

Experimental Investigation of Effects of Rice Sheath Aggregate Mix With In Fly Ash Bricks Composition

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Abstract:-- Bricks are most important construction material .now a day various bricks composition available for better strength and thermal comfort for building. We are focus on local area agriculture waste (rice sheath) aggregate mixing with fly ash bricks composition. It helps to cost cutting and use of agriculture waste and give thermal comfort. Recycling such wastes by utilizing them into building materials is a moderate solution for the pollution issues. The main aim of the work is to manufacture fly ash bricks with mixing rice sheath aggregate.The composition of fly ash bricks are fly ash, sand, and cement. In this work RSA mix with portion 0%, 15%, 20%, 35%. Experimental result like water absorption, compressive test and thermal conductivity show that mixing of agriculture waste RSA is good for bricks composition and building.

Index Terms:- Rice sheath, Fly ash bricks, water absorption test, compressive test, thermal conductivity.

I. INTRODUCTION

Now day agriculture fully dependent to technology so agriculture waste are not use for animal feeding or any other use of it. Its best use of waste in building material. Bricks are most important component for any building manufacturing. Its eco-friendly material to use in making bricks.

Mostly now day fly ash bricks are using making building its cost effective and thermal comfort and strength the building .so focus on this and mixing a new fly ash bricks composition by using rice sheath aggregate its waste material.

The main components of fly ash bricks are Calcium oxide (60-70%), Silica (15-20%), Alumina (5-10%), and Iron oxide (3-5%).rice sheath aggregate mix in this composition to manufacture new bricks composition. And investigation the effect on bricks properties.[6]

Changing the composition of fly ash bricks by mixing rice sheath aggregate with normal strength is a new dimension of bricks design, and large-scale purposes will enhance the development of the construction industry through cost cutting. Used to improve insulating properties. Thermal conductivity (TC) decreases with the addition of rice sheath fine aggregate mix with fly ash bricks composition.

Rice sheath is the agriculture waste product gating from Rice plant .it is the most important crop in the Chhattisgarh, shown in Fig. 1. The composition of the rice sheath organic

compounds Table 1.[7] Table 2 . Chemical composition of fly ash [1]

The main aim of the work is to manufacture fly ash bricks, with mixing of rice sheath fine aggregate. The objective is to reduce the thermal conductivity of bricks and find optimal composition of fly ash bricks so that the cooling and heating of the building can reduce and as well as the waste product (rice sheath) can also be utilized. The composition of fly ash bricks is fly ash, sand, and cement. In this work RSA mix in the total composition by 0, 15, 25, and 35%. The sizes of bricks are 190 × 90 × 90 mm standard size [6].

Table 1. The composition of the rice Sheath organic compounds

Content, % wt.			
C	H	O	N
39.8-41.1	5.7-6.1	0.5-0.6	37.4-36.6



Fig.1. Rice sheath

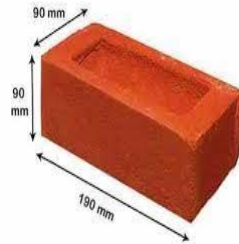


Fig.2. Bricks standard size

Table 3

Literature review on production of bricks from waste materials.

S.No.	Waste material	Cementing material	Test conducted	Reference
1.	Rice Husk	Ordinary Portland cement	Compressive test , Water absorption test	[1]
2.	Rice Strew	Ordinary Portland cement	Physical and Chemical Properties of Rice Straw Ash and Its Effect on the Cement Paste Produced cement type	[2]
3.	Limestone dust and wood sawdust	Ordinary Portland cement	Compressive strength, Flexural strength, Water absorption	[3]
4.	Granite Saw Dust	Ordinary Portland cement	Compressive test , Water absorption test	[4]
5.	Fly Ash Brick and Finding the Optimal Mix of Materials	Ordinary Portland cement	Compressive test , Water absorption test	[5]

Table 2: Chemical compositions of fly ash

Chemical composition	SiO ₂	Fe ₂ O ₃	Al ₂ O ₃	Ca O	Mg O
W (%)	62.47	31.12	1.90	1.55	1.23

II. EXPERIMENTAL INVESTIGATION

The Rice sheath aggregate used for this study is obtained from the Indian state of Chhattisgarh. Rice sheath is got after rice seeds are separated and sun dried for remove the moisture content. After that grinded and got rice sheath fine aggregate. The aggregate of rice sheath will be used to substitute ordinary Portland cement by 0%, 10%, 20%, and 30%, of the weight of cement. Fly ash bricks with 0% of RSA serve as the control experiment.

III. COMPRESSIVE STRENGTH TEST

This test is actually carried out after the curing period of 7, 14 & 28 days, the formula for calculating it as follows:-
 Compressive strength = Applied Maximum Load X 1000(N) / Cross Sectional Area 190 x 90 x 90 mm standard size
 The Compressive Strength of fly ash Brick is measure by universal testing machine (UTM) fig 5. [2]

Water Absorption Test

RSA should not absorb more 10% of water by its total weight. The bricks which are being taken for testing in UTM that should be dried up in an oven at a temperature of 105 C to 115 C until it can attain its constant weight for being cooler at a room temperature and that weight is taken as W₁. Then the brick is kept in clean water for 24 hours at a and that weight is taken as W₂. Fig 3.

Water Absorption in % = $(W_2 - W_1 / W_1) \times 100$. [1]

Thermal Conductivity Test

The KD2 Pro is a fully portable field and lab thermal properties analyzer. It uses the transient line heat source method to measure thermal conductivity, thermal resistivity, thermal diffusivity, and specific heat. Fig 7.[6]



Fig 3. Water Absorption test



Fig 4. RSA mix bricks



Fig.5 Compressive testing



Fig 6. Bricks composition



Fig 7. KD2 pro instrument for thermal conductivity

IV. RESULTS AND DISCUSSION

(A) Compressive Strength:

Compressive/Crushing strength of bricks (Indian Made) are very variable, and may vary from 3MPa to 16MPa for hand-made burnt bricks, while Crushing strength of heavy duty bricks machine pressed (also called engineering bricks) may have compressive strength as high as 45MPa, The effect of percentage RSA mixing with fly ash composition on the compressive strength of fly ash bricks is shown in Fig. According to IS12894: 2002 the compressive strength of the fly ash bricks should be greater than 3.5MPa. The compressive strength of Rice Sheath mix ash bricks is a range of 4-6MPa that value much suitable for building construction.

AT 15% mixing of RSA compressive strength increase and increasing % of RSA reducing Compressive strength. Fig .8. Show the variation of compressive strength in graph

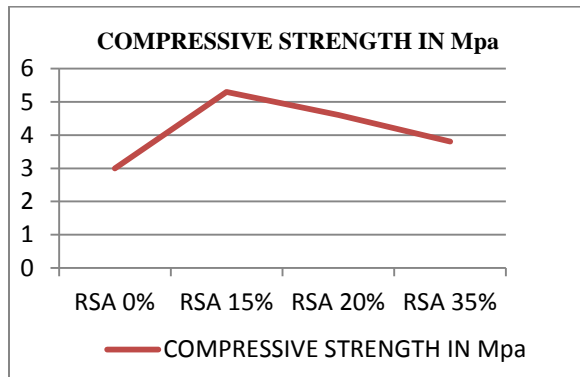


Fig 8. Compressive strength testing graph

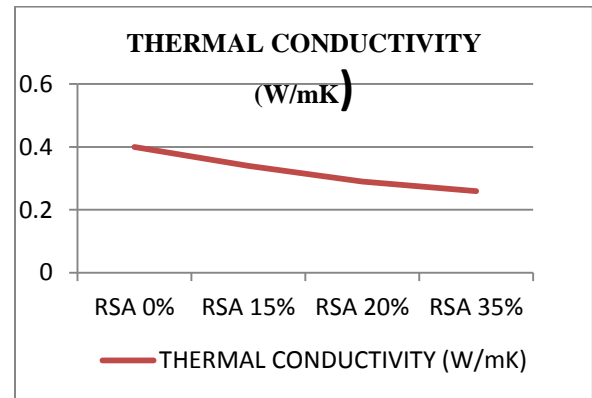


Fig 10. Thermal conductivity graph with RSA mix bricks

(B) Water absorption test:

The effect of rice sheath content on water absorption of brick samples is presented in Fig...The water absorption value is often related to the compactness and density of the brick sample, so it is also related to the compressive strength value. According to Fig.9, the water absorption of bricks slightly increased since the rice sheath content increased from 0% to 35%.

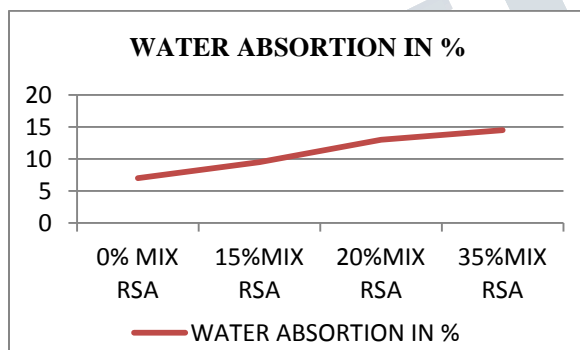


Fig .9 Water absorption test graph for RSA mix bricks

(C) Thermal Conductivity:

The thermal conductivity of the % RSA mix fly ash bricks with is shown in Fig.10. The thermal conductivity of the rice sheath mix fly ash bricks composition continuous decreases by increasing the RSA %, because rice sheath contains a bonding properties and it's not good thermal conductor material. Thermal conductivity decreases due to decreasing the density of bricks.

V. CONCLUSION

Rice sheath mixing in fly ash bricks composition experimental investigation Compressive strength, water absorption, and thermal conductivity test shows that 15%-20% rice sheath mix with fly ash bricks composition give best result for building construction. Rice sheath is agriculture waste its best use in construction material. Its economical or thermal comfort for building.

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