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MAGNETIC ELECTRIC PROCESSING OF HYDROCARBON FUEL

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Annotation: This article analyzes the technology of magnetoelectric processing of hydrocarbon fuel, its influence on physicochemical properties, and its role in increasing combustion efficiency. Factors that positively affect the engine's operating mode and energy-saving possibilities will also be considered.

Keywords: hydrocarbon fuel, magnetic processing, electric field, combustion efficiency, energy efficiency, engine. It is known that for complete combustion of fuel in the ICE chamber, it must be well mixed with the oxidizing agent (air).

Hydrocarbon fuel is mixed with air in the form of small droplets, increasing the surface area of the fuel using various means (injectors, carburetors). In this case, an aerosol is formed. The smaller the fuel droplets, the better they mix with the air and burn completely. The size of droplets depends on various factors, including the spraying agent, the properties of the fuel, and others. These are primarily fuel viscosity and surface tension. How, without changing the engine design, is it possible to reduce the size of the fuel droplet and distribute it evenly throughout the combustion chamber? One such method is electrostatic fuel processing and macroscopic atomization through injectors.

This method, discovered as a result of many years of research, has shown high results in production. Its operation is simple: for triboelectric charging of fuel, a section of the fuel line is placed in a longitudinal magnetic field. In this case, the fuel entering the triboelectric section with a magnetic field begins to charge due to friction and triboelectric effect and becomes polarized near the surface. The triboelectric field increases closer to the pipe surface as it moves inward from the section. This means that current flows from the surface of the pipe towards its geometric axis. This current is directed perpendicular to the lines of force of the longitudinal magnetic field and is under the action of a force from the field. This force is perpendicular to the flow velocity of the fuel and is directed longitudinally to the surface of the pipe, i.e., it forces the current (and, consequently, the fuel flowing through it) to rotate in the pipe, just as an axle rotates inside the barrel.

The circulation of fuel in the triboelectric section extends its path, charging more and more intensely. More intensive charging of the fuel creates a large charge current, which leads to more fuel circulation. During the rotation of the moving fuel, mechanical mixing also occurs, in which charged layers mix with uncharged layers, forming volumetric charging.

Such a device with a triboelectric section is placed in the fuel hose as close as possible to

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the carburetor in an injection engine and to the carburetor in a carburetor engine. After installing the device, it is necessary to start the engine, then turn off the engine control unit (ECUD) and start it again. For this, the "+" terminal of the battery should be disconnected for 10-15 minutes. The effect is immediately apparent and increases with increasing walking distance. The dynamic range of engine operation increases (car pulling even at small speeds and smooth engine operation at large speeds), fuel consumption decreases, and even on highways and in the city remains almost the same.

It is known that for complete combustion of fuel in the ICE chamber, it must be well mixed with an oxidizing agent (air). Hydrocarbon fuel is mixed with air in the form of small droplets, increasing the surface area of the fuel using various means (injectors, carburetors). In this case, an aerosol is formed. The smaller the fuel droplets, the better they mix with the air and burn completely. The size of droplets depends on various factors, including the spraying agent, the properties of the fuel, and others. First of all, its viscosity and surface tension. How, without changing the engine design, can the size of the fuel drop be reduced and it be evenly distributed throughout the combustion chamber? One such method is electrostatic treatment of the liquid and its macroscopic grinding by spraying through nozzles. In this case, each drop becomes electrostatically charged. This method is widely used in painting technologies. Currently, the most effective of these is the triboelectric method (Fig. 1), which is cheap, simple, and safe. In this case, the liquid or paint powder is driven through the zone of the pipe, the inner side of which is covered with a special triboelectric coating. In this case, the liquid is charged with a magnetic field of the same sign and the tube with opposite signs.

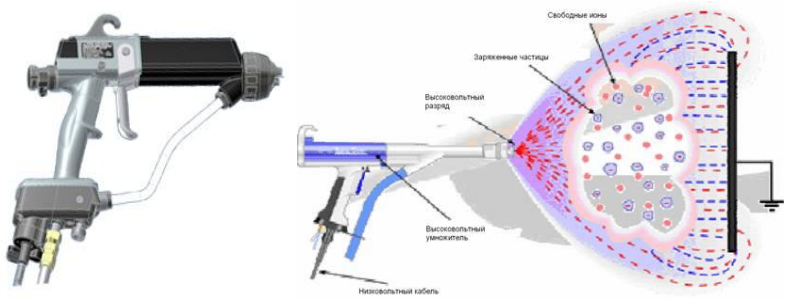

Figure 1. Hand-held electrostatic paint gun and how it works

In this case, it is necessary to observe safety regulations, as it can lead to the appearance of a high-voltage spark.

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Figure 2. Paint t*riboelectric charging method*

The purpose of using triboelectric methods is to treat fuel triboelectrically, making it safe, inexpensive, and maximally simplified. This method was discovered as a result of many years of research and showed high results in production. Its operation is simple: a longitudinal magnetic field acts on the section of the fuel line undergoing triboelectric charging. This results in the following. Fuel entering the triboelectric section begins to charge near the pipe surface due to friction and becomes polarized. As a result of penetration into the triboelectric section, polarization increases near the pipe walls. This means that a current $_{Iz}$ flows from the trunk wall towards its axis. This current is directed perpendicular to its axis and parallel to the magnetic field, therefore, it is under the influence of a $_{force\ Fm}$ from the field. This force is perpendicular to the flow velocity of the fuel and is directed longitudinally to the inner surface of the pipe, i.e., to the current velocity $_{Iz}$ (therefore, to the fuel flowing through it), as a result of which the fuel rotates inside the pipe in the same way that an axle rotates inside a shaft.

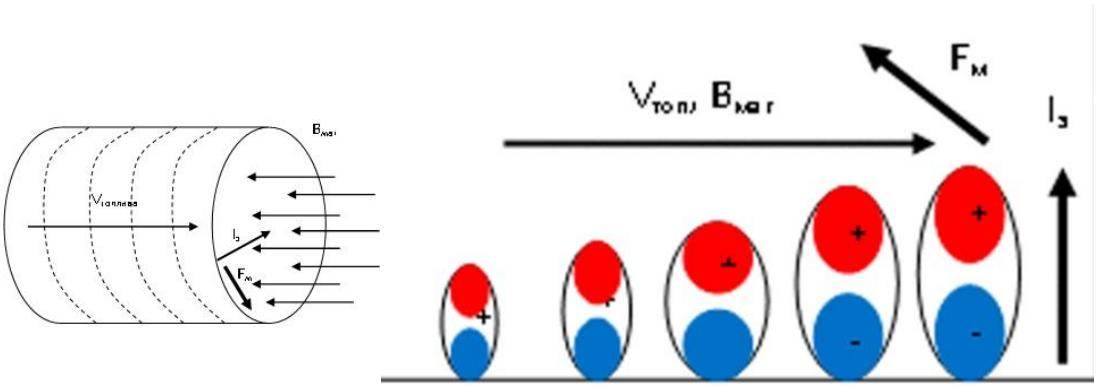

Figure 3. Triboelectric section of the fuel line. Schematic section

Such transformations lengthen the path of the fuel in the triboelectric section and lead to a stronger charge, which depends not only on the passage of the fuel through the triboelectric section, but also on friction on the internal surface of the fuel.

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References

1. Khudoyberdiyev T.S. Theory of Piston Ring Wear. Tashkent: Fan, 1996, 126 p.
2. Stone, R., and Ball, J.K. *Fundamentals of Automated Engineering*. Warrendale.Pa: SAE International. p. 762.
3. Decree of the President of the Republic of Uzbekistan "On Improving the Study of Foreign Languages." Tashkent, 2012. December 10
4. Nosirov I.Z. Methodology of conducting scientific work in conjunction with educational work. Scientific Bulletin "Mechanical Engineering" No2/2016. Andijan: AndMI. 21-25 p.
5. "Environmental Safety of Transport Flows" edited by A.B. Dyakov Moscow Transport - 1990