A REVIEW PAPER ON USE OF RHA AS REPLACEMENT FOR FINE AGGREGATES FOR PAVEMENT & PRECAST BLOCKS

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ABSTRACT:
A good way to use this material is to use it to produce "Hig h Performance Concrete," whichensures the concrete is hig hly workable and long-lasting. Concrete production is consuming significant amount of natural resources. That has brought pressures to reduce sand consumption by the use of supplementary materials. Different proportions of Rice Husk Ash have been added to the sand and Checked. Compression Testing Machine of 2000kN is used for Compressive strength test. Cube size of 150x150x150mmwas used. The maximum increase in the compressive strength of RHA concrete i.e., 5.0% has occurred at 28 days with 5% replacement, whereas the compressive strength of RHA concrete is found to be decreased by 63.40% at 3 days with 15% RHA replacement. It can be clearly observed that at the age of 28 days, there is gradual increase in the compressive strength of RHA concrete for all the replacement levels with respect to control concrete. The rate of strength development is maximum up to the age of 28 days at all the replacement levels with RHA.At 5 % RHA in sample shows high flexural strength of concrete mix at 28 days i.e. 5.14 N/mm2. From the test of split tensile strength of M25 grade of control concrete is 3.35 MPa. The split tensile strength of concrete increases with the proportions of RHA. The Concrete possesses higher split tensile strength i.e. 4.12 MPa when compared to all other proportions and with further increase in the content of RHA, split tensile strength decreases. the use of RHA in concrete increases cost upto1.78 % over the conventional cement concrete. Workability of concrete and Strength of concrete was determined by performing compression test (150mm x 150mm x 150mm) size cube, split tensile test (150 mm diameter and 300 mm length cylinders) and flexural strength (100 mm x 100mm x 500mm) size beam. There are good prospects of obtaining a good concrete strength at relatively higher cost even while replacing FA with RHA.

I. INTRODUCTION

OVERVIEW

There is an increasing importance to preserve the environment within the present day world. Rice Husk Ash (RHA) from the parboiling plants is posing a significant environmental threat and ways are being thought of to dispose them. This material is really a super-pozzolanic since it's rich in Silica and has about 85% to 90% Silica content. A decent way of utilizing this material is to use it for creating “High Performance Concrete” which suggests high workability and long-term durability of the concrete.
Cement will remain the key material to satisfy global housing and modern infrastructure needs. The necessity to reduce the high cost of Ordinary Portland cement so as to supply accommodation for the populace has in-depth study into the utilization of some locally available materials that would be a partial replacement for Ordinary Portland cement (OPC) in Construction Engineering Works. Supplementary cementations materials are proven to be effective in meeting most of the wants of durable concrete and blended cements are now utilized in many parts of the planet.

RICE HUSK ASH AS A SOIL STABILIZER

Soils are the principal broadly utilized materials in building works, especially in asphalts. Be that as it may, the properties of neighbourhood soils aren't appropriate for the needs of specific structures. In these cases, improving soil properties is a delightful other option. There are basically two sorts of progress: alteration and adjustment. At the point when physical properties of soil, similar to versatility, surface, volumetric solidness, water driven conductivity and usefulness are improved, it's named alteration and adjustment when a major degree of long haul quality addition and toughness are created. Change can create significant quality improvement.

The use of rice husk debris in parkway as sub grade material has not picked up notoriety in India because of absence of information in regards to the adjustment in properties of sub grade soil mixed with rice husk debris. The most target of present investigation is to examine the difference in properties of shifted kind of soils by utilizing rice husk debris.

The impact of the expansion of RHA alone on the versatility, unconfined pressure quality (UCS) and California Bearing Ratio (CBR) of a lateritic soil with 45% passing the #200 strainer (75 μm), was examined by Rahman. Results indicated increments of UCS and CBR in 1 day with increment in RHA up to twenty and 18%, individually, after which they started to diminish. Likewise, Alhassan watched expanding of CBR with 6-day and 1-day drenching and without dousing when a clayey soil was balanced out with RHA up to six and 12%, separately.

The improvement of soils through expansion of rice husk debris (RHA) and lime was considered in a few inquires about. RHA created in research center with controlled temperature and time (RHAC) was likewise explored.

Fig. - Useof rice husk ash

APPLICATIONS OF RICE HUSK ASH

The rice husk ash is a green supplementary material that has applications in small to large scale. It can be used for waterproofing. It is also used as the admixture to make the concrete resistant against chemical penetration.

The main applications of rice husk ash in the construction are:

- High-performance Concrete
- Insulator
- Green concrete
- Bathroom floors
- Industrial factory floorings
- Concreting the foundation
- Swimming pools
- Waterproofing and rehabilitation

II. LITERATURE REVIEW

M. C. Nataraja and Lelin Das (2010) evaluate different properties like compressive strength, split lastingness, bending strength and water absorption of paver blocks. Paver blocks consisting of nonconventional materials like kadapa for various percentage replacements of coarse aggregate are studied as per IS 15658:2006.

Tapkire et al. (2010) they found that another materials like recycled plastic (plasticbottles, pallets, carry bags; polypropylene (PP) and polyethylene Terepthalate (PET)) also can be wont to produce the concrete paver block. These wastes are often used as alternative replacements of a neighborhood of the traditional aggregates of concrete. Finally researches concluded that 20% recycled plastic are often utilized in place of aggregates in concrete, which doesn't affect the properties of concrete.

Nanda et al. (2010) concluded that stone crusher dust is added in certain percentage with fine aggregate up to 50% by weight. It also reduces the value up to 56%.

Kalingarani etal. (2012) concluded that Interlocking concrete paver block (ICPB) is having advantages in the exterior flooring. His aim of the study is making ICPB by using a maximum amount of industrial waste like fly ash and copper slag.

Thakur et al. (2013) Found that Fibers of nylon can also be used to increase the strength in compression of the Paver Block. Addition ofoptimum nylon fiber and fly ash in the construction of paver block increases its compressive strength up to13.55% as compared to standard mix.

Yeole et al. (2014) states thatConcrete paving blocks are suitablematerials for the linings of footpaths and sub roads for easy laying, high resistance impact strength, attractive with good strength so use rubber pads and adding various percentages ofwaste steel aggregates in paver blocks gives up to 50% more impact strength than ordinary paver blocks.

Neekhra et al. (2015) concluded that fibers of Nylon are kept to evaluate hardness of PB. Nylon fiber, is high tensile fibers, nylon fibers aregenerally used in manufacturing and Nylon fiber is also thermoplastic polymer. Afterperforming different percentage of nylon fiber in the CPB it is observed that addition of nylonfiber 0.3% with the percentage of cement in concrete generally generates a maximum toughness of 7,14, and 21 days of age.

KoliNishikant et al (2016)looked at the feasibility of waste glass inclusion as partial FA replacement systems. Properties of concrete incorporating waste glass as partial substitution for FA amounts of 15%, 30% and 45% were investigated. The waste glass material used was obtained waste collectors. The results obtained show clearly that glass enhances the compressive strength properties of the final concrete product. The study indicated that waste glass can effectively be used as fine aggregate replacement (up to 45%) without substantial change in strength.

Atul Thakur et al (2017)studied partial replacement (by weight) of cement with RHA in pavement blocks to determine the change in compressive strength, water absorption and abrasion resistance of paving blocks. Partial replacement of cement in different percentages such as 0%, 15%, 20%, 25%, 30%, 35% and 45% has been done. The compressive strength is determined at the end of 7, 28 and 56 days, the water absorption test and abrasion resistance is tested at 28 days.

The major findings of literature survey are as follows:

- There are various types of waste material like stone crusher dust, Recycled plastic or plastic waste, Fly ash, Copper slug, marble waste, coal waste, foundry sand, brick kiln are used to replaced material aggregate or cement in the manufacture of paver block for reduction of cost.
- There are various types of mix design with different material like Geopolymer concrete is used instead of OPC, iron ore tailing from the mining industry, rubber pad is used for improving the compressive strength of Paver Block.
- There are various types of fiber used in The Paver Block like nylon Fiber, polypropylene fiber, coconut fiber, polyester fiber for improving compressive strength, abrasion resistance and flexural strength of Paver block.
- Different size, Different shape and Different strength Paver block used in different area.
- Compressive strength of Paver block depends on a water cement ration of mix proportions.
- There are various waste material used in the manufacture of Paver block like ceramic waste, rice

husk ash, fly ash, glass powder for improving the strength of Paver block.

As our aim is to develop concrete blocks which does not only concern on the strength, it also having many other aspects to be satisfied like workability, performance, durability and also economy. So for this we need to go for the addition of pozzolanic materials along with super plasticizer with having low water cement ratio. The use of RHA is many, which is having good pozzolanic activity and is a good material for the production high performance concrete.

Some of the early research works had done using different pozzolanic materials with the replacement of cement using superplasticizer for the development high strength concrete and high performance concrete. Many investigations have been done on replacement of RHA with cement in concrete and observed veryenthusiastic results.

III. PROBLEM STATEMENT

In current days, the construction of buildings is increasing rapidly in our country. Due to these constructions, more consumption of course aggregate and fine aggregate takes place, but for manufacturing of these requires the natural resources. So due to this large amount of natural resources are utilized which causes environmental imbalance, so need of alternative materials essentially require to partially replacement of these ingredients, effective utilization of RHA could be best alternative for cement in the manufacturing of concrete blocks.

Based on the literature review research workers have used various alternate materials for partial replacement of cement for making concrete. With varying properties silica fume and various fibres have also been used but they are costly. In this context RHA is useas partial replacement of fine aggregate.

IV. OBJECTIVE OF STUDY

The objective of this work is given below-

- To utilize the waste material such as rice husk ash as a partial replacement of fine aggregate.
- To study the effect of the partial replacement of fine aggregatewith different replacement ratio i.e. %, 10% and 15% of RHA.
- To develop RHA based concrete using standard code of reference.
- To compare it with the strength of normal concrete.
- How rice husk differ with other ordinary concrete mix as fine aggregate interms of water adsorption, compressive strength, tensile strength.
- To help contribute to the industry in saving the environment, to encourage the government to find solutions regarding the disposal to landfills of waste materials and save the environment, to provide new knowledge to the contractors and developers on how to improve the construction industry methods and services by using rice husk, and to sustain good product performance and meet recycling goals.

MATERIAL USED

The materials used in this investigation are

- Cement
- Fine aggregate
- Coarse aggregate
- Water
- Rice Husk Ash

EXPERIMENTAL PLAN

The experimental program was designed for the properties i.e. workability, water absorption test, compressive strength, split tensile strength and flexural strength of concrete with M20 grade of concrete.

The program consists of casting and testing of total 90 cubes, 30 beams and 30 cylinders specimens. The specimen of standard cube of 150 mm x 150 mm x 150 mm, standard beam of 150 mm x 150 mm x 600 mm and standard cylinder of 150 mm diameter and 300 mm height were cast with and without manufacturing sand. Compressive testing machine (CTM) was used to test all the specimens.

- Proportioning
- Mixing
- Casting of specimens
- Curing of the specimens
- Compressive strength test
- Slump test
- Flexural strength tests
- Water absorption test
- Split tensile strength

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