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Compressive Strength on Concrete with Partial Replacement of Cement by Rice Husk Ash

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Abstract - *The rice husk ash is an agricultural waste. It is a by- product taken from rice mill process, which produce after burning of rice husk, with approximately the ratio of 200 kg per one ton of rice, in high temperature it reduces to 40 kg. The rice husk itself has a very rough surface which is abrasive in nature and also affect the initial settling time of cement because it present 87 to 90% silica content. The quality of rice husk ash is dependent upon the type of burning process adopted. Practical we are use of open field burring process. The mix design may be adopted M25. The partial replacement of ordinary Portland cement with RHA by is 10%, 15%, 20%, with steel fibers. And further calculate the compressive strength of the concrete. For (3day s, 7days, 14 days, and 28 days). Cement could be beneficially replaced by RHA without adversely affecting the strength. It is observer that the w/c ratio is increases by increases RHA percentage.*

***Key Words*: RHA (Rice husk Ash) 1, Mix design (M25)2, (Grade 53, OPC) Cement 3, Steel fiber4. W/c ratio 5.**

1. INTRODUCTION

Cement is very important component in construction industry is which may be affects the cost of construction and strength of material manufactured which Mixed with aggregates and water, cement forms the conventional concrete which is used in the construction of buildings, roads, bridges and other structures. The RHA is produces supplementary cementing materials to improve concrete properties (durability, strength, etc. It has content some silica fume content. The RHA can be obtaining in cheapest cost. By Adding rice husk ash to the concrete mix even in partial replacement will be enhance the workability, strength of concrete mixes, while making the concrete durable to chemical attacks, abrasion and reinforcement corrosion.

1.1 Compressive strength 1

The Concrete is a composition of fine and course aggregate (usually pebbles or crushed stone) and cement and water the cement contents (calcium carbonate) and lime (calcium oxide). In this experiment use partial replacement cement with RHA can be done in M25 concrete with (1: 1.65:2.47).

1.2. Materials

1) **Cement:** Cement used in the experimental work is ordinary Portland cement of Grade53 OPC conforming to IS: 1489 part 1 the physical properties of cement as follows:-

Specific gravity = 2.62

Fineness modulus = 2.58

2) **Rice Husk Ash**: The Rice husk ash is obtained by total burning of rice husk in a controlled temp. Without causing environmental pollution. The RHA burns it can be converted in oxide form and that's why it gains the properties of pozzolanic characteristics. This contributes strength impermeability in Concrete.

Advantages of RHA

1) It is cheap in cost.

2) It is available near the construction.

3) The RHA gives strength, increased due to the hydration of more calcium silicate than OPC concrete.

4) The RHA is high porous and light weight.

Table -1 Physical Properties of RHA

Physical Properties	Magnitude
1)Appearance	Very fine power
1) Size	25 micron
2) color	White
3)Odour	Odorless
4)Specific Gravity	2.3

Table -2 Chemical properties of RHA

Propertise. of RHA	Magnitude %	PPC
SiO2	88.32	17-25
CaO	0.67	60-65
Al2O3	0.46	6
Fe2O3	0.67	0.5-6
MgO	0.44	0.21
Na2O3	0.12	0.12
Specific gravity	2.94	2.11

Fig.RiceHusk Ash

3) **Fine aggregate**: The fine well graded sand define as, it passing through 4.75 mm sieve and retained on 600 µm Sieve, conforming as per IS 383-1970 was refer as fine aggregate in the present study. The sand is used in the preparation of concrete which is poorly graded. The fine aggregate was tested physical properties requirements such fineness modulus, and specific gravity (sp.gr) and accordance with Is code: 2386-1963.

Fig. Fine Aggregate (well graded)

4) Course Aggregate: The course aggregate size of 20 mm maximum size has been used as coarse aggregate. It can segregate by sieve analysis.

A) Specific gravity =2.64

B) Fineness Modulus = 6.816

Fig. Coures Aggergate (20 mm)

Water: The water used for the study was obtained from a free flowing stream. The portable water which is clean and free from any visible impurities. The pH value should not be less than 6to 7.

Steel fiber: The steel fibrous are used in the experiment is about 0.2 to 0.6 mm diameter in size and 20 to 50 mm in length. The steel fibers are mostly providing tensile strength to the concrete, as well as it plays the role of fined aggregate in concrete.

Fig. Steel Fibre

1) **Workability:** The workability of concrete can be affected by the addition of RHA in cement; this is can be show the slump as given below.

Table: Workability

Workability	10%RHA	15% RHA	20% RHA
Slump (mm)	25	21	20

II. **MIX DESIGN:** A trial mix has been designed for an assumed compaction factor of 0.80 as per IS 10262 - 1982 for M25 grade. The trial mix is obtained for water cement ratio of 0.50. The proportions for different ingredients of the mix without RHA are while ingredients of the mix with RHA (in different proportions).

Mix proportion: 1:1.65:2.47:0.5

1) Mix proportions without RHA

Grade of concrete	Water Kg	Cement (Kg)	F.G kg	C.G kg
Cu.m	1.50	280.8	515.844	771.20
Mix 25	0.50	1	1.65	2.47

2) Mix proportions with RHA

Amount of RHA	Cement Kg/m3	RHA in Kg/m3	Water in kg/m3	Fine. Agg.	Course Agg.
10 %	280.8	28.8	140.4	515.84	771.20
15%	280.8	42.12	140.4	515.84	771.20
20%	280.8	56.16	140.4	515.84	771.20

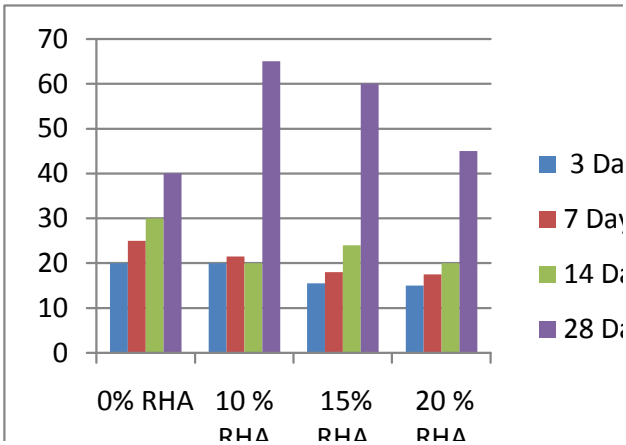
III. Testing on concrete: Compression test conducting by standard compression testing machine.

Compression test with RHA:- The average of three results of compressive strength of concrete. The age of concrete specimen used it find out this property at 3, 7, 14, 28 days and shown in Figures 10 and 11. It is observed from the result at early age, concrete Without RHA shown better results and at later the results was reverse.

Fig.2 compressive testing machine

Sample of designing	RHA % In	Compr-session testing kN/m2	3 days	7 days	14 day	28 days
C0	0	-	20	25	30	40
C1	10	-	20	21.5	20	65
C2	15	-	15.5	18	24	60
C3	20	-	15	17.5	20	45

Graphical Representation of compression test KN/m³



2. RESULTS

The cube compressive strength of M-25mix results at the various ages such as 3,7,14 days and 28 days at the replacement levels such as 10%, 15%, and 20% of partial replacement of RHA with cement in concrete and additional steel fiber, at w/c ratio of 0.5, such can be shown in the above grapes as compare.

The result is found that is the RHA (which is fully burans in kin can be give less strength as camper to the normal OPC cement.

1) The final strength of concrete of 28 day is less as camper to normal cement strength.

2) It's some advantage of RHA used in concrete is to give the imperious nature which is retain the water after final strength.

3) The RHA is used in ancient era as plastering material such as it can be good binding properties.

3. CONCLUSIONS

1) The normal mix 25 (1:1.65:2.47) per portion of OPC is gives maximum strength for 3,7,14 and 28 days.

2) The use of RHA in concrete is beneficial up to certain percentage which is 10%, 15%. By this percentile used of RHA and steel fiber is beneficial.

3) Along the use of steel fibers the strength of concrete get increased in 10%, 15% RHA.

4) In is observed in this experiment the water-cement ratio is increased by o.1%. (To 0.4%)

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