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STUDYING AND ELIMINATING THE SHORTCOMINGS OF THE TORMOZING SYSTEM OF A MODERN LIGHT CAR

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Annotation. Currently, a number of large-scale reforms being carried out in our country are bearing fruit. The automotive industry is also entering a new era of development, progress, and renewal. And, of course, meeting consumer demands is an important task in every sphere, whether it be production or service provision, any product or service must have high quality that meets the customer's needs. Also, in a constantly growing, globalizing world, the production of stylish, comfortable, convenient, and multifaceted modern cars for customers is a requirement of the times. The types of cars manufactured in our country are increasing day by day, but there are technical malfunctions in the cars manufactured, and many malfunctions occur during operation. For example, Cobalt, Lacetti cars have some brake system problems that are dangerous to human life. Due to malfunctions in the braking system, several hundred car accidents occur annually. Therefore, through this article, we will thoroughly examine such issues and demonstrate the importance of their resolution.

Keywords: braking system, friction, traffic safety.

ZAMONAVIY YENGIL AVTOMOBILNING TORMOZ TIZIMIDAGI KAMCHILIKLARNI O‘RGANISH VA ULARNI BARTARAF ETISH

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Annotatsiya. Hozirgi kunda mamlakatimizda amalga oshirilayotgan keng ko‘lamli islohotlar o‘z samarasini bermoqda. Avtomobilsozlik sohasi ham rivojlanish, taraqqiyot va yangilanishning yangi bosqichiga kirib bormoqda. Albatta, har qanday sohada, xoh ishlab chiqarish, xoh xizmat ko‘rsatish bo‘lsin, iste’molchi talabini qondirish muhim vazifalardan biridir. Har qanday mahsulot yoki xizmat mijoz ehtiyojlariga mos yuqori sifatga ega bo‘lishi lozim. Shu bilan birga, tobora globallashib borayotgan zamonaviy dunyoda xaridorlar uchun zamonaviy, qulay, qudratli va ko‘p funksiyali avtomobillarni ishlab chiqarish davr talabi hisoblanadi. Mamlakatimizda ishlab chiqarilayotgan avtomobillar turlari kun sayin ortib bormoqda, biroq ular orasida ayrim texnik nosozliklar mavjud. Xususan, Cobalt va Lacetti rusumli avtomobillarda tormoz tizimiga oid ba’zi muammolar uchrab turadi, bu esa inson hayoti uchun xavf tug‘diradi. Tormoz tizimidagi nosozliklar natijasida har yili bir necha yuzlab yo‘l-transport hodisalari sodir bo‘ladi. Shu sababli, ushbu maqolada mazkur masalalar chuqur o‘rganilib, ularni bartaraf etishning ahamiyati yoritiladi.

Kalit so’zlar: tormoz tizimi, ishqalanish, harakat xavfsizligi.

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Introduction. The automotive industry is developing day by day, and the fact that the Republic of Uzbekistan is among the countries producing automobiles is a sign of its unparalleled potential and a factor confirming its greatness in the future [1].

The measures being taken today to prevent road traffic accidents, do not allow reducing their number. This presents experts with the task of a very serious approach to road safety issues [2].

Cars have entered our lives so quickly that it's hard to imagine life without them. Today, in particular, the transportation of raw materials and finished products, open-pit mining of coal and ore, industrial construction of residential buildings and industrial enterprises, transportation of goods necessary for agriculture, fertilizers and various products, delivery of goods directly to consumers, and other issues are in wide demand [3]. The economic development of Uzbekistan depends on the level of development of the machine-building industry, the quality of the machines produced, their competitiveness in the world market in terms of technical, technological, operational, and economic indicators [4].

Taking into account the operating conditions in our country, scientific and practical recommendations have been developed based on collecting data on malfunctions in the brake system of passenger cars and determining the causes of their occurrence. Also, the general content and direction of the research and recommendations will be as follows:

1. Determining the malfunctions of the braking system of passenger cars under operating conditions and their causes.

2. Identifying factors affecting the operational reliability of the vehicle braking system and finding ways to eliminate them.

Literature analysis.

V.A. Ilarionov, B.E. Borovskoy, Yu.B. Suvorova, S.A. Yevtyukova, E.R. Domke and other domestic scientists. Problems of obtaining initial data for the study of the automobile braking process (in particular, the vehicle wheel movement coefficient on the road) Yu.V. Kuznetsov, and many other local scholars. This issue is also reflected in the works of domestic tribologists A.V. Chichinadze and I.V. Kragelskiy. Among foreign works, the research of J. Reimel, J. Wong, and many other scientists should be highlighted [5-8].

Despite a sufficiently wide range of research on this issue, currently this topic is limited to studying the direct braking of an automobile assigned to a certain category (without subcategories), illuminated only in a narrowly directed average spectrum. The supporting surface is also divided into typical variants without considering the design and operational characteristics of these contact elements (automobile wheel tires and road surface).

Research methodology.

Currently, many scientists are working on identifying defects in the braking system of automobiles, for example, Alexandrova M. P., Nikulnikova E. N., Fedoseeva V. N., and others have considered the following issues: braking mechanisms used in automobiles, their classification; The characteristics of the brake shoes, the requirements for them, and the influence of operational factors on the operation of the vehicle's braking system were analyzed and studied [9,10].

Vashutkin Alexander Sergeevich presented recommendations for justifying the parameters of the braking mechanism and ensuring the stability of the braking torque. In addition, recommendations have been developed for the methods used to improve the quality of the working surface of brake shoes and brake discs [11].

Analyzing the above cases, I set myself the following goals for identifying and eliminating malfunctions in the braking system of Cobalt vehicles:

- Factors affecting the reliability of vehicles operated in the Republic of Uzbekistan.

- and preventing the failure of the brake system parts of light vehicles.
- and the elimination of brake system malfunctions of Cobalt vehicles, taking into account climatic conditions.
- Development of proposals for improving the safety of vehicles through modern active safety systems in "Cobalt" passenger cars.

operating conditions affecting the vehicle's design and characteristics.

A car is created for certain operating conditions. Operating conditions consist of three parts: traffic conditions, road conditions, and weather conditions;

Transportation conditions are determined by a number of factors related to the operation of the vehicle. The conditions for the transportation of trucks include the type of cargo, its size, batch, distance and organization of transportation, loading and unloading, cargo.

storage, maintenance, and repair of vehicles.

The type of cargo is determined by its physical and mechanical properties, density, mass, dimensions, cost, mass, and transportation speed. The batch is determined by the size of one car or truck. Delivery distance is the distance to which goods must be delivered, and can be local (up to 50 km) or long-distance (more than 50 km). Transport organization means how much time the vehicle is at work (in hours or days), the distance it covers in a day (in kilometers), how many days it is at work in a year, the distance it covers in a year (in km). The organization of cargo transportation (time of day, days of the week, months of the year), they say, organizes the driver's work. Load unloading can be manual or mechanized.

The vehicle must be designed to carry a certain load, for example: systems for liquid cargo, dump trucks for bulk cargo are used. The cargo batch determines the car's carrying capacity.

When carrying out local transportation, it is advisable to use vehicles with high throughput and mechanized loading and unloading operations.

Result.

One of the external factors affecting the operation of the Cobalt braking system is its tires. With different road contacts and clutches, the braking efficiency is different. Therefore, it is recommended to maintain the pressure in the busbars at standard values, uniformly. The busbars on the same axis should have approximately the same depth and pattern of the tread.

Figure 1. Cobalt traffic accident caused by tire and brake system failure.

Many accidents occur due to poor tire contact with the ground, such as a Cobalt car tire cracking or problems caused by poor contact with asphalt concrete.

Loading car.

If the vehicle is loaded unevenly, a greater torque is required to brake the wheels that carry more weight than the other wheels. To brake a fully loaded vehicle, it is necessary to press the brake levers with great force.

Wheel fastening angles lead to the car pulling to the side when braking.

Cobalt cars are manufactured with a structural malfunction of the braking system, when the car moves with the air conditioner turned on and the steering wheel rests, the brake pedal freezes, which leads to many road accidents.

As a solution to the above-described problem, I have electronic control that determines the state of steering when steering is turned 90 ^{0} to the right and left of the starting position while the car is moving with the air conditioner turned on.

to the unit, the sensor must give the command to the electronic control unit to turn off the air conditioner when the vehicle steering exceeds the specified limit. As a result, the car's brake pedal won't get stuck, and consequently, traffic accidents due to brake system failure will be prevented to some extent.

In addition, during the operation of Cobalt vehicles, the following malfunctions are observed in the braking system:

- weak braking effect,
- that the wheels are not free from braking or are not rotating,
- that the braking mechanisms on the same axis operate differently.

The weakening of brake action is observed when the adjustments of brake mechanisms and steering are disrupted, brake shoes are dirty or lubricated, air enters the steering system, and the brake fluid volume decreases. In vehicles with a hydraulic amplifier, the decrease in braking efficiency can also be caused by improper operation of the amplifier.

The main reasons why the wheels are not freed from braking are that the parts of the braking mechanism, under the influence of heat, increase in size and their friction surfaces stick together as a result of excessive braking. Uneven operation of the brake mechanisms on the wheels causes the car to tilt sideways during braking. Such a situation often arises due to incorrect adjustment of the braking mechanisms, as well as the reasons listed above. If brake fluid leaks from the system, the brake system will fail, or in double-circuit systems, one of the circuits will fail.

As a result of researching the braking system of the Cobalt car, we identified the following shortcomings and developed ways to eliminate them (Table. 1).

Malfunction	Method of elimination
I-Fault: Insufficient braking efficiency.	
1.1. Leakage of liquid from the wheel cylinders of the front or rear brake mechanisms.	1.1. Replace the faulty parts of the wheel cylinders, wash and dry the drums and casings, and remove the air from the braking system.

1.2. There is air in the hydraulic system of the braking system.	1.2. Air is removed from the hydrant.
1.3. The rubber linings (cuffs) on the main cylinder are damaged.	1.3. The cuffs are replaced, and the hydraulic system is pumped.
Failure II: The vehicle brakes independently while moving.	
2.1. Air is drawn in around the protective casing of the vacuum amplifier.	2.1. After replacing the vacuum amplifier, remove the protective cover and lubricate the compressor with SIATIM-221 oil.
2.2. The amplifier cover gasket is worn out or the gasket is installed incorrectly, and the recording ring is loose.	2.2. The vacuum amplifier has been replaced.
Malfunction III: All wheels are not fully freed from braking.	
3.1. The brake pedal does not have free play. The vacuum amplifier's adjusting bolt protrudes towards the cylinder head.	Brake pedal free play adjustment, adjusting bolt protrusion 1.25... Set 2.0 mm.
3.2. The valve housing does not move because the diaphragm is compressed.	3.2. The vacuum amplifier has been replaced. It is necessary to clean the hole and remove air from the hydraulic system.
3.3. The liquid opening in the main cylinder is contaminated.	3.3. Replacement of the vacuum amplifier.
3.4. The cylinder head gaskets are blocked.	3.4. The hydraulic brake line must be washed with brake fluid, the cuffs must be replaced, and the air must be released from the line.
3.5. The cylinder head piston is stuck in the cylinder.	3.5. The main cylinder should be checked and replaced if necessary.
Malfunction IV: One of the wheels is braking even if the pedal is not pressed.	
4.1. Due to the corrosion effect, the cylinder piston becomes clogged.	4.1. The cylinder must be disassembled, cleaned, washed, and damaged parts replaced.
4.2. The cuffs are pressed in the working cylinder.	4.2. It is necessary to replace the cuffs and wash the brake fluid with the brake pad.
V- malfunction: car pulls to the side while braking.	
5.1. Brake fluid is leaking from the working cylinders.	5.1. The cuffs must be replaced, and the air must be removed from the braking system.
5.2. The piston is stuck in the working cylinder.	5.2. The cylinder is disassembled and damaged parts are replaced.
5.3. Brake discs or drums are dirty or contaminated.	5.3. It is necessary to clean the brake mechanism parts.

Conclusion.

The main technological measures that increase the accuracy and durability of the vehicle braking system include the following:

Production of materials with high corrosion resistance for various operating conditions of automobile braking systems and obtaining high-quality semi-finished products close in size to finished parts;

Development of technological methods that allow for the manufacture of parts with stable physical and mechanical properties, both in terms of accuracy and dimensions;

- application of quality control methods for materials, workpieces, and finished products corresponding to the corresponding reliability indicators;

- Application of strengthening processes (high-frequency current, cementation, cyanidation, chromium plating, etc.) ensuring the quality of the working surface of the brake system parts with high resistance to corrosion and failure under various operating conditions.

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