OPEN ACCESS INTERNATIONAL JOURNAL OF SCIENCE & ENGINEERING

ECONOMICAL METHOD OF MANUFACTURING BRICK BY USING PLASTIC AND ALUMINIUM FOIL WASTE

Pankaj Phatangade[1], Ankita Takawade[2], Bhagyashri Chaudhari[3], Ankita Bhagat[4], Prof. Shreedhar Patil[5]

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

[2]*Professor, Department of Civil Engineering, D Y Patil School of Engineering and Technology, Pune, Maharashtra, India.*[5]

Abstract- : We are facing the problem of solid waste i.e. plastic waste and Aluminium foil waste. The construction industry is the biggest industry in the world, as it requires tons of raw material for any project. To use this plastic waste in construction industry, we are trying to use it in manufacturing of brick. The bricks are likely to add energy efficiency in buildings and help create economic value to manufacturers, thereby, encouraging the ecosystem of plastic waste management involving all factors in the value chain. Looking forward to the environmental condition, complete ban on plastic cannot be made. Our present work is helping to take care of these aspects. The materials used for brick manufacturing in this study are: Aluminium foil, Plastic waste, Cement, Sand and Fly ash. In this work an attempt has been made to manufacture bricks by using waste material in range 10-20% in weight of stone dust and fly ash. Use of this additive could have practical implications as a means of recycling and for achieving cost savings in brick production. Recycling of such a waste as raw material alternatives may contribute in the exhaustion of the natural resources. The results of this investigation consolidate the idea of the use of plastic and foil waste in the field of construction industry, especially in the manufacturing of bricks.

Keyword: *Plastic waste, Aluminium foil, Brick.*

I INTRODUCTION

The construction industry is the biggest industry in the world, as it requires tonnes of raw material for any project. To use this plastic waste in construction industry, we are trying to use it in manufacturing of brick. Plastic is a new engineering material in which researchers take more interest to invest time and money because it has a wide scope to enhance the usage of plastic in different work. The properties of plastic are very unique and it can mix with every kind of material. Plastic is a composition of synthetic and semi synthetic organic compounds.

Aluminium foil is even more wasteful plastic wraps. Annually approximate 500billion plastic bags are use and around 4.5 MT foil is used worldwide. To overcome these defects, we can use this waste in construction industry. Aluminium is the third most abundant element and most abundant metal in the earth crust. Aluminium is also widely used to make aluminium foil and drug packets. The recycling of aluminium scraps is a very positive contribution in saving our natural environment creating wealth.

Plastic waste is increasing day by day throughout the world. Where proper garbage collection system is not available, waste plastics are strewn everywhere which becomes eyesore. It also pollutes the environment. A large amount of waste plastic is discarded or burned which leads to the contamination of environment and air. The large volume of materials required for infrastructure construction is potentially a major area for the reuse of waste materials. So it can be possible to use this plastic waste in construction industry.

II SCOPE OF PROJECT

The original scope of this research is the plastic fly ash brick give us hope and a way to work on innovative things related to the plastic and to try to invent some new civil engineering material which shows some remarkable response in future industry. By using such type of bricks it can help to reduce pollution to some extent.

III MATERIALS USED AND THERE PROPERTIES

1. Sand:

The silica material was utilized as a fine aggregate in concrete and mortars. Natural river sand is the most preferred choice as a fine aggregate material. River silica sand is a product of natural weathering of rocks over a period of millions of years. It is mined from the river beds. River sand is becoming a scarce commodity now. River was the clean water of superior sand is far superior for construction purposes than any other sand used in construction

2. Cement:

The manufacturing of Cement was conducted by heating limestone (calcium carbonate) with small quantities of other materials (such as clay. Tests were carried out on various physical properties of cement and the results are shown in test data of materials. cement will act as a binding material.

Table 1. Physical Properties of Cement

SR.NO.	TEST	STANDARDS
1	Initial setting time	30 MINUTES
2	Final setting time	600 minutes
3	Fineness	Not less than 90%
4	Sp. gravity	3.10 to 3.15
5	Standard consistency	30 to35%

3. Fly ash:

Fly ash is a residue resulting from combustion of pulverized coal or lignite in thermal power plants. About 80% of the total fly ash is in finely divided form which is carried away with flue gases and is collected by electrostatic precipitator or other suitable technology. The balance 20% of ash gets collected at the bottom of the boiler and is referred to as bottom ash. Fly ash got into a fine powder in the comparable to cement.

4. Plastic

When exposed to ambient solar radiation the plastic procedure two greenhouse gases, methane and ethylene. Due to its low-density properties (branching) it breaks down more easily over time, leading to higher surface areas.

5. Fly ash class-C

The fly ash was the product from the burning of younger lignite in addition of younger lignite as in addition to pozzolanic properties. It is also having self-made cement properties. Generally, it contains more than 20% lime (CaO).

Table2. Physical Properties of Cement

SR.NO.	TESTS	STANDARDAS
1	Sp. Gravity	2.62
2	Fineness	83%

6. Aluminium foil waste:

Aluminium is the third most abundant element and most abundant metal in the Earth's crust. It is concentrated in a number of high grades, natural bauxite deposits1. Because of its low density, high tensile strength and resistance to corrosion, aluminium is widely used for the manufacturing of automobile products, aeroplanes, aluminium cans, and aluminium foils.

IV METHODOLOGY

Collection of raw materials:

It include a collection of basic information about Materials to be used such as conventional bricks, sand, cement, plastic, aluminium foil waste, fly ash. Following to it, collection of raw material such as sand, cement, plastic, aluminium foil waste, fly ash is done

Cutting aluminium foil and plastic bags in predefined manner:

Plastic waste is cut into small pieces of 1x1 cm, and aluminium foil is cut and made round shaped manually to get rough texture.

fig.1 Cutting pattern of foil waste

1. Mixing material in rotary mixer.

At brick factory materials i.e. sand, cement, plastic, aluminium foil waste, fly ash mixed in that proportion to get maximum results.

Proportion used:

Fly ash 25% + Stone dust 50% + OPC 15% + Foil waste 10% = Aluminium Foil brick

fig.2 Rotary mixer

2. Moulding of brick by mechanical means in machine.

In mechanical compression machine above mixed material is placed and compacted to achieve desired shape and size

fig.3 Moulding of brick

3. Placing bricks for curing.

Bricks are placed on hand cart and transported nearby curing area. At there bricks are arranged in a manner that each brick will get cured by water easily.

fig.4 Bricks placed for Curing

4. Curing of bricks.

Bricks are cured by spraying water on it for 15 to 22 day.

V EXPERIMENTAL RESULTS

1.Water Absorption Test = 5 %

2.Shape and Size Test = 19 cm x 9 cm x 9 cm

3.Efflorescence test = No efflorescence visible

4.Soundness test = ringing sound produced and bricks are not break

5.Hardness test = little bit scratch visible

6.Compressive strength test Fly Ash brick = 3.83 N/mm2

7.Expected compressive strength for aluminium foil used brick = 4N/mm2.

8.Reduction in weight of brick as compared to fly ash brick = 123 gm.

VI CONCLUSION

1. Waste aluminium foil scrap, which is available everywhere, may be put to an effective use in brick making.
2. aluminium foil bricks can help reduce the environmental pollution, thereby making the environment clean and healthy.
3. aluminium foil brick reduces the usage of stone dust in making of bricks.
4. aluminium foil brick gives an alternative option of bricks to the customers on affordable rates.
5. Water absorption of brick is 5 percent.

VII FUTURE SCOPE

Aluminium foil waste bricks give us hope and a way to work on innovative things related to the this scrap and to try to invent some new civil engineering materials which shows some remarkable response in future industry and changes the thoughts of the researchers, users and industries.

REFERENCES

1. Rihan Maaze, Vinod Kumar, Sandip Kumar Mishra, "Influence Of Marble And Aluminium Waste Powder On The Performance Of Bricks." IJEDAR, Volume No 4, Issue no 2, 2016, ISSN 2321-9939, www.ijedr.org (Pg. No .907-912)
2. Sina Safinia, Amani Alkalbani, "Use Of Recycled Plastic Water Bottles In Concrete Blocks." Creative Construction Conference 2016. June2016. Page No. 214-221
3. Prof. Niklesh R.Murekar, Prof. Roshan Satpute, "Using Waste Material For Making Light Weight Bricks." ICRTEST, Volume No 5, Issue, Special issue 21-22, January 2017, ISSN 2321-8169 www.ijritcc.org, (Pg. No 467-470)
4. Loukham Gerion Singh, Pongsumbam Boss Singh, Suresh Thokchom, "Manufacturing Bricks From Sand And Waste Plastic." IJETMAS. March 2017,Volume 5,Issue 3,ISSN 2349-4476 Page No.426-428
5. Raju Sarakar, Ritesh Kurar, Ashok Kumar Gupta, "Use Of Paper Mill Waste For Brick Making." Cogent Engineering.November 2017,4: 1405768,Page No.1-15
6. Sachin Kambale, Dyandev Karad, "Plastic Bricks." IJARSE, Volume no 6, Special issue no(04),December

2017, ISSN(0)2319-8354, www.ijearse.com (Pg. No 134-138)

7. Arwind Singhal, Dr.Omprakash Netula, "Utilization Of Plastic Waste In Manufacturing Of Plastic Sand Bricks." ICNFESMH, JUNE 2018, ISBN 978-93-87433-29-8,www.researchgate.net (Pg. No 207-210)
8. Rajarapu Bhushaiah, Shaikh Mohammad, D.Sriniwasa Rao, "Study Of Plastic Bricks Made From Plastic." IRJET, Volume No6, Issue 4, April 2019, e-ISSN 2395-0056, p-ISSN 2395-0072, www.irjet.net (Pg. No 1122-1127)
9. Alaa .A.Shakir, sivkumar nagnathan, kamal Mustapha, "Development Of Bricks From Waste Material."Australian Journal Of Basic And Applied Science.Jan.2013.Volume.7(8).ISSN 1991-8178.Page No.812-818
10. Dinesh.S.Irubakaran.K,"Utilization Of Waste Plastic In Manufacturing Of Bricks And Paver Blocks."IJAER.Jan 16.Volume 11(3).ISSN 0973-4562.Page No.364-368
11. Pravin Gadling, Mahavir Balmukund Verma, "Comparative Study On Fly Ash Bricks And Normal Clay Bricks."IJSRD.Jan16.Volume.4(9).ISSN 2321-0613. Page No.673-676
12. Goyal brick factory, Wagholi, Pune.