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Experimental Stydy On Cement Brick Using Corn Cob Ash as a Partial Replacement of Cement

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ABSTRACT

The idea of using agricultural and industrial waste materials in concrete helps to develop alternatives for protecting the environment, compensating for the shortage of environmental sources, and resolving the waste dumping issue. Environmental awareness about possible adverse effects has substantially expanded, and, consequently, recycling or utilizing agricultural and industrial waste by-products has become an increasingly desirable option for waste disposal.

This study aims to reduce the cement content in cement brick, and it replace the cement by using corn cob ash in bricks to achieve the nominal strength. Corn cob ash mixed with sand with various proportions (25%, 30%, 35%) to achieve the strength of nominal brick. Increase the strength of structure and weight reduction of bricks was tested for compressive strength. Based on the cost comparison of conventional and corn cob ash brick was analyzed, optimum strength was analyzed. The results are clearly shows that corn cob ash used in the production of brick.

Keywords: Brick, Strenth, CornCob, Cement,Humidity.

1. INTRODUCTION

Bricks which play the most vital role in terms of construction material are usually associated with ordinary Portland cement (cement bricks). It has been estimate that the production of cement will increase from about rapidly growing at a rate over 8%. The global warming which is also another rising issue recently due to cement and is becoming vast day by day. This is mostly due to manmade activities which result in the emission of CO2. The use of OPC is still unavoidable until the foreseeable future many efforts are being made in order to reduce the use of Portland cement in brick. These efforts led to the utilization of supplementary cementing materials such as fly ash, silica fume, corncob ash etc, and finding alternative binder to OPC.

The building enterprise in India is growing quickly alongside the growing wide variety of populations in this worldwide. The authorities round India; specifically in a most growing country has been dealing with a critical problem of housing demand which has a growing day through day. Hence, the increase of the enterprise of building is also increasing, considering that human beings want to fulfill their desires of living. In any building the indoor temperature relies on various elements of the building such as walls, roofs, windows, and doors. Major surface area of the wall is exposed to solar radiation, to reduce the heat gain through the wall the perfect insulation substances have to be chosen. It is feasible to reduce heat loss in the wall to reduce the thermal conductivity (TC) of the bricks. TC of bricks depends on Chemical composition. It is crucial to focus on methods to trade the chemical composition of bricks to reduce the TC. Changing the chemical composition of fly ash bricks by using corncob ash with normal strength is a new dimension of bricks design, and large-scale purposes will enhance the development of the construction industry through cost savings. Pozzolan is used to partially replace the cement in fly ash bricks and high containing silica corncob ash (CCA) has been used to improve insulating properties.

Corncob is the waste product obtained from maize or corn and it is the most important crop in the Chhattisgarh. The corncob ash is produced from the combustion of the corncob. CCA is a suitable material to use as a pozzolano.

The aggregate of corncob ash will be used to substitute ordinary portland cement by 25%, 30%, and 35%, of the weight of cement. Compressive strength, water absorption, flexural strength, ultrasonic pulse velocity test, thermal conductivity, and density test, etc. Are carried out by the researchers and it is reported that the inclusion of waste materials in brick fulfills the minimum requirement of common building brick.

1.1 OBJECTIVE

- To compare strength between cement concrete bricks and corn cob ash brick.
- To take test on bricks.
- To cost comparison between a cement concrete brick and corn cob ash brick.

1.2 PROBLEMS STATEMENT

- High rise in the prices of cement.
- Affecting the overall cost of the construction project.
- Adverse effect on environment.

2 LITRETURE REVIEW

Krishna Kumar, Mansingh Rathore (2023)

In their paper they have reported that concrete by making an efficient concrete mix design blending with Corn Cob Ash and with addition of various percentages of polyethylene fiber (0%, 0.5%, 1%, 1.5% & 2%) in concrete has been undertaken. Development of efficient concrete mix design plays an important & vital role in producing eco-economical concrete. Corn Cob Ash partially replaced by cement in concrete for evaluating the workability and strength of concrete along with flexural & split tensile strength. This study has been done by varying (10%) Corn Cob ash on partial replacement of cement and with addition of various percentages of polypropylene fibre (0%, 0.5%, 1%, 1.5%& 2%) in concrete. About twenty-four trial mix, control mix and other variation mix were developed for M25 & M30 grade of concrete. All these concrete specimens were cured for 7 days and 28 days in deep water tank on normal 27+2 C degree atmospheric temperature. The compressive strength increased as increase the percentage (%) of Polyethylene fiber (0% to 1.5%) after 1.5% of PEF compressive strength decreases for both 14 days & 28 days cube strength. It was concluded that optimum percentage increment in compressive strength of concrete was 29.82% at 28 days of curing respectively. The capacity of haphazardly scattered filaments is to connect over the breaks that give some post splitting pliability. In the event that the strands like Polyethylene filaments which are sufficient and impeccably attached to the material, allows the FRC to convey essential worries over a generally enormous strain limit in post breaking state.

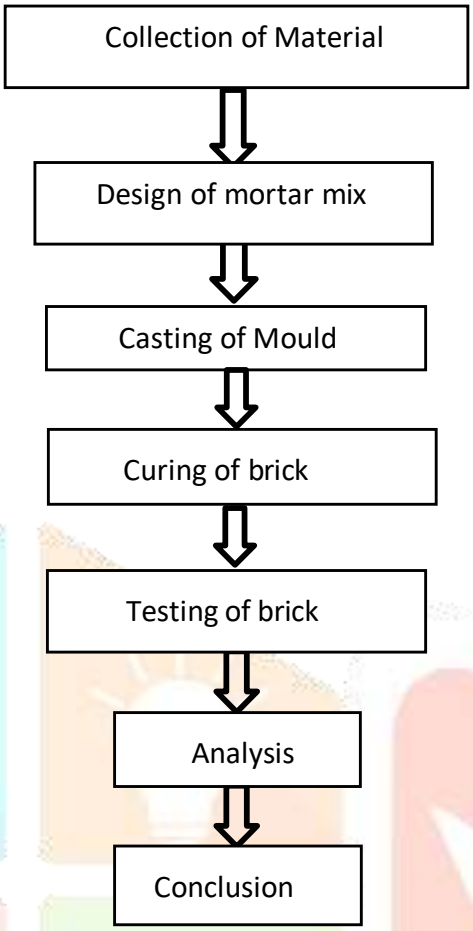
Jawad Ahmad, Mohamed Moafak Arbili (2023)

In their paper they have reported that the idea of using agricultural and industrial waste materials in concrete helps to develop alternatives for protecting the environment, compensating for the shortage of environmental sources, and resolving the waste dumping issue. Environmental awareness about possible adverse effects has substantially expanded, and, consequently, recycling or utilizing agricultural and industrial waste by-products has become an increasingly desirable option for waste

Olukotun Adebisi , Audu Mohammed Taiwo (2019)

It was noticed that This research used corn cob ash (CCA) as a pozzolan in a bid to promote green and sustainable construction while also reducing the overall cost of concrete production. This study investigates the mechanical performance of corn cob ash concrete. It examined the density and compressive strength of CCA - cement concrete using a 1: 2: 4 mix ratio and a water - cement ratio of 0.5. Cubes of 150 mm x 150 mm x 150 mm dimension with varying percentages by weight of CCA to cement combination in the order of 0 %, 5 %, 10 %, 20 % and 30 % were cast. Tests on concrete were carried out at ages 28, 56, 90 and 120 days. It was observed that concrete produced with up to 20 % CCA – cement replacement can be used for construction purposes. CCA is pozzolanic as it has a combined ($SiO_2 + Al_2O_3 + Fe_2O_3$) of above 70 %. Compressive strength of CCA concrete is not fully achieved at 28 days but increases till 120 days due to the pozzolanic activity of CCA. Compressive strength and density of concrete decrease with increasing CCA percentage. Concrete produced with up to 20 % CCA / cement replacement can be used for diverse concrete works where strength is of less significance (like mass concreting and screeding) as CCA / cement concrete has a lower strength than portland cement concrete. The use of CCA for concrete production will decrease overall cost of concrete and reduce the amount of waste in the environment.

3. METHODOLOGY



3.1 MATERIAL AND ITS COMPOSITION

1. Cement:

The cement to conforming the requirement of IS specification with respect to its physical & chemical properties. It's the basis ingredient of concrete, cement brick, mortar & plaster.

Specifications:

Ordinary Portland Cement 53 Grade, Initial Setting Time: 30 Minutes, Final Setting Time: 10 Hours

Fig.1 OPC 53 Grade

2. **Fine Aggregate:**

Fine aggregates are essentially any natural sand particles own from theland through the mining process.

Specifications: - Manufactured sand

Fig.2 Fine Aggregate

1. Corn Cob Ash:

To prepare corn cob ash, first corn cobs were broken down into small piece which helps in enhancement of combustibility and reduction in carbon content that affects the pozzolanic properties.

Fig 3. Maize

Fig 4. Corn Cob Ash

2. Mould:

The container in which we pour liquid into.

Fig 5. Mould

6.Testing (Compression Testing Machine):

A compression testing machine is a type of equipment that is used to measure the compressive strength of materials. It works by applying a compressive force to a sample until it breaks or reaches a specified deformation. Crushing strength of brick is determined by placing brick in compression testing machine. After placing the brick in compression testing machine, apply load on it until brick breaks. Note down the value of failure load & find out the crushing strength value of brick

CONCLUSION

The test program consists of casting and testing 18 bricks in size of 238 X 110 X 84 mm. The aggregate of corncob ash will be used to substitute ordinary portland cement by 25%, 30% and 35% of the weight of cement out which 6 are 25% Next 6 are 30% bricks and other 6 are 35% bricks.

The specimens were cast by filling each steel mould in three layers, each layer being compacted manually by evenly distributing 25 strokes of a steel tamping rod of 25 mm diameter, across the cross section of the mould. The specimens were de-moulded after 5 minutes and water cured in curing tank until testing age of 7, 14 and 28 days.

All the bricks were tested by using a Compression testing machine by keeping the bricks in a horizontal position. After placing the brick in compression testing machine, apply load on it until brick breaks. Note down the value of failure load & find out the crushing strength value of brick.

REFERENCES

[1] Khan Amjad, Gangadhar, Murali Mohan Murali and Raykar Vinay,(1999) "Effective Utilization of Waste Plastics in Asphalting of Roads", R.V. College Of Engineering, Bangalore.

[2] M. Wahlstroem.,(Oct 1999), "Environmental quality assurance system for use of crushed mineral demolition wastes in road constructions", Waste Management, Vol. 20, pp 225- 232.

[3] R. Vasudevan.,(2011), "A technique to dispose waste plastics in an ecofriendly way – Application in construction of flexible pavements", Construction and Building Materials, Vol. 28, Department of Chemistry, Thiagarajar College of Engineering, Madurai, Tamil Nadu, India, pp 311–320.

[4] Sangita.,(2011), "Effect of waste polymer modifier on the properties of bituminous concrete mixes", Construction and Building Materials, Vol. 25, Central Road Research Institute, New Delhi, India, pp 3841–3848.

[5] S.E. Zoorob, L.B. Suparma.,(2000), "Laboratory design and investigation of the properties of continuously graded Asphaltic concrete containing recycled plastics aggregate replacement (Plastiphalt)", Cement & Concrete

[6] Composites Aravind K. Das Animesh, (2007), "Pavement design with central plant hot-mix recycled asphalt mixes", Construction and Building Materials, Vol. 21, Dept. of Civil Engg., Indian Institute of Technology Kanpur, India, pp 928–936.

Vol. 22, School of Civil Engineering, (CEMU), The University of Leeds, UK