AN EXPERIMENTAL INVESTIGATION ON FLY ASH BRICK WITH COCOUNT COIR

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ABSTRACT

The use of brick masonry is common in our country. The important material for construction of infill walls and load bearing walls are Clay bricks, Fly ash bricks, Hollow blocks and the dividing of rooms is made possible by steel sheets, wooden pieces and glasses.

This investigation is carried out by materials like fly ash, coir fibre, and quarry dust for manufacturing of bricks. The fly ash class 'F' is used for manufacturing of bricks. The fly ash is the waste product from thermal power plants and it disposed in huge volumes. But it can be used as a resource material for manufacturing of bricks. In agricultural field waste materials are generated. Especially fibres having good mechanical properties, coir fibre and banana fibre and jute fibre are examples.

This investigation deals with manufacturing of bricks using fly ash and coir fibre as a resource materials from waste and cement as a binding material, and adding coir fibre of 0.4%, 0.8%, 1.2%, 1.6%.After the specimen preparation, compressive strength test, water absorption test, shape and size test, hardness test, soundness test, color test, efflorescence test, structure test are conducted. We conclude that the brick with 1.6% of addition of coir fibre have 4.11 N/mm^2 of compressive strength. The maximum cost per brick Rs. 3.36.It is economical when compared to conventional bricks available in market.

***Keywords**: Bricks, Fly ash, Coir Fibre, Compressive Strength, Cement*

INTRODUCTION

In the present scenario an alternate for clay bricks is fly ash bricks which plays key role in the construction of framed structures because of its less weight which will reduce the dead weight of the structures, another advantage is low cost. Such fly ash bricks are not subjected to load bearing structures because of its slight reduction in compressive strength compare with nominal clay bricks. So majority of the fly ash bricks were used in framed structure construction. In this study a concern to increase compressive strength using coconut fibre is carried out. A comparison has been carried out for the normal brick to fibre reinforced bricks. From the comparison the test result has shown a significant change in the compressive strength by the addition of coir fibre and the test result show significant changes in water absorption quality and other properties of fly ash bricks.

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LITERATURE SURVEY

- Girisha.C, Sanjeevamurthy, Gunti Ranga Srinisvas, Sep 2012, "Coconut coir Fibre: water absorption and mechanical properties"
- Natural fibres reinforced Epoxy composites were subjected to water immersion tests in order to study the effects of water absorption and the mechanical properties.
- Fibres in weight fraction 20%, 30%, and 40% were used for the fabrication of the composite.
- This test increases the volume fraction because of high cellulose content of the fibre.
- Sakina Najmuddin Saifee, Divya Maheshbai LAD, May-2015 "Coir fibre; A best use of waste material"
- This paper is an attempt to make the best use of the waste material obtained from the coconut trees.
- The coir fibre is widely adopted as an engineering material due to its high tensile strength and elasticity.
- It is useful because of its physical and mechanical properties.
- K.Saravana Raja Mohan, P.Jayabalan, A.Rajaraman (2012) .,**"**Properties of Fly Ash Based Coconut Fibre Composite".
- Ordinary Portland cement 43 grade with fly ash showed an increase in compressive strength, split tensile strength, flexural strength and modulus of elasticity.
- Addition of coconut fibre in fly ash mixed concrete composite enhance the mechanical properties.
- Cement is replaced with five percentages (10,20,30,40 and 50%) of class F Fly ash.
- Four percentages of coconut fibres (0.15, 0.30, 0.45, and 0.60%) having 40mm length were use

1. MIX DESIGN

DETAILS	DESIGNATION
Conventional bricks	B
Addition 0.4%	B1
Addition 0.8%	B2
Addition 0.12%	B3
Addition 0.16%	B4

MIX PROPORTION

FLY ASH (Kg)	QUARRY DUST (Kg)	CEMENT (Kg)	COIR FIBRE (gm)
1.692	0.846	0.282	0
1.692	0.846	0.282	10
1.692	0.846	0.282	20
1.692	0.846	0.282	30
1.692	0.846	0.282	40

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2. TEST FOR BRICKS:

Compressive Strength Test (7 Days)

SAMPLES	LOAD (KN)	STRENGTH (N/mm^2)
0	51.1	2.22
0.4%	53.2	2.31
0.8%	57.2	2.48
0.12%	73.1	3.17
0.16%	76.2	3.33

Fig. 1 Compressive Strength Test (7 Days)

Compressive Strength Test (28 Days)

PROPORTION	LOAD (KN)	STRENGTH (N/mm^2)
0	80.8	3.51
0.4%	85.2	3.70
0.8%	90.6	3.93
0.12%	93.9	4.08
0.16%	94.7	4.11

Comparison of Compressive Strength Results

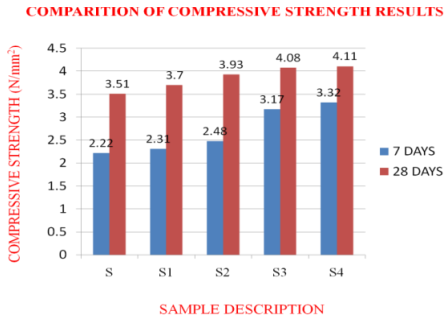

Fig 2. Comparition of Compressive Strength Results

3. Water Absorption Test (24 Hours)

Dry weight (w1) gm	Wet weight (w2) Gm	Water absorption %
2532	2589	2.25
2545	2664	4.67
2560	2670	4.29
2618	2697	3.01
2578	2709	2.25

Fig 3. Water Absorption Test (24 Hours)

4. SHAPE AND SIZE TEST

The shape and size of bricks should be purely rectangular with sharp edges. Standard brick size consists length x breadth x height as 23cm x10cm x 7cm.

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Fig 4. Shape And Size Test

5. Hardness Test

In this test, a scratch is tried to make on the brick surface with the help of a fingernail. If no impression is left on the surface, the brick is taken as enough hard.

Fig 5. Hardness Test

6. SOUNDNESS TEST

In this test, 2 bricks are chosen randomly and struck with one another. Then sound produced should be clear bell ringing sound and brick should not break. Then it is said to be good brick.

Fig 6. Soundness Test

7. COLUOR TEST

A good brick should have a uniform dark grey colour.

Fig.7 Colour Test

8. EFFLORESCENCE TEST

The water has been absorbed and bricks appear to be dry, place a similar quantity of water in the dish and allow it to evaporate as before. Examine the bricks for efflorescence after the second evaporation and report the results. Results of efflorescence test shall be reported as nil. If there is no noticeable deposit of efflorescence.

Fig 8. Efflorescence Test

9. STRUCTURE TEST

A brick is broken and its structure is examined. It should be homogeneous, compact and free from any defects such as holes, lumps etc.

Fig 9. Structure Test

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10. COST ANALYSIS OF BRICKS

BRICK	COST (Rs)
B	3.340
B1	3.345
B2	3.350
B3	3.355
B4	3.360

11. CONCLUSION

- The above results concludes that the compressive strength of fly ash bricks using coir fibre is 1.6% higher than the ordinary clay bricks, so this bricks can be effectively used for all construction purposes.
- In this report optimum value of the brick sample (S4) was observed at the proportion of 60% of Fly ash, 10% of Cement ,30% of Quarry dust and 1.6% of coir fibre and the cost of that brick wasRs. 3.36 only.
- It is economical when compared to that of conventional bricks available in market.

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