

A Proactive Upkeep by Involving Miniature Surfacing for Asphalt

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Abstract:

The strategy for blend plan for miniature surfacing as portrayed by ASTM and ISSA, obviously expressed that the techniques for blend configuration ought to be utilized exclusively as an aide. Hence, a more careful strategy is expected to give fruitful blend plans, in light of execution related tests remembered for the plan technique as opposed to depending vigorously on the experience of the development team with these sorts of medicines. The two strategy 'Research center technique for blending and relieving miniature surfacing combinations (TxDOT, 2004)' and 'A Lab Examination on Bitumen-Emulsion Blends' (Tipnis and Pandey, 2001) have been attempted in the lab however there were a few impediments to these strategies as balling couldn't stop totally except if an extremely cautious blending of the blend is taken consideration off. In this manner, an alternate blending philosophy of blending coarse and fine totals in with emulsion is investigated and is made sense of. where found shaping of a ball during the blending of totals with emulsion seemed to have been tackled, and no balling was framed.

Keywords: Micro surfacing, Mixtures, Laboratory, Mixdesigns, ASMISSA.

1. Introduction:

Road transport is taken into account to be one among the foremost cost-efficient and most popular modes of transport for each freight and passengers. Expressways and highways represent solely regarding 2% of the whole road length in India, however they carry about 40% of the road traffic, resulting in a strain on their capability (NHAI, 2011).

The focus of road activity within the early to mid-20th century was on the development of latest pavements. within the latter a part of the twentieth century continued into the twenty first century, this focus has been shifted to maintenance and rehabilitation of pavement infrastructures. Maintenance embodies actions that may retard or correct the deterioration of infrastructure facilities. These actions include crack sealing, resurfacing, and so forth and pavements should be elite for maintenance after they are still effective. In most cases, the right time to use maintenance is before the necessity is clear to the casual observer. this can be as a result of once pavements begin to deteriorate; they deteriorate apace on the far side the purpose wherever maintenance is ineffective. one amongst the solutions for preventive maintenance of pavement is micro- surfacing. (Kumar and Ryntathiang, 2016). Republic of India has an intensive road network of 4.24 million metric linear units– the second largest within the world (Luo et al. 1989). The National Highways have a complete length of seventy,934 km and function the main road network of the country. it's calculable that over 70 % of freight and eighty-five percent of traveller traffic in the country is being handled by roads. (Luo et al. 1989). For Rigid pavements, the requirements could vary significantly reckoning on subgrade soil type, environmental conditions, and quantity of significant vehicular traffic (ACPA, 1996). The terminologies comparable to subgrade and molding were employed in the 1993 AASHTO style Guide to style the pavements (AASHTO, 1993). Roads are classified into 2 main classes supported their structures as rigid pavements and versatile pavements. Concrete is generally accustomed construct the carrying surface of a rigid pavement that acts sort of a block over any irregularities within the underlying supporting material. hydrocarbon materials are used to construct the wearing surface of flexible pavements. Safety, cost, ride quality, and performance are characteristics of pavement systems that are thought-about high-priority client demands by transportation agencies throughout the world. Ride quality is that the characteristic most notable to the traveling public. The growing concern of resource depletion associated international pollution has challenged several researchers to hunt and develop new materials looking forward to renewable resources. Pavement preservation is outlined as a program using a network-level, future strategy that enhances pavement performance by victimization an integrated, cost-efficient set of practices that reach pavement life, improve safety, and meet driver expectations (FHWA, 2005). Actions used for pavement preservation embody routine maintenance, preventive maintenance (PM), and corrective maintenance

(Uzarowski associated Bashir, 2007). Transportation agencies use chip seal, suspension seal, micro-surfacing, cape seal, fog seal, and so forth small egress is to be applied over an existing pavement surface that is structurally sound, however the surface is showing signs of premature ageing, combination loss, and high degree of polishing, chemical reaction surface etc.

2. Literature Review:

(Petrova et al. 2018) The adopted state strategy for the development of the construction materials' industry pays much attention to the development of modern efficient transport infrastructure (Skvortsov, 2012 with the requirements of international standards. Currently, asphalt concretes are used in road construction in Russia. The standard service life of the asphalt concrete surface is equal to approximately 10 years, however, under the influence of natural and anthropogenic factors it can decrease. In foreign countries, the share of asphalt concrete roads constantly decreases, and the share of cement concrete roads increases. Cement concrete roads are becoming the fundamental type of arterials. Their share reaches 50% in some European countries and 60% in the USA. In Russia, their share is so far no more than 2–3%. In 2017, according to Decree No. 656 of the Government of the Russian Federation dd. 30.05.2017, a goal was set to increase road surface inter-concrete surfaces require repair approximately once in 5 years. Not only cement concrete surfaces but also surfaces made of alkali activated slag (cement-free) concrete with higher durability can serve as an alternative to asphalt concrete surfaces et al., 2017; Petrova and Prokofieva, 2015). The purpose of the study is a comparative evaluation of the corrosion resistance of alkali activated slag concrete and that of Portland cement concrete in a corrosive oil-containing medium. It is demonstrated that, during five years of observation, the absorption of the corrosive medium by concrete on alkali activated slag binder turned out to be 3.8 times lower than that by Portland cement concrete, which can be explained by the specifics of alkali activated slag concrete structure. The resistance coefficient of alkali activated slag concrete in bending tests amounts to 1.15, whereas the resistance coefficient of Portland cement concrete in bending tests amounts to 0.82. Therefore, it is established that alkali activated slag concretes have a higher durability in a corrosive oil-containing medium.

(Anonymous, 2018) Micro surfacing was applied on Brooklyn Bridge as pavement surfacing. Due to high traffic and the need for short condition timing, type III mix design was placed on the bridge steel grid deck at night and the results were satisfactory.

(Garfa, et al. 2018) In another study the effectiveness of type III micro surfacing in repairing aged asphalt rutted slabs was evaluated. The results of the study revealed that thermal aging of the slabs has a positive effect on the rutting resistance of hot mix asphalt which is rehabilitated with micro surfacing.

3. Methodology:

The mix is to be a fast setting system i.e. able to settle for traffic once a brief amount of your time ideally at intervals regarding 2 hours relying upon weather conditions. this might be used as surface protection treatment to boost skid resistance, surface durability, seal fine and medium cracks. it's applied on existing pavement surface that is structurally sound, however the surface shows sign of premature ageing, combination loss, cracking, high degree of sprucing etcetera usually small egression is arranged in single layer, but when the present surface is very polished, cracked, it is recommended to use in two or more layers. small egression helps in preservation of pavement strength and might be used each for preventive and periodic renewal treatment on a ideally low and medium traffic road. It are often used for pavements in urban and rural areas, primary and interstate routes, residential streets, highways, and toll roads. this could even be used on prime of single coat surface dressing (Cap Seal) or open ranked intermixture carpet while not seal coat and conjointly on Dense Hydrocarbon Macadam/Bituminous Macadam.

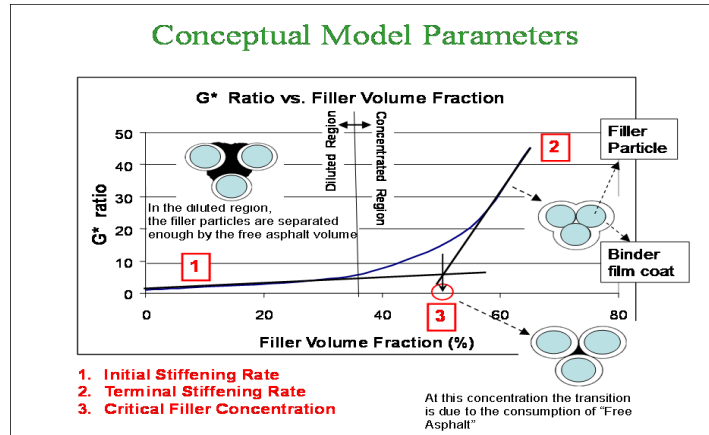


Fig.: Schematic of the progress of stiffness in terms of filler influence Extracted from Faheem, A., and H. Bahia (2010, p. 10)

4. Objective:

Best on the present study following objectives are drawn.

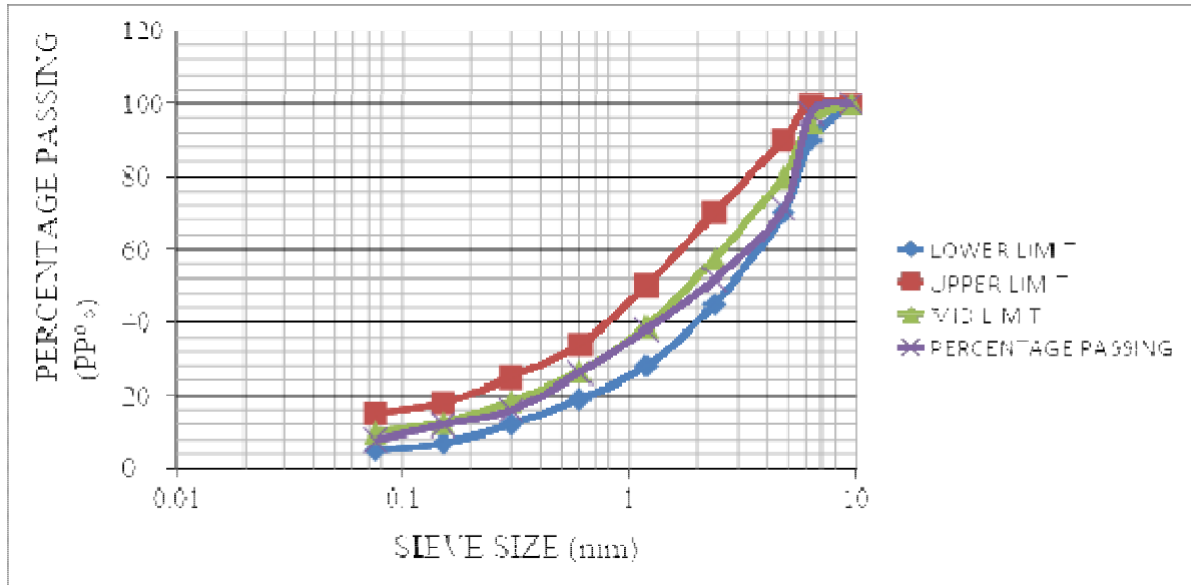
1. Prolongs road life, increased safety and rider comfort.
2. Provides excellent surface roughness and slip resistance.
3. Eco-friendly: It doesn't harm the environment as no heating or underfloor heating is required.
4. Offers a new wear surface.
5. Conservation of natural resources.
6. To provide economical pavement preventive maintenance treatment.
7. Faster laying process.

5. Results:

At the beginning of the project, project staff tried to collect samples on site to cast samples to be tested in the laboratory using the IRC-SP-81-2008, MoRTH 5th Revision Mix Design Tests, IVSS. The mixture was removed from the application machine. Test specimens for cohesion, wet abrasion and loaded wheels were formed from this mixture on the construction site. They have been tested in the laboratory.

Gradation of Coarse Aggregate by Sieve Analysis: -Sample-1000gm

Sieve Size-mm	Retained wt.	Cum. Wt. Retained	% Retained wt.	% Passing wt.	Specification Limit IRC	
					Lower Limit	Upper Limit
9.5	0	0	0	100	100	100
6.3	27.4	27.4	2.74	97.26	90	100
4.75	260.8	288.2	28.82	71.18	70	90
2.36	193.7	481.9	48.19	51.81	45	70
1.18	137.4	619.3	61.93	38.07	28	50
0.600	118.7	738	73.8	26.2	19	34
0.300	102.9	840.9	84.09	15.91	12	25
0.150	39.8	880.7	88.07	11.93	7	18
0.075	42.5	923.2	92.32	7.68	5	15



Upper, Lower, and Middle aggregate gradation curves (0-6 mm size).

Result for Determination of Cure Time of Micro-Surfacing Mixture

Sr. No.	Weight of Sample	Weight of Dry Sample	Loss in Wt.	% of Moisture content	Specification Limit
1	200	197	3	1.5	
2	200	197.5	2.5	1.25	
Average 1.375					

Determination of Torsional Elastic Recovery of Residual Binders

Type of material = 6mm Down Aggregate				Purpose to use = Micro surfacing		
A	B	C	D	E	F	G
Wt. Before Extra.(gm)		Wt. Extract Extra. (gm)		Increased Wt. of Filter paper (gm)	Weight Bitumen(gm)	% of Limit bitumen in The total mix 5.5 To 10.5
Sample	Filter paper	Sample	Filter paper			
500	3.5	450	5.5	2	48	9.6%
500	3.6	451	5.1	1.5	47.5	9.5%
500	3.5	453	4.5	1	46	9.2%
500	3.5	452.5	4.5	1	46.5	9.3%

6. Conclusion:

From analysis of results, following conclusions are reported:

- 1) The Bio Stab MY used in this study significantly improves storage stability of quick setting bitumen emulsion under extremely acidic condition (pH 2), where most of the bitumen emulsion stabilizers undergo acid hydrolysis, and thus losing the ability to stabilize the bitumen emulsions.
- 2) SBS modified low penetration bitumen residue shown higher stiffness comparing the EVA modified bitumen residue, indicating more resistance against loading. This can be explained by the more elasticity of the SBS modified bitumen than EVA modified.
- 3) Bitumen residue obtained from unmodified low penetration bitumen emulsion was stiffer than the original PG 58-28 bitumen. This indicates the potential of forming cold mix asphalt with the same stiffness as conventional HMA mixes.
- 4) Huet- Sayegh analogical model (2S2P1D) was used for the modelling of linear viscoelastic properties of both EVA and SBS modified bitumen residues. SBS modified bitumen residue have shown higher stiffness and lower phase angle than the EVA modified bitumen residue. This proves more elastic behavior for the SBS modified bitumen residue, and thus more potential to resist against loading. It was also observed that the behavior of EVA modified bitumen residue does not follow linear viscoelastic behavior under small strain loading at high temperature (80 °C).

5) In both 30-min and 60-min cohesion test results, it was observed that the micro-surfacing mixture prepared with SBS modified bitumen emulsion develops more cohesion with aggregates, comparing the unmodified, EVA polymer modified samples, and Latex modified mixes (reference mix). It was also observed that the SBS modified mixture has superior properties than other mixes in terms of resistance against aggregate loss (abrasion) and rutting. This can be explained by the stiffer and more cohesive mastic formed around the aggregates, and thus stronger cohesion builds up for the mix, which improves resistance against rutting.

Pune –Nashik Road (NH-50)

Microsurfacing Laying



After -Microsurfacing



Ahmednagar –Pathardi (PWD NH-222)

Before



After



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