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Utilization of Bamboo fibre and M-sand in Concrete as a Replacement of Natural Sand

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ABSTRACT

In the current world, concrete has become a very important part of the construction industry and the materials which are used in making concrete have evolved due to better quality of cement and better grade of coarse aggregates. The sand is an important part of concrete. It is mainly procured from natural sources. Thus the grade of sand is not under our control. The concrete cubes of M-25 grade were threw in this trial explore work and tried to analyze different properties of concrete like compressive quality, workability. In this study M-sand is considered as a replacement of natural sand by 50, 70 & 90% by weight of sand in concrete design mix with 5% Bamboo fiber streams as an admixture. This study is carried out at the age of 7, 14, 21 and 28 days. In this work, the general properties of fresh and hardened concrete were tried and the outcomes were dissected. As concrete is a central material for the construction industry. In this study it is observed that M-sand in significantly increased the compressive of concrete with maximum strengths. Bamboo fiber helps in improving concrete properties to avoid cracks and failure.

Keywords : Deformation, concrete beam, reinforcement, Tensile strength, Fiber.

I. INTRODUCTION

It is well recognized that fine aggregate plays an important role in concrete. fine aggregate typically occupies over one-third of the volume of concrete, and research indicates that changes in properties of fine aggregate (sand) can change the strength and fracture properties of concrete. To predict the behavior of concrete under general loading requires an understanding of the effects of sand type, sand properties, and mixture admixture. This understanding can only be gained through extensive testing and observation.

This study describes work that is aimed at improving the understanding of the role of manufacturing sand in concrete. The variables considered are manufacturing sand, combination of natural & manufacturing sand, Bamboo fiber whose length may vary from 1 to 2 inch i.e. (25 to 500 mm). Because natural fibers are naturally available materials, they are not uniform in diameter and length. The diameter is varied from 0.004 to 0.03 in. In normal and high-strength concretes. Compression, flexural, and fracture tests are used to better understand the effects sand type have in concrete.

Concrete is a most essential utilized material in human life on the grounds that all considerate designing structures are developed with concrete. In transportation for the most part inflexible asphalts are laid by concrete. Due to its quick utilization many number of inquires about are occurring to enhance the properties of concrete and to recommend

replaceable materials for concrete. The primary motivation behind this examination is to recommend the locally accessible materials (Which are notable to individuals like fiber and m sand stick cinder) to enhance the properties of concrete and to decrease the cost of development. Properties enhanced amid the tests are setting time, workability, compressive quality of concrete.

M-Sand:

Manufactured sand is an alternative for river sand. Due to fast growing construction industry, the demand for sand has increased tremendously, causing deficiency of suitable river sand in most part of the word.

Due to the depletion of good quality river sand for the use of construction, the use of manufactured sand has been increased. Another reason for use of M-Sand is its availability and transportation cost.

Since manufactured sand can be crushed from hard granite rocks, it can be readily available at the nearby place, reducing the cost of transportation from far-off river sand bed.

Thus, the cost of construction can be controlled by the use of manufactured sand as an alternative material for construction. The other advantage of using M-Sand is, it can be dust free, the sizes of m-sand can be controlled easily so that it meets the required grading for the given construction.

Fig 1: M Sand

II. LITERATURE SURVEY

Navin Chand, Mukul Shukla & Manoj Kumar Sharma found that the Tensile strength of bamboo has been experimentally determined parallel and perpendicular to the fibre direction. Different properties are exhibited in two directions in bamboo due to the basic structural difference present in the two directions. Striking differences exist in the distribution of cells within one culm, both horizontally and vertically. Stress and strain values of bamboo under tensile loads are also determined by using the Finite Element Method (FEM) software ABAQUS and the failure load patterns have been generated and analyzed. Flexural strength and deflection in bamboo determined experimentally matches closely with the FEM generated values. Numerous studies have been carried out on natural reinforcing materials such as wood **(Andonian *et al.*),** jute **(Manzur and Aziz),** bamboo **(Kankam *et al.*)**, raffia palm **(Kankam)** and palm stalk **(Kankam).** Attention is gradually been focused on the use of bamboo (*Bambusa vulgaris*), rattan (*Calamus deerratus*) and other natural fiber reinforcing materials as alternative reinforcements in concrete especially for low-cost housing for rural communities. In rural communities of Ghana, babadua is used in thatching and its stems are tied into framework of houses before daubing with mud (Schreckenbach and Abenkwa).

Roy et. al. (2015) (Effect of Steel Fibres on Concrete with M-Sand as a Replacement of Natural Sand) Here author described the experimental study of fiber reinforced concrete with m-sand. Investigated the compressive strength and tensile strength of the concrete grades M25 & M30 having different percentage of steel fibre (0%, 1%, 1.5% & 2%).The chemical admixtures is used to increase the workability of concrete. The investigation is carried out on a total no of 96 specimen by conducting compressive strength test and split tensile test.

Concluded that the strength obtained by natural sand and replacement of natural sand with M sand in concrete with addition of steel fibers. The investigation derives the following conclusion. By adding steel fibers to fresh concrete compressive strength increases by resisting cracks and their by increasing the durability. Replacement of river sand with m sand gives a satisfactory strength and can be used as alternate material for river sand. Using steel fiber reinforcement admixture enhances the both compressive strength and flexural strength.

Marcalíková et. al. 2019 Illustrated work is focused on the area of mechanical properties of two types of Steel Fibers for reinforced concrete. In both cases, the same concrete mixture is used. The Steel Fibers used differ in shape. The first one is short and straight fiber and the second one is 3D steel fiber. Steel Fiber Reinforced Concrete was prepared at a dosage of 40 and 75 kg steel fibers/m3 . The experiment includes determination of strengths, concretely compressive strength, a three-point flexural test and Splitting Tensile Strength test. The results are summarized; fracture mechanics parameters necessary for structural modeling are also included.

Following are the main objectives of our study are as follow:

1. Determination pf M-Sand Use In Place pf Natural Sand To Stop Environmental Hazard.
2. Determine Compressive Strength pf Concrete With Varying Percentage of M-Sand Replacing Natural Sand.
3. To Establish A Proper Mix of M-Sand And Fiber For Its Future Implementation On Field.
4. To Determine the Cost Effectiveness & Availability of Manufacturing Sand Over Natural Sand.

III. Methodology Considered

1. Collect material Samples from site and crushers.
2. Ordinary Portland cement is to be use. The aggregates which comprises river sand and crushed granite of 20 mm maximum nominal size was used.
3. Mixed at a water-cement ratio of 0.45.
4. Materials are mixed properly.
5. Cubes and beams are to be cast.
6. Testing should be done after curing for 7,14 and 28 days samples.
7. Test should be perform in college lab.
8. Values must be get checked by guide and supervisors.

Test Preparation

The tensile test is conducted on UTM. It is hydraulically operates a pump, oil in oil sump, load dial indicator and central buttons. The left has upper, middle and lower cross heads i.e; specimen grips (or jaws). Idle cross head can be moved up and down for adjustment. The pipes connecting the lift and right parts are oil pipes through which the pumped oil under pressure flows on left parts to more the cross-heads

Fig:2 Preparation of Samples

Fig:3 Testing machine U.T.M.

IV. Results

Table 1: Compressive Strength

Compressive strength of M-25 mix. Cube (N/mm²)				
Days/% of replacement of sand	0%	50%	70%	90%
7 day	15.5	15.9	16.3	16.7
14 days	22.8	23.25	23.7	23.95
21 days	23.1	23.5	23.9	24.05
28 days	24.3	25.1	26.4	27

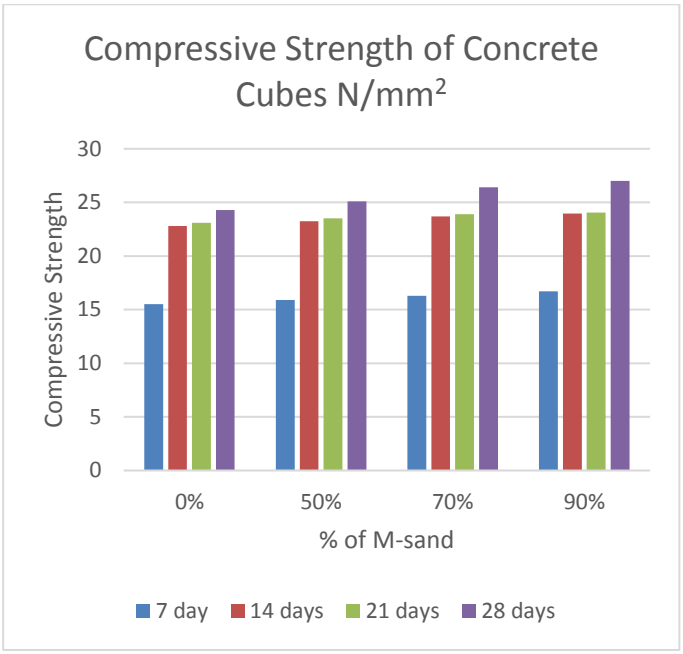

Fig 4 : Compressive Strength

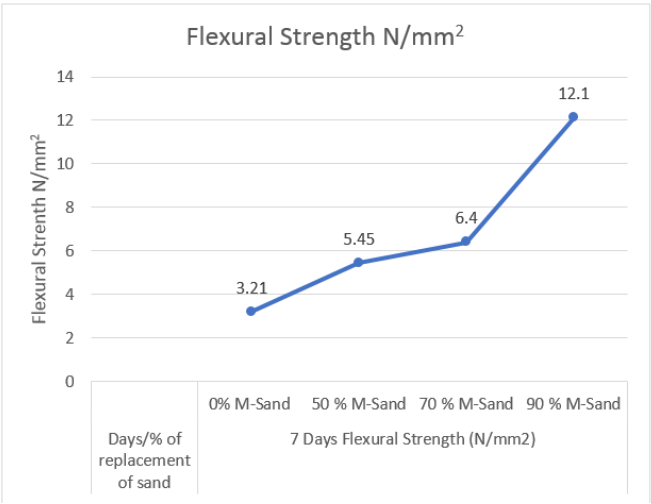

Fig 5 : Flexural Strength

V. Conclusion and Discussion

1. As I have did experimental study on Based on the present study, the following conclusions were drawn.
2. The addition of M-sand significantly increased the compressive of concrete with maximum strengths in each case being achieved at 90% of M-sand as per results observed in 7, 14, 21 and 18 days Curing Samples.
3. Compressive strength increased significantly with the addition of bamboo fiber and M-sand

replacement strength is increased as percentage of M-sand in increased.

VI. Future Scope

1. In this study we are utilizing M-sand as a alternate of natural sand in proportion whereas in future one can completely replace it.
2. In this study we are considering Bamboo fiber as an admixture to enhance concrete properties whereas in future one can opt any other fiber or material to enhance properties.
3. In this study we are testing concrete whereas in future one can test for Reinforced concrete.

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