

Great hopes are placed on successes in improving the combustion process of the working mixture – the process with homogeneous compression ignition, which allows for more complete combustion at lower average temperatures.

Reference

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IMPROVING THE CHARACTERISTICS OF PISTON INTERNAL COMBUSTION ENGINES BY USING EXHAUST GAS ENERGY

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The main methods of utilizing the thermal energy of exhaust gases [1]: use of gas turbine supercharging of internal combustion engines and turbo compound systems; utilization of heat from internal combustion engine exhaust gases through preliminary thermochemical conversion of fuel; transfer of heat to the cooling system and to the air conditioning system to accelerate the heating of the internal combustion engine and the vehicle interior; use of thermoelectric converters in the components of the exhaust gas exhaust system; use of an additional heat engine to drive various units, including the air conditioner compressor, cooling fan, etc.

The widespread use of gas turbine supercharging in piston internal combustion engines is well known. Modern types of gas turbine supercharging systems allow to increase the specific energy parameters of internal combustion engines and increase the effective efficiency.

Some types of turbocharging systems allow to increase the torque in the low-speed range – from n_{is} (idle speed) to n_{Mmax} (left limit of maximum torque) on the external speed characteristic, which provides the well-known convenience of engine control, reduces the number of gearbox shifts. The following types of gas turbine supercharging systems fully possess this property:

- turbocharger with adjustable turbine nozzle;
- turbocharger with hybrid drive (with electric machine);
- register turbocharging system;
- two-stage turbocharging system;
- two-stage adjustable supercharging system;
- supercharging system with turbocharger and centrifugal electric compressor.

The systems with two-stage supercharging and hybrid drive (with electric machine) have the greatest potential [2]. The latter solution looks the most interesting in terms of prospects for large-scale application in the near future.

Reference

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THE INFLUENCE OF SILENT BLOCK CHARACTERISTICS ON THE FUNCTIONAL PROPERTIES OF AUTOMOTIVE SUSPENSIONS

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Bushings are among the most vulnerable parts of a vehicle. Designed to effectively absorb loads and reduce vibrations that occur during acceleration, braking, and cornering, they must withstand critical stresses.

They connect the suspension components to the vehicle body (frame). Bushings are the load-bearing elements that determine the suspension's performance, and they change their properties during operation under loads and external factors.

Silent blocks in a vehicle's suspension are special rubber-metal components. A bushing is an elastomeric cylinder installed between the outer and inner bushings. Bushings connected to suspension components transmit forces from the vehicle's wheel to the body or frame.

Bushings can be divided into two groups: torsional and compression. Elements that operate under compression and bending include cushions (bearings). And the elements that work on torsion are silent blocks, which are used in the suspension guide arms [1, 2].

A vehicle's suspension provides a flexible connection between the body and the wheels, reducing dynamic loads when driving on uneven roads and over obstacles [3, 4].

Suspensions differ in their design: the presence or absence of silent blocks. Silent blocks are used in virtually all types of suspensions, with the exception of heavy-duty vehicles equipped with a balance beam suspension. In passenger cars, independent suspension is widely used.