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Exprimental Investication On Modular Bricks Using Coconut Shells

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ABSTRACT

Every construction industry totally relies on cement, sand and aggregates for the production of concrete. Nowadays, most of the researchers are doing the research on the material which can reduce the cost of construction as well as increase the strength. Some of the waste materials are used in concrete according to their properties. For instance fly ash, rice husk, slag and sludge from the treatment of industrial and domestic waste water have been found suitable as partial replacement for cement in concrete. The coconut shell is a material which can be a substitute for aggregates.

Keywords:Causes,ConstructionAccident,FatalityPrevention,Safety

1. INTRODUCTION

1.1 GENRAL

Currently India has been taken a major initiative on developing the infrastructures such as express highways, power projects and industrial structures etc.,to meet the requirements of globalization, in the construction of buildings and other structures concrete plays the rightful role and a large quantum of concrete is being utilized. River sand , which is one of the constituents used in the production of conventional concrete , has become highly expensive and also scare. In the backdrop of such a bleak atmosphere, there is large demand for alternative materials from industrial waste.

The utilization of Coconut shell which can be called as manufactured aggregate has been accepted as a building material in the industrially advanced countries of west for the past three decades. As a result of sustained research and developmental works undertaken with respect to increasing application of this industrial waste, the level of utilization of Coconut shell in the industrialized nations likes Australia, France, Germany and UK has been reached more than 60% of its total production. The use of manufactured sand has not been much, when compared to some advanced countries.

The project presents the feasibility of the usage of Coconut shell as hundred percent substitutes for coarse aggregate in conventional concrete. Tests were conducted on cubes, beam and cylinder to study the compressive, tensile and flexural strengths of concrete

and durability studies were done for concrete with Coconut Shells as coarse aggregate.

1.2 COCONUT SHELL

The most widely used coarse aggregate for making block of is the natural sand mined from the riverbeds. However, the availability of river sand for the preparation of concrete is becoming scarce due to excessive non-scientific methods of mining from the riverbeds, lowering of water table , sinking of bridge piers, etc. are becoming common problems .The present scenario demands identification of substitute materials for the river sand for making concrete. In recent years, tremendous efforts have been taken to research and study the utilization of byproduct and waste materials in the production of concrete. The successful management cost and concrete production cost, besides enhancing the properties of concrete in both fresh and hardened state.

Coconut shell have been used for various activities in construction industry such as road construction and manufacture of building materials such as light weight aggregates, bricks, tiles and autoclave blocks. Researchers

have also been conducted to study the effects of replacement of aggregate in the properties of freshly mixed and hardened concrete applications. It was deduced from those studies that

alternative to "aggregate". The alternative to aggregate seems more natural and can be made available in the desired quantity. Coconut shell that is also referred to as coconut shell is actually.

Social And Economic Importance Of Coconut

The coconut palm and its fruit are regarded as the most important plant to humans around the world(Child 1974). Among its most important uses coconut is a food source, provides supplement for body fluids and minerals, and acts as an anti-helminthic.

The liquid endosperm is also a media for invitro storage of semen and a growth regulator of plants (Wood roof 1970). Copra, the dehydrate do sperm of the nut, is next to soybean as a source of oil for food. Coconut oil is also used in cosmetics and pharmaceuticals. The material that remains after the oil is expressed from copra is called oilcake and is used as animal feed (Wood roof 1970).

Coconut shell is used directly as fuel, filler, extender in the synthesis of plastic, to make activated charcoal, household articles, and to produce various distillation products, such as tar, wood spirit and pitch. Coir, a course fiber from the

Shell of the nut, has various domestic and industrial uses. Coconut root is brewed and used in folk medicine, for example, as a cure for dysentery (Wood roof 1970).

1.3 MODULAR BRICK

Specification of Brick

A brick is small block of burnt clay with a size that can be held in one hand conveniently. Brick should be thoroughly burnt, of uniform color, having plane rectangular faces, sharp straight, right angle edges.

Standard Modular size of common building brick is 190X90X90 mm.

The size of a Non-Modular brick is 9"X4-3/8"X2-11/16"(229X114X70 mm).But it is specified as 230X110X70 mm.

The weight of a brick is about 3 to 4 kg

Table 1: Recommended Size of Bricks

Type of Bricks	**Normal Size (mm)**	**Actual Size (mm)**
Modular Bricks	200x100x100	190x90x90
Non - Modular Bricks	229x114x70	230x110x70

2. BACKGROUND OF THIS STUDY

Experimental results showed that water absorption increases with the increase of wt% of particle but compressive hundred percentage substitute of aggregate with coconut shell.

The center for earth and science studies (CESS) report have suggested for the usage of coconut shell as an properties increases up to 30wt% of particle approaches to actual compressive strength of epoxy. Composites consist of one or more discontinuous phases embedded in a continuous phase. The discontinuous phase is usually harder and stronger than the continuous phase and is called the 'reinforcement 'or 'reinforcing material', whereas the continuous phase is termed as the 'matrix'. Properties of composites are strongly dependent on the properties of their constituent materials, their distribution and the interaction among them. The geometry of the reinforcement (shape, size and size distribution) influences the properties of the composite to a great extent .Natural fillers and fibers reinforced thermoplastic composite have successfully proven their high qualities in various fields of technical application. As replacements for conventional synthetic fibers like aramid and glass fibers are increasingly used for reinforcement in the thermoplastic due to their low density, J. Bhaskar, V. K. Singh, et.al.,(2012) Reports development of the mix design of light weight aggregate concrete using Coconut shell aggregate (CSA) as coarse aggregate together with cement and river sand. The compressive strength after 28 days was found to be in the ranges between 4.9 N /mm2 - 23.5 N /mm2 under water curing. The test results shows that concrete using coconut shell aggregate has resulted in acceptable strength required for structural lightweight concrete. It is concluded that the lightweight concrete developed from CSA aggregate can be used for both structural and non-structural applications, K.Gunasekaran and P.S.Kumar et.al.,(1998)

Reported by The Utilized coconut fiber to verify the physical and mechanical properties as well as fracture behavior of composite cement reinforced with coconut fiber reported the results of a study undertaken in enhancing properties of fly ash concrete composites with coconut natural fiber. A control mixture of proportions 1:1:49:2.79 with w/c of 0.45 was designed for the normally popular M20 concrete with replacement of Cement. Coconut fiber was found to increase the mechanical properties of concrete. From the literature it was found that coconut fiber has attained its pace in the research activities to be used as a building material, here an attempt was made to utilize coconut shell as a substitution of natural coarse aggregate for making concrete and to verify its strength, Alida Abdullah, Shamsul Baharin Jamaludin Saravanan et.al.,(2009)

3. MATERIALS AND METHODS

First category of the tests conducted to find the physical and chemical composition of coconut shell. These properties are the particle size distribution based on IS 383: 1970, the

specific gravity (IS 2386(part III)1963)for assessing batch quantities ; bulk density (IS: 2386(part III) 1963) which enables quantities of materials for concrete to be converted from quantities by weight to volume .

The second category of the test examined the slump and the compressive strength of concrete using coconut shell as coarse aggregate. For this purpose, lean mixes 2.01:4.162:4.62(cement: sand: coarse aggregate) and 2.01:4.162:4.49:0.133(cement: sand: coarse aggregate: coconut shell) ratios were used in the following percentage are 10%, 20%, 30%.

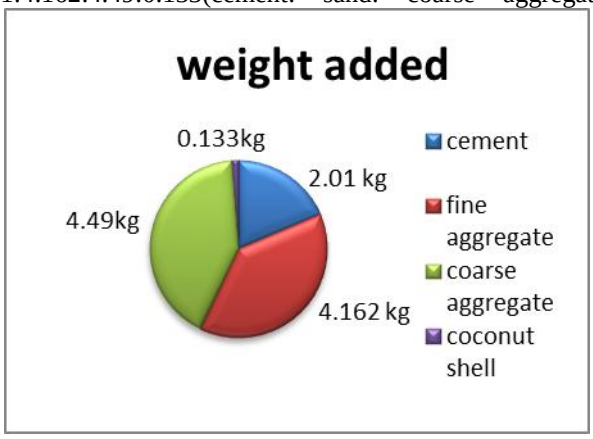


Figure: 1 Design mix ratio

In order to produce a workable mix weight is adopted. The required quantity of cement was measured and mixed with the coconut shell . After even consistency, the required quantity of coarse aggregate as well as water was added. The constituents were thoroughly mixed until a good consistency mix was obtained. The slump and compaction factor tests were performed on each batch in accordance with provisions of IS 1199: 1959. The specimens were then cast in three layers; each layer was compacted with damping rod. The top surface of the specimens were toweled flat and the moulds covered with polythene sheets in the laboratory for 24 hours, de-moulded and cured in water and tested at the specified periods of 7,14&28 days.

3.1 PREPARATION OF SPECIMENS

The natural coarse aggregates were replaced as 0%, 2.5%, 5%.7.5%, 10%.The test results were analyzed and compared with theoretical values, obtained from various codes. Due to high water absorption of coconut shell, they were presoaked in water for 24 hours, prior to mixing.

Batching and Mixing:

Weigh Batching was practiced with the help of electronic weigh balance. Batching was done as per the mix proportions. Mixing was done in tilting mixer. It was mixed for 2-3 minutes, after addition of water.

Placing and Compaction:

Blocks are cleaned and oiled to prevent the formation of bond between

Concrete and moulds. Place the fresh concrete in cubes in 3 layers, tamping each layer 25 times. The entrapped air in concrete is removed by table vibrator. Anything kept on the table gets vibrated.

Demoulding:

After placing fresh concrete in moulds,it was allowed to set for 24 hours. It was marked with some permanent identification mark i.e. A1, A2, A3, etc. Concrete cubes are now kept in curing tank for 7, 14 and 28 days. After 28 days, concrete cubes were

4. RESULT

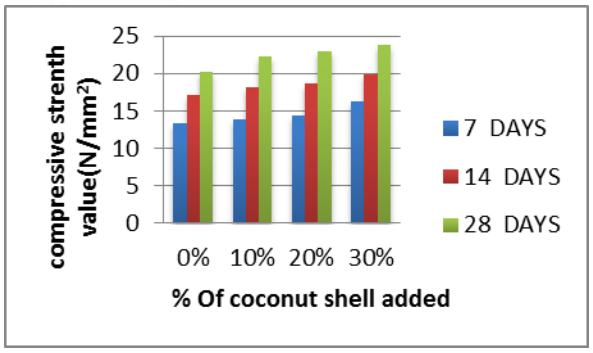
TABLE 1: Testing Of Material on fresh concrete

% of coconut shell added	Slump value (mm)	Compaction Factors	Remarks
0	28	0.920	Workable
10	18	0.920	Workable
20	25	0.927	Workable
30	28	0.931	Workable

Table 2: Result of Block for Compression

SI.NO	Curing Days	Average compressive strength in N/mm^2			
		0%	10%	20%	30%
1	7	13.3	13.8	14.3	16.2
2	14	17.2	18.1	18.7	19.8
3	28	20.3	22.3	22.9	23.8

Figure 2: Result of Block for Compression replacement of coconut shell



5. CONCLUSION

The purpose of designing as can be seen from the above definition in two fold. The first object is to achieve the stipulated minimum strength and durability. The second object is to make the block in the most economical manner. The cost of block is made up of the cost of materials, plant and labour .The variation in the cost of materials arise from the fact that cement is several times costly than aggregate ,thus the aim is to produce as lean mix as possible.

EXPRIMENTAL PHOTOS

Figure 3: Preparation of specimen Block

Figure 4: specimen Block

Figure 5: Compression test on specimen block

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