

Study of Sawdust and Ricehusk in Pavement Construction

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Abstract—India has the second largest road network. Even though the development of this sector was sprawling, the traffic loading is increasing. The increase in number of vehicles imparts increase in the tyre pressure, traffic loading, maintenance of vehicle, vehicle-operating cost etc. Hence, the degradation of the performance of the pavement is one of the major problem. Researchers have been dealing with many techniques to enhance the performance thus by reducing the maintenance and increasing the service life. The major expenditure of Indian administration is the fund allocation for the maintenance of pavement. Many researches contribute the modification of bitumen mixes as one of the solution to enhance the property of pavement. In addition, the availability of resource is becoming scarce nowadays. In this study, the replacement of bitumen with sawdust and ricehusk is done. Sawdust and ricehusk is a waste material, which contributes to air pollution. Hence if it is possible to use saw dust and ricehusk in the mix the reduction of waste material can also be done. For evaluation and comparative study of property of virgin as well as modified bitumen various tests including penetration grade, ductility, specific gravity and marshall test will be conducted.

Keywords: Sawdust, Ricehusk, Bitumen, Marshall.

I. INTRODUCTION

Road transportation is considered as the primary mode of transportation. India stands in the second place for having largest road network. According to Ministry of Road Transport and Highways "Basic Road Statistics of India 2015-2016" India has more than 5,903.293 kilometres of road network. The material availability, investments and the degradation of the performance of the transportation are some of the main problems concerned with the pavement construction and their maintenance. The conventionally used paving material in the flexible pavements is hot mix asphalt, which is

combination of aggregates and bitumen.

Over the past years, the amount of vehicles on the road has increased and thus the loading on the pavement increased. Thus, many researchers have been taken measures to reduce the performance degradation. Sawdust and Ricehusk are selected as the waste materials, to be added as fillers. Saw dust is the waste material produced from grinding, chipping and milling of wooden material. Ricehusk This contributes to air pollution. If there is a chance to incorporate this to bitumen then reduction of pollution can be done. In this study an attempt has been made to conduct a comparative study on bitumen with sawdust as filler and bitumen with ricehusk as filler.

II. LITERATURE REVIEW

Basha Fayissa¹, Oluma Gudina, Biruk Yigezu¹ (2020) "Application Of Sawdust Ash As Filler Material In Asphaltic Concrete" Production" In This Study The Application Of Sawdust Ash In Asphalt Concrete Production Is Investigated As Filler Material physical And Chemical Tests Were Investigated For Saw Dust Ash . It Reaches The Conclusion That Sda Could Be Used As Filler Up To 12 %.

Kenneth Miebaka Oba¹ and Emmanuel Ledesi Tigbara² 1Lecturer, (2020) "Characterisation of Saw Dust Ash – Quarry Dust Bituminous Concrete" This study evaluates usefulness of Quarry Dust and Saw Dust Ash as mineral fillers in a bituminous concrete in order to reduce cost and encourage reuse of waste materials in the environment. It reaches the conclusion that cost of aggregate is reduced.

R.G.N. Yasanthi¹, T.M. Rengarasu¹, N. Jegatheesan and W.M.K.R.T.W. Bandara¹ (2020). " Effects of

Temperature Variation on Hot Mix Asphalt Concrete with Saw Dust Ash Used as Aggregates".in this study sample were subjected to two different temperature conditions.The results of the study reveal that the Marshall Stability and Marshall Flow value are very mmuch ensitive to the temperature differences.

RillagodaG.N.Yasanthi Terrance M.Rengarasu,and W.M.K.R.T.W.Bandara(2016). "Variation of Marshall Properties of Hot Mix Asphalt Concrete with Waste Materials"(2018).This studysummarizes the findings of research on reusing the waste materials as raw materials in asphalt construction. It concludes that Marshall Stability decrease with the increase in SDA content used ,The Marshall Flow increase with the SDA amount and cost reduction resulted by reusing, for the waste sample used during the study is about 16.6%.from the original cost of construction.

Rocksana Akter ,Md. Kamal Hossai. (2017). "Influence of Rice Husk Ash and Slag as Fillers in Asphalt Concrete Mixes" In this study, an attempt has been made to assess the influence of non- conventional fillers such as rice husk ash and slag in bitumen paving mixes and also compared with traditional filler stone dust.we can conclude that slag and rice husk ash can effectively be used as filler in paving mixes in place of most commonly used filler such as stone dust.

Mohamed Mohiey, Hassan A. Mahdy and Mokhtar F. Ibrahim (2020) "Effect of Rice Husk Ash on the Performance of Hot Asphalt Mixes. In this study, using rice husk ash (RHA) in hot mix asphalt (HMA) as filler was evaluated.This study conclude that rice husk ash can be used in alphatic concrete pavement fully or partially.

Ranjyot Kushwaha, Prof Rajesh jain(2018)."Review paper on Use of Rise Husk Ash as mineral filler in Mastic Asphalt". In this study, an attempt is made to evaluate influence of non conventional filler material such as Slag, fly ash, stone dust, brick dust and Rise Husk Ash, steel slag.s. It conclude that use of RHA as mineral filler in Mastic Asphalt not only improves the quality of Mastic Asphalt but also help in usage of waste material called RHAand it also increase the stability of road.

IV. OBJECTIVES OF WORK

To study the use of waste materials such as saw dust and ricehusk in bitumen.

Various tests such as Specific gravity, Permeability, Ductility, and Marshall were performed to evaluate the suitability of sawdust and ricehusk as filler in bitumen.

To inspect the conduct and execution of bitumen changed with various waste materials like saw residue and rice husk.

V. METHODOLOY

Literature survey was done and study was done based on the survey. Test on raw bitumen was done. The tests conducting are penetration, ductility, specific gravity and marshall test.Then the above tests on bitumen with sawdust as filler at 5%,10%and 15%was done Also the above tests on bitumen with ricehusk as filler at 5%,10% and 15% was done. The comparative study on both the addition of filler as made.

VI. MATERIALS USED

A.BITUMEN

In this project, VG-30 will be selected for the preparation. Modified bitumen can be prepared by modifying VG-30 bitumen by the optimal dosage of toner by weight of bitumen. The modification is done with addition of Sawdust and bitumen at 5% , 10%, and 15%.

B.SAWDUST

Sawdust will be collected from local wood mills. The Sawdust is the by-product or waste product of woodworking operations such as sawing, milling, planing, routing, drilling and sanding. It is composed of fine particles of wood. These operations can be performed by woodworking machinery, portable power tools or by use of hand tools. The Sawdust passing through sieve sizeof 0.075mm

C.RICEHUSK

Ricehusk are the hard protecting coverings of grains of rice.In addition to protecting rice during the growing season rice husks can be put to use as building material.Ricehusk is crushed for this study.

VII. EXPERIMENTAL PROGRAM

A.PENETRATION TEST

It measures the hardness or softness of bitumen by measuring the depth in the tenth of a millimetre to which a standard loaded needle will penetrate vertically in 5 seconds. BIS had standardized the equipment and the test procedure.

BITUMEN	BITUMEN MIXED WITH SAWDUST			BITUMEN MIXED WITH RICEHUSK		
	5%	10%	15%	5%	10%	15%
66	42	37	32	51	47	44

Table 1:Penetration test for different bituminious mixture.

B.DUCTILITY TEST

Ductility is the property of bitumen that permits it to undergo great deformation or elongation. The ductility value gets affected by factors such as pouring temperature, test temperature, rate of pulling etc. A minimum ductility value of 75 cm has been specified by the BIS.

BITUMEN	BITUMEN MIXED WITH SAWDUST			BITUMEN MIXED WITH RICEHUSK		
	5%	10%	15%	5%	10%	15%
77cm	78.6	79.2	80	77.8	78	78.4

Table2: Ductility test for different bituminous mixture.

C.SPECIFIC GRAVITY

Specific gravity of virgin bitumen is 1.02

Specific gravity of bitumen mixed with sawdust is 1.06
 Specific gravity of bitumen mixed with ricehusk is 1.04

VIII.CONCLUSION

- Based on the study on physical properties of VG 30, it has been concluded that the values of penetration, ductility, specific gravity are within the standard specification.
- Penetration value of raw bitumen VG30 was 66. Higher penetration values indicates softer consistency. Here the penetration value decreases for sawdust and ricehusk at various proportions, as we compared to raw bitumen .
- Ductility is the property of bitumen which allows it to undergo deformation or elongation. Ductility value increases with the addition of waste materials. Sawdust has higher ductility as compared to ricehusk.

XIII. REFERENCES

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