PORTABLE DIAGNOSTIC SYSTEM OF THE ELECTROMECHANICAL COMPLEX OF THE ELECTRIC CAR

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Introductions. Today, electric cars are being actively introduced in the world. Such a rapid increase in their share in the transport industry requires the development of the appropriate infrastructure. The relevance of the work consists in providing easy monitoring of the technical condition of the electromechanical part of the electric car and performing diagnostics of the machine system before starting operation or, for carrying out repairs, bypassing the use of root rights and developer mode, which allows even ordinary users to receive the necessary information [1, 2].

Aim. The purpose of the work is to describe the concept of building an electric car diagnostic system for implementation in the conditions of the transport infrastructure.

Materials and methods. Despite the fact that the segment of electric cars is innovative and actively developing as the world economy digitalizes, the use of such cars is limited due to their high cost, relatively low technical characteristics and a lack of infrastructure - battery charging stations [1].

Despite the progress achieved in recent years in improving the infrastructure of the industry, electric vehicles are produced and sold only in the USA, Japan and some countries of the European Union (EU). In addition, another important problem is emerging: the shortage of electricity during the active transition to electric vehicles, which will require an increase in energy production at power plants. The latter, in turn, can lead to local environmental problems. There is also the problem of disposal of batteries for electric vehicles. Finally, in the countries using electric vehicles, it is necessary to create new industries for the repair and operation of electric vehicles.

The long charging time is also a problem for the user. An average car user spends a few minutes charging, and an electric car takes about 4-6 hours to fully charge. Average battery life: Depending on the type and usage of the battery in almost all EVs, the battery needs to be replaced every 3 to 10 years.

These factors are a barrier to the popularization of electric cars, which will probably begin to dominate in two decades.

The intensive growth of the world market of electric cars is due to the need for their popularization, linking to environmental problems, and this requires cooperation between the state and manufacturers at the level of individual state programs, a number of which are already being implemented in developed countries. Without state support, subsidies and giving preferences to the private sector, it is impossible to achieve a significant advantage in favor of electric cars in consumption [1].

An electric motor is extremely simple compared to a car internal combustion engine. It does not have pistons, combustion chambers, crankshafts, ignition systems, fuel and oil supply, water cooling. The number of rubbing parts is reduced to a minimum, practically only the bearings on which the rotor rotates and a simple single-stage gearbox remain. Mechanical energy is not wasted on friction, which dramatically increases efficiency. An equally important component of savings is the possibility of recuperation, that is, the return of electricity to the battery when driving "downhill". The internal combustion engine cannot return fuel to the tank [1].

If we compare an electric motor with an internal combustion engine, then the second one gives the maximum torque in a narrow range of revolutions, and to enter the nominal mode, it has to be "unwinded". In contrast, the torque of the spinning engine is regulated within much wider limits and is achieved much faster. Therefore, the dynamics of an electric car is always better than that of a conventional car [2].

The following types of electric motors are used in EVs:

- Direct current.
- Alternating current. Synchronous and asynchronous.
- Universal, working from both direct and alternating current.

In addition, AC motors are divided by the number of phases from one to three.

The necessary parameters of the supply voltage are created and regulated by an electronic inverter, which converts the constant voltage of the batteries into an alternating one [2].

Classic designs were supplemented with the so-called motor-wheel. That is, each wheel has its own electric motor with a control system. The efficiency of such systems reaches 92% [2].

The electronic control system performs several functions in an electric car aimed at safety, energy saving and passenger comfort [3]:

- high voltage management;
- adjustment of traction;
- ensuring a rational mode of movement;
- control of smooth acceleration;
- assessment of battery charge;
- management of regenerative braking;
- control of energy use.

Structurally, the system combines a number of input sensors, a control unit and executive devices of various electric vehicle systems. Input sensors evaluate the position of the gas pedal, brake pedal, gear selector, pressure in the brake system, battery charge level. From sensor signals, the control unit ensures the optimal movement of the electric vehicle for specific conditions. The main parameters of the operation of the electric vehicle (energy consumption, energy recovery, remaining battery charge) are visually displayed on the instrument panel [3].

Therefore, the described elements and systems require constant diagnostics to ensure the reliability of operation of transport and temporary repairs.

Results and discussion. There are discussions about the concepts of building a diagnostic system for electric cars. However, a common feature among all the proposed options remains the non-contact diagnostic system.

Conclusions. Thus, it is possible to conclude about the necessity and relevance of the development and implementation of the proposed approaches to the construction of diagnostic systems of electric cars into the practice of modern

automobile infrastructure.

LITERATURE

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