

Use of Rice Husk Ash (RHA) in Concrete – A Review

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Abstract - Concrete is considered to be the most versatile material of construction and widely used all over the world only second to water. It has emerged as the material of choice for the construction of a large variety and number of structures in the world. There have been several efforts to add various waste materials as additives in concrete, one of such being rice husk ash.

This paper mainly emphasizes on the past studies on the properties of concrete along with rice husk ash as a additive or replacement.

Key Words: Concrete, Rice Husk Ash, Corrosion, Strength, Porosity

1. INTRODUCTION

Rice husk is an agricultural residue obtained from the outer covering of rice grains during milling process. It constitutes 20% of the 500 million tons of paddy produced in the world [1]. Rice husk ash (RHA) has been used as a highly reactive pozzolanic material to improve the microstructure of the interfacial transition zone (ITZ) between the cement paste and the aggregate in concrete [2]. Reactivity of RHA is attributed to its high content of amorphous silica, and to its very large surface area governed by the porous structure of the particles [3–6].

The present paper is an attempt to summarize the extensive works carried on Rice Husk Ash by various researchers.

2. LITERATURE REVIEW

V. Saraswathy and Ha-Won Song worked on corrosion performance of rice husk ash blended concrete. From their investigations it was found that the incorporation of RHA up to 30% replacement level decreases permeability, reduces the chloride penetration, improves corrosion resistance and strength properties. From this study it was concluded that the replacement level of RHA is recommended up to 25%.

K. Ganesan et al. worked on Rice husk ash blended cement: Assessment of optimal level of replacement for strength and permeability properties of concrete. According to their studies they concluded that as high as 30% by weight of OPC can be replaced with re-burnt rice husk ash without any adverse effect on permeability and strength properties of concrete.

Ayesha Siddika et al. carried Study on concrete with rice husk ash. They concluded that the concrete containing rice husk ash had same density within the range for normal weight concrete and, thus, it can be used for regular construction applications. They also concluded that the slump decreases and the water demand increases with increase in cement replacement with rice husk ash. They finally concluded the optimal percentage replacement of fly ash to be 10%.

N.K. Muhammed Koya and Deepa G Nair worked on Sustainable building blocks from Rice Husk Ash. There research verified that proposed RHA- concrete building blocks were successful in overcoming the drawbacks of the conventional concrete blocks with improved sustainability characteristics.

Muhammad Shoaib Ismail and A. M. Waliuddin studied on Effect of rice husk ash on high strength concrete. Their study indicated that the optimum replacement of cement by RHA will be around 10% to 20% with finely ground RHA.

Abdulhameed Umar Abubakar studied on Nigerian rice husk ash (RHA) in cement, concrete and mortar: a review. They found that the rice husk ash as partial substitute of cement in the production of cement-based products will improve their performance. Their work concluded that RHA can be used as cement replacement in concrete at 10 – 20% replacement.

Arvind Kumar et al. studied on Replacement of Cement in Concrete with Rice Husk Ash. They concluded that RHA based sand concrete piece can essentially decrease room temperature. They also concluded that Rice Husk Ash being a waste material will lessens the expense of development.

Md. Akhtar Hossain et al. studied on Effect of Rice Husk Ash on Concrete. They concluded that the concrete made with RHA had higher compressive strength at 90 days in comparison with that of concrete with no RHA. However at 14 and 28 days the strength was different. The compressive strength of concrete increased by 15.6% for 10% replacement level of cement by RHA and for 20% replacement, the results were not significant.

S. D. Nagrale et al. worked on Utilization of Rice Husk Ash. They concluded that the use of RHA in concrete leads to

around 8-12% saving in material cost. Thus, the addition of RHA in concrete helps in making an economical concrete.

3. CONCLUSION

On the basis of post studies on Rice Husk Ash (RHA) concrete it can be concluded that RHA concrete is an environmental friendly substitute for normal concrete. The use of RHA concrete also tends to be more economical than normal concrete. Also RHA concrete gives better strength as compared to normal concrete at aging.

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