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Experimental Work on Concrete by Using Waste Foundry Sand

[1]Sk. Sahera, [2]Dr. K.Chandramouli, [3]J. Sree Naga Chaitanya, [4]B Krishna Satish

[1&3]Assistant Professor, Department of Civil Engineering, NRI Institute of Technology, Visadala (V), Medikonduru (M), Guntur, Andhra Pradesh, India. Email: jarugumillichaitanya1989@gmail.com

[2] Professor & HOD, Department of Civil Engineering, NRI Institute of Technology, Visadala (V), Medikonduru (M), Guntur, Andhra Pradesh, India.Email: koduru_mouli@yahoo.in

[4]B. Tech Student, Department of Civil Engineering, NRI Institute of Technology, Visadala (V), Medikonduru (M), Guntur, Andhra Pradesh

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ABSTRACT-

Concrete can be distinguished by the kind of cement or aggregate that is used, by the unique properties it exhibits, or by the production techniques employed.A severe scarcity of river sand that was advantageous for a new field of study. research on the depletion of river sand and the necessity of scientific resource management and utilisation. Foundry sand can be added to concrete as an additional ingredient to change its qualities, or it can be used to replace fine aggregates by 5%,10%,15%,20% and 25%.Many of the concrete's engineering qualities, including its Splittensile, and compressive strengths, were greatly enhanced by the addition of banana fibres.Additionally improved was the flexibility's resistance to cracking and spalling. Consequently, it functions as a natural additive, endowing regular cement concrete with new attributes. Various percentages of banana fibres with a length of 50 mm were employed in this context by 0.25%, 0.5% and 1% for M20 grade of concrete for 7 and 28 days.

KEYWORDS: Waste foundry sand, Banana fibres , Compressive strength and Split tensile strength.

I. INTRODUCTION

Cement paste is combined with fine and coarse aggregate to create concrete, a composite material that dries over time. Most of the concert is made with concrete that has a lime base or is constructed on hydraulic cement. The peanut business generates waste materials like peanut shell ash. It is usually disposed of outside without taking into account the benefits to the environment or the economy.

As land filling is turning more and more expensive, using waste and byproducts has become a desirable alternative to disposal. WFS, or waste foundry sand, is one type of industrial byproduct. Around the world, the ferrous and non-ferrous metal casting industries generate millions of tonnes of waste. Every year, India produces over 2 million tonnes of waste foundry sand. WFS is a significant byproduct of the metal casting industry and has long been utilised with success as a filler for vacant spaces. However, the rapidly rising costs of disposal make using waste foundry sand for land infill increasingly problematic.

Fibre reinforced concrete (FRC) is a material composed of aggregate, Portland cement, and discrete discontinuous fibres. Conventional unreinforced concrete is brittle, with sporadic strain and tensile strength capabilities. Concrete becomes more homogenised and isotropic and changes from a brittle to a more ductile composition when banana fibres are added. Different types of microcracks in conventional concrete are rapidly accentuated beneath applied loads.

2. OBJECTIVES:

1. To examine at the potential benefits of partially replacing fine aggregate with leftover foundry sand.

2. By presence of fibre is to control cracks .

3. To examine the concrete's split tensile and compressive strengths.

3. MATERIALS

Cement: In concrete, which is used for construction, cement is primarily employed as a binder agent that binds and hardens other components together. In building, ordinary Portland cement, or OPC, is utilized. Grade 53.

Fine Aggregate: River sand that was accessible nearby was utilised as fineaggregate in the current study.

Coarse Aggregate: Coarse aggregate is defined as aggregate that is still present above the IS Sieve 4.75 mm. According to IS383:1970, a progressive increase in size of 10–20 mm is the usual maximum.

Water: Concrete was mixed and cured using clean tap water, and aggregates were cleaned.

Waste Foundry Sand: Mak's Casting Uppal in Hyderabad provided the locally sourced waste foundry sand. WFS was utilized to partially substitute natural river sand, or fine aggregate.

Banana Fibre: The fibres from the banana trunk utilised in this project come from a nearby community in the Tamilnadu region. The fibres are offered in processed and consumable fibre forms. Fibres of a uniform length were produced using a cutting machine.

4. EXPERIMENTAL RESULTS

4.1 Compressive strength

As concrete's compressive strength acts as a standard for determining the material's quality, it needs to be assessed.

Table1 : Compressive strength of concrete with Waste Foundry Sand as partial replacement of fine aggregate.

Sl.no	% Of WFS	Compressive strength Results (N/mm^2)	
		7 days	28 days
1	0%	26.51	39.28
2	5%	28.69	42.08
3	10%	30.53	43.62
4	15%	32.01	45.66
5	20%	30.88	44.18
6	25%	28.66	41.84

Table 2: Compressive strength of concrete by addition of banana fibres.

Sl.no	% of BF	Compressive strength Results (N/mm^2)	
		7 days	28 days
1	0%	26.51	39.28
2	0.25%	29.53	43.26
3	0.5%	32.66	46.73
4	1%	30.26	43.93

Table 3: Combined compressive strength result with 1325% Waste foundry sand replace with fine aggregate and by adding 0.5% Banana fibre in concrete.

Sl.no	% Of WSF+BF	Compressive strength Results (N/mm^2)	
		7 days	28 days
1	0%	26.51	39.28
2	15% WSF+0.5%BF	35.19	49.92

4.2 Split tensile strength results

The split tensile strength conducted in compressive strength machine for the cast and cured specimens and the results are furnished in Table.

Table 4 : Split tensile strength of concrete with Waste Foundry Sand as partial replacement of fine aggregate.

Sl.no	% Of WFS	Split tensile strength Results (N/mm^2)	
		7 days	28 days
1	0%	2.71	3.88
2	5%	2.83	4.11
3	10%	2.96	4.24
4	15%	3.13	4.46
5	20%	2.94	4.22
6	25%	2.79	3.99

Table 5 : Split tensile strength of concrete by addition of banana fibres.

Sl.no	% of BF	Split tensile strength Results (N/mm^2)	
		7 days	28 days
1	0%	2.71	3.88
2	0.25%	2.84	4.16
3	0.5%	2.92	4.23
4	1%	2.85	4.08

Table 6: Combined Split tensile result with 15% Waste foundry sand replace with fine aggregate and by adding 0.5% Banana fibre in concrete.

Sl.no	% Of WSF+BF	Split tensile strength Results (N/mm^2)	
		7 days	28 days
1	0%	2.71	3.88
2	15% WSF+0.5%BF	3.26	4.65

5. CONCLUSION:

1. The Normal Concrete Compressive strength result for 7 and 28 days is 26.51 N/mm^2 and 39.28 N/mm^2.

2. At 15% replacement of fine aggregate by waste foundry sand the compressive strength of concrete for 7 and 28 days is 32.01 N/mm^2 and 45.66 N/mm^2.

3. By addition of 0.5% banana fibre in concrete the compressive strength of concrete for 7 and 28 days is 32.66 N/mm^2 and 46.73N/mm^2.

4. Combined replacement of with 15% of waste foundry sand and 0.5% of banana fibre adding on concrete the compressive strength of concrete for 7 and 28 days is 35.19 N/mm^2 and 49.92N/mm^2.\

5. The Normal Concrete Split tensile strength result for 7 and 28 days is 2.71 N/mm^2 and 3.88 N/mm^2.

6. At 15% replacement of fine aggregate by waste foundry sand the Split tensile strength of concrete for 7 and 28 days is 3.13N/mm^2 and 4.46N/mm^2.

7. By addition of 0.5% banana fibre in concrete the Split tensile strength of concrete for 7 and 28 days is 2.92N/mm^2 and 4.23N/mm^2.

8.Combined replacement with 15% of waste foundry sand and 0.5% of banana fibre adding on concrete the Split tensile strength of concrete for 7 and 28 days is 3.26 N/mm^2 and 4.65N/mm^2.

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