JOURNAL OF APPLIED SCIENCE AND SOCIAL SCIENCE
eISSN 2229-3113 pISSN 2229-3205

Volume 15 Issue 08, August 2025
Impact factor: 2019: 4.679 2020: 5.015 2021: 5.436, 2022: 5.242, 2023: 6.995, 2024 7.75

INFLUENCE OF CLIMATE CONDITIONS ON THE COOLING SYSTEM

Juraev Voxidjon Islamjon ugli
Andijan State Technical Institute
Transport Logistics, Teacher
vohidjonjorayev95@gmail.com

Abstract: The article discusses the theoretical basis for the influence of climatic conditions on the cooling system of internal combustion engines (ICE) of motor vehicles. First of all, the design structure, operating principles and efficiency levels of existing cooling systems were analyzed. The processes of providing the engine thermal system are illustrated by means of physical and mathematical modeling of heat exchange processes in the cooling system. The advantages of industrial and air cooling systems were compared, the advantages and disadvantages of each of them were identified. Highly efficient heat exchangers are proposed to create new generation cooling systems. Energy efficiency control based on computer modeling and experimental tests is aimed at ensuring the reliability of power supply. This study has practical application in automotive, agricultural machinery and other types of agricultural machinery, emphasizing the efficiency of the ICE.
Keywords: cooling, automobile, environment, transport, engine, transport, effect, radiator, water pump, pump, mathematical model, modeling, differential.

INTRODUCTION.

The work of many research scientists is devoted to increasing the reliability and safety of machines and units in various operating conditions. An important direction of modern automobile production and services for their operation is to increase the performance and efficiency of internal combustion engines. The efficiency and reliability of internal combustion engines are determined mainly by the performance of their individual systems and units [1].

Increasing the efficiency of heat exchange units is an important task of modern production, one of the directions of which is to solve the problems of enhancing heat transfer in the cooling systems of automobile engines [2].

Experiments show that the efficiency of engines and their individual indicators are significantly affected by operating conditions. Some climatic zones are characterized by high temperatures, others by low temperatures. At the same time, the dust content of the atmosphere seriously impairs the performance of engines [3].

The influence of coolant temperature on various parameters and temperatures of engine parts: piston and cylinder head temperature; fuel mixture filling coefficient; coolant temperature; radiator working area; amount of heat transferred to water and oil.

Dust is a decisive factor in the wear of internal combustion engines, therefore its amount in the air significantly affects their reliability. For example, during sandstorms in the desert, the amount of dust increases to 5-10 g/m3. This affects the increase in the amount of dust in the air several times on relatively windless days. It should be noted that the high ability of dust to penetrate into small cracks, in most cases through the air, oil and fuel cleaning systems, disrupts the operation of engine systems [4].

The operating conditions of engines have a complex effect on their various indicators. Thus, the presence of a high-altitude movement during the movement of a car leads to an increase in the

JOURNAL OF APPLIED SCIENCE AND SOCIAL SCIENCE
eISSN 2229-3113 pISSN 2229-3205
Volume 15 Issue 08, August 2025
Impact factor: 2019: 4.679 2020: 5.015 2021: 5.436, 2022: 5.242, 2023: 6.995, 2024 7.75

temperature of its units. In general, the normal state of the engine is a state of stabilization of all parameters of the operating process and the temperature of its parts within the appropriate limits. The most important indicator of the normal state of the engine is the temperature of the most heated and most important parts of the engine - pistons, piston rings, cylinder liners, heads, valves, bearing shells, etc.

It has been established that with an increase in the temperature of the liquid in the cooling system, the temperature of the main parts of the engine increases and the parameters of its operating process change.

With an increase in the temperature of the engine parts, the filling coefficient of the fuel mixture naturally decreases, since the engine parts (main channels, intake manifolds, etc.) begin to be exposed to high temperatures. Accordingly, the effective engine power decreases and the minimum effective fuel consumption increases. An increase in ambient temperature leads to a decrease in engine power, as well as a decrease in air density at the air intake and a decrease in the filling of the engine cylinders with air mass.

It should be noted that the temperature of the fluid in the cooling system only approximately reflects the normal state of the main engine components, since in different engine operating modes there is a different temperature difference between the coolant and the cylinder walls. For example, for a Cobalt engine, when the coolant temperature is + 90°C, the operating temperature of the upper zone of the cylinder liners at full load and at a speed of 1500 rpm reaches + 160°C, and at the same load and when the speed is increased to 4000 rpm it rises to + 230°C.

It was also found that in different operating modes ΔtWt is the temperature difference between the coolant at the inlet and outlet of the engine, which is 5-10°C. In normal engine operation, the oil temperature changes in proportion to the temperature of the fluid. In this case, it is considered normal if the oil temperature does not exceed the coolant temperature by more than 10°C.

When the coolant temperature rises to +120°C (high-temperature systems), the temperature of the engine parts increases by only 10-12°C. In general, the influence of ambient and air temperatures on the internal combustion engines of automobiles is extremely large. Considering that they can reduce engine performance, it means that we need to study the importance and influence of ambient and air temperatures for the proper operation of engines.

CONCLUSION

In conclusion, theoretical studies have been conducted to improve the internal combustion engine cooling system. Data are presented on the principle of operation of the radiator, which is one of the most important parts of the cooling system, and an analytical description of the heat exchange process. In addition, the amount of heat released by the engine from the coolant in the radiator was calculated and recommendations were developed.

REFERENCES:

1. Omonov FA, Jorayev VI PROBLEMS AND CAUSING FACTORS IN THE DEVELOPMENT OF FERGANA CITY PUBLIC TRANSPORT //European Journal of Emerging Technology and Discoveries. – 2023. – T. 1. – No. 2. – pp. 72-75.
2. Islamjon JV et al. CONVENIENCES CREATED TO PASSENGERS WHEN USING PUBLIC TRANSPORT SERVICES //Education news: research in the 21st century. – 2023. – T. 2. – No. 14. – pp. 138-146.

JOURNAL OF APPLIED SCIENCE AND SOCIAL SCIENCE
eISSN 2229-3113 pISSN 2229-3205
Volume 15 Issue 08, August 2025
Impact factor: 2019: 4.679 2020: 5.015 2021: 5.436, 2022: 5.242, 2023: 6.995, 2024 7.75

3. Islamjon JV et al. METHODOLOGY OF ESTIMATING THE CONSUMPTION OF MATERIAL RESOURCES IN THE USE OF THE BUS PARK //Mechatronics and robotics: problems and development prospects. – 2023. – T. 1. – None. 1. – pp. 266-267.
4. Ikromov N. et al. Analysis of transport and its cargo processes // E3S Web of Conferences. – EDP fanlari, 2024. – T. 548. – B. 03021.