

# Analysis on key maintenance technologies of new energy vehicles

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**Abstract:** With the continuous development of the society and improvement of the national economic level in China, people's life has undergone enormous changes in many aspects, the demand for transportation has gradually increased, and various transportation modes have emerged. At present, environmental pollution is becoming increasingly serious as automobile exhaust has become one of the main factors of air pollution. Under such circumstances, new energy vehicles have emerged and become increasingly popular in society, actively responding to the scientific and sustainable development strategy called for by China's government. This paper mainly studies the maintenance technology of new energy vehicle engines, hoping to provide help for the development of China's new energy vehicle industry.

**Keywords:** New energy vehicles; engines; maintenance technology

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## 1. Introduction

The process of global industrialization has caused serious damage to the environment. In addition, secondary problems brought by the continuous improvement of scientific and technological level in recent years have led to more and more serious environmental pollution, endangering people's health. Automobile exhaust is one of the main factors of air pollution. The emergence of new energy vehicles has effectively solved this type of problem, reduced the emission of harmful gases and relieved the pressure on the urban environment. In the application process of new energy vehicles, the engine as the brain of the vehicle is extremely important. As various problems will occur in the use of mechanical equipment, the engine maintenance technology level of new energy vehicles is crucial to the development of the industry. Only by continuously improving the maintenance technology level can the long-term use of new energy vehicles be guaranteed.

## 2. Development status of new energy vehicles' engine

According to the current development of new energy vehicles around the world, many foreign countries entered the industrialized society early, with more research on new energy vehicles. Along with the development of research activities, there have been a perfect production system for new energy vehicle engines and a set of production processes. However, China is still in the primary research and development stage without a perfect system for new energy vehicles. Despite that, initial success has been achieved in recent year. Some automobile enterprises are gradually transforming and cooperating with foreign enterprises on purpose of improving the core technology level of new energy vehicle engines. With the continuous development of the society, the use of new energy vehicles will gradually increase, effectively reducing the emission of automobile exhaust and the environmental pressure in China. As an extremely important component of new energy vehicles, engines requires continuous research and development to ultimately meet the needs of social development and folks.

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### **3. Common faults of new energy vehicles**

New energy vehicles mainly include pure electric vehicles and hybrid electric vehicles. This paper mainly analyzes the common faults and maintenance technologies of pure electric vehicles and oil-electric hybrid electric vehicles, which is the representative of hybrid electric vehicles. Batteries are an important component of both kinds, especially for pure electric vehicles, as on-board batteries are the main power source with a high failure frequency. The high voltage of electric vehicles will accelerate the damage of high-voltage devices during long-term operation, meanwhile cause failures of management systems and circuits, resulting in failure of battery monitoring and protection functions. Other common battery failures include shorter battery life than expected, overload and insufficient power generation. The motor is an important component of new energy vehicles for energy conversion, whose faults are mainly mechanical and electrical. Mechanical faults are generally caused by component damage, while electrical faults are open circuit, short circuit and poor contact caused by winding faults of stator or rotor. In the process of high-speed running, the load on the transmission will be increased, and frequent gear shifting will aggravate the wear between gears and components, which will lead to transmission failure and vehicle malfunction. While the above analysis is only on the common faults of new energy vehicles, correct judgment should be made according to the actual situation in the maintenance and testing process.

### **4. Maintenance technology of new energy vehicle engine**

According to the current types of new energy vehicles in China, there are mainly two types of automobile engines, namely, electric automobile engines and hybrid automobile engines. Based on years of working experience, this paper discusses in detail the maintenance technology of these two engines from the following contents.

#### **4.1 Maintenance points of electric vehicle engine**

Two aspects need to be paid attention to before carrying out maintenance work on the engine of electric vehicles, namely, the maintenance and repair of batteries and the running status of automobile engines. Relevant personnel should first confirm the power battery in correct position and improve the safety of the location so as to prevent the battery from losing power caused by external factors. Once the battery is faulty, the vehicle will not have sufficient power support, which will eventually lead to the continuous reduction of its total mileage. In addition, when the battery suffers from power loss, lead sulfate crystals will appear in the sulfation of the battery and adhere to the periphery of the engine. In the long run, the engine will suffer from chemical erosion, which will greatly reduce the battery life. The available battery capacity of the electric vehicle should be checked to determine its service life. Secondly, during driving, real-time attention should be paid to the operation of the engine. Once the engine has abnormal conditions, it should be stopped immediately to avoid traffic accidents.

As the main power source of pure electric vehicles, the maintenance of batteries is one of the main technical points. Idle batteries should be stored according to the specified requirements of storage environment. It should be cleaned and maintained regularly to avoid sulfation, and charged regularly to avoid affecting the performance by loss of electricity. After long-term use of the battery, corresponding maintenance measures shall be taken if the endurance of the battery decreases. If the failure cannot be repaired, the battery with same model shall be replaced in time. Once the temperature of one or several points in the power battery is too high to reach the alarm threshold during operation or charging, the temperature sensor should be checked. If there is a deviation in the numerical comparison, the LUM temperature value needs to be calibrated, followed by checking whether there is looseness or foreign matter on the connection point, ensuring that the fan is on, adding heat insulation materials, stopping operation to dissipate heat, and stopping charging or replacing LUN. The occurrence of sparks, local overheating and shaking during operation may be caused by short circuit due to water inflow of the motor, or it may be caused by short circuit of commutator due to overload operation of the motor. When the motor fails, the following aspects should be checked. The fuse should be checked and replaced if burnt. The resistance of the input and output ends of the power switch with a multimeter should be checked, which

can be proved to be damaged if the resistance value is infinite. In addition, it is also practicable to check the accelerator, controller and the joint of the motor to find out the fault location.

## 4.2 Maintenance points of hybrid electric vehicle engine

Compared with electric vehicle engines, hybrid vehicle engines are more complicated, so as the maintenance, which requires maintenance personnel to continuously improve their own technology. Users of hybrid electric vehicles should regularly maintain the engine to prolong its service life. In the maintenance process, firstly, pay attention to the electric quantity of the engine; then check whether the engine can start normally; finally, check the running state of the engine to see whether it runs slowly or stops abnormally. Once poor line contact and looseness are found out, solve them in time to avoid traffic accidents caused by abnormal running state of the vehicle. The complicated structure of the hybrid electric vehicle brings difficulty to diagnose the cause of the fault. The engine is a part with high failure frequency. If there is shaking when starting the engine, it can be mostly determined that one or more cylinders in the engine stop working. At this point, it is necessary to check the ignition wire, high-voltage wire, spark plug, high-voltage common-rail fuel and fuel injector for blockage. If the vehicle stalls on bumpy road conditions and the power is insufficient, then it is an oil circuit fault. If the rotating speed of the starter is insufficient or the starter is unable to rotate, the battery connector should be checked for looseness or oxidation, and then corresponding maintenance should be carried out. If the starter is failed, then check the oil quantity, the performance of the ignition device and the wire connector.

## 5. Conclusion

With increasingly serious environmental problems, new energy vehicles emerge accordingly, effectively reducing vehicles' exhaust and easing the pressure on the urban environment. When carrying out maintenance on new energy vehicles, targeted measures should be taken for different types of vehicles. Comprehensive investigation of the engine's operation and the battery can avoid traffic accidents caused by abnormal conditions during the operation of the vehicle. Because the structure, power unit and drive system of new energy vehicles are different from those of traditional vehicles, the types of faults are quite different as well. In order to meet the maintenance requirements of new energy vehicles, it is necessary to have a thorough understanding of the operating principles of new energy vehicles. Then, through advanced maintenance technology and fault diagnosis instruments, the faults can be quickly located, improving the maintenance efficiency. Meanwhile, preventive measures should be taken to reduce the probability of faults.

## References

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1. Song Y. Analysis of engine maintenance technology of new energy vehicles. *Heilongjiang Science* 2017; (21): 74-75.
2. Han S. Discussion on fault diagnosis and maintenance technology of automobiles' electronic control engine system. *Internal Combustion Engine & Parts* 2017; (18): 83-84.
3. Zhang J. Research on maintenance and fault maintenance technology of automobile engine. *Hunan Agricultural Machinery* 2017; 44(3): 33-35.
4. Wen S. Analysis on new energy automobile engine maintenance technology. *Automobile Technology* 2017; (6): 51-53.