influence of feasibility and accesseibility for flexible pavement by using natural fibres

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Abstract **- Now a days, for the purpose of better transportation, good quality and higher ultimate strength of pavement is necessary. In our research work, we will try to make the subgrade processing higher strength, lesser thickness and economical cost oriented with using high efficient natural fibres like jute fibre. For the flexible pavement, optimum jute fibre content of 3%, 5%or 7%with different length of 12 and 18 mm will be analysed by various laboratorical test. The required replacement material are easily available, environmental friendly, economical and easy to use. In any type of pavements a weak subgrade results in greater thickness layer, so that the stress on the subgrade are inconstant with their load carrying capacity. To obtain the required strength and increase the life span of the pavement marshal stability and mix design will be adopted. The focus of the research work is to utilize the strength of stabilized flexible pavement with using lesser base material, environmental friendly, economical and higher strength able jute fibres with different length and sizes.**

Index Terms **-ultimate strength, natural fibres, flexible pavement, jute, sustainability.**

I. INTRODUCTION

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II. PROBLEM DEFINATION &SCOPE

Problem:

Flexible pavements are often afflicted with problems of cracking and rutting due to repeated traffic loads, steps must be taken to increase the life of the bituminous pavements, cause permanent deformation (rutting), fatigue and low temperature cracking, service life of the road pavement.

Scope

- ✓ A pavement structure can be designed either as a flexible pavement or rigid pavement.
- ✓ Importance of flexible pavement in a developing country like India is still intact.
- ✓ Advantages and disadvantages of flexible pavement.
- ✓ Properties: Flexible pavements have low or negligible flexural strength and are rather flexible in their structural action under higher volume of traffic and load.
- ✓ Significance of transportation in economic development of the country.

III. MATERIAL INVESTIGATION

A) materials

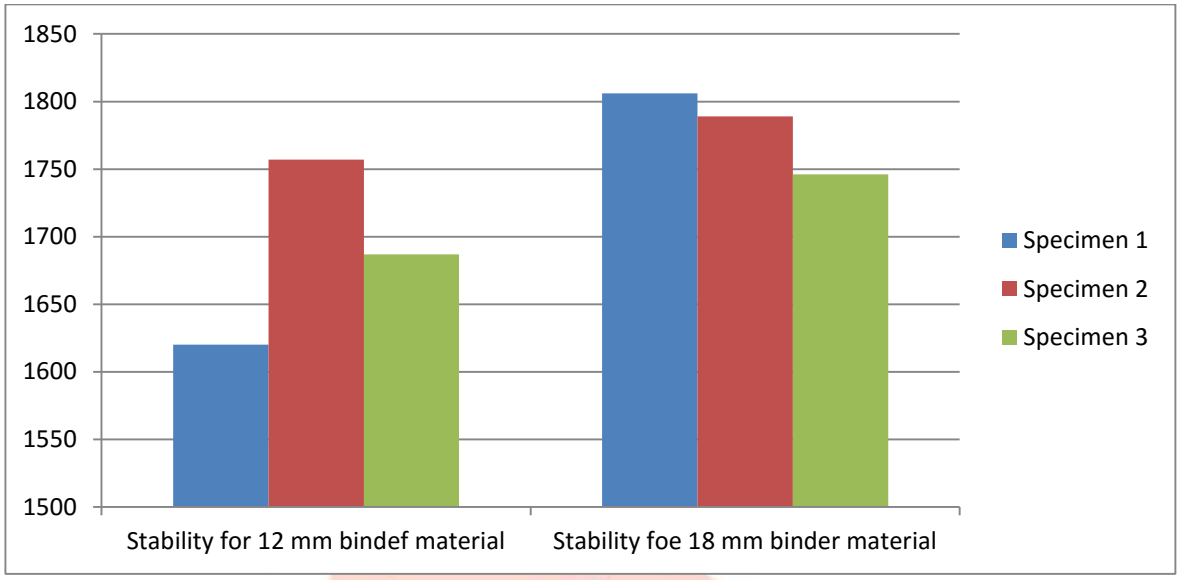
1. Coarse Aggregate Crushed aggregate confirming to IS: 383-1987 was used. Aggregates of size 20mm, 16mm and 12.5 mm of specific gravity 2.74 and fineness modulus 7.20 were used.
2. Bitumen of grade 80/100 were used. As per IRC: code 37; Penetration value were found out to be in range of 75-80 and Ductility value were in range of 75-82

B) Advantages Of Jute Fibre

- ❖ jute includes good insulting and antistatic properties and has low thermal conductivity
- ❖ It has high tensile strength ,low extensibility and ensure better breathability of fibres
- ❖ Jute is one of the most versatile natural fibre for replacement of bitumen in flexible pavement

C) Test For Marshal Stability Value

	Specimen 1	Specimen 2	Specimen 3
Stability for 12 mm bindef material	1620	1757	1687
Net flow for 12 mm binder material	3.80	4.20	4.05
Stability foe 18 mm binder material	1806	1789	1746
Net flow for 18 mm binder material	3.87	3.96	4.20

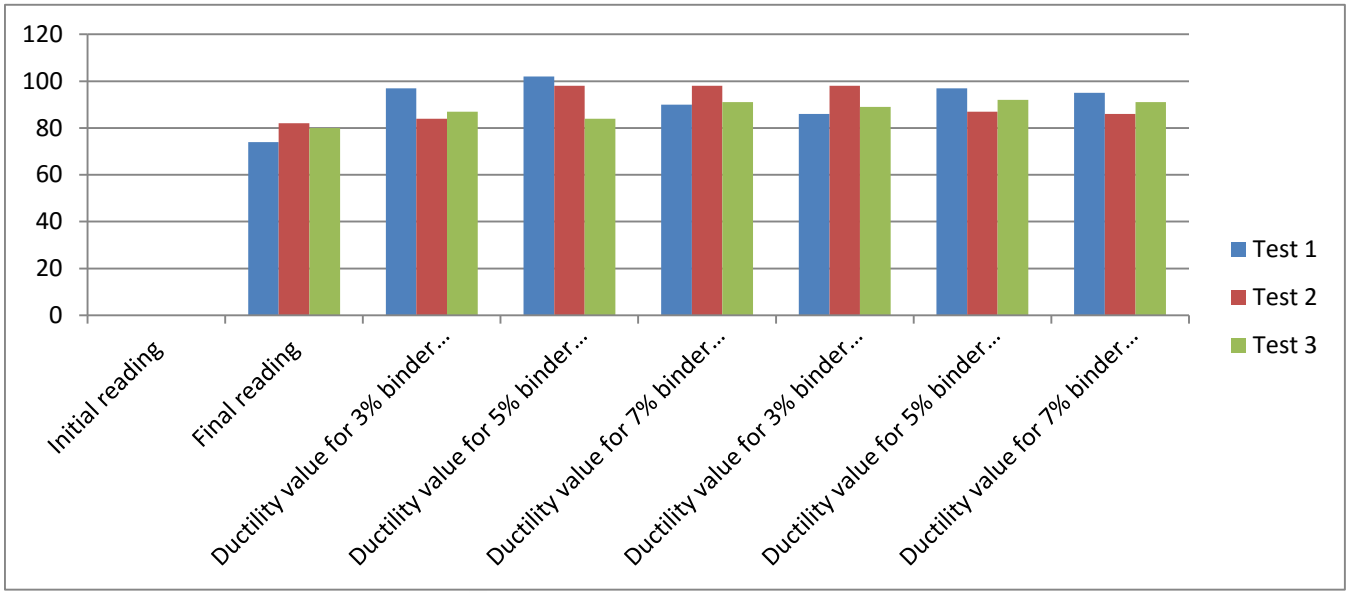


D) Test for Ductility Value

1. Melt the bituminous test material completely at a temperature of 75°C to 100° C above the approximate softening point until it becomes thoroughly fluid.
2. Strain the fluid through IS sieve 30.
3. After stirring the fluid, pour it in the mould assembly and place it on a brass plate. In order to prevent the material under test from sticking, coat the surface of the plate and interior surfaces of the sides of the mould with mercury or by a mixture of equal parts of glycerin and dextrin.
4. After about 30-40 minutes, keep the plate assembly along with the sample in a water bath. Maintain the temperature of the water bath at 27° C for half an hour.
5. Remove the sample and mould assembly from the water bath and trim the specimen by levelling the surface using a hot knife.
6. Replace the mould assembly in water bath for 80 to 90 minutes.
7. Remove the sides of the mould.
8. Hook the clips carefully on the machine without causing any initial strain.
9. Adjust the pointer to read zero.
10. Start the machine and pull clips horizontally at a speed of 50 mm per minute.
11. Note the distance at which the bitumen thread of specimen breaks.

Ductility value

	Test 1	Test 2	Test 3
Initial reading in mm	0	0	0
Final reading in mm	74	82	80
Ductility value for 3% binder material(jute),12 mm	97	84	87
Ductility value for 5% binder material(jute),12 mm	102	98	84
Ductility value for 7% binder material (jute),12 mm	90	98	91
Ductility value for 3% binder material(jute),18 mm	86	98	89
Ductility value for 5% binder material(jute),18 mm	97	87	92
Ductility value for 7% binder material(jute),18 mm	95	86	91

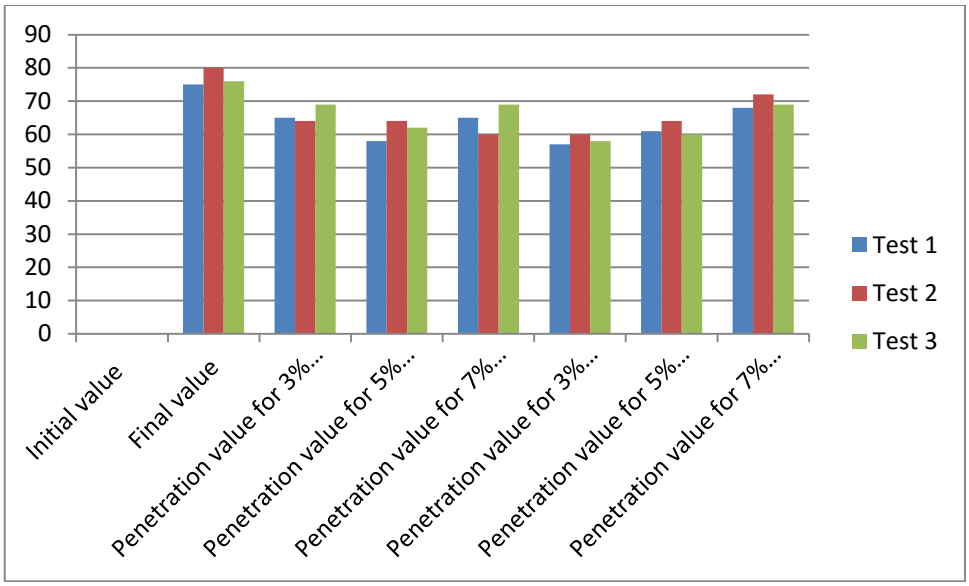


E) Test for Penetration Value

- Preparation of test specimen: Soften the material to a pouring consistency at a temperature not more than 60°C for tars and 90°C for bitumen above the approximate softening point and stir it thoroughly until it is homogeneous and is free from air bubbles and water. Pour the melt into the container to a depth at least 10mm in excess of the expected penetration. Protect the sample from dust and allow it to cool in an atmosphere at a temperature between 15° to 30° C for one hour. Then place it along with the transfer dish in the water bath at 25° ± 0.1 °C, unless otherwise stated.
- Fill the transfer dish with water from the water bath to depth sufficient to cover the container completely, place the sample in it and put it upon the stand of the penetration apparatus.
- Clean the needle with benzene, dry it and load with the weight. The total moving load required is 100 ± 0.25 gms, including the weight of the needle, carrier and super-imposed weights.
- Adjust the needle to make contact with the surface of the sample. This may be done by placing the needlepoint in contact with its image reflected by the surface of the bituminous material.
- Make the pointer of the dial to read zero or note the initial dial reading.
- Adjust the penetration machine to measure the distance penetrated.
- Make at least 3 readings at points on the surface of the sample not less than 10 mm apart and not less than l0mm from the side of the dish. After each test return the sample and transfer dish to the water bath and wash the needle clean with benzene and dry it. In case of material of penetration greater than 225, three determinations on each of the two identical test specimens using a separate needle for each determination should be made, leaving the needle in the sample on completion of each determination to avoid disturbance of the specimen.

Penetration value

	Test 1	Test 2	Test 3
Initial value	0	0	0
Final value	75	80	76
Penetration value for 3% binder material(jute),12 mm	65	64	69
Penetration value for 5% binder material(jute), 12 mm	58	64	62
Penetration value for 7% binder material(jute),12 mm	65	60	69
Penetration value for 3% binder material(jute),18 mm	57	60	58
Penetration value for 5% binder material(jute),18 mm	61	64	60
Penetration value for 7% binder material(jute),18 mm	68	72	69



CONCLUSION

Flexible pavement depends upon the strength of its bitumen binder. Addition of jute fibre in flexible pavement improves different values such as penetration, ductility and stability values. After adding jute fibres in proportion of 3%, 5% and 7%, we noticed the penetration value improves by 30% to 40% as per recommended value of IRC: 80/100 which results in increased strength. Ductility value improved significantly by 30% to 50%. This indicates the durability and the strength that it could provide during excessive loads on pavement results in better performance and life of pavement. Also the stability and flow values were obtained which indicate the actual vertical deformation when maximum load is reached. As bituminous pavement is subjected to severe traffic loads from time to time, it is necessary to adopt bituminous material with good stability and flow.

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