European Journal of Pedagogical Initiatives and Educational Practices
ISSN (E): 2938-3625
Volume 3, Issue 1, January- 2025

CAR AS A TECHNICAL SYSTEM

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Abstract
The article examines the general structure of the car, its main systems, units and assemblies. It provides a brief description and purpose of these systems. The main components of the systems are described.

Keywords: Car device, basic systems, a brief description.

Introduction

A car is a complex technical system consisting of many subsystems. A technical system is understood as a set of interconnected structural elements designed to solve a common technical problem. The main systems that determine the structure of a car are the engine, transmission, steering, brake system, load-bearing system (body or frame), suspension and wheels.

An automobile engine is an engine that converts energy of some kind into mechanical work to propel a vehicle.

The most common type of automobile engine is the piston internal combustion engine (ICE). This engine can be carburetor or injection.

It can be powered by various automobile fuels: gasoline, diesel fuel, liquefied petroleum gas or compressed natural gas.

In addition to the ICE, cars can be equipped with a Stirling engine or a Wankel rotary piston engine; also engines that use the energy of a pre-spinned flywheel, the energy of gas under high pressure (see air car), steam engines (see steam car), electric motors (see electric car).

Hybrid cars have a combined power plant.

Transmission (power transmission) - (from the Latin transmissio - transfer, transmission) in mechanical engineering, all mechanisms connecting the engine with what should move (for example, with the wheels in a car), as well as everything that ensures the operation of these mechanisms.

The vehicle transmission generally includes:

- Clutch or torque converter;
- Gearbox;
- Final drive,
- including mechanical reduction gear and differential;
- Constant velocity joint (for front-wheel drive vehicles) and wheel drive shafts (half-shafts).

Also, optionally, the vehicle transmission may include:

- Cardan drive;
- Transfer case.

Steering is a set of mechanisms of a car or other wheeled vehicle (tractor, combine, construction equipment, combat vehicles), as well as aircraft chassis, ensuring movement in the direction specified by the driver. Consists of a steering wheel, steering column, steering mechanism and steering drive.

The braking system is designed to reduce the speed of movement and/or stop a vehicle or mechanism. It also allows you to keep the vehicle from moving spontaneously when it is at rest.

According to their purpose and functions, brake systems are divided into:

- Service brake system
- Spare brake system
- Parking brake system
- Auxiliary brake system

The body is a part of a car or other vehicle designed to accommodate passengers and cargo. The body is attached to the car frame. Frameless load-bearing bodies are common, which simultaneously perform the function of the frame - all other units and assemblies of the car are attached to them.

Car suspension (also: Car suspension system) is a set of devices that provide an elastic connection between the supporting system and the wheels (or axles) of the car, reducing dynamic loads on the supporting system and wheels and damping their vibrations, as well as regulating the position of the car body during movement. The properties of the suspension of a particular car depend on various parameters (unsprung mass of the car, suspension kinematics, wheelbase, track, body rigidity) and the interaction of individual parts (on the type and rigidity of elastic elements, shock absorbers, stabilizers, hinges, levers, and especially on tires).

Guide devices:

Suspension elements that determine the nature of the wheel movements relative to the vehicle's supporting system (body or frame). First of all, these are understood to mean lever mechanisms of various designs and kinematic schemes. Also, the role of guide devices can be performed by elastic suspension elements such as springs.

Elastic suspension elements:

Suspension elements that reduce dynamic loads acting on the vehicle. These are springs, coil springs, torsion bars, rubber, pneumatic and hydropneumatic elastic elements. Also anti-roll bars and suspension travel limiters.

Damping devices:

Suspension elements that dampen the vibrations of the car body when moving. These are shock absorbers of any operating principle.

The concept of "car" combines two words:

Autos in Greek means independence.

Mobile (in French - movement).

A combination that best reflects the essence of the concept. At the same time, "independence" and the ability to "move" require special control over safety and reliability.

For this, a deep understanding of all the interrelations in the operation of automotive mechanisms and systems is important. The task of manufacturers and specialists in the field of repair is to ensure that the units are in good working order and work smoothly. This is a huge

responsibility, which requires not only the willingness to make decisions, but also a quick orientation in physical laws and the features of technology.

Any auto mechanic, electrician, mechatronics engineer encounters three concepts: "part", "node" and "unit"

A car part is its integral (manufactured without assembly) structural part made of a homogeneous material;

Units are a combination of several parts. In fact, this is already an assembly unit. At the same time, if a set of several parts is aimed at converting speed, type of movement, we are dealing with a mechanism. Typical units are a pneumatic cylinder, an overrunning clutch, and a clear example of a mechanism is a planetary mechanism. Sometimes you can also come across the concept of "component". This term is relevant for automotive electrics. A typical component is, for example, a spark plug.

A unit is a combination of several mechanisms to solve a single problem.

Car systems. The interaction of units and mechanisms creates a system. What types of systems are there and what are their purposes?

Systems:

Ignition. To generate a spark and ignite the fuel at the right time, to start the engine.

Injection (injector systems). To ensure fuel injection.

Intake of exhaust gases and control of harmful emissions. To remove exhaust gases from the engine cylinders, cool them, and reduce noise and toxicity of gaseous substances.

Cooling. To eliminate the risk of overheating of engine parts, as well as cooling the air in the turbocharging system, oil in the lubrication system, working fluid in the automatic transmission

Power. To supply fuel and power the engine, prepare the combustible mixture, store the fuel and its subsequent purification.

Control. To adjust the speed and direction of vehicle movement.

Air conditioning. To create and maintain a favorable microclimate in the passenger compartment, cabin.

Active vehicle safety. To prevent an emergency. Their most common functions are anti-lock brakes, stability control, brake force distribution, emergency braking, pedestrian detection, lane change assistance, hill start assistance, driver fatigue monitoring, and road sign recognition.

Charging. To power the engine's electrical equipment.

Cooling and lubrication. To protect the engine. Basic functions include regulating the operating temperature and reducing friction between the engine and mating parts. The lubrication system also helps protect parts from corrosion.

Braking. To reduce speed and create braking torque - stopping the car, holding the car in place for a long time.

Computer systems - "managers" and "monitoring" specialists who directly interact with electrical/electronic circuits.;

Fuel system. To provide the fuel-air mixture with fuel. It is the fuel system that is needed to power the engine.

Drive system. To transmit power from the engine directly to the wheels.

The creation and improvement of automotive systems is the main concern of manufacturers.

Service station specialists, on the contrary, often have to solve the opposite problem: disassemble the unit into units, the unit into parts. However, the reverse assembly of parts, units is also a typical procedure for vehicle maintenance.

Every future diagnostician should confidently know the names and locations of vehicle components. Moreover, he should correlate them with the main "autonomations":

Body - the base of the vehicle and its external frame. It can be a supporting system or a separate element.

Frame - the enclosure of the vehicle. Sometimes you can come across the name frame. You will learn more about the body and frame in the article "Frame, body and chassis", which will be published very soon.

Engine - (literally from German - driving). The mechanism that converts the energy of heat, fuel flashes into mechanical work, provides the vehicle with effective power.

Suspension. Serves to ensure contact of the tire with the road surface.

Steering. Serves to control the car.

Auxiliary equipment and safety systems - increase comfort, ensure safety and convenience of driving the car and its systems.

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