

STUDY ON HIGH FRICTION PAVEMENT TREATMENT (FRICTION ROAD)

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ABSTRACT

Pavement skid resistance play an important role in reducing disasters and injuries .HFST is initiated by Federal Highway Administration (FHWA). This technique is applied in region where rate of accident is maximum for the safety. Skidding is one of the major reason for the accident. High Friction Surface Treatment (HFST) is a safety first pavement treatment intended to restore and maintain pavement friction to reduce crashes .This paper is presented on how friction can be increased between Tyre and surface of road & to reduce the skidding distance after applying breaks. High Friction Surface Treatment must implemented on roads that have high traffic volumes, accident prone zones and more number of intersections.

Keywords—HFST, Rate of Accidents, Calcined Bauxite, LCAH ,Friction Number, Road Safety .

1. INTRODUCTION

The problem of accident is a very major problem in highway transportation due to complex flow pattern of vehicular traffic along with pedestrians. Traffic accidents leads to loss of life and property. Thus the traffic engineers have to undertake big responsibility of providing safe traffic movements to road users and ensure their safety. Accidents are mainly occur due to heavy traffic, slopes, lack of control on vehicle, dangerous road locations, environment around the road and over speeding .[1]

Skidding is one of the major reason for the accidents. Causes of skidding can be divided into three parts, such as

- 1) Condition of road – Due to wet roads or muddy roads road become slippery and skidding occurs.
- 2) Condition of vehicle – Brake should be evenly adjusted so the application of brakes slow down the vehicle. If brake pull one way skidding occur.
- 3) Action of driver – Sudden steering action on a slippery surface and applying sudden brakes while vehicle is moving with high speed causes skidding.

II. RATE OF ACCIDENTS IN INDIA

-One serious road accident in the country occurs every minute and 16 peoples die on Indian roads every hour.

-1214 road crashes occur every day in India

- Two wheelers account for 25% of total road crash deaths

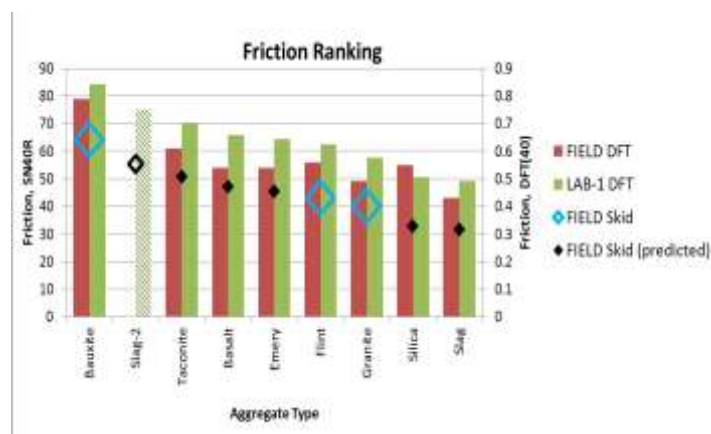
- 20 children under the age of 14 die every day due to road crashes in the country

Top 10 cities with highest number of road crash deaths are Delhi, Chennai, Jaipur, Bengaluru, Mumbai, Kanpur, Lucknow, Agra, Hyderabad, Pune.[2]

III. LITERATURE REVIEW

3.1 High Friction Surface Treatment Alternative Aggregates Study- NCAT Report 15-04

High Friction Surface Treatment (HFST) are used to improve roadway surface conditions in location with high crash rates. The more widely applied HFST specification recommends crushed calcined bauxite aggregate, which is an important product. In this report series of studies examined the performance of seven alternative aggregate sources to determine if they provided similar friction performance. The research was divided into three studies – LAB-1, Field & LAB-2. After completion of all three studies the final analysis made the conclusion that, None of the seven alternative aggregates matched the friction performance of bauxite.[3]



3.2 Evaluation of Bitumen Properties Modified With Additive- Yero&Hainin

The main objective of the study is to investigate the characteristics of bitumen modified with a Long Chain Aliphatic Hydrocarbon (LCAH) additive, which include viscosity, the bitumen consistency and also its compatibility with the binder. In this study the additive mixed is tested against normal bitumen for viscosity, penetration test & softening point. The additive (LCAH) used in this study was to lower the mixing and compaction temperatures of asphalt. The results indicated that the viscosity of the binders can be reduced through the use of LCAH especially, at high temperature there by increasing the softening point and reducing

the penetration of the binders. The addition of LCAH increases the softening point and decreases the penetration of both binders.[4]

In above study the additive (LCAH) mixed bitumen tested for viscosity, penetration and softening point. In this work, author concluded for these tests are as follows,

Viscosity -

The viscosity of the binder was measured using the Brookfield viscometer; the equipment was used to measure the viscosity characteristics of the neat and modified binder PEN 60/70 and PEN80/100. According to the manufacturer the additive reduces both mixing and compaction temperatures. This test determined whether the additive decreases the viscosity of the binders used in the study, which consequently depends on the test temperatures (in the range 100-135 °C). The viscosity of each bitumen sample with and without LCAH was measured at various test temperatures and at a shear rate of 6.8/s. This shear rate was selected because it conforms to the rotational speed of 20rpm with the Brookfield Spindle 27 recommended for Superpave (SHRP).

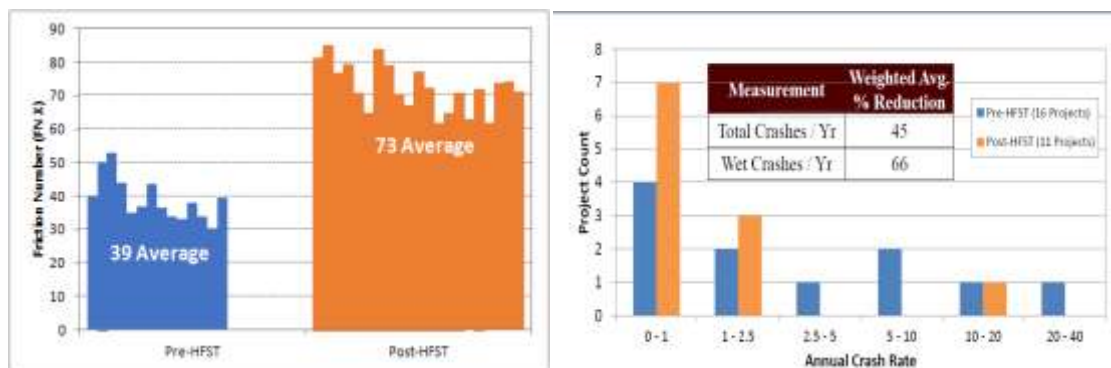
Penetration and softening point -

The penetration grade of the neat bitumen with and without LCAH was investigated using the penetrometer in accordance with ASTM D5-97 specification, while the softening point of the various test samples was determined using the ring and ball test in accordance to ASTM D36-95. [5]

3.3. Overview of High Friction Surface Treatment - FDOT

This study consists of information about friction number & treatment for friction surface. High friction is important for proper and safety driving, for this friction number is determined. More is the friction number less is the breaking distance. Breaking distance is determined as, $S_b = \frac{V_{mph}^2}{30(f+g)}$.

This treatment is used for ramps & sharp curves, rear end crashes, descending vertical grades nearing intersections, bridge deck sealing etc. Types of applications for this treatment are manual, semi-automated and fully automated. After application of this treatment results shows that about 87% of increase in friction is seen on treated roads and reduction in crashes is the major achievement of this treatment. [6]



High Friction Surface Treatment (HFST) is easy to construct and durable. HFST results in significant improvement in friction number, reduced crash rates and low costs.

IV.CONCLUSION

It is possible to reduce road accident rate and severity by adopting and enforcing proper safety measures. Health of the Nation is more important than the wealth of the Nation. Road safety is a major public health concern. So attention must be given on Road safety measures. Strict implementation of road safety measures reduces road accident injuries and fatality.

In order to achieve road safety friction of road must be taken into account. So High Friction Surface Treatment (HFST) is necessary to avoid accidents and crashes. As we studied in above research papers and studies by using calcined bauxite and additive like Long Chain Aliphatic Hydrocarbon (LCAH) proper amount of friction can give to the road. In order to reduce the number of accidents occurs on roads friction treatment becomes the major aspect. In future HFST must be taken as important and necessary component for construction of pavements.

REFERENCES

- [1] Transportation System Engineering – Dr. Tom V. Mathew, IIT Bombay.
- [2] Prof. A.K. Patel, M.M. Desai, Review Study: Safety Measures for Controlling Road Accident Injuries And Fatalities.
- [3] National Centre for Asphalt Technology at Auburn University (Report 15-04) – Michael Hietzman , Pamela Turner, Mary Greer .
- [4] Suleiman Arafat Yero, Mohd. Rosli Hainin , Research Study: Evaluation Of Bitumen Properties Modified With Additive, IJRRAS 13(1) ..
- [5] Annual Book of ASTM Standards: Road And Paving Materials; Traveled Surface Characteristics , American Society of Testing and Materials, 2005 , Vol.04.03.
- [6] Final Report Project BDR 74-977-05 , Florida Department of Transportation & Federal Highway Administration.