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EFFECT OF RICE HUSK ASH IN CONCRETE AS BINDING MATERIAL AND FINE AGGREGATE

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ABSTRACT

Cement is the most expensive constituents of concrete. Over 5% of global CO2 emission is attributed by cement production. Similarly due to the demand in the fine aggregate. In this work alternate source for cement and fine aggregate as rice hush ash is used. A comparative study on properties of concrete when cement and fine aggregate are partially replaced by rice husk ash. Percentage replacement of cement with RHA is kept as constant at 10% and fine aggregate is replaced at 0%, 5%, 10% and 15% in a mix of M20 grade of concrete. The strength such as compressive strength and split tensile strength are found out at 7 and 28 days. The strength are compared with control concrete and the optimum % of replacement of RHA is found out.

key words: *Rice Husk Ash (RHA), compressive strength, splittensile strength*

I. INTRODUCTION

These days discarding agro squander are the serious issue. One of the agro squander is Rice Husk. Consistently a normal of 120 million tons of rice husk are created by paddy field. Greater part of rice delivering nations like india, the husk created from the rice preparing is either scorched or dumped as a waste. Rice husk can be utilized as a fuel if its consumed at high temperature and it transform into an ash. Ash acquired is permeable as fine total and its pounding into a fine power . RHA is a pozzolanic material contains 85% of silica content. Utilizing Rice Husk Ash as a substitute material in concrete decreases the natural issue.

Objective of research

1. To find the optimum percentage of RHA in concrete bypartial replacement of Natural Sand.
2. To use pozzolanic material such as RHA in concrete bypartial replacement of cement.
3. To find compressive strength and split tensile strength.
4. To provide economical construction material.
5. Safeguard the environment by utilizing agro waste properly.

II. MATERIALS AND METHODS

Materials:

RHA: Rice Husk Ash was blazed for roughly 72hours in air in an uncontrolled burning method. The temperature was within the scope of 400-600 degree C .The powder collected was sieved through BIS standard sieve size 75µm and its shading was dim.

Cement: Ordinary Portland concrete (OPC) of 43 evaluation was utilized as a section of that the structure and properties is in consistence with the Indian standards

Aggregate: Total is a granular material, as an example, sand, rock, squashed stone, smashed hydraulic-bond cement, or iron impact heater slag, utilized with water powered establishing medium to make either concrete or mortar. Those particles that are dominatingly which held on the 4.75 mm (No. 4) strainer are known as coarse total. Those particles passing the 9.5 mm (3/8 in.) strainer, all passing the 4.75 mm (No. 4) strainer, and transcendently held on the 75 µm (No. 200) sieve are known as fine total.

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III. MIX DESIGN

The mix was designed for M20 grade as per IS: 10262-2009 at ratio of 1:2.1:3.26. The Table:1 shows various percentage replacement and Table : 2 shows mix design proportion for 1 m^3 of concrete.

Table1: percentage replacement of cement and fine aggregate

Batch No.	% Replacement of cement by RHA'C	% Replacement of fine aggregate by RHA'F
1	0	0
2	10	0
3	10	5
4	10	10
5	10	15

Table 2: Mix design proportion of M20 concrete for I cubic meter volume

Batch No	Cement (kg)	RHA'C (kg)	Fine Aggregate	RHA'F (kg)	CA (kg)	W/C
1	350	0	756	0	1140	0.45
2	315	35	756	0	1140	0.45
3	315	35	718	38	1140	0.45
4	315	35	680	76	1140	0.45
5	315	35	642	114	1140	0.45

The sieve analysis was carried out on fine aggregate using I.S. sieve. The fine aggregate being used satisfies the guideline of code IS 373:1970

Table 3 Sieve Analysis of fine aggregate

IS Sieve (in mm)	Wt. Retained (in gm)	Cumulative Wt. Retained	% Wt. Retained	Ratio
10	0	0	0	100
4.75	60	60	4.29	95.71
2.26	132	19	13.71	86.57
1.18	262	454	32.43	87.57
0.60	330	774	55.23	44.71
0.30	446	1220	87.14	17.86
0.15	132	1352	96.57	8.43

Compression Testing Machine (CTM)
Compression tests are utilized to decide how an item or material responds when it is compacted, squashed, smashed or leveled by estimating principal parameters that decide the example conduct under a compressive burden. These incorporate as far as possible, which for "Hookean" materials is roughly equivalent to as far as possible, and furthermore known as yield point or yield quality, Young's Modulus (these, albeit for the most part connected with elastic testing, may have compressive analogs) and compressive quality. Compression tests can be embraced as a major aspect of the structure procedure, in the creation condition or in the quality control research facility.

IV. RESULTS

Compressive strength tests were conducted at the ages of 7, 28 days. A comparative study was made on control concrete with replacement of cement by RHA1 in 10% and fine aggregate by RHA2 in 0%, 5%, 10% and 15%. The test results are reported in Table 4 for various mix proportions.

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Table 4: Compressive strength of concrete in MPa

BATCH NO	Compressive Strength (N/mm^2)	
	7 Days	28 Days
MIX 1	30.8	44.18
MIX 2	27.4	41.16
MIX 3	24.6	39.41
MIX 4	25.6	37.19
MIX 5	26.7	37.33

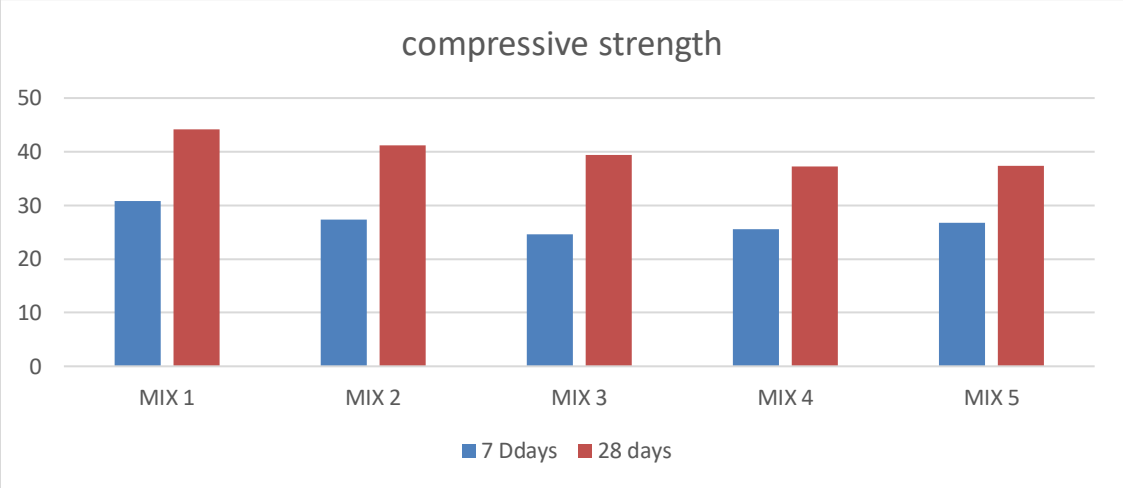

Fig: graphical representation of compressive strength of concrete

Table 5: Split Tensile strength of concrete

BATCH NO	Split Tensile Strength (N/mm^2)	
	7 Days	28 Days
MIX 1	1.63	2.41
MIX 2	2.09	2.54
MIX 3	2.13	2.76
MIX 4	2.18	2.84
MIX 5	2.46	2.95

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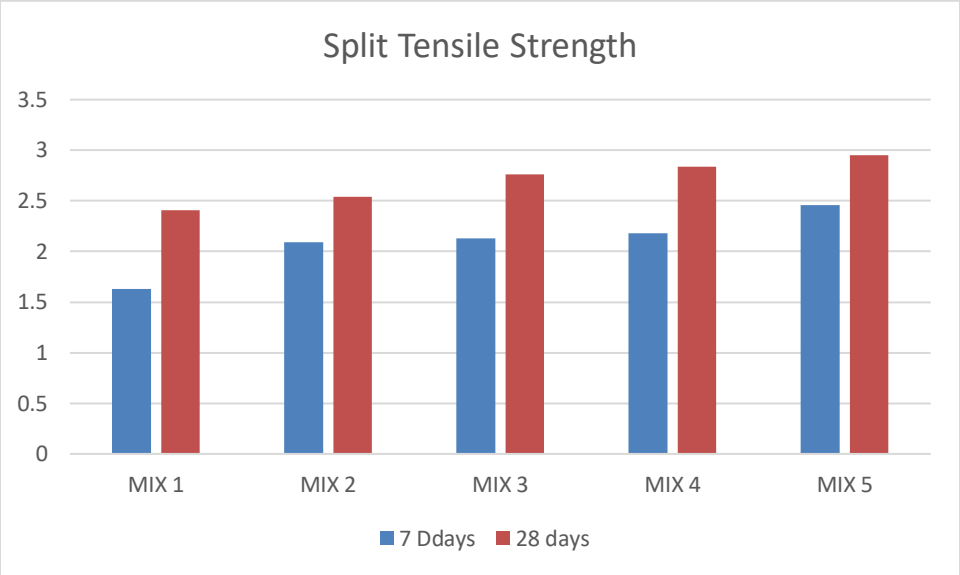

Fig: Graphical representation of split tensile strength of concrete

V. CONCLUSION

Based on above study the following observations are made on partial replacement of cement and fine aggregate by Rice Husk Ash:

- The gradual decrease in the compressive strength as the percentage of replacement increases at 7 and 28 days .
- The gradual increases in spilt tensile strength as the percentage of replacement increases at 7 and 28 days.
- The maximum compressive strength is obtained at 5% replacement of fine aggregate by RHA.
- The maximum Split tensile strength is obtained at 15% of replacement of fine aggregate by RHA.
- The workability of RHA concretes have decreased if the percentage of replacement increases.

The problem of disposal of land filling is reduced.

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