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EVALUATION OF THE TECHNICAL CONDITION OF THE ENGINE USING THE ANALYSIS OF THE COMPOSITION OF GASES USED IN INTERNAL COMBUSTION ENGINES

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Abstract: This article is devoted to a method for analyzing the composition of gases used in internal combustion engines to detect and diagnose breakdowns and failures of internal combustion engines.

The sharp increase in the number of cars in the world poses huge challenges for scientists to further improve internal combustion engines. Today, one of the main tasks is the full use of engine power, the creation of an environmentally friendly internal combustion engine, and a reduction in fuel consumption.

Keywords: car, engine, breakdown, failure, gross weight, torque, power, crankcase oil, diagnostics, external speed characteristic, crankshaft, speed, engine power use.

Introduction. Gases used in internal combustion engines contain about 200 constituents. Their stability period lasts from a few minutes to 4-5 years. They are grouped according to their chemical composition and properties, as well as their effect on the human body.

The first group. They include non-toxic substances: nitrogen, oxygen, hydrogen, water vapor, carbon dioxide and other natural constituents of atmospheric air.

Carbon dioxide and water vapor are produced when fuel burns. In nature, it is absorbed by plants and turns into organic matter during photosynthesis. increasing its concentration is dangerous in terms of creating a condition called "greenhouse effect" in the absorption of long-wave heat radiation, which causes warming of the earth's surface.

The second group. This group includes only one substance carbon monoxide ( ). It is a product of incomplete combustion of hydrocarbon fuels derived from petroleum. It is colorless, odorless, and lighter than air.

Carbon dioxide has a pronounced toxic effect, it affects the human nervous and cardiovascular system. Carbon dioxide is stored in the atmosphere for 0.3 years.

The third group. Its composition includes nitrogen oxides, mainly -nitrogen oxide, -nitrogen dioxide and. These gases are formed in the combustion chamber of internal combustion engines at a temperature of 2800 0C and change from one type to another during the exhaust stroke.

The fourth group. This group includes various hydrocarbons, i.e. compounds. They are formed as a result of incomplete combustion of fuel in the engine.

Hydrocarbons are poisonous and have a bad effect on the human cardiovascular system. Hydrocarbon compounds of used gases are poisonous as well as carcinogenic.

The fifth group. Aldehydes are organic compounds with an aldehyde group attached to a hydrocarbon radical. Most of the aldehydes are produced in the operating conditions where the combustion temperature in the engine is not very high - normal driving and low loads. The exhaust gases contain 60% formaldehyde, 32% aliphatic aldehydes and 3% aromatic aldehydes. More than 32% of the total amount of organic

constituents in waste gases are borderline hydrocarbons, about 27% are non-borderline hydrocarbons, up to 4% are aromatic compounds, and more than 2% are aldehydes.

The sixth group. It includes soot and other small particles (grinding products of engine parts, aerosols, soot and dust).

Soot - black solid hydrocarbon particles are formed during incomplete combustion and thermal decomposition of fuel hydrocarbons.

The seventh group. This group of sulfur compounds includes sulfur dioxide and hydrogen sulfide, inorganic gases that appear in the exhaust gases of engines using fuel with an increased content of sulfur. Compared to other types of fuel used in cars, diesel fuel contains much more sulfur.

The eighth group. The members of this group are lead and its compounds. Lead and its compounds are found only in the exhaust gases of gasoline engines when using gasoline.

Literature analysis and methodology. In Uzbekistan, the works aimed at the analysis of the operational indicators of car engines suitable for climatic conditions have not been researched. In foreign countries, the methods of determining the performance characteristics of engines in hot climates have been somewhat analyzed.

The performance of cars directly depends on the power of its engine. At present, internal combustion engines with pistons are mainly used in cars. Today, one of the main tasks facing specialists is to increase the power of the engine and increase the speed and carrying capacity of the car. For this purpose, it is necessary to increase the main operational characteristics of the engine, reduce fuel consumption and consumption of operational materials.

In our republic, scientific research aimed at increasing the reliability of car engines is not at the level of demand, because car production coincided with the period of independence and is now entering the stage of development. A number of scientists in the Republic, abroad and in Russia have conducted and are conducting scientific research in this direction.

The degree of development of the research topic. Great scientific contribution to the research topic created by O. Hamrakulov, Sh. Magdiyev, E. Asatov, A. Tojiboyev, A. Mukhiddinov, O. Adilov, B. Begmatov, L. Mamayeva, M. Eshonkulov and others. added The scientific development of these authors is aimed at improving the environmental characteristics of internal combustion engines, which are the main energy source of vehicles [2, 3, 4, 5, 9].

In the manual of B. Begmatov, the basics of ecology, practical ecology, ecological safety and sustainable development are studied. The legal, organizational and economic foundations of environmental safety are given. Special attention was paid to the issues of studying and solving environmental problems of Uzbekistan. The book contains relevant illustrative materials, control questions, test tasks, abstracts and lecture topics for each chapter. The study guide is written for students of higher educational institutions. Students deal with various issues of environmental protection [5].

In the manual of A.A. Mukhiddinov, O.K. Adilov, the general issues of ecology, the atmospheric cover, the hydrosphere and its protection, the lithosphere and its protection, the protection of plants and animals, the organizational and legal foundations of environmental protection are shown [4].

Results. The integration of Russia into the European and world economy, the expansion of international cargo transportation, the participation of not only freight carriers, but also private passenger cars and buses in them seriously increases the requirements for environmental safety, economic and other indicators. It ensures that it will be brought closer to the European standards step by step.

This is reflected in the tightening of maintenance and repair and in the methods of spreading them.

Economic, technological and organizational conditions divide the influence according to the tactics of execution. As a result of the use of economic and other criteria, strategy 1 develops in two directions, which are fundamentally different from each other: in technical maintenance, performance of work on Los without prior control (I-1) and with prior control Loj - diagnostics (I-2), i.e. execution according to the situation. Depending on economic conditions, product durability, and objectives, each of these strategies may be acceptable, but strategy I-2 may be further refined. In the I-21 strategy, it is immovable, and then mainly compact and mobile control and diagnostic tools are used. The main conditions for the use of this tactic are: accuracy, reliability and use of control-diagnostic tools in various work, low costs for their purchase and use. Then I-21 tactics can develop in two different directions. In the first one (I-211), the ability to work is monitored, which is carried out with certain (permanent or variable) periodicity. As a result of these checks, the technical situation is "corrected". In the second one (I-212), a prediction of employability is given based on the control results, which in the next step gives an opportunity for the periodicity of future controls.

Table 1 contains excerpts from the environmental ratings of cars sold in the German market, compiled by the German Transport Association (VCD).

European standards for toxic substances, gGkm, according to the NETSD style for passenger cars

Table 1.

Rules under Rule 83	Gasoline engines				Dizel dvigatellari		
	NOx	CxHx	CO	Solid particles	COQNOx	CO	Solid particles
YEVRO-1 (1991)	0,57	0,77	3,9	-	1,14	3,2	0,18
YEVRO-2 (1996)	0,25	0,34	2,7	-	0,9G‘0,7	1,0	0,1G‘0,08
YEVRO-3 (2000)	0,15	0,20	2,3	-	0,56	0,64	0,05
YEVRO-4 (2005)	0,08	0,10	1,0	-	0,30	0,05	0,025
YEVRO-5 (2010)	0,06	0,075	1,0	0,005	0,25	0,5	0,005

Ratings are given according to the new European Driving Cycle (YaEXD), which represents a combination of the urban (ECE-R) and modified extra-urban (EUDC) cycles. The highest rating goes to 10 points. The evaluation takes into account engine power and performance, top speed, fuel consumption according to YaEXD, CO2 emissions and external noise level.

Discussion. Reintroduction of used gases (recirculation). The essence of this method is that a certain part of the exhaust gases is separated from the exhaust system and directed to the input channel of the IYD to capture a part of the new charge. The amount of released gases is changed by means of special adjustment structures depending on the operating mode of the IYD. Due to the large heat capacity of the processed gases re-entered into the chamber, it reduces the combustion temperature, which significantly reduces the release of nitrogen oxides. In this case, the combustion process worsens, as a result, the amount of SO and SN increases slightly, and the amount of smoke in the exhaust gases increases in diesels. In some cases, the amount of SN also decreases due to the prolongation of combustion and the increase in temperature at the end of the expansion.

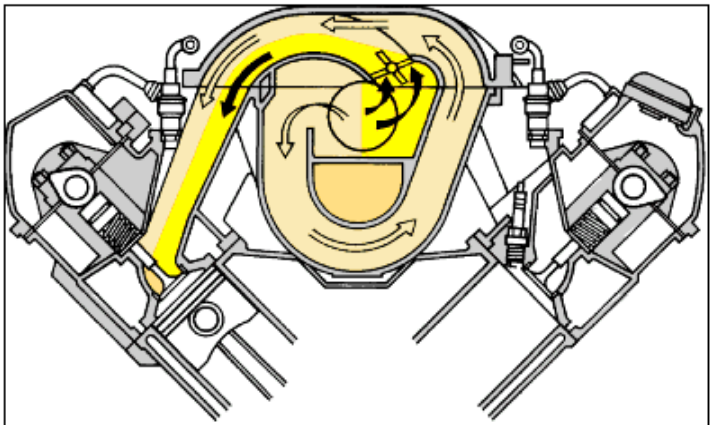

Figure 1. Entering a certain part of the used gases into the input collector.

The re-introduction method is used in both spark-ignition engines and diesel engines. In the first case, the processed gases are transferred to the intake system after the carburetor, in this case, the mixture formation process is not disturbed. The expansion of the use of exhaust gas re-introduction in gasoline-powered IYDs (together with rapid combustion chambers) helps to transfer them to work in liquid mixtures. This leads to an increase in the release of nitrogen oxides. Reintroduced exhaust gas replaces part of the new mixture and causes a decrease in power. In this case, the deterioration of the combustion process leads to poor utilization of heat in the cycle. The share of re-introduced processed gases (compared to the total amount of processed gases) does not exceed 15 percent, and in most cases it is at most 10 percent. According to experimental data, when 5 percent of the processed gases are re-introduced, the output of nitrogen oxides decreases from the initial level to 40 percent, and when 15 percent is re-introduced, it decreases to 60-70 percent (Table 1). This method is widely used in the engines of

passenger cars in countries where the amount of nitrogen oxides is strictly limited, together with other measures, for example, the oxidative neutralization method.

It is possible to put it into practice by scientifically justifying the study of the international requirements for the amount of toxic substances in the gases used in cars. In the economic justification, the prices of resources in the market today are used, the level of competition of the produced products is taken into account, the price of the products prepared through the project is calculated and compared to the market price, the level of competition is taken into account when drawing up the production program. The amount required for the implementation of the project is calculated as a percentage of the bank loan, and the period of returning it to the bank should not exceed the requirement.

Such economic justification is carried out in the following sequence:

1. Preliminary information on the study of the international requirements for the amount of toxic substances in the gases used in cars is filled.

2. The main fund and the production fund of the study of the international requirements for the amount of toxic substances in the gases used in cars are calculated.

3. The annual production volume and production price (per unit of product) are calculated for the scientific justification of the study of the international requirements for the amount of toxic substances in the gases used in cars.

4. A program for the production of a scientific justification for the study of the international requirements for the amount of toxic substances in the gases used in cars will be created. It calculates revenue, cost, gross profit, depreciation and efficiency.

5 The study of the international requirements for the amount of toxic substances in the gases used in cars is considered to be the period of self-justification.

6. Indicators of the use of basic funds: fund return, the number of turnover of circulating funds, annual labor productivity, profitability are calculated.

Conclusion. Protection of the environment from the harmful effects of motor transport is mainly carried out in 2 different directions:

1- improvement of cars and their engine designs.

2- fight against harmful operation of vehicles in operation.

Improvement of the construction of cars and its engine, improvement of the engine operation mode, use of various auxiliary equipment and high-quality fuel, timely and high-quality performance of maintenance and repair work, and low-harmfulness, gas turbine, external combustion-Stirling engine, is carried out by the production of electric cars, injection engines.

The fight against the harmful operation of cars in operation consists mainly of limiting the amount of harmful substances emitted by cars by the relevant legal documents and controlling the observance of these standards.

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