Research on New Energy Automobile Power Motor Testing System

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Abstract. As one of the important means to realize the energy revolution, the new energy vehicles have become the most popular transportation workers. As the core part of the electric vehicle, the performance and stability of the electric drive determine the quality of an electric vehicle.

Keywords: vehicle, new energy, power

1. Introduction
As the technological revolution has continued to promote economic growth, people's overall quality of life has improved, and the demand for transportation travel has become more vigorous. Vehicles used for various purposes are making an indelible contribution to the economic development and prosperity of society while creating serious road congestion. In addition, the huge increase in the number of vehicles and the ever-increasing number of residents' car ownership has greatly increased vehicle emissions, making the air pollution prevention and control already under great pressure worse, facing a more severe situation. At present, the cars driving in the streets of various countries are mainly gasoline cars, which emit a lot of harmful gases every year, causing serious pollution to the natural environment. In recent years, many industrial powers in the world are aware of the serious damage to the ecological environment caused by gasoline and automobiles, and strongly support their own car companies to carry out the revolution of the automobile industry, while promoting environmental protection travel mode, while speeding up the research and development and promotion of new energy vehicles. China has always paid special attention to the protection of the ecological environment in the process of economic development, not willing to lag behind in the cultivation and research and development of new energy vehicles, and has acquired a lot of leading technology in the field of new energy vehicles in the world. Under the present automobile development situation, if our country can develop the advanced new energy automobile motor test system firstly, it will be very helpful to enhance the comprehensive strength of our automobile enterprise and realize the bend overtaking to the old automobile enterprise.
2. Motor power test requirements: simulation load, impact load, starting performance, four quadrant operation, regenerative energy feedback efficiency.

At present, electric vehicles have entered people's lives, and their safety performance must be guaranteed. Therefore, the electric vehicle motor. It is very important to carry out strict type test before production [1]. The power system of new energy vehicles generally changes. Frequency motor drive system consists of power battery, frequency converter and motor. The simulation test of this system needs additional negative. Load the motor to simulate the actual running state of the car.

The whole power system is mainly divided into two parts for testing: the control part and the transmission part. The control part needs the whole power. In the system, the CAN bus network connected to each device is used for monitoring, message decoding and analysis, and can bus analyzer is generally used. To analyze the bus network message [2]. The transmission part needs to measure and analyze its power situation, generally using power analysis. It can measure the battery output. The results of the dynamic test system for comparative study are shown in table 1.

| Research modalities       | shortcomings                                      | merit                                                  |
|---------------------------|---------------------------------------------------|-------------------------------------------------------|
| field test                | The development cycle is long and the cost is very high. Adjustment, correction, poor adaptability. | True and reliable, and the system has good real-time performance. Good flexibility |
| Auto software simulation test | The accuracy and practicability of the simulation results are poor. | The development cycle is moderate and the cost is moderate. |
| Testing Platform          | All modules should be coordinated                 | The system has a wide range of applications. Good real-time and reliability to meet the actual needs |

3. Reliability test: temperature rise test, overload capacity, maximum speed, overspeed test, torque given dynamic response time testDurability test

Enter output and motor output synchronously, and understand that the power part of the car moves in actual operation. Operation and working efficiency of power equipment. The test items of electric vehicle motor include:

4. Motor parameters: motor torque characteristics and efficiency test, locked rotor torque and locked rotor current test

The above are GB-T 18488.1-2006 motor and controller for electric vehicle part I technical conditions and GB-T18488.2-2006 test method of electric motor and its controller for electric vehicle, Part II, national standard. In addition, at present, the better manufacturers will test the driver of the motor, and do the joint debugging of the motor and the driver. The measurement items include: input and output parameter measurement of the driver when the motor is running, conversion efficiency measurement, and the whole electricity when the motor is running. The efficiency test of the driving system. Figure 1 shows three-phase winding of a rotating magnetic field generated electricity condition.[3]
The input power of the three-phase asynchronous motor from the battery is

\[ P = mU_1cos\varphi \] (1)

Three-phase asynchronous motor generates rotor copper consumption, stator iron consumption and winding copper consumption during operation. Therefore, the input power minus the preceding power loss is the output power.

\[ P = T \times \omega = T \times \frac{2\pi n}{60} = \frac{T \times n}{9.55} \] (2)

The range of slip n is from 0 to 1.

\[ n = (1 - s)n_0 = (1 - s)60f_1/p \] (3)

In which \( f_1 \) is the current frequency in the stator winding and \( p \) is the polar logarithm of the rotating magnetic field.

In the test process, it is relatively simple to test the highest speed of electric vehicle motor, that is to provide the tested motor with. Run the rated voltage for 1 minute or 5 minutes, in the process, use the sensor to collect the speed value in real time, and finally look at the test process. What is the current maximum speed. The method of electric overspeed test is different. The overspeed test is to give the motor under test a higher than the rated value. Set the power supply frequency, let the tested motor run at 120% of the rated speed, idle for 1 minute, and finally observe the motor. Whether there is abnormal operation or shape deformation.

5. New energy vehicle power testing system

5.1 Driving form

At present, there are many enterprises that try to produce new energy vehicles, most of them are traditional automobile enterprises gradually transforming into new energy automobile enterprises, and some are new enterprises with innovative ideas, holding the ideal of developing a grand plan in the field of new energy automobiles. The production concept and technical level of each enterprise and the different types of automobile make the new energy vehicles mainly have three driving forms: front drive, front drive and rear drive. Car drive is a well-known concept, the front drive is the front wheel drive, and the opposite is the rear wheel drive. Both the front drive and the front drive are the driving
modes in which the motor and its controller are placed in front of the car, while the rear drive is the driving form in which the motor can be placed in front or behind the car.

5.2 Composition of the test system
The motor test system needs to test multiple items of the new energy vehicle power system. The load virtual test of the automobile and the torque size, rotation speed, input and output power and effective power of the motor are mainly completed by the electric dynamometer and its related modules. The power supply simulation is responsible for the test of the power supply capacity of the battery or battery pack that supplies power to the motor-related system in the new energy vehicle. The storage and discharge of the battery is greatly influenced by the ambient temperature, and the constant and suitable working temperature plays an important role in the idealization of the working capacity of the battery. The drive schematic is shown in figure 2.

![Drive schematic](image)

**Figure 2.** The drive schematic

6. Conclusion
In the new energy vehicle test items, to achieve the road condition cycle test of electric vehicle motor, the requirements of equipment are higher. Road.The condition cycle is a kind of complex motor test item, which needs the high performance of the whole electric vehicle motor test system.Can be realized. Taking the MPT motor test system as an example, it allows the user to set the cycle condition curve on the software, and then measure the power. The load on the bench will load the tested motor dynamically according to the curve to realize the road condition cycle test.

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