In the meantime, this can ensure that they can quickly and accurately identify vehicle faults and adopt the most appropriate treatment measures. The use of electronic diagnosis technology in the maintenance of new energy vehicles can achieve all-round management of maintenance work and strengthen maintenance efficiency.

3.3. Improve Failure Risk Management Mechanism

At this stage, maintenance management operations related to new energy vehicles can reach a consensus in terms of location prevention, rapid processing, and loss reduction. The application of traditional maintenance techniques and methods often relies too much on the personal abilities and professional qualities of technicians. After the maintenance work is completed, the maintenance personnel will not give the owner some suggestions to avoid risks. Through the application of electronic diagnosis technology, people can use the computer module to realize the diagnosis of the automobile system, and clarify the specific failure risk. Meanwhile, people can also perform early warning operations on the risks caused by problems such as aging of components and improper maintenance through multiple inspections of user files and analysis of stored data. For this reason, maintenance personnel should take corresponding measures to avoid risks. Users can use the smart phone software client terminal under electronic diagnosis technology to view this type of information. This can ensure that it can avoid risks under professional guidance and maintain the stability of new energy vehicles [3].

4. ANALYSIS OF COMMON FAILURES OF NEW ENERGY VEHICLES

4.1. Pure Electric Vehicle Failure

The power source of a traditional car is gasoline combustion. When the new new energy vehicle is running, it will convert gasoline into electrical energy, and then charge the battery with electrical energy to make the energy utilization rate steadily improved. During the development of traditional cars, gearboxes and engine parts will undergo strict inspections and are close to ideal conditions. However, battery technology is not perfect when used in pure electric vehicles, and there is little practical experience. This has further increased the probability of failure, which has affected the stability of pure electric vehicles. For example, lithium batteries are often used in automobiles. Once the control method is improperly applied during use, it is prone to overcharging or discharging problems, which shortens the battery life.

4.2. Hybrid Electric Vehicle Failure

In contrast, hybrid electric vehicles can combine the generators and new energy motors in traditional vehicles to improve vehicle fuel economy. At this stage, the engine and the motor work together in the starting phase or the acceleration phase of the car, which can ensure that the fuel consumption of the car is greatly reduced. However, only the engine is running when the car is running smoothly. Relevant statistics show that if the weight and size of the car are the same, the average fuel consumption of a hybrid electric vehicle is lower than that of a traditional fuel vehicle. This is mainly because the motor
will play an auxiliary role, the engine speed will be in the ideal fuel range when the car is running, to ensure that the engine emissions are further reduced. However, because hybrid electric vehicles are mainly based on traditional fuel vehicles and combined with electric function systems, the complexity of the internal structure is increased. This often leads to ignition failures, oil circuit failures, etc., which is difficult to maintain [4].

4.3. Relay Fault Diagnosis Problem
New energy vehicles need to be supported by the relay fault diagnosis control system during operation, but it is difficult for some new energy vehicles to fully monitor the internal voltage of the relay device. After the driver closed K4, the total voltage could not be increased to more than 70% of the normal voltage after more than 2 seconds. At this time, many relay failure problems may occur in the operation of pre-charger technology, which makes it difficult to obtain completeness analysis of relay failures. In addition, in the driving of new energy vehicles, the motor device should maintain a higher voltage input. In consequence, in the maintenance of new energy vehicles, although the closing control of the motor device can be achieved, the staff cannot accurately judge the content of the fault. More importantly, the mechanical circuit breaker device cannot keep pace with the closing control demand, which is not conducive to the precise control of the voltage of the power supply device.

4.4. Problems with Motor Temperature Control
In terms of driving safety and stability maintenance of new energy vehicles, motor temperature control has positive significance. In the construction of the basic motor temperature control system for new energy vehicles, if the actual loss of motor system devices cannot be studied in depth, the motor system will fall into an abnormal working state, which will affect the driving quality of new energy vehicles. Otherwise, if the motor device cannot get good temperature control, its own work will be difficult to complete, and even stagnation will occur. As a result, new energy vehicles should ensure the temperature control ability of the motor device when driving. The device can perform alarm processing operations for the temperature rise, and improve the temperature control system through real-time supervision.

5. SPECIFIC APPLICATION CONTENT OF ELECTRONIC DIAGNOSTIC TECHNOLOGY IN NEW ENERGY VEHICLE MAINTENANCE

5.1. Application in Chassis Output Power Detection
The energy used by new energy vehicles is different from traditional vehicles, and there are big differences in their own power plant and mechanical motion structure. Besides, since there are no cylinders and pistons in the new energy vehicles, the performance judgment and diagnosis of the vehicle need to be realized through chassis output power detection. As a result, this requires vehicle maintenance personnel to use electronic diagnostic technology to detect the output power of the new energy vehicle chassis. During the maintenance of new energy vehicles, maintenance personnel also need to test and repair various performances. Only when the various functions of the car are clarified can we accurately judge the car's operation failure and give a more scientific maintenance plan. The output power of the new energy vehicle chassis is an important parameter content of the vehicle, and a lot of vehicle-related information is hidden among them. Therefore, maintenance personnel need to collect data with the help of electronic diagnostic technology, and provide a basis for follow-up work through a comprehensive analysis of the data. In actual new energy vehicle chassis output power detection, maintenance personnel can also use electronic diagnostic technology to understand the engine power transmission mechanism and fuel efficiency. Maintenance personnel can also use wavelet technology to realize the diagnosis of chassis data. This is also the essence of improving the maintenance efficiency of new energy vehicles [5].
5.2. Application in Car Circuit Maintenance

Traditional car and circuit-related maintenance is not complicated. However, the power source of new energy vehicles is mainly electricity, and the circuit complexity and the car's dependence on the circuit system are relatively high. Once the system fails, it is difficult for maintenance personnel to accurately judge the content of the failure. At this time, maintenance personnel need to check the new energy circuit system with the help of electronic diagnostic technology, and better perform repair and maintenance on it. From the perspective of the operation of new energy vehicles, electronic components will be affected due to improper operation during operation, and their losses are extremely serious. With the help of electronic diagnostic technology, maintenance personnel can accurately determine the location of damaged components through data collection and analysis without disassembling the internal devices of the car, avoiding circuit damage due to component removal. What's more, the staff can also use electronic diagnostic technology to understand the load situation of the internal power system of the new energy vehicle. For example, we can use the ABS warning light status to clarify the content of the fault code, and accumulate some work experience through targeted maintenance operations, and use this to improve the maintenance efficiency of new energy vehicles. The specific new energy vehicle circuit system is shown in Figure 1. Generally speaking, the traditional vehicle equipment battery is 12V. New energy battery packs have a capacity of more than 30kwh, and ordinary batteries have a capacity of only 0.5 to 0.7kwh, and they are prone to power loss during use.

![New energy vehicle circuit system diagram](image)

5.3. Application in Car Motor Maintenance

As mentioned above, the power system of energy vehicles at this stage mainly includes pure electric and oil-gas hybrid. No matter what kind of power system is used, the engine is the core component of a new energy vehicle, which is directly related to the normal operation of the power system. Hence, maintenance personnel need to use electronic diagnostic technology to reasonably monitor the voltage changes of new energy vehicles, understand the specific factors that cause voltage changes in the system, and then create favorable conditions for subsequent fault location judgments. Only in this way, new energy vehicles can always be installed and running. More importantly, maintenance personnel should also perform monitoring operations in a timely manner to find other faults based on the specific conditions and characteristics of the new energy vehicle circuit system with the help of electronic diagnosis. Once a circuit failure or poor signal is found, the actual electronic diagnostic system alarm will change. This can help maintenance personnel to carry out targeted motor detection operations, so that the circuit and the system are always in a stable operation state [6].

5.4. Application in the Maintenance of Automobile Power Battery

Among new energy vehicles, the battery is a component in the power system. The most common materials are lithium batteries, lead-acid and nickel-metal hydride, etc. The actual durability is directly related to the safe operation of new energy vehicles. As a result, new energy vehicle owners should do a
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good job in battery maintenance to maintain the stable operation of the vehicle's power system. Maintenance personnel can use electronic diagnostic technology to perform maintenance and overhaul of new energy batteries. For example, when an unexplained ceasefire occurs when a new energy vehicle is running, maintenance personnel can use electronic diagnostic technology to detect battery charging data. Simultaneously, maintenance personnel can use these data to understand the battery installation location and surrounding temperature, and then infer the battery operating status and service life. Moreover, it can also put forward corresponding opinions on maintenance and replacement to ensure that the power battery of the new energy vehicle is always in a stable state and avoid new safety issues.

6. PRECAUTIONS FOR ELECTRONIC DIAGNOSIS TECHNOLOGY IN THE APPLICATION PROCESS OF NEW ENERGY VEHICLE MAINTENANCE

In the current stage of new energy vehicle maintenance and testing, the application of electronic diagnostic technology is a new form, and the following aspects need to be paid attention to in the use process. Only in this way can the technological advantage be better utilized. First of all, each maintenance unit should perform the maintenance operation of electronic diagnosis technology. In addition, the application of electronic diagnostic technology has extremely high application to equipment. Maintenance personnel not only need to use electronic diagnostic instruments and oscilloscopes, but also to maintain these devices to avoid errors in diagnostic results. Secondly, maintenance personnel are the main body of this type of diagnostic technology application. Their actual equipment operation proficiency and skills will affect the efficiency and quality of subsequent electronic inspections. In consequence, companies need to train relevant maintenance personnel to ensure the full application of electronic diagnostic technology and the safe operation of new energy vehicles. For example, in the fault diagnosis under information fusion, the integrated information involved is more diverse and the amount of information is also larger. Workers need to use these data information to understand the cause of the failure in a timely manner, and then improve the accuracy of specific failure diagnosis of new energy vehicles.

7. CONCLUSION

In summary, with the continuous development of new energy vehicle technology and the improvement of people's awareness of environmental protection, the utilization rate of new energy vehicles is getting higher and higher. Under such circumstances, fault diagnosis and maintenance of new energy vehicles are very important. Staff should pay attention to the research work of electronic diagnosis technology. Staff can use electronic diagnostic equipment and trip computer to improve the efficiency of fault diagnosis. This is also the basic condition for improving the professional service quality of the automobile maintenance industry.

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