Manufacturing Bricks Using Waste Plastic

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Abstract:
Plastic waste which is increasing day by day becomes eyesore and in turn pollutes the environment, especially in high mountain villages where no garbage collection system exists. A large amount of plastic is being brought into the tourist trekking regions are discarded or burned which leads to the contamination of environment and air. Hence, these waste plastics are to be effectively utilized. Low-density polyethylene bags are cleaned and added with sand at particular percentages to obtain high strength bricks that possess thermal and sound insulation properties to control pollution and to reduce the overall cost of construction; this is one of the best ways to avoid the accumulation of plastic waste which is an on-degradable pollutant. This alternatively saves the quantity of sand/clay that has to be taken away from the precious river beds/mines. The plastic waste is naturally available in surplus quantity and hence the cost factor comes down. Also coloring agents can be added to the mixture to attain desired shades. Hence in this thesis, an attempt is made to study regard the properties of the brick which is manufactured using plastic wastes. The present work deals with the manufacturing and analysis of bricks made with waste plastic (LDPE) and fine aggregates. The bricks produced are light weight, have smooth surface and fine edges, do not have cracks and have high crushing strength and very low water absorption. The bricks are manufactured by heating waste plastic to temperature range of 120 to 150 degree centigrade and mixing sand to the molten plastic.

I. INTRODUCTION

Plastic is the very hazardous material and very difficult to decompose it is main problem in the world. Use of plastic is high in our daily life such as polythene bags, disposals, furniture's, packing food packets and other accessories. Plastic is vary in large and various types according to their chemical composition. Separation of plastic wastes and mainly big problem in front of us. Nowadays, the world plastic deposited by burning procedure. They emit large amount of hazardous and toxic gases. These gases effect on the human health and also living animals. Human suffers by the toxic gases such as cancer, high blood pressure, Asthma etc. We are not completely able to stop the use of plastic but we are able to recycle and reuse it by many ways and minimum effect on environment.

We use such recycle plastic in the various industries such as construction, transportation, manufacturing .etc. In construction industry, larger cost of project is include in materials up to 60% to 70% of the total cost of the project. So, construction industry large amount of bricks are used and they available in various forms such as clay bricks, concrete bricks, fly ash bricks and foam bricks. In this project, we try to use wastes plastic to manufacture the bricks and increase the strength and achieve economy so the people can easily afford this type of bricks.

II. LITERATURE REVIEW

1) Maneeth P D, et.al, (2014), [1] In this paper, bricks of different mix proportions were prepared with varying plastic (PET, PP), laterite soil (passing 2.36mm IS Sieve) and bitumen content, and the bricks were tested for compressive strength and water absorption. This study showed that strength of these bricks was dependent on plastic percentage and minimum 60% of plastic by weight is required for plastic soil bricks by trial and error method. 70% of plastic by weight was considered as the optimum dosage of plastic in the view of workability criteria and 2% of bitumen was taken as optimum binder content which resulted in compressive strength of 8.16N/mm2 which is higher than laterite stone (3.18N/mm2)and has less water absorption of 0.9536% than laterite stone. So, it can be a better alternative material and solves the problem of safe disposal of plastics and effective utilization of quarry waste is achieved.

2) Dinesh.S, et.al, (2016), [2] This paper is the attempt made to study regard the properties of the bricks and paver blocks which are manufactured using plastic wastes, river sand and some colouring agents like red

oxide. Various mix proportion of plastic and river sand (1:2, 1:3, 1:4, 1:5, and 1:6) were made and tested for compressive strength using compressive testing machine and water absorption test. From this study it was concluded that plastic soil bricks possess more advantages like cost effective because the natural resources consumed for the manufacturing of these bricks and paver blocks are very much less when compared to conventional one. The manufacturing cost could be reduced further by replacing the river sand with fly ash/quarry dust or other waste products. These bricks and paver blocks also abolish the land requirement problem for dumping plastic wastes and this method is more suitable for countries which has difficult to dispose/ recycle the plastic wastes.

III. AIM AND OBJECTIVEES

This work was under taken with following objectives

- The study was intended to evaluate the index properties of laterite quarry waste and general properties of Poly-ethylene teryphthalate (PET).
- To arrive at the optimum dosage of PET that could result in building material with good strength and less water absorption.
- To arrive at the optimum dosage of bitumen that could enhance the binding capacity of plastic in molten state, to achieve a mix with better binding quality there by leading to bricks with good strength & lesser water absorption.
- To develop an alternative building martial that could satisfy requirements of good building material.
- To arrive at a solution for the problem of imbalance between the availability and the demand of conventional building materials.
- To develop a scientific way of reusing waste plastic (PET bottles) along with utilization of laterite quarry waste that could result in alternative building material.

IV. Scope

a. Establishing the industries.
b. Increasing their strength by adding other material.
c. Recycling the plastic and using as a construction material.
d. Protection of environment.
e. The plastic bricks used for further in construction projects due to its light weight and economic purpose.
f. The plastic use in the many form in the construction like bricks, tiles, road pavements etc.
g. When plastic used for these construction the structures will be more economics and it have enough strength, durability.

V. METHODOLOGY

a) ***Collection of Plastic Materials:*** The plastic material should be collected from the factories waste and hospital waste and industries waste and also food packages and plastic bottles this will come under the LDPE plastic type.

b) ***Batching of plastic***: Measurement of materials for making brick is called batching. After collection of materials we separate the types of plastic and remove any other waste presented in the collected material and check that any water content in in sample collected ten proceed for burning.

c) ***Melting of waste plastic:*** After completion batching the plastic waste was taken for burning in which the plastic bags are drop one by one into the container and allowed to melt. These would be done in closed vessel because to prevent the toxic gases released into atmosphere. These will be at the temperature of 120-150 degrees centigrade.

d) ***Mixing:*** Mixing of materials is essential for the production of uniform and strength for brick. The mixing has to be ensuring that the mass becomes homogeneous, uniform in color and consistency. Generally, there are two types of mixing, Hand mixing and mechanical mixing. In this project, we adopted hand mixing. Until the entire plastic content required for making plastic brick of one mix proportion is added into it. Then these plastic liquids thoroughly mixed by using trowel before it hardens. The mixture has very short setting bags are turned to molten state; the river sand is added to it. The sand added is mixed time. Hence mixing process should not consume more time.

e) ***Moulding:*** After completion of proper mixing we place mix into required mould. In these projects we use the normal brick sizes (19x9x9 cm). After 2 days remove the brick from the mould and then done curing. The test specimens after moulding were allowed to dry for a period of 24 hours. The specimens were kept in curing tank and allowed to cure for a period of 28 days.

f) ***Curing:*** The test specimens after moulding were allowed to dry for a period of 24 hours. The specimens were kept in curing tank and allowed to cure for a period of 28 days. Shown in below figure.

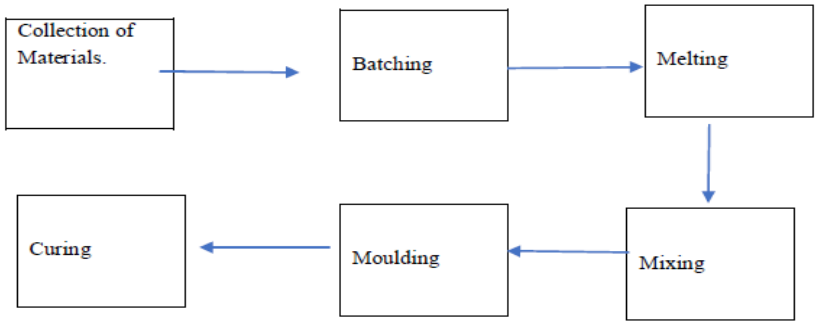

Fig. 1 : Methodology

Fig. 2 : Collection and Melting of plastic

Table 1. Mix Ratio

Mix Ratio	1:3	1:4	1:5
For 1 Brick	1000:3000	800:3200	670:3350
For 4 Brick	4000:12000	4000:12000	2680:1300

VI.RESULTS AND CONCLUSION

From the above literature review we came to know that use of innovative materials with sustainable application such as plastic bottles can have considerable benefits including finding the best optimization in energy consumption of the region, reducing environmental degradation. Plastic bottles can cause the green construction by saving energy and also, recycling of the materials, minimizing the emission of CO2 etc. The study also suggests that waste materials which are fine in size, if handled in controlled condition will provide sustainable development. Walls constructed using plastic bottle blocks have been less costly as compared to the regular bricks and also they provide greater strength than bricks.

VII. REFERENCES

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