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PROBLEMS AND SOLUTIONS IN THE OPERATION OF A LIGHT VEHICLE'S BRAKE SYSTEM

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Abstract: The car's braking system is of great importance from a safety perspective. This article analyzes the main problems arising during the operation of the brake system, their causes and consequences, as well as effective solutions. The main goal of the work is to increase the reliability and safety of the braking system, and proposals have been developed aimed at ensuring the effectiveness of the braking system in modern cars.

Keywords: passenger car, braking system, operating process, problems, solutions, safety, efficiency.

Introduction. The braking system is one of the most important components in ensuring safety and control efficiency in passenger cars. The basis for ensuring the safety of drivers and passengers during vehicle traffic, preventing road accidents, and ensuring efficient vehicle operation is the proper functioning of the braking system. In modern passenger cars, the braking system consists of hydraulic, mechanical, and electronic elements, and the quality and operational efficiency of each component determine the reliability of the entire system.

The operation of the brake system is carried out by the driver's pressure on the pedal, brake fluid, the condition of pads and disks, as well as signals from electronic control systems. At the same time, problems arising in the braking system, such as elongation of the brake area, stiffness or softness of the pedal, noise and vibrations, overheating of the system, and malfunctions in electronic control directly jeopardize the driver's safety.

Analysis shows that malfunctions in the brake system are often associated with insufficient maintenance, the use of outdated or low-quality components, as well as improper system configuration. Therefore, to increase the efficiency and ensure the safety of the braking system, it is necessary to conduct regular technical inspections of the system, use high-quality components, diagnose electronic systems, and update them when necessary.

The article identifies the main problems in the operation of the car brake system and analyzes effective solutions for their elimination. The main goal of the research is to increase the reliability of the braking system, ensure safety, and guarantee its optimal operation in modern vehicles. At the same time, the article also shows ways to develop recommendations for the maintenance of the brake system, update and optimize the system components.

Discussion. The braking system of a passenger car plays an important role in car safety, and any malfunction in its operation can pose a serious danger. The analysis results showed that problems in the braking system are often associated with the level of maintenance of the system, wear and tear of components, and incorrect adjustment. For example, the elongation of the braking field is one of the most common problems. This occurs due to the aging of the hydraulic fluid and the deformation of the brake pads or discs. As a result, the vehicle's stopping distance increases and the risk of road traffic accidents significantly increases. To eliminate this problem, it is important

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to regularly check brake components, use high-quality fluids and pads, and professionally configure the system.

In addition, the hardness or softness of the brake pedal is also an important problem. In hydraulic systems, inflow of air, lack of liquid, or malfunction of the master cylinder can lead to incorrect pedal operation. If the pedal is too hard, the driver cannot apply brakes quickly and effectively; if too soft, braking efficiency decreases. To eliminate these problems, it is recommended to bleed the system, check the liquid level, and replace components if necessary.

Also, the appearance of noise and vibrations in the braking system is one of the common problems. This is often due to improper contact between the brake discs and pads, disk deformation, or wear. As a result, the driver experiences additional stress during the braking process, and the reliability of the system decreases. To eliminate this problem, it is important to regularly check brake discs and pads, replace deformed parts, as well as adjust the gaps in the system.

Problems with the heating of the brake system also negatively affect safety. Overheating of the system occurs as a result of long-distance drops or frequent braking, which reduces the effectiveness of brakes. To eliminate this problem, it is recommended to use ventilated disks, high-quality pads, and technically optimize the system.

Modern cars have ABS, EBD, and other electronic control systems that optimize the braking process. However, malfunctions in electronic systems also cause problems, for example, ABS may give incorrect signals or not work. In such cases, it is recommended to check the system using diagnostic tools, update or replace electronic components.

In general, the analysis shows that in passenger cars, braking system problems mainly arise from insufficient maintenance, wear and tear of components, and incorrect adjustment. By eliminating these problems, vehicle safety and control efficiency will be significantly increased. At the same time, the use of modern technologies and high-quality components ensures long-term stable operation of the braking system.

The main problems in the operation of the brake system are:

1. Braking distance increase: The vehicle's stopping distance increases due to worn-out or incorrectly adjusted brake system components (such as brake fluid or pads). This situation is a serious threat to security.

Solution: Regular inspection of brake components, use of high-quality fluids and pads, and professional system adjustment.

2. Hardness or softness of the brake pedal: In hydraulic systems, insufficient air or fluid intake impairs pedal performance.

Solution: Cleaning the system with air (bleeding), checking the liquid level, replacing components if necessary.

3. Noise and vibration: Noise occurs due to improper contact between the brake pedal or disc-plates, disk deformation, or wear.

Solution: Regular inspection of the brake discs and pads, replacement of deformed parts, adjustment of the spaces between the brake pedal and the disc.

4. Problems with braking system overheating: Long-distance drops or frequent braking can lead to overheating of the system. This reduces efficiency.

Solution: Technical optimization of ventilated disks, high-quality pads, and the system.

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5. Problems in electronic control systems: ABS or EBD systems may give incorrect signals or not work.
Solution: Check the system with diagnostic tools, update or replace electronic components.
Analysis shows that brake system problems in passenger cars often arise from insufficient maintenance, wear of components, and incorrect adjustment. By eliminating the problems, it is possible to significantly increase the safety of the car and the efficiency of control.
Conclusion. The analysis showed that the braking system of a passenger car is one of the most important components in terms of safety, and problems arising during its operation pose a serious risk. The article extensively analyzes the main problems in the operation of the brake system, including elongation of the brake area, pedal stiffness or softness, noise and vibrations, overheating of the system, and malfunctions in electronic control systems.
Effective solutions were proposed for each problem: regular maintenance, use of high-quality components, diagnostics and adjustment of the braking system, updating or replacing electronic systems. These measures will serve to increase the safety of the vehicle and optimize the efficiency of the braking system.
The article also emphasized the need to use modern technologies to ensure the effective operation of the braking system. Ventilated disks, high-quality pads, optimal operation of electronic control systems, and regular monitoring of the system increase the reliability of the braking process.
In general, identifying problems with the braking system in passenger cars and taking measures to eliminate them significantly increases the safety of the vehicle. This not only ensures the safety of the driver and passengers, but also guarantees the long-term efficiency of the vehicle. Therefore, the enrichment of the braking system with technical maintenance, diagnostics, and modern technologies is the main factor in ensuring the safe and reliable operation of passenger cars.

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