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Construction of Road Using Industrial Waste (Rubber & Plastic)

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Abstract -

Plastic waste and rubber waste are increasing rapidly due to modern lifestyle and industrial development. Disposal of these wastes has become a major environmental problem. Improper disposal leads to land pollution, water pollution and harmful effects on human health. In recent years, researchers have developed new techniques to utilize waste materials in road construction. One such technique is the use of plastic and rubber waste mixed with bitumen.

In this project, waste plastic and rubber materials are melted and mixed with bitumen and used in the binder layer of road construction. The addition of plastic and rubber improves the strength, durability and water resistance of the road. It also reduces the amount of bitumen required and lowers construction cost. This method is environmentally friendly and helps in effective waste management. Therefore, the use of plastic and rubber waste in road construction is considered a sustainable and economical solution.

Key Words: Plastic Waste, Rubber Waste, Bitumen, Binder Layer, Road Construction, Penetration Test, Ductility Test, Flash Point Test, Waste Management, Eco-friendly Roads

1.INTRODUCTION

Road transportation plays a vital role in the economic development of a country. Good quality roads are essential for safe and efficient transportation. However, conventional road construction materials such as bitumen are costly and sometimes fail due to heavy traffic loads and environmental conditions.

At the same time, plastic waste and rubber waste are increasing every year. Plastic bags, bottles, packaging materials and used tyres are commonly discarded in the environment. These materials are non-biodegradable and remain in the environment for many years.

To solve these problems, engineers have developed a method to use plastic and rubber waste in road construction. In this technique, plastic and rubber waste are mixed with bitumen to produce modified bitumen. The modified bitumen improves the strength and durability of the road. This method also helps in reducing environmental pollution caused by plastic and rubber waste.

2. Methodology

For this dissertation work it is proposed to carry out the work in the following phases.

Phase I : Collection of Materials.

Phase II : Cleaning of waste .

Phase III: Cuttinng of plastic.

Phase IV: Preparation of Rubber particles.

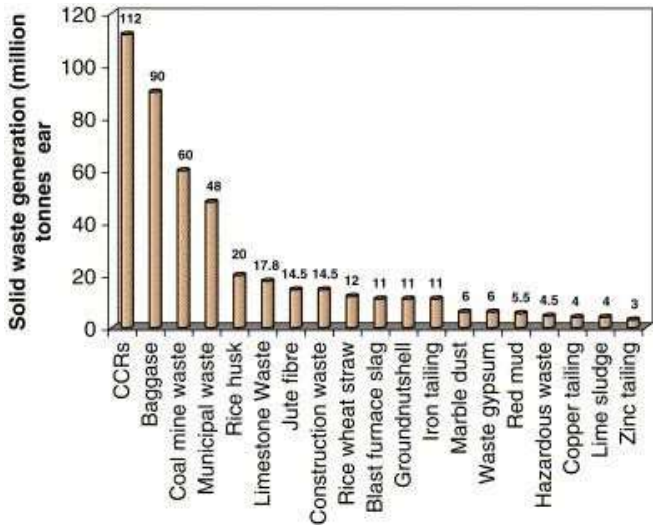
Phase V : Heating of Bitumen.

Phase VI: Mixing processs.

Phase VII: Preparation of modified bitumen. .

Phase VIII: Application in Road layer.8

Phase IX : Testing



Waste material Generation in India

Types of Industrial Wastes and its applications for using in highway construction

1. Plastic Wastes

sPlastic waste can be used in highway construction by mixing shredded plastic with bitumen. This improves the strength, durability, and water resistance of the road. It also increases the life of the pavement and helps in recycling plastic waste, which reduces environmental pollution.

2. Rubber Waste

Rubber waste can be used in highway construction by mixing it with bitumen to produce rubberized bitumen. This improves the strength, durability, and flexibility of the road surface. It also increases skid resistance, reduces traffic noise, and helps in recycling waste tyres, which reduces environmental pollution.

3. Properties of Material

Material	Purpose in the Panel
Bitumen	It acts as a binding material that holds aggregates, plastic, and rubber together and provides strength to the road.
Plastic Waste	Plastic improves the strength, durability, and water resistance of the pavement. It also helps in recycling waste plastic.
Rubber (Waste Tyre Rubber)	Rubber increases flexibility and elasticity of the road and helps in reducing cracks and deformation.
Aggregates (Coarse & Fine)	Aggregates provide the main structural strength and stability to the road.
Heating Equipment	Used to heat bitumen, plastic, and rubber so that they melt and mix properly.
Mixing Equipment	Helps in uniform mixing of bitumen, plastic, rubber, and aggregates Equipment

4. Test

Testing of materials: These following test methods are conducted.

1 . Following are the tests to be performed on bitumen:

a) Ductility test
b) Softening point test
c) Penetration value test
d) Flash & fire point test.Test

1 . Following are the tests to be performed on the mixture of plastic and rubber

a) Ductility test
b) Softening point test
c) Penetration value test
d) Flash & fire point test

5. Results

Test	Material		Range
	Bitumen	Plastic + Rubber	
Penetration Value	67mm	50mm	80-100 mm
Ductility Test	75cm	41cm	Minimum 40 cm
Softening Point Test	50°C	55.5°C	45-600C
Flash Point Test	250°C	269°C	> 1750C

6. Future Scope :

The use of plastic and rubber waste in road construction has great potential in the future. With increasing environmental concerns and the growing amount of plastic waste, this technology can play an important role in sustainable development. Large quantities of plastic and rubber waste can be effectively recycled and used in road construction instead of being disposed of in landfills.In the future, this method can be widely implemented in the construction of highways, city roads, rural roads and parking areas. Further research can also be carried out to improve the mixing techniques and performance of modified bitumen.

Government authorities and road construction agencies can adopt this technology on a larger scale to reduce environmental pollution and improve the durability of roads. Therefore, the use of plastic and rubber waste in road construction has significant scope for future development and practical application.

7 .Conclusion-

The use of plastic and rubber in bitumen for road construction is an effective and innovative method. It helps in improving the strength, durability, and flexibility of the pavement. The addition of waste plastic and rubber also helps in reducing environmental pollution by recycling waste materials.

Plastic and rubber modified bitumen provides better resistance to water, cracking, and deformation compared to conventional bitumen roads. It also increases the life of the road and reduces maintenance costs.

Therefore, the use of plastic and rubber in the binder layer is a sustainable and eco-friendly solution for modern road construction

8.Referance

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