Use of Rice Husk Ash In Concrete

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Abstract- *Conventional building material like cement is both resource and energy- intensive material. Production of cement also emits CO2 in atmosphere. In order to decrease this environmental pollution and cost of conventional building materials, alternative materials like fly ash ground granulated blast furnance slag, met kaolin, rice husk ash (RHA) and silica fume is used because of their pozzolanic behavior. RHA which contains high silica content produced by controlled incineration of rice husk can be used as supplementary cementitios material in concrete production since it exhibits high pozzolanic characteristic and contributes to strength and permeability of concrete. This paper presents an overview of the work carried out on the use of RHA as partial replacement of cement in concrete and its effect on workability, compressive strength . The advancement of concrete technology can reduce the consumption of natural resources and energy sources and lessen the burden of pollutants on environment. Presently large amount of RHA are generated in rural and small scale industries with an important impact on environment and humans. In recent years many bresearches have establiushed that the use of supplementary cementitious materials like fly ash, blast furnance slag, silica fume, met kaolin, and rice husk ash, hypo sludge etc. can not only improve the various properties of concrete- both in its fresh and hardened states, but also can contribute to economy in construction costs.*

The use of durability enhancing mineral admixtures or supplementary cementing materials has gained considerable importance the last decade or so as a key to long service life of concrete structures. Tjhere are many mineral admixtures that are used in way throughout the world but rice husk ash stands out as an eco- friendly, sustainable and durable option for concrete. This paper attempts to bring out the effectiveness of rice husk ash as a versatile concrete admixture and discuss some versatile application of rice husk ash This paper summarizes the research work on the properties of rice husk ash (RHA) when used as partial replacement for ORDINARY PORTLAND CEMENT (OPC) in concrete. OPC was replaced with RHA by weight at 0%, 5%, 10%, 15%. 0% replacement served as the control. Slum cone test was carried out on fresh concrete while compressive strength test was carried out on hardened 150mm concrete cubes after 7, and 28 days curing in water. The compressive strength of the hardened concrete increased with increasing OPC replacement with RHA

I. INTRODUCTION

1.1 General Introduction

There were many experimental work conducted to improve the properties of the concrete by putting new material, whether it is a natural materials or recycled materials or synthetic materials in the concrete mix. The additional material can be replacing the aggregate, cement or just as additive and one form of the additive is natural material. A large amount of agricultural waste caused dispose in most of tropical countries especially in Asia tor countries like Brazil, Nigeria, Malaysia, India. lf the waste cannot be dispose properly it will lead to social and environmental problem. This has necessitated research into alternative materials of construction. There is an increasing interest in what happens to products at the end of their useful lives, so natural material has an advantage in that they can bio degrade or burnt in a carbon-neutral manner. Natural material like Rice Husk waste and non-biodegradable material are not commonly used in the construction industry but still are often dumped as solid wastes. However, with the quest for affordable housing system for both rural and urban population of India and other developing countries, various proposals focusing on cutting down conventional building materials cost have been put forward. One of the suggestions in the forefront has been the sourcing, development and use of the alternative, non-conventional local construction materials including the possibility of using some agricultural wastes and residue as construction materials. As the Rice Huck waste are agricultural waste, therefore, an economic and interesting option.

Demand of good quality of building materials to replace the traditional materials and the need for cost effective and durable materials for low cost housing has necessitated the researchers to develop variety of new and innovative building materials. Rice milling generates a byproduct known as husk and this husk converted in to ash is

1.2 Need of Study

Construction industry is one of the fastest growing sector in India. Rapid construction activity and growing demand of house has led to the short fall of traditional

building materials like bricks, cement, sand and wood. Demand of good quality of building materials to replace the traditional materials and the need for effective and durable materials for low cost housing and necessited the researches to develop variety of new and innovative building materials. In case of manufacturing the cement we have to produce more and more lime which is taken by mining. Also while manufacturing the cement, large amount of CO2 is liberated which is very harmful to human health and environment. Day to day manufacturing of cement is effecting on natural resources and at some point we will face unavailability of this materials.

Rice Husk ash is the material which can be replaced to cement as it contains around 85-90% silica is the basic component of sand which is used with cement for plastering and concreting. It has been observed that the annual generation of rice husk in India is about 18-22 million tons and accounts for 20-25% of its weight. And after removing the rice husk it affects the land if disposed on open land, it is the big problem for the farmers. Rice Husk is easily available at rice mills and farmes. Rice Husk is brought at cheaper cost than the cement.

1.3 Problem statement

1. It is big problem for the farmers to dispose the rice husk
2. For production of cement, natural resources required which will vanish after some year.
3. It is observed that Rice Husk will create the problem of disposal over and above the land.

1.4 Objectives

Basic intention is to efficiently utilize the waste rice husk in constructive way sothet it can be beneficial to society however main objectives of current project work are:

1. To increase the strength of concrete with replacement to the cement.
2. Due to addition of Rice Husk ash, concrete becomes cohesive and more plastic and thus permits easier finishing of concrete.
3. To increase workability of concrete.
4. This RHA is a great environment threat causing damage to the land and the surrounding area in which it is dumped. So the problem of disposal of it also could be solved
5. To achieve economical concrete.
6. To solve the natural resources for the future use.

II. METHODOLOGY

The present project work requires preliminary investigations in a methodological manner.

3.1 MARERIALS

3.1.1 Ordinery Portland Cement (OPC)

The product manufactured by burning and crushing to powder an intimate and well proportion mixture of calerious and argillaceous material is called cement

Ordinery Portland Cement is far the most important type of cement. The OPC was classified into three grades viz., 33 Grade, 43 Grade, and 53 Grade. If the 28 days strength is not less than 33 n/mm2, it is called 43 grade cement, and the strength is not less than 53 n/mm2 it is called 53 grade cement.

The manufacture of cement is decreasing all over the world in view of the popularity of blended cement on account of lower consumption, environmental pollution, economic and other technical reasons. In advanced western countries the use of cement has down to about 40% of the cement production.

PROPERTIES

1. Specific Gravity- 3.15
2. Soundness- 10 mm
3. Loss in Ignition- 4.0%
4. Insoluble Residue- 3.0%
5. Chloride Content- 0.1.%
6. Lime Saturation Factor- 0.80 to 1.02%

3.1.2 Fine Aggregate

Fine aggregate was purchased which satisfied the required properties of fine aggregate required for experimental.

a) Specific gravity = 2.7
b) Fineness modulus = 2.8 (medium sand)

The project work is restricted to sand collected from the river. The sand was collected to ensure that there was no allowance for deleterious materials contained in th sand. Locally available free of debris and nearly riverbed sand is use as a fine aggregate. Among various characteristics, the most important one is grading coarse may be preferred fine aggregate, increase the water demand of concrete and very

fine sand may not essential as it usually as larger content of thin particles in the form of cement.

The sand particles should also pack to give minimum void ratio, higher voids content lead to requirement of more mixing water. Properties such void ratio, gradation specific surface and bulk density have to be assessed with optimum cement contained and reduced mixing water. The physical properties are tested in laboratory.

Figure No. 2- Sieve Analysis of Fine Aggregate

Sieve Size (mm)	Weight retained (gm)	Percentage Retained	Cumulitive Percentage retained
4.75	14	1.4	1.4
2.36	128	12.8	14.2
1.18	266	26.6	40.8
600	308	3.8	71.6
300	165	16.5	88.1
150	84	8.4	96.5
Pan	32	3.5	-
Total weight	1000gm	Cumulative Percentage retained	312.6

Table No. 7 – Fineness of Fine Aggregate

Fineness modulus (FM)=312.6/100= 3.126

Since FM is between 2.2 and 3.2 sand is suitable for use.

3.1.3 Coarse Aggregate:

Crushed granite of 20 mm maximum size has been used as coarse aggregate. The sieve analysis of combined aggregates confirms.

a) specific gravity = 2.64

b) Fineness Modulud = 6.816

Coarse aggregate is chemically stable material in concrete. Presence of coarse aggregate reduce the shrinkage and other diamensional changes an account of movement of moisture. Coarse aggregate contributes to impermeability of concrete, provide that is properly grade and the mix is suitably designed. Coarse aggregate is conventional concrete contributes to the heterogeneity of the cement concrete and there is weak interface between cement mix and aggregate surface in conventional concrete. By restricting the maximum size of aggregate and cement becomes more homogeneous and there is a marked enhancement in the strength properties as well as durability.

Figure No 3- Coarse Aggregate

Table No.8- Fineness of Coarse Aggregate

Sieve Size (mm)	Weight retained (gm)	Percentage Retained	Cumultive Percentage Retained
40	142	7.1	7.1
25	485	24.25	31.25
20	202	10.1	41.25
12.5	260	13	54.45
10	417	20.55	75.3
4.75	492	24.6	99.9
Total weight	2000gm	Cumulitive Percentage Retained	309.51

Fineness modulus (FM)= 309.51/100= 3.095

Since FM is between 2.2 and 3.2 sand is suitable for use

Sr. No.	Type of Cement	Weight of Cement (gm)	Weight of water added (gm)	Penetration Measured (mm)	Percentage Of water
1	RC 0	400	150	6.3	37.50
2	RC 1	400	145	6.0	36.25
3	RC 2	400	140	5.4	35.00
4	RC 3	400	135	5.2	33.80

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