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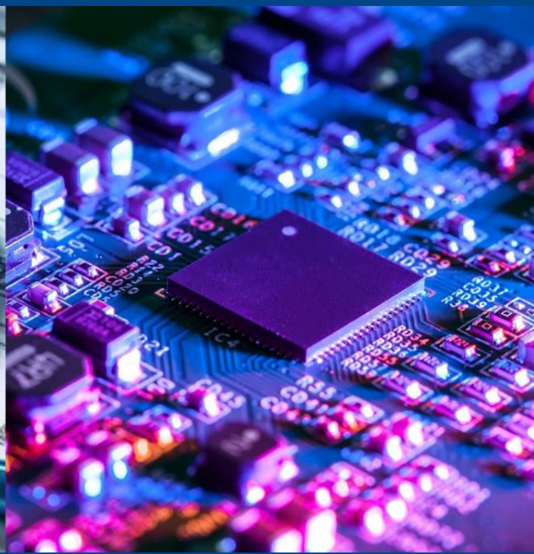

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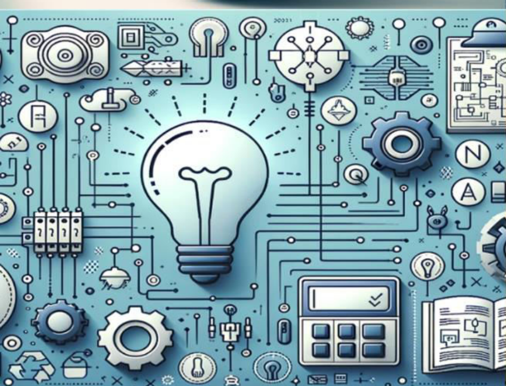

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Rubberized Concrete

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ABSTRACT : The increasing concerns regarding the environmental impacts of waste materials, such as used tires, have motivated research into the reuse of these materials in concrete production. Rubberized concrete, which incorporates rubber particles from discarded tires as a partial replacement for fine aggregates, has the potential to improve certain properties of concrete, such as flexibility, durability, and impact resistance. This study investigates the effects of rubber addition on the workability, mechanical properties (compressive, tensile, and flexural strength), and durability of concrete, including water absorption, shrinkage, and freeze-thaw resistance. Experimental results indicate that while rubberized concrete shows a decrease in compressive strength compared to conventional concrete, it offers improvements in tensile strength, flexibility, and resistance to freeze-thaw cycles.

The research underscores the potential of rubberized concrete as a sustainable alternative for non- structural applications in civil engineering.

KEYWORDS: Rubber Aggregate, Waste Tire Rubber, Recycled Material, Compressive Strength, Sound Insulation , etc.

I. INTRODUCTION

Concrete is one of the most widely used construction materials in the world due to its strength, durability, and versatility. However, traditional concrete has certain limitations, such as brittleness, susceptibility to cracking, and environmental concerns related to the use of natural aggregates. In recent years, researchers have explored alternative materials to improve the properties of concrete while promoting sustainability. One such innovation is rubberized concrete, which incorporates recycled rubber from waste tires into the mix as a partial replacement for conventional aggregates Rubberized concrete is an eco- friendly and cost-effective solution that helps reduce environmental pollution caused by discarded tires while improving some mechanical and durability properties of concrete. This paper provides an overview of rubberized concrete, its composition, properties, advantages, challenges, and potential applications.

The disposal of waste tires, an increasingly serious environmental issue, has prompted various attempts to reuse tires in meaningful ways. One innovative approach is the incorporation of rubber from scrap tires into concrete, leading to the development of rubberized concrete. Rubberized concrete involves the substitution of conventional aggregates (such as sand and gravel) with rubber particles derived from used tires. This substitution provides several potential advantages, including improved impact resistance, enhanced durability, reduced weight, and noise reduction. With the ever-growing demand for concrete in construction, researchers have turned to modifying concrete with various materials to enhance its performance. The incorporation of rubber particles, often in the form of shredded tire rubber, significantly affects the rheological and mechanical properties of concrete. This study aims to assess how the inclusion of rubber in concrete mixtures influences its workability, strength, and durability.

II. METHODOLOGY

To investigate the feasibility of using waste glass in concrete,
Theofndlere. mimotsatology will be employed. Calculation of cement, sand and aggregate for M20 Grade of concrete
M20(1:1.5:3) proportion 1 part of cement
1.5 part of Fine Aggregate 3 part of coarse Aggregate

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Density of materials:-
1) Cement1440 kg/m³
2) Aggregate:- 500 kg/m³
3) Sand :-1600 kg/m³
material Required for I cube casting:-Size of cube 0.15^3m
Step 1st convert wet volume into dry Volume.
= 0.153 x 1.54 = 5.1975 x10^3

1) volume of cement
1/5.5 x 5.1975x10-3
(Ratio of cement/sum of ratio)x(dry volume Cement in kg = 9.45×10- 4x1440=1.3608 kg Cement volume= 9.45x10-4

2) volume of Sand:-
=(1.5x cement in kg) Sand in kg = 2.0412Kg 1.5×1.3608

3) volume of Aggregate:-
= (3x cement in kg) (3×1.3608)
Aggregate In kg = 4.0824 kg

4) water Required:-
=(0.45x cement in kg) 0.45x1.3608
0.612 L
0.612L

Fig -1: Different types of materials

2.1 Advantages
1. Sustainability: Reduces waste by recycling used tires.
2. Impact Resistance: Absorbs energy, reducing damage from impacts.
3. Sound Insulation: Provides excellent noise reduction.
4. Thermal Insulation: Enhances thermal resistance.
5. Crack Resistance: Minimizes cracking and shrinkage.

2. 2 Disadvantages
1. Reduced Strength: Lower compressive and tensile strength.
2. Poor Bonding: Weak adhesion between rubber and cement.
3. Workability Issues: Difficult to mix and compact.
4. Water Absorption: Rubber can absorb water, reducing durability.

5. Longer Curing Time: Requires extended curing for strength development.

Fig -2: Concrete cube keep for 24 hrs

Fig -3: Concrete cube for curing for(7 days, 14 days, and 28days)

Fig -4: Testing on concrete cube on (CTM)

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III. RESULTS

Sr .no	Curing period (Day s)	% Waste tire rubb er	Compressive st rength(N/mm 2)	Load at Failure (K N)
1	7	4%	227.8	10.12
2	14	4%	284.4	12.64
3	7	8%	217.2	9.65
4	14	8%	287.0	12.87

IV. CONCLUSION

1. Sustainability: Utilizes waste tire rubber, reducing environmental waste and promoting sustainable construction.
2. Reduced Weight: Rubber content lowers concrete density, making it lightweight and easier to handle.
3. Improved Flexibility: Enhances flexibility and impact resistance, suitable for non-structural applications.
4. Lower Compressive Strength: Higher rubber content reduces compressive strength, limiting structural use
5. Enhanced Noise and Vibration Absorption: Ideal for applications like road pavements and sound barriers

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