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Improve Properties of Concrete using Polymeric Waste Materials for Road Paving

Amit Singh[1], Rohit Jain[2]

[1]Research Scholar, [2]Associate Professor,

[1,2]Department of Civil Engineering, Lakshmi Narain College of Technology, Bhopal, Madhya Pradesh, India

ABSTRACT

We arranged number of examples by fluctuating level of modern waste polypropylene fiber I. e. (0%, 0.25%, 0.5%, 0.75% and 1.00%). The thickness of Fiber Reinforced Concrete (FRC) was tried following setting up the solid blend while the compressive quality and the split elasticity of the Fiber Reinforced Concrete (FRC) were tried following 7 and 28 days of relieving. Results demonstrate that the thickness of new Fiber Reinforced Concrete (FRC) somewhat or unimportantly diminishes from 2397 kg/cm3 to 2393 kg/cm3 with the expansion of polypropylene fiber. The expansion of waste polypropylene fiber builds the quality of Fiber Reinforced Concrete (FRC) for all restoring ages in a specific way. From that point forward, there is a sudden decrease in the quality of the Fiber Reinforced Concrete (FRC). The expansion of 0.5% polypropylene fiber is suggested for the most extreme quality with least coefficient of weakness. The expansion of 0.5% waste polypropylene fiber increment the compressive quality around 10% and 17% split rigidity of the Fiber Reinforced Concrete (FRC)

KEYWORDS: *polypropylene fiber, Fiber Reinforced Concrete, compressive, tensile strength*

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INTRODUCTION

Some analyst determined the utilization of expended plastic container squander as a fractional substitution of the fine total inside composite materials for building applications. The investigation exhibits that the plastic containers destroyed into little PET particles might be utilized effectively as a halfway substitution of the fine total in cementitious a solid composite, which seems to give an alluring minimal effort material predictable or dependable properties and which would assist to determine a portion of the strong waste inconveniences made by plastics creation. Subsequently in this examination, the chances to utilize the waste plastic in concrete cement blends have been researched and contrasted and control tests. In this segment, just the situations where the plastic is utilized as sinewy material in concrete are introduced. The various properties of the different sorts of sinewy waste material are spoken to. At long last, the conceivable future examinations on the modern waste polymer as stringy material in the concrete mortar and concrete solid blend are assessed in this work.

Objectives of our Proposed Research Work

The significant target of this exploration work is to develop a manageable and eco neighborly answer for the utilization of mechanical waste fiber in concrete by presenting them as sinewy material for creating a concrete solid blend. This examination work or postulation is led to accomplish the accompanying destinations:

1. To examination the physical and mechanical exhibition of modern waste polymer fiber utilized in the solid blends.
2. To set up the different extents of polymer altered solid utilizing modern waste fiber.
3. To decide the ideal utilization of mechanical waste fiber in the concrete solid blend, which delivers the best concrete of having better properties like thickness test, compressive quality and split rigidity.
4. To investigate the chance of utilizing modern waste fiber in concrete solid blend.

LITERATURE REVIEW

In the research program of (22) (Pravin V Domke, 2012), to reduce the impact on the ecology or surroundings due to agricultural and industrial waste products such as Rice Husk Ash (RHA) and (coconut fibers) COIR which are the waste products of paddy industry and agricultural industry. Use of these materials in the conventional concrete is not only improves the strength of the concrete but also leads to the appropriate disposal of these materials, resulting in reducing the impact of these resources on environment. It's found that the rice husk ash (RHA) is obtained by burning of rice husk in a controlled way, which are extremely reactive pozzolonic material and the coir having excellent mechanical and physical properties to be utilized in helpful way in development of composite materials. This thesis paper

describes about the results obtained from the comprehensive investigation done on the partial replacement of cement with

Rice Husk Ash (RHA) cement concrete and shows evidently up to how much percentage the cement can be replaced by coconut fibers and Rice Husk Ash.

Many other references are available on the use of waste plastic as aggregate, filler or fibre replacement in the preparation of cement mortar and cement concrete mix (24) (Siddique et al. 2008).

(26) Tam and Tam (2006) stated that technology is being developed that will allow building materials to be increasingly infused with recycled plastic element in order to increase the strength, durability and impact resistance, and improve appearance.
(19) Jo et al. (2006) investigated the mechanical properties such as flexural strength and compressive strength of polymer concrete using an unsaturated polyester resin based on recycled PET, which participates to dropping the cost of the material and saving energy.

Cement concrete mix volume contains from 65–80% aggregate and it plays a significant role in concrete properties such as dimensional stability, workability, strength, and durability, so the use of waste materials in cement concrete mix as fibre can effect in the amount of waste materials extremely. Lightweight fibrous material is an important material in reducing the unit weight of cement concrete mix. A work has already been done on the use of plastic waste as polyethylene terephthalate (PET) bottle such as Light weight fibrous material **(15) (Choi et al 2005)**.

Result Shows the effect of Accelerator on Concrete Mix

Concrete	Cement Kg/m^3	Water Kg/m^3	Reduction In Water Content (%)	W/C Ratio	Slump (mm)	Compressive Strength kg/cm^2		
						3 Days	7 Days	28 Days
Reference concrete	350	210	Nil	0.6	55	88.5	163.4	253
Concrete with Accelerator	350	178.5	15.0	0.51	60	135	216	304

Test Results for Compressive Strength of Cement

S. No.	Days	Characteristics Compressive Strength from our Tests (N/mm^2)	Value Specified by BIS: 8112-2013 for OPC 43
1	3	23.60 N/mm2	23 N/mm2
2	7	34.88 N/mm2	33 N/mm2
3	28	46.85 N/mm2	43 N/mm2

Specific Gravity of Aggregates used in our Concrete Mix

S. No.	W1 (gms)	W2 (gms)	W3 (gms)	W4 (gms)	S. G.
1	646	944	1650	1464	2.66
2	646	946	1652	1464	2.68
3	646	946	1650	1464	2.63
4	646	944	1650	1466	2.61
5	646	948	1652	1464	2.65
6	646	946	1650	1464	2.63

Water Absorption of Test Samples

S. No.	W1	W2	% Water Absorption
1	2000	2030	1.5
2	2000	2026	1.3
3	2000	2026	1.3
4	2000	2028	1.4
5	2000	2026	1.3
6	2000	2028	1.4

Conclusion

1. The addition of waste polypropylene fiber increases the strength of concrete for all curing ages up to a certain point. After that there is an abrupt reduction in the strength of the Fibre Reinforced Concrete (FRC). Because at higher dosage, concrete loses its ability to make a proper bond.
2. The mix which was prepared with the addition of 0.45% fibre with 0.50 W/C ratio posses the maximum compressive as well as tensile strength. Therefore this mix is recommended for maximum strength.

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