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An Overview on Mechanical and Durability Properties of Rice Husk Ash Concrete

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***Abstract*—This paper investigates the effect of durability and mechanical properties rice husk ash (RHA) on concrete. The establish and suitable proportion of RHA for the partial replacement of binding material cement, concrete mixtures with 0 to 30% RHA in cement were produced and mechanical properties has analysis. The effect of RHA concrete on the uniformity of concrete. The degree of damage has examine by percentage of reduction in compressive strength and chloride ions penetration as compared with control specimens have cured normally. The results indicate that the partial replacement of cement by RHA increased its durability and homogeneity but did not increase the every age compressive strength of concrete. However, concrete containing RHA represent higher compressive strength at the after ages. The screening by electron microscopy (SEM) studies of the microstructure of concrete specimens showed that the RHA filled up the void and this explained the superior mechanical performance of the concrete with RHA. Decreasing the non-ground RHA similar particle size provides a positive effect on the compressive strength of mortar. Compressive strength of cylindrical concrete in the 45–70 Mpa Range has obtain.. The results also indicate that up to 22% of ground RHA have advantageously blended with cement without adversely affecting the strength and durability and mechanical properties of concrete.**

***Index Terms*— Rice Husk Ash, Cement, Concrete, Compressive Strength**

I. Introduction

RHA concrete is like fly ash concrete with regard to increases strength development of the concrete but with a higher pozzolanic activity. Rice husk is an agricultural waste product which is produced in about 500 million tons approx. [1]. Approximately, for 100 topic. The adjective of the present investigation is to evaluate the rice mill boiler burnt rice husk to strength and permeability properties of hardened concretes and identify the optimal level of RHA replacement. The need to reduce the high cost of Ordinary Portland Cement in concrete has intensified research into the use of some locally available RHA partial replacement for Ordinary Portland Cement (OPC) in Civil Engineering and Building Works. Pozzolanic activity of rice husk ash (RHA) depends on silica content, silica crystallization phase, and size and surface area of ash particles. Rice Husk Ash (RHA) concrete has been reported to be a good pozzolan by numerous researchers. This research work utilized the use of Rice Husk Ash as partial replacement for Ordinary Portland Cement in concrete. It can be blended with OPC to improve the durability of concrete and its workability, and considerably reduce its cost. Rice Husk Ash (RHA) is an agricultural waste product, and how to disposed of it is a problem to waste mangers.

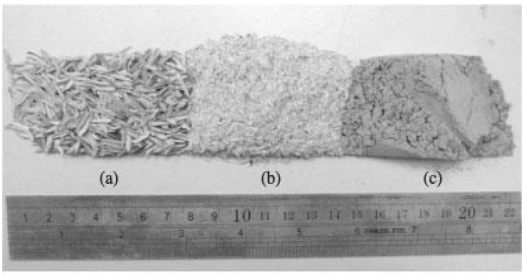

Fig. 1. Rice husk component

II. Rice husk Combustion


Fig. 2. Raw Rice Husk (RRH)


Fig. 3. Rice Husk Ash

Rice-husk is the agricultural by-product materials. It constitutes about 22% of the weight of rice. It contains about 51% cellulose, 28–30% lignin, and 15–21% of silica. When completely burnt rice-husk is convert grey to white in color, when partially burnt rice-husk ash is blackish. The controlled environment and temperature of burning yielding better quality of rice-husk ash and its particle size and specific surface area are dependent on burning condition. This research on producing rice husk ash (RHA) that can be used in concrete is not new. In investigated the effect of preprocessing on the pozzolanic reactivity of RHA [3], [4].

III. Materials and Methods

The used Indian standard code IS 8112-1995 Ordinary Portland cement (OPC) conforming. The river sand passing through 1.18 mm IS sieve with fineness modulus of 2.85 and specific gravity of 2.55 was used as fine aggregate. Available crushed granite aggregate, passing through 12.5 mm sieve while being retained on 4.75 mm sieve with fineness modulus of 6.26 and specific gravity of 2.7. (Conforming to IS 383-1970) was used as coarse aggregate.

A. Rice Husk Ash (RHA)

Rice Husk was burnt for approximately 3hrs in an open atmosphere and extreme burning process. The temperature was in the range of 400- 650C degree. The ash collected was sieved through Indian standard sieve size 75µm and its color was grey. Batching was done by volume at replacement percentages of 10, 20, and 25%. Under controlled condition and then cooled. The material was pulverized to a mean grain size of 3.8 lm before it was used as a cement replacement material.

B. Aggregates

The course aggregate collected from river and mountain. Locally available crushed granite aggregate, passing through 12.5 mm sieve while being retained on 4.75 mm sieve with fineness modulus of 6.26 and specific gravity of 2.7 from IS 383-1970 was used as coarseiver state.

C. Water

The important role of water in concrete production (mix) in that it starts the reaction between the cement and the aggregates. It helps in the hydration of the mix. The water used in this project was Pipe borne and free from contaminants.

D. Temperature Effect

The reactions of exothermal occur during the hydration of cement. Heat of Hydration is an essential aspect that influences the setting and characteristic behavior of Portland cements. This temperature variation, from the initial moment of setting until the hardening hydration of the cement, may cause shrinkage which results in the cracks develop in construction. It can be seen in some RHA constructions (Rojas). The pozzolanic Cement materials blended with usually has decreased heat of hydration compared to pure cement during the period of C3S hydration (Mustafa 2005). The rate of heat of hydration cement added with pozzolanic material mainly depends on three factors, C3S hydration, aluminates hydration and pozzolanic reaction.

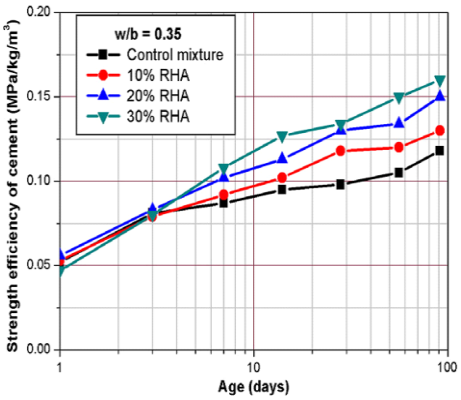

Fig. 4. The Effect of RHA content on efficiency of cement strength

E. Workability

Usually RHS cement concrete mixtures contain too mixing water because of two reasons: Firstly, the water demand and workability are significantly influenced by Particle size distribution, particle temperature effect, and voids present in the solid system. RHS concrete mixtures do not have an optimum particle size distribution, and this accounts for the undesirably high water requirement to achievement certain workability. Secondly, to plasticize a cement paste for achieving an acceptable consistence much larger amounts of water than necessary for the heat of hydration of cement have to be used because Portland cement particles, due to the presence of electric charge on the surface, tend to be trap volumes of the mixing water [5]. Studies by Owen (1979) and Jiang (2000) have indicated that with high volume fly ash concrete mixtures, up to 20% reduction in water requirements can be achieved. However, there is the possibility of water reduction longer than 20% in the presence of RHA

IV. Conclusion

RHA Concrete is very beneficial for upcoming construction life cause cement is very costly and CO_2 emission and also save environment effect.

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