International Journal of Advanced Research in Arts, Science, Engineering & Management (IJARASEM)

| ISSN: 2395-7852 | www.ijarasem.com | Bimonthly, Peer Reviewed & Referred Journal|

| Volume 8, Issue 5, September 2021 |

Review on Use of Aluminium Foil and Glass Powder Waste in Fly Ash Brick Production

Ritesh Ghawat[1], Vishvajeet Rananavare[2], Omprakash Bangar[3], Manish Raut[4]

Department of Civil Engineering, Dr.D.Y. Patil School of Engineering and Technology, Pune, Maharashtra, India[1,2,3,4]

ABSTRACT: This paper reviews the use of waste materials in manufacturing bricks. It consists of analysis and result from experiment and literature of authors. The cost of construction materials is increasing and also the cost of construction, so it is necessary to find alternatives to those costly materials whichshould not affect brick properties. Wastes which cannot be recycled and takes longer time for breakdown can be considered as an alternative. In this paper the researches using various types of wastes to manufacture bricks and comparing their properties with normal bricks is reviewed.

KEYWORDS: Fly ash,waste, aluminium foil, glass powder

I. INTRODUCTION

The growth in population has resulted an increase in industrial wastes and this led to land pollution. The cost of raw material required for the construction is increasing so there is need to replace these costly materials, waste material can be used and various researches and experiments have been carried out and it was observed that using waste materials in bricks are more effective and obtained good results in every aspect as compared to conventional bricks. Various wastes are used by researchers such as fly ash, glass powder, quarry dust, marble slurry, aluminium foil, glass fibre, copper slag, stone dust,etc.By using wastes in brick its effective properties can be usefulto bricks. Aluminium foil is used in a large scale but not all aluminium foils are recycled, because they often contain food waste which can contaminate collection, such rejected foil waste takes around 400 years to breakdown and causes land pollution. It is better to reuse such foil waste by using it in manufacturingof brick and it also helped make bricks lighter in weight, less water absorption, etc. Glass is one of the most used material and also a non-decaying material. Waste glass are mostly recycled but some mixed waste glass cannot be recycled, such waste glass can be used in powdered form in manufacturing of bricks which can partially replace cement which is most costly material in a brick. By using waste glass powder in bricks, thebeneficial properties of the waste can be useful in bricks. Fly ash bricks also known as eco-friendly bricks are used by the researchers to experiment by adding various waste materials and comparing them with other bricks. The recycling or reusing of such wastes is a very positive contribution in saving our natural environment.

II. LITERATURE REVIEW

N. R.Ekere et.al.[1]carried out the synthesis of potash alum from aluminium foil and aluminium scraps. The synthesized alum was found to be more effective than the commercially available alum in the treatment of muddy and waste water from fast food industry.They compared the physic-chemical properties of the synthesized alum to that of the commercially available and observed that use of synthesized alum in water treatment is more efficient, economical and eco-friendly than the commercially available.

Pankaj Phatangade et.al.[2] carried out an experiment by using plastic waste and aluminium foil waste in mix proportion of fly ash brick of size 19cm*9cm*9cm. 10-20% of fly ash and stone dust were replaced by plastic and aluminium waste and various tests were performed and compared to normal fly ash brick. It resulted lighter in weight and cost effective than normal fly ash brick. It stated that aluminium foil can be used as an alternative in manufacturing brick at affordable rate and also helps to reduce environmental pollution.

Omoniyi et.al.[3] carried out an experiment by replacing cement with waste glass powder in saw dust cement brick and it was observed that on addition of Waste Glass Powder the initial strength was low but at 28th day it met required design strength. Hence, 30% of waste glass powder of size less than 100µm could be included as cement replacement in mortal mix of binder sand ratio of 1:6 in the production of non-load bearing sandcrete hollow blocks without any unfavourable effect. Waste Glass Powder was used to partially replace cement at 0%, 5%, 10%, 15%, 20%, 25%, and 30% in the production of test samples of 100x100x100mm at binder sand mixing ratio of 1:6.

Rakesh Kumara, et.al.**[4]** studies performance of fly ash bricks, this type of brick uses 50% of fly ash but without using of clay. The mechanical properties of the fly ash brickhave exceed that those of conventional brick and also enhanced compressive stress. The study suggests that the fly ash from chemical industry ash/ Electrostatic Precipitators (ESPs) can be effectively used for manufacturing of bricks. Using of fly ash in to manufacturing of brick, helps in minimization of the waste also this method will help to conserve natural resource like air, water, soil and also due to uniformity of the fly ash bricks the quality of construction is improved.

N.Sudharsan, et.al.[5]conducted an experiment by replacing fly ash by glass powder in the various proportions. Two types of Fly ash bricks were casted. In first type Boron glass replaced in Fly ash bricks and another type Soda lime glass lime replaced in Fly ash bricks. Optimum value was obtained after replacing 20% of fly ash with glass powder. It was observed that the fly ash-glass powdered bricks can reduce the production cost of brick by 25% as compared to normal fly ash brick and proved to be feasible for the construction industry.

Kathiravan, et.al.[6] presents the experimental investigation of Fly Ash Bricks using Quarry Dust, Red Soil and Cement. The Red Soil and Cement each 10% is used. The Quarry Dust is mixed as bricks 10%, 20%, 30%, 40%, and 50% of each mix proportions. They observed thatin F40 mix water absorption is less and compressive strength was high as compared to conventional mix of bricks. It was concluded that these fly ash bricks can be used for low height constructions such as compound wall, shed, etc. and not in RCC.

B. Venkatesan, et.al.[7] carried out an experiment by adding waste glass powder in making of fly ash bricks with various mix proportions and comparison was carried out between conventional fly ash & clay brick. The bricks were lighter in weight and highest compressive strength was obtained after 21 days at mix proportion of 50% sand + 50% waste glass powder in fly ash brick. The compressive strength obtained was 30% higher than normal fly ash brick and 50% higher than clay bricks.

RihanMaaze, et.al.[8]carried out an experiment by replacing materials with marble slurry, aluminium powder and then mixed these wastes with different proportion of black cotton soil, red soil, water, fly ash. A moderate increase in compressive strength from 10-50 % was observed as comparable to normal bricks on adding aluminium powder. On addition of marble slurry better results on compressive strength and water absorption were observed. Slight decrease in water absorption percentage is observed in only marble and only aluminium powder addition, no changes were observed when both added together.

Irshad Ali, **[9]**tried to enhanced the properties of concrete with different percentages of fly ash, glass powder and fly ash + glass powder as a partial replacement of cement has been varying different for different percentages for each mix. On the basis of experimental result, it can be concluded that fly ash + glass powder up to 40% of cement replacement as it is showed desired compressive, flexural strength after 28 days of curing and good workability and a lower coefficient of capillary absorption hence better durability.

D.Sabitha, et. al.[10] carried out an experimental investigation to find the optimum mix percentage of fly ash brick with addition of waster glass powder and copper slag. The addition resulted in compressive strength was increased up to 30% and above 30% the compressive strength was decreased and water absorption decreased as copper slag and waste glass powder ratios in brick increases. The optimum mix percentage of fly ash brick with addition of waste glass powder and copper slag obtained was 30%.

Prof. Niklesh r. Murekar, et.al.**[11]**examined different methods for producing bricks from waste materials which can be divided into categories like firing and cementing. The firing and cementing methods for producing bricks from waste materials still have the drawbacks of high energy consumption and large carbon footprint as the conventional brick production methods. For wide production and utilization of bricks from waste materials, further research and development is needed, not only on the technical, economic and environmental aspects but also on standardization, government policy and public education.

P.P. Gadling, et.al.[12] presented Fly Ash brick properties, manufacturing process material required for preparing the clay bricks and fly ash bricks as per Indian standard code provisions, inspection and quality control. They replaced sand with fly ash as a raw material to make fired bricks, it was effective and also lighter in weight. In every aspect it was observed that fly ash bricks were very effective as compared to normal Clay bricks.

Yogesh Dudhagamwar, et.al. [13]investigated the application of plastic bottles as one of the urban wastage in buildings construction and that how it can lead to sustainable development. At the end, it concluded that in different

factors such as time of execution, cost, load capacity, flexibility reducing waste and energy efficiency, plastic bottle can be more effective compared to some conventional building materials such as brick, concrete and ceramic block.

Nutan C. Patel, et.al. [14]carried out an experiment by adding glass fibre to the mixture of fly ash brick to increase compressive strength of brick.Various tests such as water absorption and crushing strength test were performed on bricks by adding different mix proportion of glass fibre. It was observed that as percentage of glass fibre is increased, the compressive strength of the brick kept increasing and the water absorption of the brick kept decreasing, similarly the cost of brick also kept increasing with increase of glass fibre in mixture.

III. CONCLUSION

From the above researches it is concluded that

1) Various types of waste materials from the different industries were recycled or reused in different proportions by various methods to manufacture bricks.
2) Use of waste materials has improved the properties of the bricks such as increase in compressive strength, reduce water absorption, etc.
3) Adding waste such as glass powder in fly ash brick increases compressive strength.
4) By adding aluminium foil waste in bricks, reduced weight and reduced cost can be obtained.
5) By comparing with other bricks, bricks produced from waste material found out to be more cost effective.
6) Using waste is also a solution to the problem of waste disposal and avoid land pollution.

REFERENCES

[1] N. R. Ekere, J. N. Ihedioha, AgwogieAiyehirue Bright. Synthesis of potashalum from wasteAluminiumfoil and Aluminium scrap. Int. journal ofchemical science. Jan. 2017.vol.12(4). ISSN 0972-768X. pg.no.1145-115

[2] Pankaj Phatangade, Ankita Takawade, Bhagyashri Chaudhari, Ankita Bhagat.Economical method of manufacturing brick by using plastic and aluminium foil waste, OAIJSE, Volume 5/Issue 9/Sep 2020, ISSN: 2456-3293, pg no. 56-59

[3] Omoniyi, T.E. Akinyemi B.A, Fowowe A.O, Effects of Waste Glass Powder asPozzolanic Material in Saw Dust Cement Brick, Scholars Journal of Engineeringand Technology (SJET) ISSN 2321-435X,2014; 2(4A), pg.no.517-522

[4] Rakesh Kumara, A. D. Kulkarnib, S. J. Attarc, K. S. Kulkarni. Utilization ofFly Ash for Bricks Manufacturing. International Journal of AdvancedEngineering Technology E-ISSN 0976-3945IJAET/Vol.II/ Issue III/JulySeptember, 2011. pg. no.359-362

[5] N.Sudharsan , T.Palanisamy Feasibility of using waste glass powder in fly ashbricks, International Journal of Advanced Engineering Technology, Vol.VII/Issue II/April-June,2016, E-ISSN 0976-3945, pg.no.684-688

[6] Kathiravan, Ms. Nirmala, Dr. Dhanalakshmi. Performance of Fly Ash Bricksusing Waste Materials. International Research Journal of Engineering andTechnology (IRJET). Volume: 05 Issue: 02 Feb-2018 -ISSN: 2395-0056pg.no.1693-1696.

[7] B. Venkatesan, N. Sakthieswaran Experimental Studies on Waste Glass Powderin Manufacturing of Fly Ash Bricks, International journal of innovative research& development, April, 2015 Vol 4 Issue 4, ISSN 2278 – 0211, pg.no.332-337

[8] RihanMaaze, Vinod Kumar, Sandeep Kumar Mishra. Influence of Marble andAluminium Waste Powder on the Performance of Bricks. IJEDR. January 2016vol.4(2). ISSN 2321-9939. pg.no. 907-912

[9] Irshad Ali, Behavior of Concrete by using Waste Glass Powder and Fly Ash asa Partial Replacement of Cement. International Journal of Engineering Research& Technology (IJERT) ISSN: 2278-0181,Vol. 4 Issue 05, May-2015,pg.no.1238-1243.

[10] D.Sabitha, P.Muthanand, An Experimental Investigation of Fly Ash Brick withAddition of Waste Glass Powder and Copper Slag. International Journal ofInnovative Research in Science, Engineering and Technology, Vol. 5, Issue 4,April 2016,ISSN: 2319-8753,pg no.4922-4929

[11] Prof. Niklesh r.Murekar, Prof. Roshan Satpute.Using Waste Material for Making Light Weight Bricks. InternationalConference on Recent Trends in Engineering Science and Technology. Jan.2017. Volume 5(1). ISSN: 2321-8169 pg.no. 467 – 470.

[12] P.P.Gadling,Dr. M.B. Varma.Comparative Study on Fly Ash Bricks and Normal Clay Bricks. IJSRD -International Journal for Scientific Research & Development. Jan 2016 vol.4(9).ISSN 2321-0613. pg.no.673-676.

[13] Yogesh Dudhagamwar, Saurabh Umbarkar, Hitesh Andraskar, Raj BedmuthaUse of Plastic Bottle as Bricks. International Advanced Research Journal inScience, Engineering and Technology ISSN 2393-8021. Vol. 4, Special Issue3, January 2017 pg.no. 90-91

[14] Nutan C. Patel, Prof. Jayeshkumar PitrodaFly Ash Brick: Glass Fibre the innovative concept for getting higher strengthbrick. International Journal of Innovative Research in Science, Engineeringand Technology Vol. 2, Issue 3, March 2013.