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PARTIAL REPLACEMENT OF CEMENT BY RICE HUSK AND FLY ASH

Ayush Mishra, Charulata Singh, Divyanshu Kushwaha: Graduate students,

Civil Engineering Department, Shri Shankaracharya Technical Campus, Bhilai.

Vishal Chandrakar: Assistant Professor, Civil Engineering Department, Shri Shankaracharya Technical Campus, Bhilai.

Abstract

Cement is an important construction material in concrete production; however, it is expensive and unaffordable for many low-income and rural communities in developing countries. In this experiment we replace the cement by rice husk (RHA) and fly ash(FA). In this experiment rice husk is constant i.e. 20% of weight of cement and fly ash is varied i.e. 5% ,10%and 15% by weight of cement. The study further satisfy that the RHA based concrete was more cost efficient in structures that were close to areas of rice production due to reduced RHA transportation costs.

Key word: Rice husk ash, expensive, construction, communities

INTRODUCTION

Concrete as is well known is a heterogeneous mix of cement, water and aggregates. The admixtures may be added in concrete in order to enhance some of the properties desired specially. In this project I started proportion form 5% FA and 20% RHA mix together in concrete by replacement of cement with the gradual increase of FA by 5%, RHA was constant i.e. 20% of weight of cement.

In this experiment we conduct the compressive strength of concrete. The size of cube is 150x150x150 mm. Strength of concrete will be find in 7days,14days and 28days.

The workability of RHA concrete has been found to decrease but FA increases the workability of concrete so RHA and FA mix together in concrete to improve the workability of concrete. The work presented in this paper reports an investigation on the behavior of concrete produced from blending cement with FA and RHA.

In the ancient period, construction work was mostly carried out with help of mudstone from industry. Fly ash is a by-product of burned coal from power station and rice husk ash is the by-product of burned rice husk at higher temperature from paper plant artificial fibers are commonly used nowadays in order to improve the mechanical properties of concrete. Considerable efforts are being taken worldwide to utilise natural waste and bye product as supplementary cementing materials to improve the properties of cement concrete. RHA is by-product of paddy industry. Rice husk ash is a highly reactive pozzolanic material produced by controlled burning of rice husk. FA is finely divided produced by coal-fired power station. Fly ash possesses pozzolanic properties similar to naturally occurring pozzolanic material.

Rice husk ash is a by-product of agriculture and is generated in rice mills. Rice husk (rice hull) is the coating of seeds or grains of rice. This coating protects the seed or grain during the growing season. The husk converts to hard materials, including opaline silica and lignin. When properly burnt, rice husk contains high amounts of silica (SiO2). Hence it can be used as supplementary cementitious material in combination with cement to make concrete products.

When paddy is milled, 80% of the weight is of rice and 20% of the weight obtained is husk. This husk can also be used as a fuel for steam or power generation and other purposes."

Fly ash used was obtained Koradi Power Plant Nagpur, Nagpur, Maharashtra, India. Fly ash is one of the residues generated in the combustion of coal. Fly ash is generally captured from the chimneys of power generation facilities, whereas bottom ash is, as the name suggests, removed from the bottom of the furnace.

LITERATURE REVIEW

Rice husk ash as a partial replacement of cement in high strength concrete containing micro silica: Approx the ratio of 200kg per one ton of rice, even in high temperature it reduces to 40kg. 5 mixture plans with proportion 5%, 10%, 15%, 20%, 25%, RHA by weight of cement in addition to 10% micro silica (MS). Test rest indicated the +ve relationship b/w 15% replacement of RHA with increase in compressive strength by about 20%. The same result obtains for water absorption ratio likely to be unfavorable.

The impact of using rice husk ash as a replacement material in concrete: RHA in different ratio 0%, 7%, 14%. Water – cement ratio 0.3, 0.5, 0.7. Cured in water for different period 10, 20, & 30 days. Flexural, compressive, tensile, slump tests. Adverse impact was found to increase the water cement ratio which is assigned to the effect of water on RHA and as a result on the porosity of the concrete.

Structure and properties of mortar and concrete with rice husk ash as partial replacement of ordinary Portland cement: 10% of RHA will result comparable strength. Some agent also added in RHA concrete, for agent of degradation in microstructure like sulphate attack, chloride ingress etc. for durable and good shrinkage of concrete. RHA in concrete mix increase the water demand.

Effect of using a combination of rice husk and olive waste ashes on high-strength concrete properties: In this concrete combination of rice husk ash and olive waste ashes is used in different proportion like for RHA 2.5%, 5%, 10% respectively. 21 min of concrete is prepared with diff proportion. Different tests are conducted in 7& 28 days. Outcome – the optimum dosages for RHA is 20% and OWA are 5% respectively. Increase compressive strength about 58.7%.

OBJECTIVE

The objectives and scope of present study are.

- To find the optimum mix design with regards to the amount of water, RHA, FA and cement ratio. • To investigate the physical properties of the RHA and FA strength (bending and compression).
- To study the relative strength development with age of (RHA + FA) concrete with control concrete.
- Use of industrial waste in a useful manner.
- To conduct compression test on (RHA+FA) and control concrete on standard IS specimen size (150 x 150 x 150) mm.
- To provide economical construction material.
- Provide safeguard to the environment by utilizing

METHODOLOGY AND TESTING

❖ Procurement of rice husk ash from the rice sellers.

❖ Lab testing of characteristics of rice husk ash specific gravity, physical state, particle size, odour, colour, appearance etc.

❖ Preparation of design mix of M20 grade using relevant IS code.

❖ Preparation of different concrete mix using rice husk ash as partial replacement of cement by 0%,5%,10%, 15%,20%,25%.

❖ Comparative study of compressive, flexural, split tensile strength of concrete mix thus prepared.

WE PREFORM THE COMPRESSIVE STRENGTH OF CONCRETE ON LABORATORY:

Compressive strength is the capacity of material or structure to resist or withstand under compression. The Compressive strength of a material is determined by the ability of the material to resist failure in the form cracks and fissure.

Compressive Strength of concrete is defined as the Characteristic strength of 150mm size concrete cubes @28 days.

The compressive strength of concrete is given in terms of the characteristic compressive strength of 150 mm size cubes tested at 28 days The characteristic strength is defined as the strength of the concrete below which not more than 5% of the test results are expected to fall.

OBSERVATION TABLE

Days	Normal cube strength (N/mm2)	Mixed cube		Compressive strength of mixed cube (N/mm2)
		%RHA	%FA	
7days	26.6	20%	5%	18.66
		20%	10%	20
		20%	15%	17.77
14 days	30	20%	5%	21
		20%	10%	22.36
		20%	15%	23.4
28days	40	20%	5%	27.55
		20%	10%	31.11
		20%	15%	28.88

RESULT AND DISCUSSION

The compressive strength of the concrete mixes obtained after 7,14 and 28 days of curing are finished. Three cubes of each curing were tested and average of results were noted.

It is found that the replacement of cement by RHS & FA will achieve their target mean strength in all age.

The comparison of result of compressive strength using cube specimen of M20 grade of concrete for different percentage of RHA & FA. Target mean strength of M20 was 26.6 N/mm2.20% RHA & 10% FA gives 31.11N/mm2 compressive strength.

It is seen that increase in percentage of RHA & FA, percentage of water requirement will also be increased.

CONCLUSION

The following conclusions can be drawn:

1. Compressive strength increases with the increase in the percentage of Fly ash and Rice Husk Ash.

2. The percentage of water cement ratio is reliant on quantity of RHA used in concrete. Because RHA is a highly porous material

3. The workability of concrete had been found to be decrease with increase RHA in concrete.

4. the rice husk is burned out at 600º to 800º c. It is observed that the 80 % silica was produced due to this it gives an excellent thermal insulation.

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