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# Scrap Tyre Use for Construction of Road

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**ABSTRACT:** No doubt after LPG reform there is boom in every sector particularly in area like manufacturing industry as well in steel industry. We can directly say from above is the use of four-wheeler, two-wheeler vehicles etc. is increasing day by day. As a result, amount of waste tyres also increasing. Waste tyres in India are categorized as solid or hazardous waste. It is estimated that about 60 per cent of waste tyres are disposed via unknown routes in the urban as well as rural areas. The waste tyres can be used as well sized aggregate in the various bituminous mixes if it is cut in the form of aggregate and can be called as rubber aggregate. This not only minimizes the pollution occurred due to waste tyres but also minimizes the use of conventional aggregate which is available in exhaustible quantity. This leads to various environmental problems which include air pollution associated with open burning of tyres (particulates, odour, visual impacts, and other harmful contaminants such as polycyclic aromatic hydrocarbon, dioxin, furans and oxides of nitrogen) and aesthetic pollution. Therefore, it is necessary to utilize the wastes effectively with technical development in each field.

## I.INTRODUCTION

Waste tire rubber is an important source of secondary raw materials. It is estimated that 1.2 billion waste tyre rubber produced globally in a year. 33 million vehicles manufactured in India. The disposal of these discarded tires is a major environmental concern worldwide. Tire landfilling a common method for disposing of waste tyre rubber is responsible for a serious ecological threat. The landfilling of waste tyre creates soil and water pollution because the waste tyre rubber holds toxic and soluble components. It also provides breeding habitat for various pests. Burning of tyres results in serious fire hazards. Therefore, it is necessary to find out the alternative for consumption disposal of the discarded rubber tyres. Waste tyre rubber can be used in the construction industry. An attempt to use this waste tyre rubber for improving the properties of bitumen by blending it with crumb rubber will improve the bitumen binder properties and cost-effective.

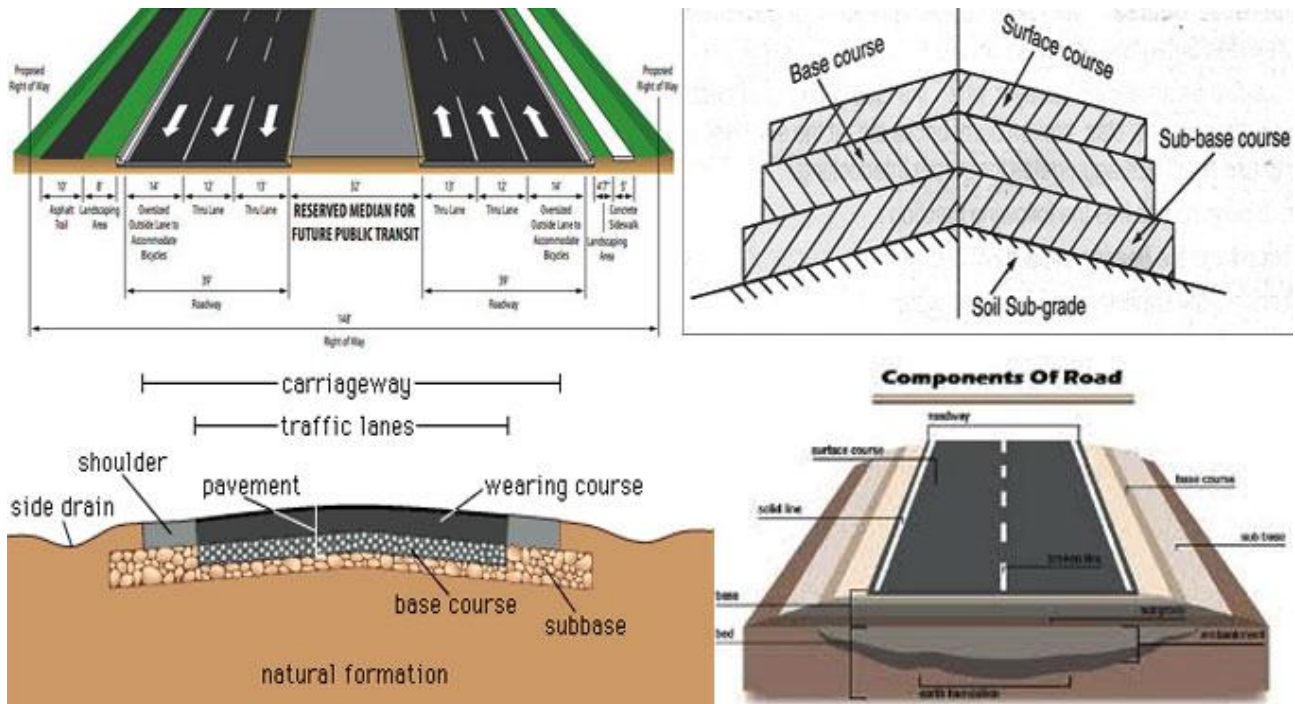


Fig.1

## II.RELATED WORK

**1.Why Waste Tyre:** - Waste tyre is used in highway construction because of their following properties: - 1. Lightweight 2. Free Drainage 3. Low earth pressure 4. Good thermal insulator 5. Durability 6. Compressible 7.low cost 8.vibration damping

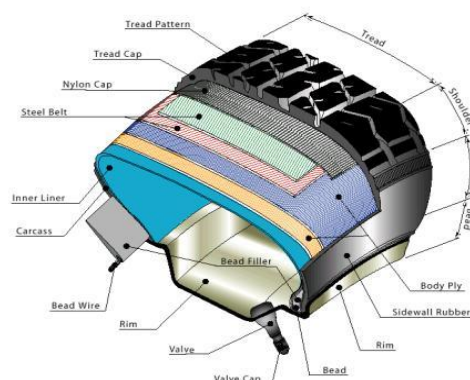


Fig.2

**2.METHODOLOGY:** Waste rubber tyres we recollected from roads sides dump sites and waste-buyers. The collected waste tyres were sorted as per there quired sizes for the aggregate. The waste tyres were cut in the form of aggregate of sizes ranging from 22.4 mm to 6.00mm (as per IRC-SP 20) in the tyre cutting Machine. The waste rubber tyres can be managed as a whole tyre as slit tyre as shredded or chopped tyre as ground rubber or as a crumb rubber product. The rubber of tyre usually employed in bituminous mix, in the form of rubber particles are subjected to a dual cycle of

magnetic separation then screened and recovered in various sizes and can be called as Rubber aggregate. It was cleaned by de-dusting or washing if required.

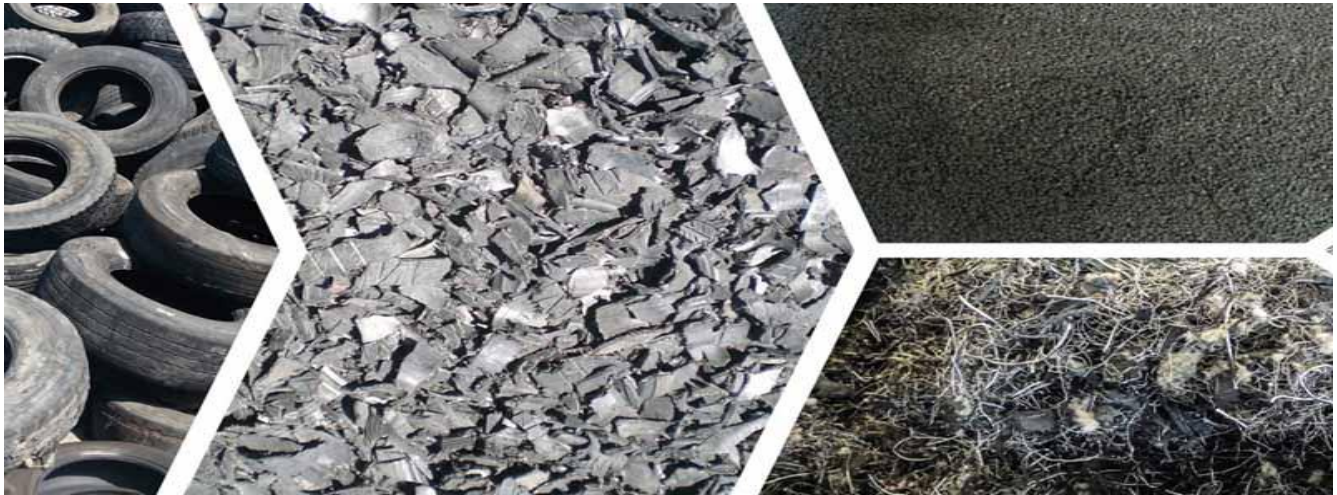


Fig.3

**ADVANTAGES:** 1) Reductions of up to 10 Db in noise level in comparison with noise levels of conventional pavement surfaces have been reported. 2) Increases the drainage properties of road pavement. 3) There is an compression takes place due to continuous loading of traffic. 4) Vibration at attenuation property will be increase. 5) Decreases the maintenance cost of road pavement. 6) This provides a stable road base for a longer time period than some other lightweight materials. 7) Because of their low density, tyre shreds can be used to build roads over unstable soils.

### III. EXPERIMENTAL STUDIES

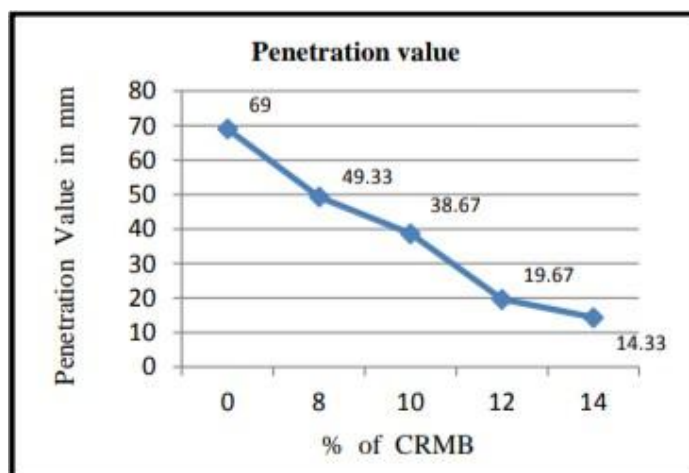
**1. MIXING OF CRUMB RUBBER WITH PLAINBITUMEN:** In preparing the modified binders, about 500 gm of the bitumen was heated to a fluid condition in a 1.5- litre capacity metal container. For the blending of crumb rubber with bitumen, it was heated to a temperature of 160 °C and then crumb rubber was added. For each mixture sample 0%, 8%, 10%, 12%, and 14% of crumb rubber by weight is used. The blend is mixed manually for about 3-4 minutes. The mixture is then heated to 160 °C and the whole mass was stirred using a mechanical stirrer for about 50 minutes. Care is taken to maintain the temperature between 160 °C to 170 °C. The contents are gradually stirred for about 55 minutes. The modified bitumen is cooled to room temperature and suitably stored for testing

**2. PENETRATION TEST:** It measures the hardness or softness of bitumen by measuring the depth in tenths of a millimetre to which a standard loaded needle will penetrate vertically in 5 seconds. BIS had standardized the equipment and test procedure. The penetrometer consists of a needle assembly with a total weight of 100g and a device for releasing and locking in any position. The bitumen is softened to a pouring consistency, stirred thoroughly and poured into containers at a depth at least 15 mm in excess of the expected penetration. The test should be conducted at a specified temperature of 25o C. It may be noted that penetration value is largely influenced by any inaccuracy with regards to pouring temperature, the size of the needle, weight placed on the needle and the test temperature. A grade of 40/50 bitumen means the penetration value is in the range 40 to 50 at standard test conditions. In hot climates, a lower penetration grade is preferred.

**III.RESULTS****Table 2: Penetration Test Result**

% Of CRMB	Reading	Trial			Average. Value In mm
		1	2	3	
0% of CRMB	Initial	0	0	0	69
	Final	64	69	75	
	Penetration Value	64	69	75	
8% of CRMB	Initial	0	0	0	49.33
	Final	44	48	56	
	Penetration Value	44	48	56	
10% of CRMB	Initial	0	0	0	38.67
	Final	33	37	47	
	Penetration Value	33	37	47	
12% of CRMB	Initial	0	0	0	19.67
	Final	19	20	20	
	Penetration Value	19	20	20	
14% of CRMB	Initial	0	0	0	14.33
	Final	14	14	15	
	Penetration Value	14	14	15	

Penetration Test were done for normal bitumen and modified bitumen with 0%, 8%, 10%, 12%, and 14% of rubber waste content. The result was shown in Table 2. From the result of the test, the penetration value for normal bitumen was 69 mm. Penetration value decreased with the increased amount of the rubber waste added. Lower penetration value making harder grade of asphalt, giving additional strength to the road and reduces water damage.

**V.RESULT****Graph 1: Penetration Value v/s CRMB %**

The possible use of rubber particles from scrap tyres into concrete mix have already given better result in sub-bases for highway pavements, highway medians, sound barrier and other transportation structures. The addition of rubber aggregate in bituminous mix decreases the quantity of stone aggregate by volume and increases the flexibility and

flexural strength of the carpet layer of the highways. Aggregate is the granular material used in bitumen concrete mixtures, which makes up 90 to 95 percent of mixture weight and provide most of the load bearing characteristics of the mix. Due to which the quantity of aggregate is gradually decreasing which will need the alternative material as aggregate for the highway construction.

#### IV.CONCLUSION

Penetration value test result shows that Penetration value decreased with the increased amount of the rubber waste added. Lower penetration value making a harder grade of asphalt, giving additional strength to the road and reduces water damage. Lower Penetration thereby making a harder grade of asphalt, giving additional strength to the road and reduces water damage.

Softening point test shows that Softening Point increased with the increased amount of the rubber waste added. This showed that the bitumen becomes less susceptible to temperature changes as the content of rubber waste increased. Increase of Softening Point, thereby giving it protection against hot climatic conditions.

Ductility test result shows that the rubber waste added will harden the bitumen.

The bitumen becomes more viscous and harden, which would be useful to obtain stiffer bitumen asphalt.

The biggest advantage of using rubberized bitumen is that the road life increases in comparison to the normal bitumen whereas the cost increase on the road.

Improved adhesion aggregates and binder thereby giving better strength, stability and longer life. Addition of waste tyres as rubber aggregate modifies the flexibility of surface layer.

Optimum content of waste rubber tyres to be use dis between the ranges of 5% to 20%.Problem like thermal cracking and permanent deformation are reduce in hot temperature region.

Rubber has property of absorbing sound, which also help in reducing the sound pollution of heavy traffic roads.

Waste rubber tyres thus can be put to use and it ultimately improves the quality and performance of road. Conventional tone aggregate can be saved to a certain quantity.

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