

Use of Bagasse Ash Mixed With Quarry Dust & Building Scrap in Brick Making Concrete

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Abstract— There is a strong demand in our country for environmentally safe reuse and effective disposal method for sludge due to the increasing amount of sludge generated by the various industries or plant in India. Landfills techniques are commonly used for disposal of sludge in India, rapid urbanization has made it increasingly difficult to use the above techniques. Therefore, incineration process has become one of the few alternatives available for disposal of sludge. The ultimate disposal of incinerated sludge ash can be accomplished by using it as an engineering construction materials. One possible solution for the management of this ash is to re-use it as a building material, namely to incorporate this ash into making of bricks. The fire clay brick is one of the most common and abundant masonry building material. As such, the recycling of waste materials by incorporating them into bricks has been a popular topic of investigation over the last few century, with varying degrees of success across a wide range of waste material. This popularity is likely due to flexibility on the type of wastes which can be mixed into the brick making material, but more importantly, the high temperature involved in firing the bricks allows for the volatilization of dangerous component, as well as the fixation of wastes into the vitreous phase of the brick. The current study investigates the potential for reusing sugarcane industry sludge by using it as a partial replacement material in clay bricks.

Key words: Bagasse Ash Compressive Testing Machine Flexural Test, Efflorescence

I. INTRODUCTION

As we all know that the waste from the various 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 extraction of its juice, known as “bagasse” is the largest agriculture residues in the world. Brazil was the largest producer of sugar cane in the world. The next major producers of sugarcane was India followed by china, Thailand, Pakistan & Mexico. India produces about 341200 thousand metric tons sugarcane. Hence the bagasse is also available in mass amount in India. 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 the rivers which affects the health of human being, environment, fertile land, sources of water bodies etc.

Depending on the incinerating conditions, the resulting sugarcane bagasse ash (SCBA) may contain high levels of SiO_2 and Al_2O_3 . Uses of Sugarcane bagasse ash waste in brick can save the sugarcane industry disposal costs and produces a ‘greener’ bricks for construction. It also helps in making eco- friendly bricks which reduces the harmful effects from its disposal. Huge quantity of ash which is a waste product, is easily available at very negligible rate. In this research the bagasse ash, lime, quarry dust and scrap can

be used as the replacement of clay and sand in the burnt clay bricks. The different proportions of the bagasse ash, lime, quarry dust and scrap are taken and bricks are manufactured in the site of vitbhatti. After the full manufacturing process the bricks are tested in the laboratory and results are analyzed regarding the water absorption, compressive strength, flexural test, efflorescence & physical test.

Then the final results are compared with the standard results of burnt clay and fly ash bricks. The aim of this research was to make green bricks which is also economical to maintain environmental balance and avoid problem of ash disposal. It was also expected that bricks must be lighter in weight, energy efficient and meet compressive strength requirements of IS 1077:1992. It is expected that compressive strength of the bagasse ash brick would be more than the clay & fly ash bricks. The bricks also expected to serve the purpose of solid waste management and innovative sustainable construction material.

II. OBJECTIVES

The objectives of our work are as follows:

- 1) To study the compressive strength of the brick by adding different percentage of bagasse ash and other material
- 2) To study the cost of the brick.
- 3) To check the density of the brick.
- 4) To utilize the waste materials available in the agro-industries.
- 5) To make the bricks which are energy efficient which is the only viable solution to the environmental concerns and natural resources conservation for future generations.

A. Bagasse ash

The fibrous residue of sugarcane after crushing and extraction of its juice, known as “bagasse”. The bagasse is however used as a biomass fuel for boilers, but after burning the by-product left is known as bagasse ash which has no use and generally disposed into the rivers which affects the health of human being, environment, fertile land, sources of water bodies etc.

B. Lime

The lime is an ancient cementing material. It has been used from early days to be a good building material in construction works. It is not available in nature in Free State but it is produced by burning limestones. Shells of sea animals, kankars are also used in the manufacture of lime.

III. RESULTS & DISCUSSION

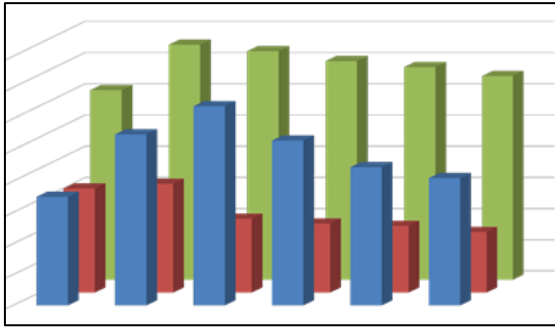


Fig. 1: Compression of Weight of Different Sample

S.No.	Types of Brick	Compressive Strength(N/mm ²)	Weight (kg)	Density(kg/m ³)	Water absorption (%)	Flexural Strength(N/mm ²)
1.	Ordinary Clay brick	3.50	3.350	2176.73	15	6.082
2.	Fly ash brick	5.50	3.500	2274.20	10	7.535
3.	Sample 1	6.40	2.380	1546.46	~20	7.328
4.	Sample 2	5.30	2.228	1447.69	~20	7.010
5.	Sample 3	4.45	2.152	1398.31	~20	6.818
6.	Sample 4	4.10	1.957	1271.60	~20	6.532

Table 1: Compression of Different Sample

IV. CONCLUSION

- 1) As shown in result the Compressive strength of sample bricks decreases on increase in percentage of Bagasse ash as compared to clay and fly ash bricks.
- 2) Use of bagasse ash reduces the cost of bricks and help in producing a Eco- friendly bricks for construction.
- 3) Environmental effect by wastes and disposal problems of the bagasse ash can be reduced through this research.
- 4) This research helps in converting the non-valuable bagasse ash into bricks and used for construction purpose.

REFERENCES

- [1] Prakash Chavan and Dr.M.S.Nagakumar Studies on soil stabilization by using the bagasse ash, International Journal of Scientific Research Engineering & Technology (IJSRET) ISSN: 2278-0882 ICRTIET-2014 Conference Proceeding, 30-31 August, 2014
- [2] Madurwar V. Mangesh, Mandavgane A. Sachin and Ralegaonkar V Rahul Current science, Vol.107, No.6, 25 september 2014.
- [3] Apurva Kulkarni, Samruddha Rajee, Mamta Rajgor-Bagasse Ash As An Effective Replacement In Fly Ash Bricks, International Journal of Engineering Trends and Technology (IJETT) – Volume 4 Issue 10 - Oct 2013
- [4] Kevin Hii, Abbas Mohajerani, Paul Slatter and Nicky Eshtiaghi (2007)- Reuse of Desalination Sludge for

Brick Making School of Civil, Environmental and Chemical Engineering, RMIT University, Melbourne, 3000, Australia.

- [5] C.-H.Weng, D.-F.Lin, and P.-C.Chiang (2003), Utilization of Sludge as BrickMaterials, Adv Environ Res, 2003, Vol. 7, Issue 3, pp. 679-685.
- [6] Tay, J.H., and show, K.y.(1999). “Constructive sludge disposal option converting sludge into innovative civil engineering material.”Trauner, E.J. “Sludge ash bricks fired to above and below ash vitrifying temperature”
- [7] Alleman J.E. Bryan, E.H and Stumm, T.A (1990). “Sludge amended brick production Applicability for metal – laden residues.” Water Sci. and Technol, 22(12), 309-317
- [8] Tay, J.H (1987). “Bricks manufactured from sludge” J.Envir. Engg. ASCE, 113(2),278-283.