УДК: 69.059.14

WHEEL TRACK DEFORMATIONS IN ASPHALT CONCRETE PAVEMENTS

Yuldashev Akmal Temirovich senior lecturer
Tashkent State Transport University

Narmanov Akbar Kuziboyevich, assistant teacher
Tashkent State Transport University

ABSTRACT

The article describes the reasons for the appearance of wheelbase deformations that occur on roadways with asphalt concrete pavement, their types and methods of their elimination, which are theoretically hit and analyzed

Key words: asphalt concrete pavement, roadbase, operation, loads, deformation, wheel track deformations.

The main element of the road construction on which the vehicle will move is the road surface. The road structure consists of several layers, including the roadway, the multi-layer base part of the roadway, which receives cargo from road transport and transfers it to the ground, and the lower part of the road cover. As a result of the action of forces on the surface of the asphalt concrete coating through the wheels of the car during the movement of the vehicle on the highways, the formation of elastic deformations and the subsequent appearance of irreversible deformations on the pavement.

The problem of the formation of wheelbase deformations on the pavements and its elimination has long been considered one of the most important issues for road engineers in many countries of the world. The analysis of data shows that the formation of wheel track deformation is 20%-35% of all reasons for the decrease in the transport performance of highways. The formation of wheel track deformations on highways occurs within 3-5 years after the highways are put into operation. As a result of high-speed and long-term movement of cars on highways, road traffic accidents are more likely to occur on roads with wheel track deformations of 15-17 mm [1,2].

The pressure applied to the asphalt concrete pavements by the wheels of heavy-duty vehicles causes the deterioration of the pavement surface, which leads to the appearance of stresses in the road surface layers, and also depends on the specific pressure of the wheel and the size of the car wheel, which leads to excessive loading of the road surface section, and the formation of longitudinal stress, i.e., wheel marks [3].

Deformations in asphalt concrete pavements can appear in several forms: on the surface of the asphalt concrete pavement, it can be seen in the form of wheel track deformations caused by the movement of cars (Fig. 1), as well as in the appearance of deformations (depths) and cracks caused by deformations in the upper part of the road surface (Fig. 2).

As a result of the impact of loads from heavy vehicles moving for a long time on asphalt concrete pavements and high summer temperatures, various types of deformations are formed on highways, and this indicator is more often observed in the southern regions. In recent years, the deformations formed on highways, primarily due to the strong impact of heavy vehicles and the wear of this coating, lead to the appearance of wheel track deformations on the pavements (Fig. 1) [3].

Fig. 1. Deformations of wheel tracks formed on pavements as a result of vehicle movement.

Fig. 2. Disruptions (depth) and cracks caused by deformations in the base layers of the road surface.

The service life of the pavements can be reduced to 2-2. 5 times due to the occurrence of deformations and breakdowns as a result of high intensity of heavy vehicles on asphalt concrete pavements [5].

On newly built and reconstructed highways, the following types of formation of deformations on automobile roads are observed based on the data collected during the operation of roads caused by mechanical loads from automobils and the influence of other forces:

- residual deformation (formation of wheel tracks);
- the appearance of cracks due to wear of the pavements;
- the appearance of cracks as a result of an increase in temperature;
- unroughness of pavement (IRI) [7].

When testing asphalt concrete pavements resistant to wheel track deformations in the laboratory, test processes are performed on the pavement in the operational process, not on the newly laid asphalt concrete pavement. Standard test methods for asphalt concrete pavements exposed to high vehicular loads often do not show a positive effect on the use of additives that increase the erosion resistance of asphalt concrete. In the assessment of erosion resistance, modeling of the passage of heavy-duty vehicles on a single pavement surface is tested by wheel action through repeated pulls for asphalt-concrete pavements (Fig. 3).

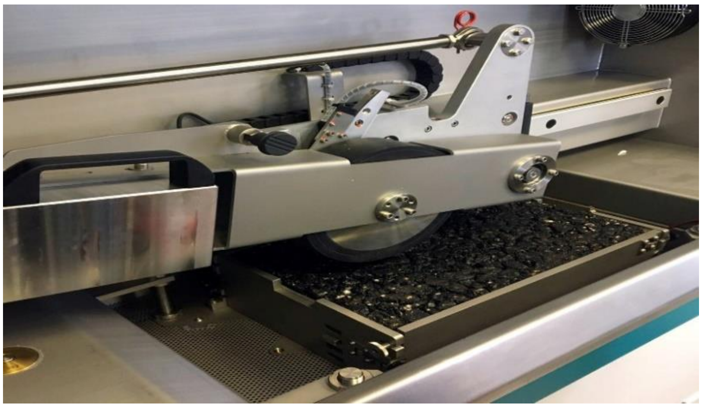

Fig. 3. **A device for testing asphalt concrete pavements for rutting.**

Increasing the deformation resistance of asphalt concrete pavements can be done in two ways: by calculation and by improving the composition of asphalt concrete. The development of the methodology for calculating road structures for resistance to deformations allows to develop the types of road surfaces resistant to the formation of wheel track deformations and the methods of repair activities [3].

Optimizing the properties of fillers in asphalt concrete, improving the properties of binders, and using temperature-resistant asphalt concrete types by using mineral additives, as well as using materials such as crushed mastic asphalt concrete and polymer-dispersed asphalt concrete, contribute to the reduction of possible deformations and breakdowns and increase the service life of the pavement [8].

The analysis of methods of asphalt concrete pavements to combat damage shows that there are currently new effective materials science solutions for the development of asphalt concrete compositions resistant to the formation of wheel track deformations and are currently being actively developed.

In order to develop complex measures to control the formation of wheel tracks, it is necessary to plan repair measures in time, develop a repair strategy and improve the condition of road structures in regulatory documents, and implement a methodology for predicting the formation of wheel track deformations using existing models.

REFERNCES:

1. Карпов Б.Н., Клековкина М.П., Мещеряков К.Г.О совершенствовании технических решений устройства дорожных одежд // Журнал Дорожная Держава. 2010. № 26. с. 18-20.
2. Пахаренко Д.В. Внимание - колея! // Журнал Дорожная Держава. 2010. №25. с. 28-30.
3. Костельков М.П., Перевалов В. П., Пахаренко Д. В. Практика борьбы с колейностью асфальтобетонных покрытий может быть успешной // Журнал Дорожная Техника. 2011, с. 54-70 с.
4. Илиополов С.К., Селезнев М.Г. Уточненный метод расчета напряженно-деформированного состояния системы «дорожная одежда - грунт». Ростов-на-Дону: Новая книга, 1997. 142 с.
5. Guide for Mechanistic-Empirical Design Of New And Rehabilitated Pavement Structures ARA / Inc., ERES Division 505 West University Avenue Champaign, Illinois 61820. 1999. pp. 20.
6. Николенко М.А., Бессчетнов Б.В. Повышение длительной трещиностойкости асфальтобетона дорожных покрытий // Инженерный вестник Дона, 2012, №2 URL: ivdon.ru/ru/magazine/archive/n2y2012/856.
7. Cundill M.A. The Merlin Low-Cost Road Roughness Measuring Machine. TRRL Research report 301. 1991. pp. 1-20.
8. Нарманов А.Қ., М.Т.Маматкулов "Асфалтбетон қопламаларindaги ғилдирак изи деформацмасияларининг пайдо бўлиш сабаблари" The 21st Century Skills for Profrssional Activity 163-165 б Т: 2021 й.