ISSN: 2350-0328

International Journal of AdvancedResearch in Science, Engineering and Technology

Vol. 7, Issue 7 , July 2020

Technology of Bitumen Emulsion Research on Road Repair in Hot Climates

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ABSTRACT: The article presents theoretical and practical research results in the development of highway repairs and their implementation. that is, Modern high technology of road repair in hot climates, improvement of efficiency of repair works by means of introduction of bitumen emulsion in milling for road repair in hot climates of the republic, the economic efficiency of road repairs by introducing portland cement with milling bitumen emulsion to milling for road repair in hot climates of the Republic. In other words, I introduced the bitumen emulsion to improve the efficiency of repair and construction of roads in hot climates of the country, and to improve the quality of roads, thus reducing the number of road traffic accidents.

KEYWORDS: Asphalt granules, bitumen, emulsions, road, cement, sand, rocks

I.INTRODUCTION

Development of new, effective technologies to overcome the existing problems in the road network in the Republic, underfunding and road construction works The issue remains relevant.

It is known that the climate of Uzbekistan is a dry hot climate. The dry-hot climate is characterized by long summer (over 100 days) with maximum air temperature of + 50 °C and above, with average temperatures of 28-30 ^{0}C in the hottest month. the relative humidity is the sum of meteorological conditions, which is less than 50-55% in the hottest month. The conditions of dry hot climate are as follows: the amount of solar radiation during the summer is 600-800 kcal /sm^2 per day, temperatures above 25 ° C for more than 100 days, humidity below 50%, average wind speed in July is 1.2. Reaches 1.4 m /s. Dry-hot climates are characterized by significant variations in temperature and relative humidity during the day, when the surface of building structures is heated to 60-80 ^{0}C during the day, the night temperature is above 40 ° C, and dry winds are blown away.

Road construction materials are selected prior to the construction of roads and road facilities. When selecting road construction materials, it is important to consider the conditions and operation of roads and structures and how to withstand external forces.

Organic binders are subdivided into bituminous and resin types, depending on the source of the raw material.

Natural organic binders have been known for a long time and have been used as building materials in Babylon and Egypt about 4,000 years ago.

With the discovery of new rocks, such as limestone, the use of asphalt materials has diminished slightly, but since the 18th century, interest in asphalt has again increased. Meanwhile, asphalt was discovered in Iran, Cuba, Switzerland and France. Asphalt is used extensively in the construction of roads and bridges.

In our country from 1925 to 1927 various scientific works on the use of organic binders were carried out. As a result of scientific work, the State All-Union Standard has been established.

There is an increase in the efficiency of repairs by introducing technology for the construction of upper layers using bitumen emulsions and asphalt granules on highways in hot climates. [1]

II. RESEARCH PART

The use of recycled materials in asphalt coatings is generally mixed with the bitumen emulsion and deposited in cold asphalt surfaces after smoothing uneven surfaces. Liquid material, consisting of bitumen or resin and water, is an emulsion, and the emulsions can easily save up to 30% of the organic product by rapidly spreading on the surface of the mineral material.

Bitumen emulsions are environmentally friendly and water environments and bituminous particles play a role. Bitumen in road emulsions is approximately 1 microns and is 50-60% of the structure of the environment. When

ISSN: 2350-0328
International Journal of AdvancedResearch in Science, Engineering and Technology
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70% of their content is emulsion with high concentration. Bitumen is a polar substance and does not dissolve in the polar fluid (water). Therefore, it forms a callous environment with high water.

The main advantage of emulsions, especially direct, is that they have very low values compared to bitumen. In addition to heating stone materials, emulsions and mixtures, it allows them to work with cold mixing, which speeds up road construction and repair and simplifies their technology.

There is a strong connection between the old surface and the asphalt concrete layer, which is used by most adhesive layers for many types of roads and is used to treat the entire surface with a thin layer. Depending on the type of coating and surface conditions per square meter, it is recommended to use 0.25 to 0.7 liters of bitumen emulsion. The emulsion acts as an over-lubricant and forms a plane between the two layers. When applied under the layer, when the traffic is stopped or the speed is reduced to 40 km / h, it is necessary to wait for full emission of the emulsion before applying the top layer [2].

Highway repair with the use of bitumen emulsion is effective. This method can create one or more layers. This method is used to repair old asphalt concrete coatings for various defects and oxidation, breakage and repair of cracks or open surface coatings. The emulsion easily penetrates the surface of the cracks, penetrates to the surface and covers the mineral aggregate, thus increasing the life of the coating and increasing the lifetime of the coating. The technology uses fine sand coating when the coating is repaired.

The granulometric composition of the asphalt granule from the work of the freeway simon section is shown in Table 1

The granulometric composition of the asphalt pellets scraped with the help of the working piece of freeway simon.

Table 1

Name of the parameter	Sieve size (mm)									
	20	**10**	**5**	**2,5**	**1,25**	**0.63**	**0.315**	**0.16**	**0.07**	**<0.071**
Total balances (gr)	**6**	**14**	**38**	**34**	**20**	**82**	**138**	**86**	**28**	**24**
Full jump **gr(w1*w2)**	**464**	**450**	**412**	**378**	**358**	**276**	**138**	**52**	**24**	**0**
Full jump % = w2\w1 *100	**99**	**96**	**88**	**80**	**76**	**59**	**29**	**11**	**5**	**0**

Particle size distribution is described below in mineral powder and cement to meet the requirements in GOST 16557-78 [3].

The use of bitumen by composite technology based on bitumen emulsions significantly reduces the use of bitumen against the coating of hot and cold asphalt concrete mixes, and the results are presented in Table 2.

ISSN: 2350-0328

International Journal of AdvancedResearch in Science, Engineering and Technology

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S/N	Composition of the mixture	The age of the samples	The average compressive strength limit of the resulting sample. samples filled with water **60 C° (P_1, MPa)**	Average compressive strength of the sample to be compressed (dry sample) (P= P1 * 1,3) MPa
1.	Asphaltobone granules 50% (<10mm) Emulsion3% Cement - 5% Water - 8%	**3 day**	**1,16**	**1,508**
		7 day	**1,53**	**1,989**
		28 day .	**1,67**	**2.171**
2.	Asphaltobone granules 45% Emulsion-5% Cement - 5% Water - 8%	**3 day**	**1,16**	**1,508**
		7 day	**1,2**	**1,56**
		28 day	**1,39**	**1,807**
3.	**Asphaltobone granules 50%** **Emulsion 7%** **Cement - 5%** **Suv - 10%**	**3 day**	**0,89**	**1,157**
		7 day .	**0,89**	**1,157**
		28 day .	**0,98**	**1,274**
4.	**Asphaltobone granules 45%** **Emulsiya10%** **Cement - 5%**	**3 day .**	**0,54**	**0,702**
		7 day .	**0,71**	**0,923**
		28 day	**0,8**	**1,04**
5.	Asphaltobone granules 50% Emulsion 10% Cement - 5% Water - 10%	**3 day**	**0,89**	**1,157**
		7 day .	**0,89**	**1,157**
		28 day	**0,98**	**1,274**
6.	Asphalt granules 45% Emulsion 7% Cement - 3% Water - 5%	**3 day**	**0,62**	**0,806**
		7 day	**0,71**	**0,923**
		28 day	**0,89**	**1,157**
7.	Asphalt granules 45% Emulsion 10% Cement - 3% Water - 5%	**3 day**	**0,45**	**0,585**
		7 day	**0,89**	**1,157**
		28 day	**0,98**	**1,274**

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International Journal of AdvancedResearch in Science, Engineering and Technology
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The dependence of samples on the strength and content of the samples. Table 2
Picture 1. Process of verification of prepared asphalt concrete in hydraulic press.

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International Journal of AdvancedResearch in Science, Engineering and Technology
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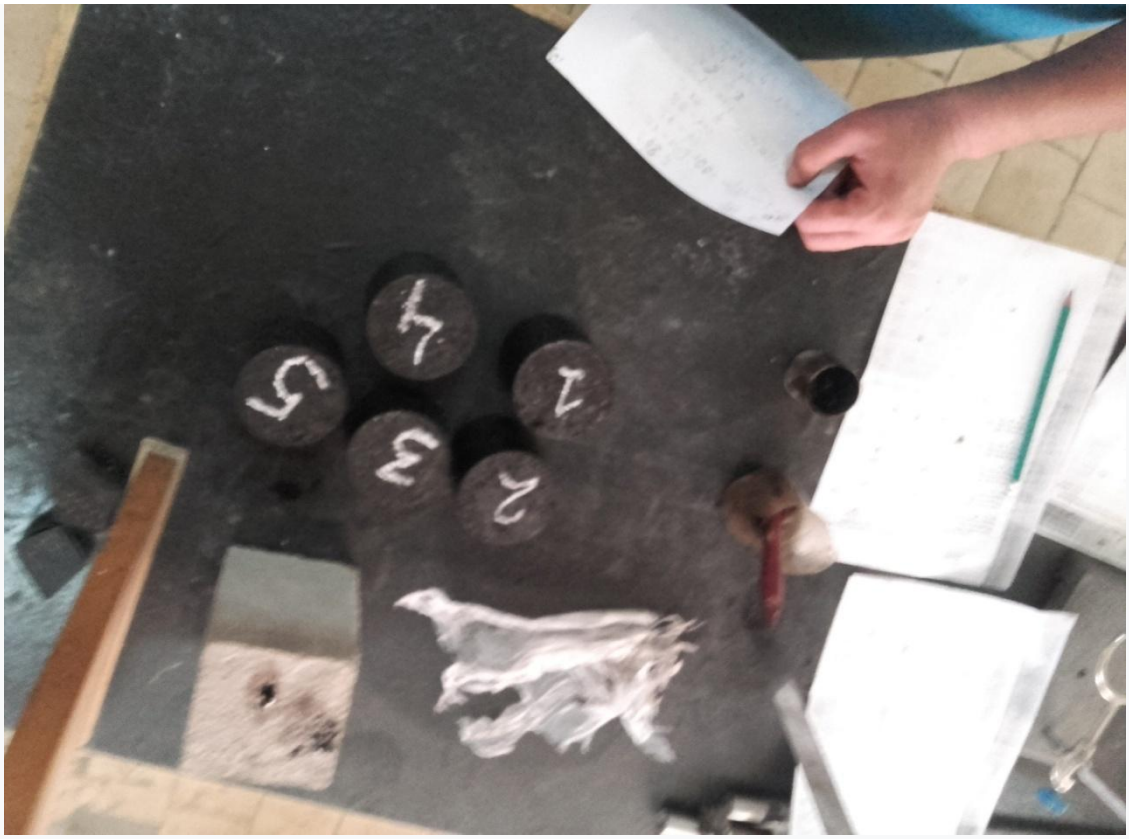

Picture 2. The process of making asphalt concrete samples

III. ANALYSIS OF RESULTS

As a result of my research lab, the following results emerged: Of my asphalt coconut samples, the sample had a hardness of up to 14 tons when I took 2% of the optimal bitumen emulsion. If the bitumen emulsion percentage was greater than 4%, the sample did not reach the specified strength. To reduce the viscosity and viscosity of the mixture, I added 400 Portland cement and achieved the desired result. The bituminous emulsion caused the coefficient of strength of the sample made of Portland cement. The increase in the emulsion percentage reduces the compression resistance of the samples. With the introduction of bitumen emulsion at 3%, the power was about 2.17 MPa and 15% decreased to 0.92 MPa.

As a result of better adhesion of bitumen emulsions to the bottom coating, their better use in repair and construction.

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International Journal of AdvancedResearch in Science, Engineering and Technology
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Table 3.

Type of material	Marerial consumption at 1000 m^2		
	Laying of hot asphalt concrete mix (%)	Cold asphalt concrete mix laying (%)	Laying of coating based on bitumen emulsion (%)
Cement	**-**	**-**	**3**
Sand	**16**	**24**	**-**
Bitumen	**5,5**	**6**	2 (for the preparation of emulsions)
Diesel fuel	**-**	**3**	
Rocks	**78,5**	**67**	**27**
Water	**-**	**-**	**2 (for the preparation of emulsions)**
Asphalt granules	**-**	**-**	**66**
Emulgator			**0,05(for the preparation of emulsions)**
Total %	**100**	**100**	**100**

The average coating life of 5 years is based on the latest hot and cold asphalt technology, and the use of this technology significantly increases the economic efficiency.

The use of bitumen emulsion based compositing techniques is important for increasing the cost-effectiveness of bed coverings.

Bitumen emulsion composite technology will be used within 2 hours upon completion of the coating, which will be repaired especially on high-density and passable roads.

Road repair technology using bitumen emulsions is well suited for internal mechanics because of coarse-grained durations, even at 2 h.

IV. CONCLUSION

In summary, the results of research on automobile roads in hot climates of the Republic of Uzbekistan have demonstrated the use of bitumen emulsions and asphalt granulation technology to construct upper layers. Constructive layers of materials allow increasing the efficiency of reconstruction and repair, better adapting to the lower floors, which increases the service life of the coating, increases the safety of transport and reduces production costs. It has also been used in conjunction with emulsions and mineral binders to fill asphaltogranulas (milling) in internal repair work.

V.RECOMMENDATIONS AND SUGGESTIONS

For further improvement, this technology has also been proposed for laying on the highways. This reduced the time of road construction and repair and saved the bitumen.

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