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Extending the Service Life of Asphalt Concrete Pavement Using Mineral Powder

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ABSTRACT

This article discusses issues such as increasing the service life of asphalt paved roads when extending the life of roads, methods of obtaining mineral powder from carbon limestone to improve the quality of road bitumen for asphalt concrete mixes.

INTRODUCTION

In order to create a modern competitive system of road management, clear delimitation of control and economic functions, de-monopolization, attract private sector enterprises and increase investment attractiveness, create a healthy competitive environment, widely introduce innovations in road construction, Also, in accordance with the objectives of the Action Strategy for the five priority areas of development of the Republic of Uzbekistan for 2017-2021, on December 9, 2019, the President of the Republic of Uzbekistan issued a decree "On measures to deep reform the road sector of the Republic of Uzbekistan." The Resolution "On measures to improve the management system of the road sector" and the Resolution "On measures to further improve the management system of the road sector" were adopted. Of course, road construction will play an important role in the development of the country.[1]

Materials and methods

In the preparation of this article, the methods of analysis of experiences, study and nationalization of foreign experience, study and orientation of technology opportunities, logic and generalization were used, and the implementation of measures based on the climatic graph of the region was offered.

The main part

Mineral powder added to asphalt concrete mixes is a polydespersed material and is the main

component that forms the structure of asphalt concrete. The main function of the mineral powder added to the bitumen is to increase the viscosity and strength of the asphalt concrete mix by absorbing the paraffin in the bitumen, which makes the bitumen product into a thin film.

Asphalt concrete mix is characterized by the fact that the mineral powder together with bitumen forms a structural, dispersed system and acts as the main binder. It is responsible for ensuring the strength of asphalt concrete by covering 90-95% of mineral grains as a thin film.[2]

Our experiments have shown that the moderate application of bitumen-mineral powder mixture creates a dispersed system structure in asphalt concrete, ensuring a high level of strength of asphalt concrete pavement. The addition of mineral powder thins the thickness of the bitumen layer formed in the aggregates, which in turn ensures that the grains of the aggregates (gravel, crushed stone, sand) are fully and firmly bound to the bitumen.

The majority of bitumen products currently produced in the country have low heat resistance, low resistance to cracking at low temperatures, poor quality of their properties, which leads to poor quality laying of many asphalt pavements, rapid deterioration, rapid deterioration in harsh and rapidly changing climates. is happening. The use of microcirculation powder not only brings significant benefits to the economy of our country, but also opens up opportunities for export and the construction of cement-concrete roads in foreign countries.

Numerous experiments have shown that the mineral powder added to asphalt concrete primarily affects the chemical and mineralogical composition of bitumen. Improves the properties of bitumen and ensures strong biting with fillers. Mineral powder for asphalt concrete mixes is mainly obtained from the carbonate natural stone materials, as well as by crushing stone materials such as shale, dolomite, diabase.

Results

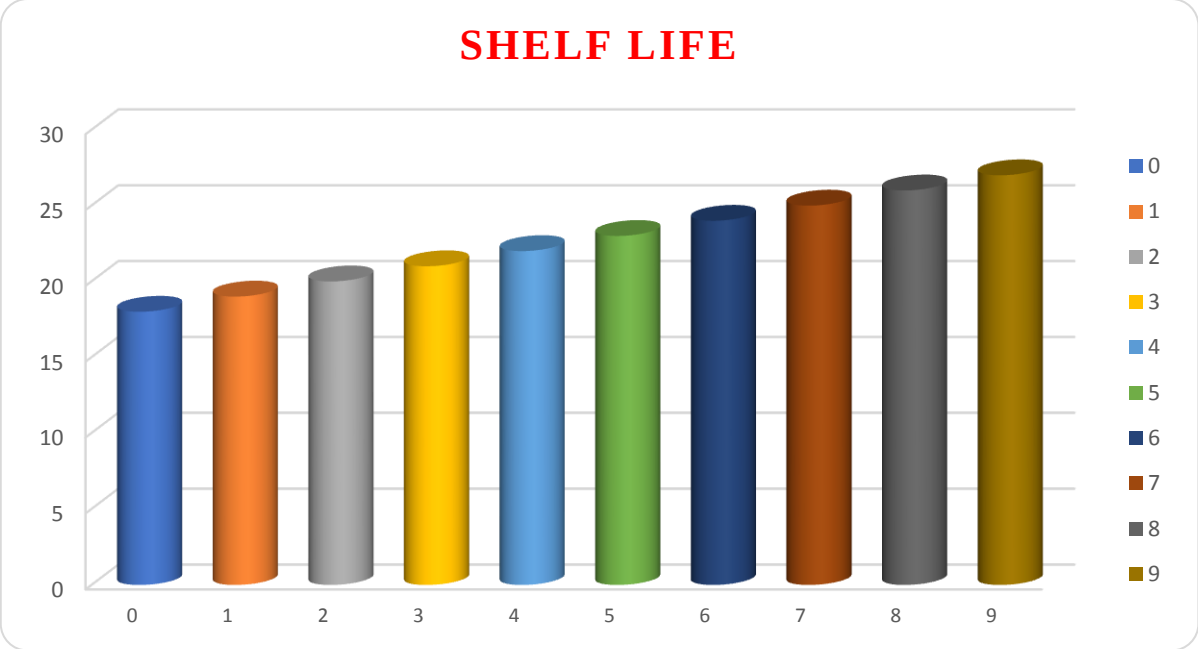
Hot asphalt concrete coating with the addition of mineral powder from carbon limestone achieves the following positive results. Experiments have shown that when preparing a cement concrete surface for repair, the following should be done:

- The service life of the road surface is extended for at least 3 years.
- The physical and mechanical properties of asphalt concrete pavement increase.
- The main properties of road bitumen (elongation, softening temperature, penetration depth, viscosity) increase and fully meet the requirements of GOST 22245-90.
- The negative impact of asphalt concrete plant (ABTS) wastes on the environment will be sharply reduced.
- It will be possible to obtain road mastic, which is resistant to dry, hot and rapidly changing climates.
- It will be possible to obtain modified bitumen, which is resistant to dry, hot and rapidly changing climates.
- Defective surfaces in the coating are marked.[3]

Based on the results, if we use our experience in extending the life of our roads, the condition of our country's roads will improve. This means that if we use mineral powder, our pavement will not only be stronger, but also beneficial to our economy.[4]

(Table 1)

Road type	Shelf life	Change
Asphalt concrete coating	20	Not available
Asphalt concrete coating with mineral powder	23	3- year



1- picture. Diagram

It was also noted that the addition of mineral powder significantly reduces dust emissions from asphalt concrete plants, which are harmful to the environment, and has a positive effect on the economic performance of organizations producing asphalt concrete mixes.

Conclusion

Studies of the composition of asphalt concrete have shown that the majority of bitumen products produced have low thermal resistance, crack resistance at low temperatures, poor adhesion properties, many asphalt pavements are poorly laid, rapidly deteriorating, sharp and fast. In order to prevent these shortcomings, we need to introduce innovative technologies to ensure that all our asphalt roads are strong and long-lasting, so the physical and mechanical properties of mineral powder from carbon limestone are thoroughly studied. We found that the process of mixing the powder with bitumen, the elongation, softening temperature and longevity of the bitumen to which the mineral powder was added. In particular, if we build cement concrete coatings using microcirculation, we achieve the following efficiencies:

- ✓ Increase the service life of the road surface by at least 3 years
- ✓ Increased physical and mechanical properties of asphalt concrete pavement.
- ✓ Reduction of costs for repair and maintenance of roads.
- ✓ Improving the basic properties of road bitumen.
- ✓ Increased availability of mastic as a road resistant to dry, hot and rapidly changing climates.
- ✓ I think it is more efficient to build asphalt roads, which are cheaper to use mineral powder, because they are more expensive in the construction of our cement-concrete roads.

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