AN EXPERIMENTAL STUDY ON PARTIAL REPALCEMENT OF CEMENT IN WITH SUGARCANE BAGASSE ASH

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ABSTRACT

We are aware that a lot of damage is done to environment in the manufacture of cement. It involves lot of carbon emission associated with other chemicals. The researches has shown that every one ton of cement manufacture releases half ton of carbon dioxide, so there is an immediate need to control the usage of cement. The Bagasse ash imparts high early strength to concrete and also reduce the permeability of concrete. The Silica present in the Bagasse ash reacts with components of cement during hydration and imparts additional properties such as chloride resistance, corrosion resistance etc. It makes the concrete more durable This project mainly deals with the replacement of cement with Bagasse ash in fixed proportions and analysing the effect of HCl on SCBA blended concrete. The concrete mix designed by varying the proportions of Bagasse ash for 0%, 10%, 15%, the cubes are been casted and cured in normal water for 7, 15 and 28 days. The test result indicate that the strength of concrete increase up to 10% Sugar cane bagasse ash replacement with cement

Keyword: *Fine aggregate, Cement, Sugarcane Bagasse Ash, Coarse aggregate.*

1. INTRODUCTION

1.1 GENERAL

Ordinary Portland cement is the most commonly used building material throughout the world and it will retain its status in near future also because of demand and expansion of construction industry all over the world. Further the greatest challenge before the concrete construction industry is to serve the two pressing needs of human society, namely the protection of environment and meeting the infrastructure requirements of our growing population Structures which are constructed in aggressive environments are liable to be subjected to acidic attack. One of such major problems is HCl attack against concrete structures due to which there will be loss of weight and reduction in strength of concrete ultimately sacrificing age of the structure. Contaminated ground water, seawater, industrial effluents are some of the sources of sulphate that attack concrete. The use of blended cements have shown a sharp results in resisting the sulphate attack on concrete, sugarcane bagasse ash which shows pozzolanic properties is being used as a partial replacement in concrete in regular intervals of 5% up to 25%. SCBA is being produced from sugar manufactu waste material which will be grinded to the

fineness less than cement for obtaining good ring units as a bonding between cement and SCBA. This project discusses the very severe exposure on concrete.

1.2 OBJECTIVE OF THE INVESTIGATION

The main objective of this investigation is to conduct an experiment on partial replacement of fine aggregate with Sugarcane bagasse ash and crusher dust in concrete in the proportions of 0,10%,20%,30%. And to study the strength parameters of compressive strength and flexural strength by,

1. Compression test
2. Flexural strength test

2. SUGARCANE

Bagasse is a by-product from sugar industries which is burnt to generate power required for different activities in the factory. The burning of bagasse leaves bagasse ash as a waste, which has a pozzolanic property that would potentially be used as a cement replacement material. It has been known that the worldwide total production of sugarcane is over 1500 million tons.
Sugarcane consists about 30% bagasse whereas the sugar recovered is about 10%, and the bagasse leaves about 8% bagasse ash (this figure depend on the quality and type of the boiler, modern boiler release lower amount of bagasse ash) as a waste, this disposal of bagasse ash will be of serious concern.
Sugarcane bagasse ash has recently been tested in some parts of the in certain replacement percentages and fineness. The higher silica content in the bagasse ash was suggested to be the main cause for these improvements. Although the silicate content may vary from ash to ash depending on the burning conditions and others properties of the raw materials in has been reported that the silicate undergoes a pozzolanic reaction with the reduction of the free lime in the concrete.

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FIGURE 1. Sugarcane

3. RESULTS AND DISCUSSIONS

The results of compressive strength, Flexural test are discussed as follows.

3.1 COMPRESSIVE STRENGTH

The compressive strength of concrete is given in terms of the characteristics Compressive Strength of 150 mm size cubes tested after 28 Days of curing. The cubes are tested as per the guidelines given in IS 516-1979. The tests are done on an electro hydraulically operated compression testing machine.

The specimen is placed in the bearing surface of the compression testing machine and compressive load is applied on opposite faces axially, slowly at the rate of 14 MPa/minute, and the result of the tested specimens are shown below,

After 24 hours, cubes extracted from forms and stored in water (curing phase) up to the time of test. Before testing, specimens were air dried for 10 to 15 minutes. The compressive strength of the specimen, σ_{Comp} (in MPa), is calculated by dividing the maximum load carried by the cube specimen during the test by the cross-sectional area of the specimen.

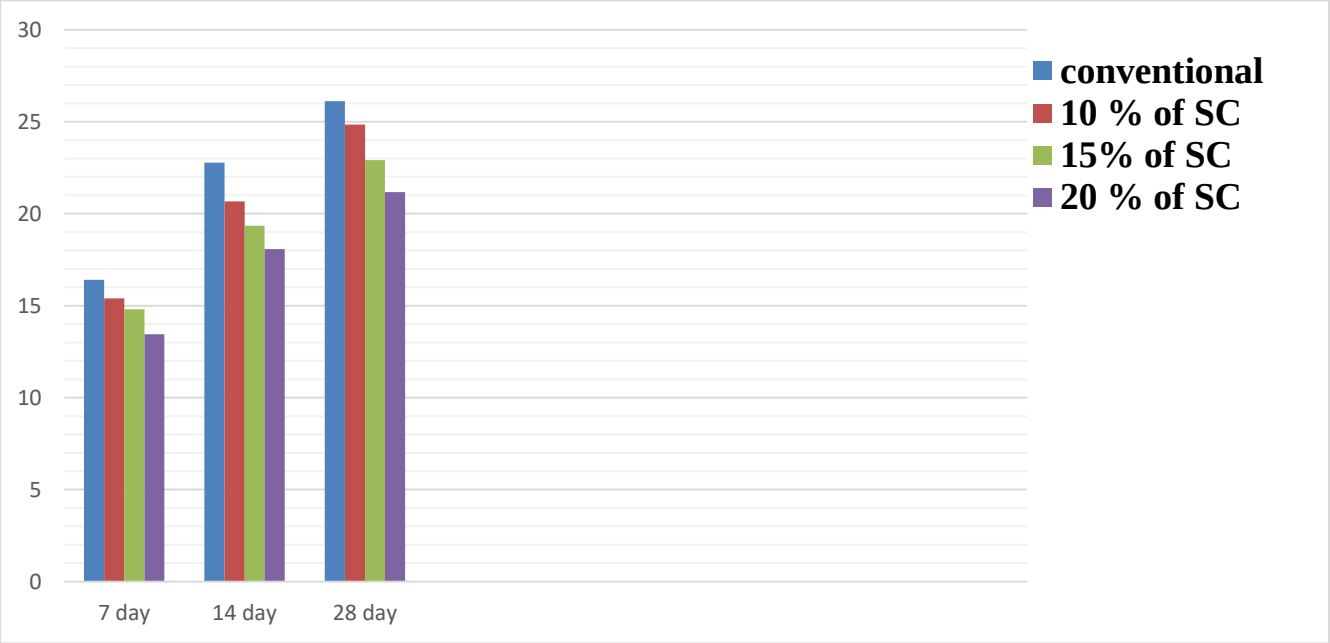

Figure 3 compressional testing values

3.2 FLEXURAL STRENGTH

The Flexural strength is one measure of the tensile strength of concrete. It is a measure of an unreinforced concrete beam or slab to resist failure in bending. After the curing period the specimen is taken out from the curing tank and wipes it clean. The dimensions of the specimen and the weight of the specimen were noted down with accuracy.

The testing machine should be provided with two rollers of 38 mm diameter on which the specimen is placed and the rollers are spaced that the between two rollers. If full contact is not obtained between the

specimen and the load applying or the support blocks so that there is a gap, the contact surface of the specimen are capped. The specimen is loaded continuously and without shock at until rupture occurs. The maximum load indicated by the testing machine is recorded.

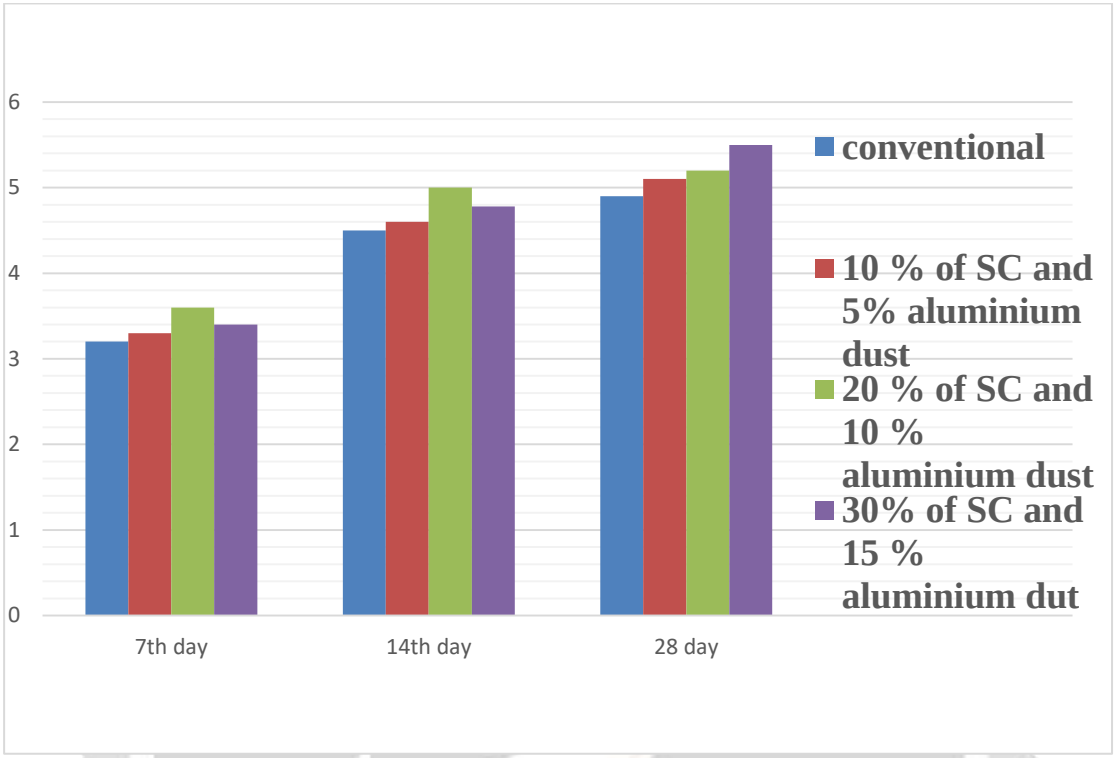

figure 4 flexural strength values

Discussion:

In this research the values of compressive strength for different replacement levels of CSFB (0%, 10%,20% and 30%) at the end of the curing periods (7 days,14 days and 28 days) are taken. These values are plotted in figs. This shows the variation of compressive strength with fine aggregate replacement at different curing ages respectively.

It is evident from figure, that compressive strength increases up to 30% replacement of sand to CSFB. The flexural strength will be decreased in 40% replacement.

4.CONCLUSION

From the test results observed, the following conclusion have been drawn:

SCBA concrete performed better when compared to ordinary concrete up to 10% ,20%,30% replacement of sugar cane bagasse ash. Increase of strength is mainly to presence of high amount of Silica in sugarcane bagasse ash. Compressive strength solution when compared to the concrete cured in normal water. Compressive strength is increased for 7, 14 and 28 days when cured in normal water, . It is observed and increase the compressive strength. Utilization of the waste material Sugar Cane Bagasse ash can be advantageously used as a replacement of cement in the preparation of concrete

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