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Research Article

METHOD FOR MONITORING THE BRAKING EFFICIENCY AND STABILITY OF VEHICLES WITH ABS WHEN DIAGNOSING THEM ON ROLLER STANDS

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Dehqonov Qodirjon Maxamat o'g'li
Assistant, Fergana Polytechnic Institute, Fergana, Uzbekistan

Odilov Jahongir Anvarjon o'g'li
Master's Degree Student, Fergana Polytechnic Institute, Fergana, Uzbekistan

Mo'ydinov Nodirjon Xomid o'g'li
Assistant, Fergana Polytechnic Institute, Fergana, Uzbekistan

Bakirov Ahrorjon Azamjon o'g'li
Master's Degree Student, Fergana Polytechnic Institute, Fergana, Uzbekistan

ABSTRACT

Road transport today occupies a leading position in terms of traffic volumes, in comparison with other modes of transport. More than 80% of cargo and more than 75% of passengers are transported by road every year.

KEYWORDS

The Main Department of the Traffic Police, Modern brake systems, ABS, Brake tester, pedal, handbrake,

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INTRODUCTION

However, road transport remains the most dangerous mode of transport. Statistics show that road traffic accidents are frequent and their severity is increasing every year. According to the Main Department of the Traffic Police, 2,242 traffic accidents were registered in Uzbekistan in the first four months of 2021. As a result, 1684 people were injured, 557 died [1-4]. According to the analysis, there were 318 accidents involving pedestrians and 148 accidents involving children in April alone. Of the total number of accidents that occurred due to technical malfunctions, 40-50% are due to malfunctions of the brake system, the failures of which are extremely dangerous during the operation of motor vehicles (ATS). Modern brake systems are becoming energy intensive, their design is becoming more complex, and the number of cars equipped with anti-lock systems is increasing. To improve the safety of vehicles under operating conditions, it is necessary to maintain their braking systems in a technically sound condition, which is possible on the basis of quality control and informative diagnostics [4-9].

Equipment and instruments for monitoring the braking system of a car. The action of the brake stands is based on the analysis of the adhesion forces of the braked wheels of the car with the working surface of the stand. Brake testers are available in two types - platform and roller.

The site stand has four measuring platforms, two for each axle of the vehicle, equipped with sensors, and an instrument rack connected to the platforms by an electric cable. In the process of diagnosing, the car at a speed of 6-10 km/h drives its wheels onto the platforms of the stand and slows down [9-12]. The measurement of braking forces is based on measuring the movement of platforms, which occurs due to the occurrence of inertia forces of the car-platform system and friction forces between the tires and the surface of the platforms. This movement, which is proportional to the total braking force of the vehicle, is recorded by sensors installed under the measuring platforms. The signals from the sensors are transmitted to the computer, which displays the maximum braking force on the display and printer at intervals of 0.05 s, on the display - a light indication of the uneven braking of the wheels of each axle and a value in percent of the braking efficiency [13-15].

The following follows to the transition of the platform stands:

- The occupied area required for placement of the stand and dispersal of the car before entering the stand;
- Evaluation of the measurement of the braking force from the deviation of the direction of movement of the car relative to the standing axis;
- Insufficient safety of work at the stand in a driven vehicle;

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- Infrequent braking loads on each wheel;
- It is not possible to determine the braking force of the parking brake when starting the car;
- The force on the brake pedal is not detected.

The following parameters are tested on the stands:

- Braking force on each wheel;
- Specific braking force;
- Coefficient of non-uniformity of braking forces;
- Effort on the controls (pedal, handbrake);
- Brake system response time;
- Braking distances.

Additionally, the car is weighed on each wheel.

Stands provide the following modes of control: working control braking; emergency braking; parking brake braking.

Diagnosis of vehicles with abs brake system. Control of the technical condition of the brake systems of the vehicle under operating conditions can be implemented both on the road and in bench conditions. In connection with the climatic conditions of our country, bench methods of control are most widely used. However, it is very difficult and energy-consuming to carry out a qualitative control of the braking process of a car with a functioning ABS on modern power brake stands. The current GOST R 51709-2001 provides for separate control of the brake system and ABS. To assess the quality of ABS work, GOST R 51709-2001 does not establish or regulate quantitative parameters. ABS performance is assessed visually - using a warning lamp on the instrument panel indicating a malfunction of the ABS, visual observation of the straightness of the vehicle and the absence of skid marks on the road during its braking. ABS is considered as an additional option for the operation of the brake system, and it is checked autonomously using diagnostic devices (testers, scanners). But, as the experience of operating cars equipped with ABS shows, up to 30% of the malfunctions of these systems are not detected by diagnostic scanners. ABS is considered as an additional option for the operation of the brake system and is checked independently using diagnostic devices (testers, scanners). But, as the experience of operating vehicles equipped with ABS shows, up to 30% of malfunctions of these systems are not detected by diagnostic scanners. In this regard, the issue of developing a method for monitoring the braking efficiency and stability of vehicles with ABS in the joint operation of the braking and anti-lock systems on roller stands is of particular relevance. A working hypothesis was the assumption that the control of the brake systems of vehicles during their braking with a functioning ABS on inertial roller stands, which ensure the synchronous rotation of all support rollers and the measurement of braking forces, is possible without increasing the drive power of the stands, and as indicators for evaluating the effectiveness of the joint functioning of the brake systems and ABS, it is advisable to use integral indicators calculated on the basis of the values of the implemented tangential reactions and the slip coefficients of the wheels relative to the surfaces

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of the support rollers, averaged over the braking process.

The process of controlling the brake system using a roller brake stent. The control of the braking efficiency and stability of vehicles with ABS under operating conditions should be carried out with the joint operation of the brake system and ABS on roller stands of inertial type, which provide continuous measurement of braking forces and loads individually on each wheel, as well as the angular velocities of the support rollers of the stand and all braking wheels of the vehicle , redistribution of the mass of the car between its axles, synchronous rotation of the support rollers.

CONCLUSION

Monitoring the effectiveness of the joint operation of the brake system and ABS of cars on roller tables under operating conditions should be carried out on the basis of integral indicators:

- The average value of the specific braking force y;
- The relative difference in the braking forces of the wheel axes, as well as the response time of the brake system.

Quality control of the process of braking the wheels of a car using an anti-lock brake system - based on the average values of the relative slip S, the slip range AS and the performed tangential reaction ARX.

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