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FACTORS AFFECTING PASSENGER VEHICLES DUE TO VARIOUS ROAD AND CLIMATE CONDITIONS

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Annotation

This article presents the impact of road and climate conditions on the vehicle's technical condition and performance, as well as the impact of other climatic factors on vehicle parts. The deterioration of road and climatic conditions, such as the presence of oil, snow, and ice, damage to the road surface, directly affects the fuel consumption of the vehicle, the characteristics of the wheels, the efficiency of the engine and transmission system, air filters, and other components. In addition, the main technical problems arising during the operation of vehicles in various climatic conditions, such as negative changes in the engine, battery failure, tire wear, and deterioration of the four-stage system, are studied separately. The results obtained during the study can be especially useful for transport specialists, car manufacturers, and users.

Keywords

car, climate, road, operation, engine, unit, mechanism, temperature, friction, abrasive particle.

Introduction

During vehicle operation, the following factors affect vehicle safety: Road conditions represent movement speed, turning radius, surface level, slope height and size, quality (proper) road construction [1]. When a car drives on a dirty, uneven road instead of an asphalted one, the number of revolutions of the digital crankshaft increases, and the number of clutches, the number of accelerations and decelerations, and the number of stops (brakes) increases [2]. This is ten times more expensive than walking on a paved road. As a result, the wear process of units and mechanisms, automobile parts, accelerates [3].

On mountain roads, as a result of frequent and prolonged stops, the brake drum and (conveyor) cover with heat up to 350°C, the friction coefficient decreases, and the stopping process deteriorates. In this case, the parking lids are consumed 5-10 times more. Mountain roads have a significant impact on tire wear, reducing their service life by 3-4 times. increases fuel consumption and reduces power [4]. Climatic conditions are represented by air temperature, barometric pressure, and humidity. More than half of the territory of the former Soviet Union is considered a cold region (the temperature is -20°C for more than half the year), this low air temperature has a significant impact on the technical condition of the car. Operation of vehicles under such conditions leads to the overcooling of all units and mechanisms. It becomes difficult to start the cold engine, the liquid in the cooling system freezes, and the battery electrolyte is extremely cold. The reason for the complex operation of cold carburetor engines (at low temperatures) is the low volatility of the gasoline, increased oil viscosity, reduced battery capacity, and reduced voltage at the poles. Low diesel temperature (entering the cylinders), compressed air temperature not lower than 350-380°C, resulting in slow fuel delivery and deterioration of spraying and ignition quality. Experiments show that engine wear is 5-6 times higher than water temperature of 30°C (water temperature of 80°C). At low air temperatures, fuel consumption increases by 5-20%. Increasing the ambient air temperature reduces the heat release from the radiator, causing the engine to overheat. In this case, the engine operates with detonation, reducing its power, cost-effectiveness, and durability.

The group of structural factors influencing the reliability of a vehicle includes: reliability level; structural complexity level; homogenization (unification) degree. The level of reliability is assessed by the ratio of the costs of developing the vehicle and maintaining it in good technical condition. The main structural factors influencing the reliability level are:

a) shape and dimensions of the parts, relative pressure and stresses on the surface of the parts, fatigue strength of the metal;

b) strength of the structure, change in the shape of parts under the influence of operating loads;

c) the precise position of the surfaces and axes of the parts working in the connection relative to each other;

j) correct selection of transmissions (seats) that ensure reliable operation of movable and fixed connections;

d) equipping engines with efficient oil pumps;

e) oil pump type productivity without bubbles;

j) use of a crankcase ventilation system, oil radiators, and high-quality oil purification to reduce oil temperature and slow down its wear;

z) the use of centrifuges with a hydroreactive drive, which purify oil a second time in engines;

i) creation of special channels for centrifugal oil purification on crankshafts;

k) using thermostats and other factors in the cooling system to maintain optimal temperature.

The complexity level of the structure. When designing a vehicle, it is necessary to consider the reliability requirements during the period from the selection of the working scheme of each unit and part to the creation of its design. The car's design should be relatively simple and consist of as few elements as possible. From the perspective of reliability theory, vehicle elements represent a complex system connected one after another.

Degree of homogenization (unification). Vehicle reliability can also be improved by using unified and standardized components and parts, as they have successfully passed tests under typical operating conditions and demonstrated their high reliability. For example, they can include bearings, seals, electrical equipment parts, normals, and a number of standardized parts. The use of standardized parts ultimately reduces the cost of maintenance and repair processes, as well as the inventory of necessary spare parts and fasteners.

Atmospheric pressure is one of the main factors in engine efficiency.

Conclusion

The climatic conditions of our country's territory consist of arid, mountainous, and desert zones, changes in atmospheric pressure, and most importantly, a large amount of dust in the air. Abrasive particles in dust accelerate the corrosion of car parts and, consequently, reduce their operational reliability. Additionally, abrasive particles enter the engine cylinders along with fuel, accelerating its failure. Dust particles can enter fuel through the air, when transporting fuel from one place to another, when refueling a car, and under several other conditions. Therefore, the problems of increasing the operational reliability of manufactured vehicles in the climatic conditions of Central Asia, in particular, Uzbekistan, remain relevant.

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