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HOW TO LEARN AND CONTROL EFFECTIVE HYBRID CARS

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КАК УЧИТЬСЯ И УПРАВЛЯТЬ ЭФФЕКТИВНЫМИ ГИБРИДНЫМИ АВТОМОБИЛЯМИ

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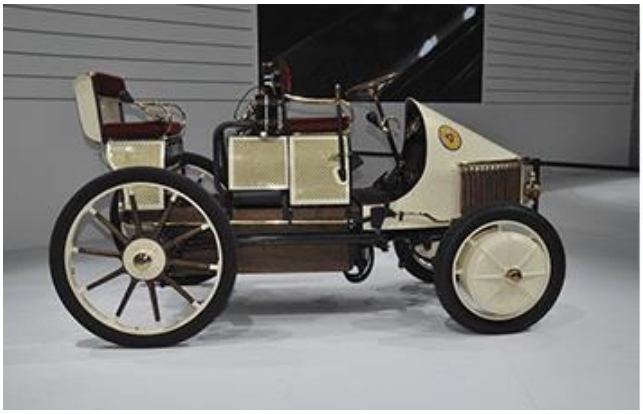
Abstract. The article deals with the history of hybrid cars, their types, running principle, parts, characters, advantages and negative features. Hybrid cars combine the efficient features of an electric motor and an internal combustion engine, and the use of hybrid cars in Azerbaijan, as in other countries, is satisfactory.

Аннотация. Статья посвящена истории гибридных автомобилей, их типам, принципу работы, деталям, характеристикам, достоинствам и недостаткам. Гибридные автомобили сочетают в себе эффективные характеристики электродвигателя и двигателя внутреннего сгорания. Использование гибридных автомобилей в Азербайджане, как и в других странах, является удовлетворительным.

Keywords: hybrid, car, running principle, internal combustion engine.

Ключевые слова: гибрид, автомобиль, принцип работы, двигатель внутреннего сгорания.

As obvious, the toxic substances emitted into the atmosphere by cars damage the environment, induce a serious threat to human health and cause many diseases. To our experts, there are about 1.3 million cars in Azerbaijan, most of which are old and unusable. Thus, today all the world's leading car companies prefer to produce electric and hybrid cars that do not harm the atmosphere. Though the first hybrid car with two energy sources pertaining to the early twentieth century was presented to the public in 1901, the model turned out to be very practical, but costly to produce.



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As the global oil crisis started in 1973, American manufacturer and designer Henry Ford created a car which cost cheaper, was less practical and ecologically more suitable. The basic principle in which the first fully hybrid system used today, a smaller internal combustion engine was applied, along with the electric motor, without losing the power of the car. This car is powered by an electric motor that reaches a speed of 17 km/h, the internal combustion engine is started, and the speed of the car increases by 21 km/h. If you need to go faster, the electric motor is turned off, hereinafter the car accelerates in the gasoline engine. In city mode, when the car gets stuck in a traffic jam, the use of an internal combustion engine activates the electric motor since it causes the engine to overheat and pollute the air. Hybrid cars are widely used in Azerbaijan, as in many countries, due to savings in both fuel and engine oil. Some drivers are still unaware of the advantages and working mechanism of hybrid cars. In the past, drivers were reluctant to buy such cars due to the fact that the official service of hybrids was not completely ready, and there were problems with spare parts and repairs. At present, a full service of hybrid cars is organized. It guarantees quality, easy finding and repair of spare parts, and the most widely spread models are 1500–2500 cubic centimeter engines. Hybrid cars are sometimes known as "hybrid electric cars" because they combine two energy sources that provide smart power management systems. In car technology, hybrid transmission is the integration of two types of power units which work with different energy sources and aim to save fuel. "Hybrid" means "mixed" borrowed from the Latin word.

Modern cars that use more than one power source to drive the wheels increase the fuel efficiency of the internal combustion engine. The technological hybrid transmission is also powered by electric motors and an internal combustion engine with a generator that generates electricity. There are the following types of hybrid cars.

Soft hybrid power plants are often equipped with starting an internal combustion engine, as well as a recovery system.

Medium hybrid cars do not move due to the electric motor, the electric motor serves as an auxiliary to the main power unit when the load increases.

Such systems are equipped with a renewable system and recharge the battery. Medium hybrid aggregates provide a more efficient heat engine.

Full hybrid cars have a high-power generator driven by an internal combustion engine that activates the system at low speeds. The main feature of these cars is to cover a distance of 50 km without switching off the internal combustion engine and recharging the battery with an electric motor.

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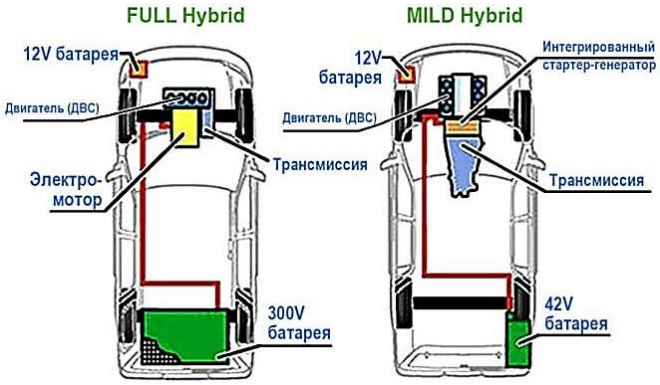

The main power transmission of a hybrid car is a vehicle with an internal combustion engine, but with one or more electric motors and an additional battery. That is, if a car has more than 1 power source, it is called a Hybrid car. The most preferred feature of hybrid systems is its standard connection. In this system, the output of the electric motor is not directly connected to the wheels, but to the transmission or the middle shaft. This system, which supports the gasoline engine, uses low-power batteries of 20–30 horsepower. The fact that the batteries are under the car lowers its center of gravity as much as possible. In other words, the front wheels are powered by electricity, and the rear wheels are powered by a gasoline engine. When the rear derailleur mode is selected, the batteries automatically switch to charging mode. Some models have 4 high-speed engines, 3 of which are electric and 1 is gasoline. Two of the electric motors are located at the front, and the other is connected to the rear of the petrol engine by connecting a standard type. The difference between such hybrid cars and simple hybrids is that they charge the batteries from the mains power as soon as the phone is charged at home. Simple hybrid cars have two engines, gasoline and electric motors work together to provide the required power. In hybrid cars, the electronic control unit completely controls the connection between both the petrol and the electric motor. As they have a standard automatic transmission, it makes driving easier and quieter and less tremulous than other cars.

The principle of operation of hybrid cars. When such cars start moving the most, when changing gears in the transmission, when stopping and moving at a traffic light in the city, as fuel is used a lot, the electric motor starts. As the car is powered by a battery, there is no need for a large engine, that is, the number of cylinders is few, the weight of the engine is reduced, and less fuel is used. However, during constant speed, the electric and gasoline engines work in balance with each other to save fuel. The annual cost of hybrid cars is at the same level as normal diesel or gasoline engines of similar power, and even many spare parts are more durable. Although hybrid batteries

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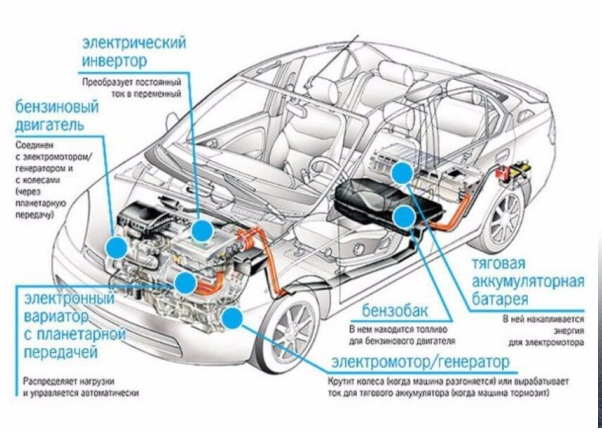
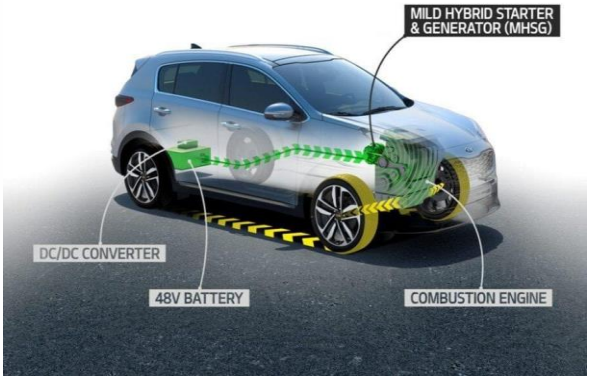
are guaranteed for 5 years or 100,000 km, they can be extended for up to a decade, depending on proper and timely maintenance.

Spare parts of hybrid cars. The main components of a hybrid car are distinguished with a compact and particularly attractive design. In such cars, the internal combustion engine running on gasoline is the same as in other cars. Hybrid cars store energy as the wheels move and brake. Some hybrid cars can store energy at home or in special battery charging centers, and can cover a distance of 25–30 km with a fully charged battery. As the electric motor helps the gasoline engine, the gasoline engine does not lose power and consumes less fuel. They work with an electric motor, not with a starter principle. Some cars don't just run on batteries. A gasoline or diesel engine whose main parts are a power unit, one or more electric motors, an additional battery, electronic control system, a device that distributes three-phase electricity from the battery to various nodes, generators and heat recovery systems.





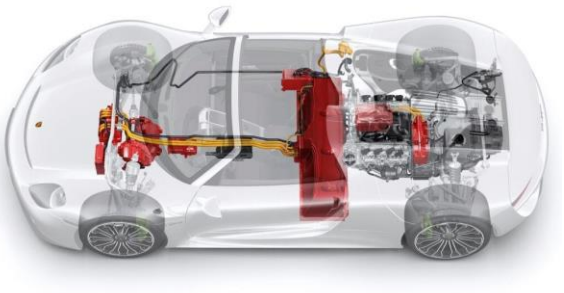
Types of hybrid cars. In the sequential mode, the internal combustion engine is used as an electric generator for the operation of electric motors. In fact, a gasoline or diesel engine has no direct connection to the car's gear lever. This system allows the installation of lighter and more low-power engines in the engine compartment. Depending on the size of the battery, these cars can cover a certain distance in electric traction without the use of an internal combustion engine.

In a parallel circuit, the task of the electric motor is to reduce the load on the internal combustion engine, ensure rapid movement of the vehicle and cause significant fuel savings. If the internal combustion engine is disconnected from the gear shift, the car can cover a certain distance from the electric traction, but the main power unit is a gasoline or diesel engine. When the car slows down or the internal combustion engine stops working, the electric motor functions as a generator to charge the battery.

The first two types of power plants in a double-parallel circuit combine the functions of operation. In a traffic jam, an electric motor is started to start or move the car slowly. The petrol or diesel engine starts at high speed. When overtaking or the car is moving upwards, the power plant operates in parallel mode- the electric motor reduces the load and saves fuel by helping the internal combustion engine.

Advantages of hybrid cars. In comparison, a car with a 24003-engine running on a traditional engine consumes 10 liters of gasoline per 100 km, a car with a 25003-engine running on a hybrid consumes 4.5 liters of gasoline per 100 km. The 13,003 petrol-powered car uses 7.1 liters of gasoline per 100 km, while the hybrid car uses 5 liters of gasoline per 100 km. Thus, it is found that when hybrid cars move at speeds below 50 kilometers per hour, the electric motor starts, and when

moving at high speeds, the gasoline engine starts, and when the engine starts, the car accumulates energy. Hybrid cars provide full energy reserves by reducing fuel consumption by 20–25%, preventing the release of toxic gases into the atmosphere, powering the battery with or without the network, thanks to a smaller engine capacity, durable engine and electric motor performance, low noise control of the internal combustion engine is ensured.



Disadvantages of hybrid cars. The battery in hybrid cars cannot be used faster due to the large number of charging and discharging cycles, hybrid cars and parts are expensive compared to gasoline or diesel models, need a professional to repair, batteries do not withstand significant heat and discharge themselves, problems arise with disposal.

Thus, despite its many disadvantages, hybrid cars are more profitable than cars with a traditional internal combustion engine. Regardless of the weather condition, it is possible to power the car, and it does not pose any danger. In a word, hybrid cars combine the efficient features of an electric motor and an internal combustion engine. The use of hybrid cars in Azerbaijan, as in other countries, is satisfactory.

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