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Vehicles of Transportation Internal Combustion Engine Press the Details of the Institution Inspection

Khujayarova Mokhigul Dustmurodovna
Special Education Teacher at 2nd Vocational School in Koson

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*Correspondence: Khujayarova Mokhigul Dustmurodovna
Email: khujayarova@gmail.com

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Abstract: In this article, the engine in the operation of vehicles details, including cylinder-piston group details, and changes in engine performance, piston rod and cylinders in the details of the cylinder when the body presses the flame-touch surface of the cylinder head redistribution of heat flow occurs, their temperature and the change of grooves in the piston-sleeve connection was analyzed. The study aims to improve the reliable performance of internal combustion engine vehicles by focusing on the maintenance and condition of the cylinder-piston group. The research includes a literature review and experimental analysis of the effects of dust and contaminants on the engine's internal components. Comparative tests were conducted on engines before and after cleaning the cylinder-piston group. Findings show that dust particles significantly impact engine performance, causing a 4-6% reduction in power and a 3-4% increase in fuel consumption. Cleaning the cylinder-piston group resulted in a 5.2% increase in engine power and a 4.0% decrease in fuel consumption. The progressive accumulation of soot was found to degrade engine efficiency and cause knocking. Regular maintenance and cleaning of the cylinder-piston group are essential to enhance engine efficiency and longevity. Implementing these practices in vehicle maintenance systems can significantly improve engine performance and reliability.

Keywords: Engine, Cylinder, Injector, Engine Power, Specific Fuel Consumption, Cylinder-Piston Group, Compression Ring, Oil Seal Ring, Sleeve, Piston, Piston Rings, Piston Skirt, Defects.

Introduction

In our country, there are various models of vehicles with different capacities operating in enterprises. Residents own over a million cars, necessitating numerous enterprises for their maintenance. Vehicles are a crucial driving force and factor in our national economy. Issues related to increasing the reliable performance of cars must be addressed by engineering and technical personnel (O. K. Adilov et al., 2014; Begmatov & Khaqqulov, 2020; Nurullaev & Umirov, 2020). The development of science and technology is essential for these professionals to acquire and apply thorough theoretical knowledge in practice. Efficient methods that ensure long-term and uninterrupted operation of cars need to be developed with minimal expenditure of money and time (Begmatov, 2020).

During engine operation, components typically experience wear and misalignment, leading to deterioration in the quality of vehicle performance (A. K. Adilov et al., 2019; O. K. Adilov et al., 2020; Umirov & Hamraqulov, 2020). Some parts of the engine are subject to significant wear, resulting in irreparable damage to performance indicators (Azimov, 2020; Eshankulov, 2020; Karimov, 1989). Therefore, the cylinder-piston group is considered the most critical component because its technical condition greatly influences the overall performance and lifespan of the engine (Buberger, 2022; Manzolli, 2022; Pramuanjaroenkij, 2023; Shafique, 2022).

Improving the reliability and performance of internal combustion engines is a multifaceted challenge involving the prevention of component wear and the maintenance of optimal engine conditions (Burnete, 2022; Dash, 2022; Khalid, 2022; Mohanty, 2022). The cylinder-piston group is particularly vulnerable to contamination by fine dust particles, which can enter the engine through fuel tanks and atmospheric exposure. This contamination leads to increased engine wear, reduced power output, and higher fuel consumption (Chakraborty, 2022; Li, 2022; Park, 2022; Paykani, 2022).

The study aims to address these issues by investigating the effects of contaminants on engine performance and exploring methods to maintain the cylinder-piston group in optimal condition. By doing so, the research seeks to contribute to the development of more efficient maintenance practices that can enhance the reliability and longevity of internal combustion engines in vehicles.

Methodology

Research shows that the inside of the engine cylinders is 20 in size includes dust no larger than μm. Fine dust particles typical of our region can easily enter the fuel tanks through the pipes released into the atmosphere. enters. Fuel was stored in warehouses without care and when being transported to places of use, as well as cars and roads with dust in the process of pouring into the tank of construction machines

gets dirty. It is known from the scientific research conducted until now that transport cylinder-piston group of the engine during the operation of tools engine power is reduced by 4-6% when setting the details, comp fuel consumption increases by 3-4% and the waste of lubricating fluid to the body determined. Therefore, this article is about vehicle engines engine when the cylinder-piston group details are pressed changes in indicators are highlighted.

"Efficient use of tractor engines" by S.M.Kadirov cars, tractors and road construction machines in the book engine operation process, engine parts hot climate under the conditions of tension, determining the performance of the engine factors have been thoroughly studied.

B.I. Bozorov's book “Ekologicheskaya bezopasnost avtotransportnix sredstv” contains the main features that determine the environmental safety of motor vehicles.

In Kadirov (2006) book “Internal Combustion Engines” automobile, internal combustion of tractors, agricultural and road construction machines theory of processes occurring in engines and their work Factors affecting cycle, power and fuel consumption are analyzed.

Fuel supply and air mixing in carburetor engines the working principles of the devices, the operation of the diesel fueling device and the processes of creating a combustible mixture were considered.

The knematics and dynamics of the engine crankshaft mechanism, issues of balancing and ensuring smooth operation of engines, the structure of all systems and details of engines are considered. In the book “Theory of Engines and Cars” by Kadirov & Qadirkhanov (1969), the theory of processes occurring in internal combustion engines and their cycle, power and fuel consumption the factors positively influencing the consumption were analyzed.

Result and Discussion

Result

The combustion chamber of engines used in tractors and cars and the pressure force in the expansion of the combustible mixture in it affects the piston of the engine and is transmitted from it to other parts. At this time, all the processes that take place inside the cylinder are performed with the help of a piston. Therefore, these engines are called piston internal combustion engines.

Reciprocating internal combustion engines are the most common type of heat engines. These engines are widely used in all sectors of the economy due to their compactness and high durability (Karimov, 1989).

An internal combustion engine is a heat engine designed to generate mechanical energy by burning fuel. IYODs are classified according to several characteristics

1. By function: immovable (stationary) and mounted on transport.
2. According to the method of gas exchange: 4-stroke and 2-stroke.
3. Depending on the type of fuel used: a) operating on light liquid fuel (kerosene, gasoline); b) operating on heavy liquid fuel (fuel oil, diesel fuel, gas oil); v) in the form of gas (generator gas, natural gas, propane-butane); g) two fuels (gaseous fuel and liquid fuel); d) a lot of fun. These are special duty diesels, adapted to work on light and heavy liquid fuels with different characteristics.
4. According to the method of igniting the combustible mixture: compression ignition (diesels) and forced ignition with the help of a spark (gasoline and gas engines).
5. According to the method of creating a combustible mixture: creating a mixture outside the cylinder and inside it.
6. By cooling method: liquid and air cooling.
7. According to the method of adjustment (adjustment) of the amount of heat supplied during the cycle: it is adjusted qualitatively, quantitatively and in mixed methods.
8. According to the method of introducing a new charge into the cylinders: naturally introduced from the atmosphere and introduced under pressure.
9. According to the type of piston movement: piston and rotor-piston, in rotor-piston engines, the piston moves planetary (compound) inside the housing.
10. According to the location of the cylinders: one row is located vertically, obliquely and horizontally; two rows are V-shaped and opposite (Karimov, 1989).

If we look at the history of internal combustion engines according to information from social networks, it seems that they cover a long period.

In France, the first piston internal combustion engine was created by Lenoir in 1860. This engine was a two-stroke engine with a valve distribution mechanism, the air-fuel mixture was ignited by an external source of energy, and the fuel used was igniting gas (light gas). Second piston internal combustion engine In 1876, the German designer N. Otto created a 4-stroke gas engine. In this engine, the mixture was compressed before combustion, as a result of which it was possible to increase the economy of the engine compared to the Lenoir engine. Otto's engine was used in industry.

Three- piston internal combustion engine In 1889, I.S.Kostovich in Russia created a liquid fuel (gasoline) engine, which was designed for installation in airships.

Four-piston internal combustion engine In 1897, German engineer R. Diesel was the first to create a compression ignition engine. In Russia, the first engine with the ability to carry a flame as a result of fuel compression began to be created in 1899.

The fifth piston internal combustion engine was built in Russia in 1901 by GVTrinkler, the first non-compressor diesel.

Sixth piston internal combustion engine Russian engineer YVMamin in 1910 is an important compressorless engine for tractors.

V.I Grinevsky, N.R Briling, YE.K. Mazing, Stechkin B.S and other scientists made a great contribution to the development of the theory of engines. The great Russian heat engineer VIGrinevsky studied the working processes in steam engines, boiler units and internal combustion engines. Under the leadership of A.A Mutalibov, a scientific and technical figure who served in the Republic of Uzbekistan, a laureate of the Council of Ministers and the Beruni award, a doctor of technical sciences, A.AMutalibov made a great contribution to increasing the efficiency of using gas condensates, gas fans and engines in the conditions of Central Asia. Currently, under the leadership of the Rector of the Institute, Corresponding Member of the Academy of Agriculture, Doctor of Technical Sciences, Professor S.M. Qadirov, he is working on the creation of new cars of Uzbekistan, on the coating of the cylinder-piston group of engines with ceramic coatings, on the replacement of gasoline engines with diesel engines. studies are being conducted on replacing it with gas.

The permissible upper limit of the concentration of pollutants is determined by the state standard.

So, regardless of the amount of pollutants, at a certain value of time, the gaseous emissions emitted from the polluting sources of vehicles moving on all road sections are completely absorbed and added to the composition of atmospheric air (Jayarova, 2024).

As a result of experimental studies, the institution was completely released 30 minutes of engine operation at nominal power mode and in which the above mentioned emulsion should be used is determined.

Comparison of results and formation of bodies in cylinders cylinder group to evaluate the effect on engine performance internal combustion engines whose details are printed by the institution and not published by the institution tuning characteristics were obtained. Comparison engine rated load was carried out under the conditions of working with After the entity is excluded power increased by 5.2%, specific fuel consumption decreased by 4.0% was determined. The maximum pressure of the cycle and the rate of pressure rise change, i.e. decrease is 10 and 28%, respectively.

Discussion

Analyzing the nature of changes in the layers of the organization, it can be divided into several stages.

The first stage is training. The engine is in the early stage of operation

only the C zone of the piston is covered with soot, the thickness of the sparse soot can be 30-50 mkm, and soot is formed on the remaining surface of the piston bottom, in the combustion chamber. At this stage, formation of soot is observed on the surface of the cylinder head in contact with the flame, i.e., in the S zone, and its parameter is exactly the same as that of the piston.

However, the ignition surface of the cylinder head differs in that there are additional zones of local active formation, which depend on the relief of the ignition surface of the cylinder head.

The second stage refers to the operation of the engine for 60-900 moto hours

and the formation of a local institution slowly grows and separates. Plate-like 250-290 mkm thick in the S zone of the piston and cylinder head a type of solid layer is formed, its hardness reaches 2T. The powder in the bottom of the piston, in the combustion chamber and in the zone other than the C zone of the cylinder head is sparse, 100-200 mkm thick, mostly soft, easily separated from the surface.

The third stage is for 900 moto hours of engine operation, significant increase in entity formation and decrease in entity accumulation is distinguished by At the beginning, the thickness of the body increases considerably and reaches 1000-1200 mkm in the S zone of the piston and 600-800 μm in the S zone of the flame contact surface of the cylinder head. As the working time increases, the surface of the C zone increases, the size of the body increases, and the hardness reaches the value of 3T.

For the third stage, a 3T thick porous body is placed on the bottom of the piston uniform distribution is also characteristic. As the working time increases on the surface of the cylinder head in contact with the flame, the zone S expands, occupies zone v of both valves, zone b of the nozzle hole and fills them. in which the valves are not tightly touching and gas exchange the process is broken, the holes of the nozzle adjuster screw are coked will remain, and fueling characteristics will deteriorate.

After the engine has run for 1200-1500 moto hours, the formation of soot stabilizes in thickness, because the piston in the position of the upper end point and the gap between the surface of the head in contact with the flame is equal to 1800 μm will be In this case, the total mass of the body is 3-3.5 grams. If the thickness of the body layer does not increase, its mass will increase again leads to hardening. In this case, the compression ratio increases, the load on the parts of the cylinder-piston group increases, and on the engine knocks appear.

Thus, the reason for the appearance of knocks is with the bottom of the piston accumulation of soot between the flame contact surface of the cylinder head it was found that the details are bumping into each other. Studies resulting in a porous layer on the valve plates after 1000 moto hours of operation the formation of a white layer was also detected.

Body yield obtained in working conditions and accelerated tests as the time worked increases when the attendance figures are compared it turns out that the degree of coking varies with the same regularity.

Accelerated tests using diesel in a thick mixture and during entry was held by accelerating the formation of the body while giving oil.

Conclusion

To make the following conclusion on the research work carried out in the article and suggestions can be made:

Soot pressing the bottom of the piston and the surface in contact with the flame of the cylinder head leads to a violation of the combustion process in the cylinder, a redistribution of heat flows, and a deterioration in the efficiency and economy of engines.

The method of cleaning the parts of the cylinder-piston group from the body without disassembling them is promising during its implementation in the car maintenance system.

In short, the formation of soot and coke in the details of the cylinder-piston group limits the accuracy of the engine to a large extent and has a negative effect on its efficiency and economy.

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