WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Partial replacement of cement with rice husk ash in manufacturing of brick

Prof. R. S. Bute[1],Miss. Snehal S. Sahare[2], Mr. Arshil. A. Sheikh[3], Mr. Chetan A. Sawankar[4], Fardeen A. Sheikh [5], Shubham V. Katole[6]

[1] Department of Civil Engineering Priyadarshani J.L. College of Engineering Nagpur , Maharashtra India
[2] Department of Civil Engineering Priyadarshani J.L. College of Engineering Nagpur, Maharashtra India
[3] Department of Civil Engineering Priyadarshani J.L. College of Engineering Nagpur, Maharashtra India
[4] Department of Civil Engineering Priyadarshani J.L. College of Engineering Nagpur, Maharashtra India
[5] Department of Civil Engineering Priyadarshani J.L. College of Engineering Nagpur, Maharashtra India
[6] Department of Civil Engineering Priyadarshani J.L. College of Engineering Nagpur, Maharashtra India

ABSTRACT :

Building materials that require higher environmental compatibility have recently increased construction as cement production has expanded and environmental challenges have increased. Sometimes, cement replacement strategies aim to use agricultural waste such as rice shell ash (RHA). Researchers have examined the use of rice shell ash at various proportions of cement for brick production. This study analyzes how different proportions of rice shell ash in bricks affect lifespans and sustainability lifespans.

Introduction:

Production of Cement ranks among the principal carbon dioxide (CO2) emission sources worldwide. Scientists and builders worldwide focus on developing sustainable alternatives to cement because of expanding environmental construction standards. Research has demonstrated that Rice husk ash obtained through rice milling operations functions well as an industrial waste material suitable for construction materials applications. RHA combined with cement offers a method for diminishing cement consumption while it might enhance specific properties observed in bricks. The research evaluates the practicality of using RHA as a substitute for cement in brick production.

Literature Survey

1. **Patil Nita Babosa and H. Sharanagouda**, " Rice Shell and His Application: Rating. Current International Journal of Microbiology and Applied Science. (ISSN: 2319-7706, Volume: 6 November 2017, Overall, an overview of the importance of rice shells as a prerequisite for rice development is closed. It presents further testing for distribution and travel distribution, various uses and travel distribution, as well as various uses in the rice field, as well as for testing innovative applications in the US.

2. **Dr. Marcela Ondova, Assoc. Prof. Dr. Alena Sicakova "** In June 2014, a review of current trends in the course of Kois Institute, the Faculty of Civil Engineering, Kosice's Institute of Technology, Flight Ash: The use of stone dust and cement proved to be advantageous.

Raw Materials:

- Basic and important steps for each project. Project materials must be avoided from causing environmental damage during use. We used cement content in our production along with flight and rice. Rice shell ash is produced by burning the ashes in a rice bowl.
- **Rice Husk Ash (RHA):** It has a name from the industrial process of burning rice shells that protect rice grains. Rice squash serves rich silica. It qualifies as an ideal alternative to cement materials. RHA contributes to two effective benefits: Reduce energy-intensive cement manufacturing processes and find applications for agricultural waste.

Fig no 1: Generation of rice husk ash

Cement

The brick industry widely employs Ordinary Portland Cement (OPC) because it functions effectively to unite construction elements together. Cement acts as the binding element which gives bricks their necessary strength and properties. OPC cement produces high carbon emissions during manufacturing operations.

Fig no 2: OPC cement

Fly Ash

The cement industry together with construction production deploys fly ash as a valuable resource material from most thermal power plants. Fly ash finds applications in construction materials because it optimizes concrete properties to achieve better workability and higher strength with increased durability. The integration of fly ash with cement production enables decreased environmental impacts because it can substitute specific proportions of Portland cement production. Soil stabilization together with road construction and multiple other applications employ fly ash as a working material.

Fig no 3: Fly ash

Methodology

The proper method to manufacture bricks with fly ash and rice husk ash occurred after completing a research-based review. A procedure leading to environmentally friendly brick production includes these steps.

1. A literature review explored "Utilization of industrial and agricultural waste to produce eco-friendly.
2. The researchers set the approach for making operations and testing procedures.
3. Collection of raw materials.
4. Molding the bricks.
5. Basic test on agriculture and industrial waste bricks.
6. A scientific evaluation and performance assessment of the brick samples.

Type of Test :

Water Absorption Test

The brick is placed in water for 24 hours. After this, the wet brick is weighed. The difference in the weight of the dry brick and the wet brick is calculated which gives the amount of water absorption. For a high-quality brick, the amount of water absorption must not exceed 20% of the dry brick weight.

Sr. No.	Mix Proportion	Sample	Initial Weight (in kg)	Final Weight (in kg)	Water Absorption (%)
1	Fly Ash :65 Cement :30 RHA :5	A1	1.760	2.100	19.31%
2	Fly Ash :75 Cement: 20 RHA: 5	B1	1.740	2.020	16.10%

3	Fly Ash :70 Cement: 25 RHA: 5	C1	1.720	2.040	18.60%

Compressive Strength Test

Brick pressure resistance is the ability to resist or withstand the reflection of bricks when checking the printing press. The ability of a material is determined by the ability of the material to resist failure in the form of cracks or cracks.

Sr. No.	Mix Proportion (%)	Sample	Days	Compressive Load (kN)	Stress(N/mm2)
1	Fly Ash :65 Cement :30 RHA :5	A1	7	66	4.342
		A2	14	124	8.15
		A3	28	160	10.52
2	Fly Ash :75 Cement :20 RHA :5	B1	7	45	2.96
		B2	14	104	6.84
		B3	28	136	8.95
3	Fly Ash :70 Cement :25 RHA :5	C1	7	58	3.81
		C2	14	88	5.78
		C3	28	116	7.63

Weight Test

The weight of normal traditional sound stones is 3-4 kg, and the weight of agricultural and industrial waste is 1-2 kg. The maximum weight is less than 2.5 kg. All bricks were measured on a conditional electronic scale. Agriculture and industrial waste. All sample weights for each share were obtained. The weight of the brick is discovered after the sun for 7, 14 and 28 days after irrigation.

Sr. No.	Mix Proportion (%)	Sample	Wet Weight (in Kg)	Dry Weight (in Kg)
1	Fly Ash :65 Cement :30 RHA :5	A1	1.980	1.760
		A2	1.980	1.680
		A3	1.960	1.780
2	Fly Ash :75 Cement :20 RHA :5	B1	2.040	1.740
		B2	2.060	1.660
		B3	2.080	1.700
3	Fly Ash :70 Cement :25 RHA :5	C1	1.920	1.720
		C2	2.060	1.680
		C3	2.060	1.680

Soundness Test

When conducting the soundness test for bricks the quality assessment entails two brick impacts to determine their resistance to forceful blows while verifying their durability strength.

Hardness Test :

Brick quality evaluation through the hardness examination includes using sharp objects to scratch the brick surface; bricks without marking demonstrate good hardness standards.

Future Scope

1. Cost effectiveness evaluating the economic viability of using rice husk ash as a partial cement replacement.
2. Utilizing RHA reduce relinces on cement a resources intensive materials and helps manage agricultural waste.
3. The use of RHA can lead to the production of light which can reduce transportation costs and structural loads.
4. By changing the brick-changing tone, you can significantly reduce the lack of fertile soil and an agricultural environment.
5. Traditional techniques for producing bricks pollute the air. Air pollutants can be reduced by forcing new, unfree brick technology.

REFERENCES

1. K. P. Mehta, "Reducing the environmental impact of concrete,"Concrete Int., vol. 23, no. 10, pp. 61–66, 2001.
2. S. S. Hossain, L. Mathur, and P. K. Roy, "Rice husk/rice husk ashas an alternative source of silica in ceramics: A review,"J. AsianCeramics Societies, vol. 6, no. 4, pp. 299–313, 2018
3. P. Jongpradist, W. Homtragoon, R. Sukkark, W. Kongkitkul, andW. Jamsawang, "Efficiency of rice husk ash as cementitious ma-terial in high-strength cement-admixed clay,"Adv. Civil Eng., vol.2018, Paper no. 8346319, pp. 1–11, 2018.
4. N. Bheel, A. W. Abro, I. A. Shar, A. A. Dayo, S. Shaikh, and Z. H.Shaikh, "Use of rice husk ash as cementitious material in con-crete,"Eng. Technol. Appl. Sci. Res., vol. 9, no. 3, pp. 4209–4212,2019.
5. S. H. Sathawane, V. S Vairagrade, and K. S Kene, "Combine effectof rice husk ash and fly ash on concrete by 30% cement replace-ment,"Proceedia Eng., vol. 51, pp. 35–44, 2013.
6. L. T. Minh and N. X. T. Tram, "Utilization of rice husk ash aspartial replacement with cement for production of concretebrick,"MATEC Web of Conf., vol. 97, Paper no. 01121, pp. 1–6,2017.[11] M. N. Amin, S.