Use of Sugarcane Bagasse In Brick Manufacturing

Nihar.P.Shah[1], Bhagyesh.P.Satankar[2], Mayur.R.Lakhe[3], Sagar.R.Pati[4], Dhiraj.O.Bavage[5], Prof. Miss Smita.K.Daterao[6]

[1, 2, 3, 4, 5] Dept of Civil Engineering

[6]Assistant Professor, Dept of Civil Engineering

[1, 2, 3, 4, 5, 6] Trinity Academy of Engineering, Pune, Maharashtra, India

Abstract- *As we know that the waste from the industries is very harmful for the environment as well as to our health, if not disposed in proper manner. The fibrous residue of sugarcane after crushing and the extraction of its juice, known as bagasse is one of the largest agriculture residues in the world. The bagasse is however used as a biomass fuel for boilers, but after burning the by-product left is of no use and generally disposed into rivers which affects the human health of human being, environment, fertile land, sources of water bodies etc. Depending on incinerating conditions, the resulting sugarcane bagasse ash (SCBA) may contain high levels of SiO2 and Al2O3. Uses of sugarcane bagasse ash in brick can save the sugarcane industry disposal and produce 'greener' bricks for construction. In research of bagasse ash can be used as the replacement of clay and sand in burnt bricks. The different proportion of the bagasse ash are taken and bricks are manufactured. After the full manufacturing process the bricks are to be tested in laboratory and results are analyzed regarding the water absorption and compressive strength. The aim of this research was to make green bricks to maintain environmental balance and avoid problem of ash disposal. Sugarcane bagasse ash is one such solid waste generated in huge quantities in India, a leading sugar producer. Sugarcane bagasse ash is a silica rich material that can play the role of effective pozolan leading to enhanced pozzolonic reactions resulting in better performing .*

Keywords- Sugarcane Bagasse Ash, Sugarcane Bagasse, Cement, Water , Crushed Sand, Compressive Strength, Split tensile strength, Eco-friendly, Cost feasibility

I. INTRODUCTION

Portland cement concrete is and will remain a major construction material of choice in civil engineering construction. Portland cement is the most important constitute of concrete. Unfortunately, cement manufacturing consumes large amount of energy about 7.36 x 10^6 kJ per tons of cement. Also, approximately 1 tons of CO2 is released into atmosphere during the production of 1 tons of cement. Thus partial replacement of Portland cement by mineral by product such as fly ash, slag, silica fume can significantly reduce CO_2 emission. Ordinary Portland cement is recognized as a major construction material throughout the world. Research all over the world today are focusing on way of utilizing either industrial or agriculture waste , as source of raw material for industry. This waste utilization would not only be economical , but may also result in foreign exchange earning and environmental pollution control. Industries waste, such as blast furnace slag , fly ash and silica fume are being used as supplementary cement replacement material. The present study was carried out on SCBA obtained by controlled combustion of sugarcane bagasse which was procured from the Maharashtra province in India. Sugarcane production India is over 300 million tons of as unutilized and hence waste material. Our project analyzes the effect of SCBA in concrete by partial replacement of cement. building materials.

II. LITERATURE REVIEW

The utilization of agricultural and industrial waste produced by industrial processes has been the focus of waste reduction research for economical, environmental, and technical reasons at south Gujarat region. Sugarcane bagasse is a fibrous waste-product of the sugar refining industry. Sugarcane bagasse ash as a waste material is already causing serious environmental pollution, which calls for urgent ways of handling the waste. In this study, Sugar cane bagasse ash has been partially/fully replaced with the different material like, cement, sludge lime & stone dust and test for crushing strength and % water absorption was performed for different bricks sample had various proportions. Finally result shows, optimum utilization of sugar cane bagasse ash as waste material in construction brick.

III. METHODOLOGY

Compressive strength :

The compressive strength of the concrete is one of the most important properties of the concrete. Concrete is strong in compression and in construction also concrete is mainly used in compression. Higher the compressive strength, better is the durability and bond strength. Resistance to abrasion and volume stability improve with the compressive strength which is very important in quality control of concrete.

The compressive strength of the concrete cubes with zero %, 5%, 10% & 20% replacement of cement by sugarcane bagasse ash were determined three number of 150x150x150 mm cubes are cast for each mix and cured in water for 7 & 28 days. In accordance with IS 10086-1982. Then, the concrete specimen were tested for compressive strength after 7 & 28 days. The compressive test is determined by dividing the ultimate applied load by the cross section area of the cube. The type of fracture of the specimen and the compressive strength was also recorded and compared with conventional concrete. Among various strengths of concrete , compressive strength as received a large amount of attention because, the concrete is primarily meant to withstand compressive stress . The procedure is executed as per the IS 516-1959, using the universal testing machine. The load is applied gradually, till the failure for the specimen.

Compressive strength , C=P/A

Where,

P= Load in Newton
A= area of cross section of cube in mm^2

Compressive Testing Machine

Compressive test on Bagasse Brick
Split Tensile Strength :

The tensile strength is one of the basic and important properties of the concrete. The concrete is not usually expected to resist the direct tension because of its low tensile strength and brittle nature. However, the determination of tensile strength of concrete is necessary to determine the load at which the concrete members may crack. The cracking is a form of tension failure

Splitting tests is well known indirect tests used for determining the tensile strength of concrete. The test consists of applying compressive line loads along the opposite generators of a concrete cylinder placed with its axis horizontal between the patterns. Due to the applied line loading a fairly uniform tensile stress is induced over nearly two third of loaded diameter. Due to this tensile stress, the specimen fails finally by splitting along the loaded diameter.

The splitting tensile strength of the concrete specimens was tested at 7 and 28 days. The size of cylinders 300 mm length and 150 mm diameter are placed in the machine such that load is applied on the opposite side of the cylinder are casted. Align carefully and load is applied, till the specimen breaks.

The splitting tensile strength can be obtained from the following equations:

Split tensile strength = 2P/ πdl

Where, T = splitting tensile strength (MPa)

P = maximum applied load (N)
l = length (in mm)
d = diameter (in mm)

Split Tensile Strength

ADVANTAGES:-

1. To improve the quality and reduce the cost of construction material
2. Has high silica content
3. Low specific gravity.
4. Valuable pozzolonicmaterial and its cost is similar to fly ash.
5. Reduce negative environment effect and landfill volume.
6. Bagasse ash is very lightmaterial.
7. Bagasse can be used as farm fertilizer.
8. Bagasse can be used as making ceramic products.
9. Increases workability of fresh concrete.

2.2 CHEMICAL AND PHYSICAL PROPERTIES OF BAGASSE ASH.

2.2.1CHEMICAL PROPERTIES OF BAGASSE ASH :-

Sr.no.	Chemical compound	Percentage %
1	Nitrogen	0.2 – 0.3
2	P2O5	1.5 – 2
3	CaO	1 – 2
4	Mgo	0.07
5	Sio2	85 – 90
6	Heavy metals	NA
7	Fe	2 – 4

2.2.2 PHYSICAL PROPERTIES OF BAGASSE ASH

	Density (g/cu.cm)	Surface area (sq.cm/g)	Particle size	Colour
OPC	3.15	3250	36.2	Dark grey
SCBA	2.52	5140	28.9	Redish grey

IV. CONCLUSION

In conclusion ,we found that after all the tests we carried out on bricks we found that Bricks made from sugarcane bagasse where safe in strength & Cost.

We used different proportions to get better results which will directly affect the compressive strength and tensile strength.. Modified replacement proportion 25%, 50% and 75% that can effectively replace the cement.

The bricks are Economical and durable to be used in market.

REFRENCE

[1] Aigbodion.V.S: Potential of using bagasse ash particle in Metal Matrix Composite, PhD work on-going, Department of Metallurgical and Materials Engineering, Ahmadu Bello University, Samaru, Zaria, Nigeria, 2008.
[2] Barroso J, Barreras F, Amaveda H, Lozano A: On the optimization of boiler efficiency using bagasse as fuel. Fuel 2003;82:1451–63.
[3] "Cetrel and Novozymes to Make Biogas and Electricity from Bagasse", Business Wire, 14 December 2009.
[4] Deepchand (2005). "Sugar Cane Bagasse Energy Cogeneration – Lessons from Mauritius", The United Nations.
[5] Fogel R, Garcia RR, Oliveira R, Palacio D, Madeira L, Pereira N Jr: Optimization of acid hydrolysis of sugarcane

bagasse and investigations on its fermentability for the production of xylitol by Candida guilliermondii. ApplBiochemBiotechnol 2005, 122:741-752.

[6] Payá .J, Monzó,.J , Borrachero .M V, Díaz-Pinzón .L, Ordóñez .L M: Sugar-cane Bagasse ash (SCBA): studies on its properties for reusing in concrete production Journal of Chemical Technology & Biotechnology , 2007, Volume 77 Issue