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Partially replacement of cement &sand by using paper mill sludge & Sugarcane bagasse Ash (SCBA) in concrete

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ABSTRACT

Paper mill sludge is a major economic and environmental problem for the paper and board industry. The material is a by-product of the deinking and re-pulping of paper. The million tonnes quantity of paper mill sludge produced in the world. The main recycling and disposal routes for paper sludge are land-spreading as agricultural fertilizer, producing paper sludge ash, or disposal to landfill, Hypo sludge is investigated for its use as a partial replacement for cement in cement mortar .The utilization of Sludge as cement replacement material in mortar or as additive in cement introduces many benefits from economical, technical and environmental points of view. Today researches all over the world are focusing on ways of utilizing either industrial or agricultural wastes as a source of raw materials for the construction industry. These wastes utilization would not only be economical, but may also help to create a sustainable and pollution free environment.

Sugar-cane bagasse is one such fibrous waste-product of the sugar refining industry. Fresh concrete tests like compaction factor test and slump cone test were undertaken along with hardened concrete tests like compressive strength, split tensile strength. The result shows that bagasse ash can be a suitable replacement to fine aggregate

1. INTRODUCTION

Present days because low accessibility of natural resources, the ordinary Portland cement and natural sand is being used rapidly in the world, because of construction of industries, residential buildings and other concrete based structures .So, the production and utilization of concrete and sand has been rapidly increased, So due to that lot of heat is emitted into the atmosphere due to hydration action of cement. So to reduce the amount of cement in concrete as well as reduction the impact of using natural sand in concrete we are using byproduct of paper industry for cement and Sugarcane bagasse ash (SCBA) for sand. While producing paper the various waste come out from various processes used in paper industry. Paper making Industries generally produce large amount of solid waste. The only way of disposal of this paper mill sludge is dumping which is dangerous for environment. Paper fibers can only be recycled to limited number of times. From paper manufacturing processes three types of sludge are obtained namely lime sludge, ETP sludge, De-linking sludge .In our project we used lime sludge as a partial replacement of cement. Each Indian paper mills produces an average of over 40 tons of

sludge per day. The specific gravity of hypo sludge is generally 2.80 but it is very slightly higher when silica content is low. This value can be compared with specific gravity of cement which is 3.15.

2. OBJECTIVES OF STUDY

- The primary objective of this project is to make an economical and eco-friendly concrete gaining the same strength.
- The reduction of the effect of natural sand on the environment as well as the disposal of paper mill sludge in the ground is the secondary objective.
- This project includes both the factors of environment as well as the cost reduction to form an economical concrete.
- The replacement for cement as paper mill sludge and replacement of sand as Sugarcane bagasse ash (SCBA).

3. LITERATURE SUMMARY:

Pitroda et al., International Journal of Advanced Engineering	Innovative use of paper industry waste In design mix concrete	Innovative use of paper industry waste In the cement has been replaced by waste paper sludge accordingly(without hypo sludge),10%,20%,30%/40%by weight for m-25 and m-40 mix
IJISET - International Journal of Innovative Science, Engineering & Technology, Vol. 4 Issue 3, March 2017	Experimental Study on Partial Replacement of Cement by Hypo sludge in Concrete	These tests were carried out to evaluate the mechanical properties like compressive strength and spilt tensile strength up to 7 days and 28 days. In this work, M30 grade concrete was developed by replacing cement by 10%,15%,20%,30of hypo sludge.
Chemical, Civil and Mechanical Engineering Tracks of 3rd Nirma University International Conference on Engineering (NUiCONE 2012)	Utilization of Bagasse Ash as a Partial Replacement of Fine Aggregate in Concrete Prashant O Modania*, M R Vyawahareb	Bagasse ash mainly contains aluminium ion and silica. In this paper, untreated bagasse ash has been partially replaced in the ratio of 0%, 10%, 20%, 30% and 40% by volume of fine aggregate in Concrete.

International Journal for Service Learning in Engineering Vol. 5, No. 2, pp. 60-66, Fall 2010 ISSN 1555-9033	Experimental Study on Bagasse Ash in Concrete R.Srinivasan	In this paper, Bagasse ash has been chemically and physically characterized, and partially replaced in the ratio of 0%, 5%, 15% and 25% by weight of cement in concrete.

4. MATERIALS

Cement:

Ordinary Portland cement of OPC grade 53. Various physical properties were performed as per IS.

Sand:

The aggregate size is lesser than 4.75 mm is considered as fine aggregate. Sand confirming IS.

Coarse Aggregate:

The aggregate size bigger than 4.75 mm, and20mm downsize is considered as coarse aggregate.

Sugarcane bagasse ash (SCBA):

The bagasse is fibrous waste-product in nature and has a similar particle size range of sand which indicates that it could be tried as replacement with sand in concrete mixture.

Paper mill sludge:

This Paper mill sludge contains, low calcium and maximum calcium chloride and minimum amount of silica. Paper mill sludge behaves like cement because of silica and magnesium properties. This silica and magnesium improve the setting of the concrete

5. EXPERIMENTAL WORK

Number of cubes (for 14 days test + for 28 days test**)**

Test conducted	For 0% sludge & 0% Sugarcane bagasse ash (SCBA)	For 10% sludge & 10% Sugarcane bagasse ash (SCBA)	For 15% sludge & 20% Sugarcane bagasse ash (SCBA)	For 20% sludge & 30% Sugarcane bagasse ash (SCBA)
Compressive strength test	3+3	3+3	3+3	3+3
Flexural strength test	3+3	3+3	3+3	3+3
Split Tensile test	3+3	3+3	3+3	3+3

Total number of molds: 72

6. SCOPE OF THE PROJECT WORK

To find the possibilities of reducing the amount of cement and sand in concrete as it will create an eco-friendly environment in construction. The need of reduction in the cost of overall construction will be done. It has a large scope in high rise projects and this technique is so flexible that it can be used by small projects as well. The project is related to just a study basis but the implementation is infinite. Different methods are applied to reduce the quantity of cement but both the materials i.e. cement and sand is not replaced at once. This will gain a superior increase in the reduction of use of cement and sand.

7. CONCLUSION

Finally our project is done with various mixes with curing periods of 14 days & 28 days by Partial replacement of cement and sand by using paper mill sludge and sugarcane bagasse ash (SCBA).

Testing of cubes, beams and Cylinders are yet to be done.

8. OUTCOMES

Paper mill sludge, bagasse ash are the industrial waste, optimum use of these materials in construction field will bring down the construction cost of project.

Also the waste material is not good for the society it creates the environmental issues so by using these waste material these problems can be solved. Also dumping problems of these materials is minimized.

In this study attempt have been made to obtain the strength by using varying proportion of these materials.

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