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Feasibility Study on Plastic- Soil Brick As A Construction Material

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Abstract— **In today's brand hygienic generation, unscientific exploitation of natural resources and piled up discarded plastic pose a serious threat to environment. paradox but true, plastic is both dangerous yet most creative invention of this era. Its versatility ad versed in various technological innovations inspired us ethically and owing to its properties envisioned to utilize it as a construction material. Bricks are both used as a structural and filler material. In this project we have successfully tried to mimic the bonding property of clay in conventional bricks by using waste plastic, hoping to utilize it as a low-cost construction material. Plastic soil bricks of different proportions by volume that is 80% plastic -20% sand and 50% plastic - 50% sand were casted. compression test, drop test, water absorption test and fire ignition test were conducted to analyze their suitability as a construction material.**

Keywords- Plastic brick; eco brick; Plastic soil brick.

I. INTRODUCTION

Plastic is a very common material that is now widely used by everybody in this world. Plastic has many advantages as it is compact and light in weight. Common plastic items that are used are bags, bottles, containers and food packages. The use of waste plastic for the production of bricks is an optimal method to solve the problem of storing waste materials and to optimize the cost for the production of building materials. Polyethylene terephthalate and polypropylene. The large volume of materials required for construction is potentially a major area for the reuse of waste materials. Recycling the plastics has advantages since it is widely used and has a long service life, which means that the waste is being removed from the waste stream for a long period. Because the amount of clay required to make bricks is large, the environmental benefits are not only related to the safe disposal of bulk waste, but also to the reduction of environmental impacts that arise due to burning of plastics. The bricks manufactured possess the properties such as neat & even-finishing with negligible water absorption & which satisfies the compressive strength to a certain extent.

II. MATERIAL DETAILS

A. Waste plastics

plastics can be moulded into different shapes when they are heated. in closest environment it exists in the different forms such as cups, furniture's, basins, plastic bags, food and drinking containers, and they are become waste material. Accumulation of such wastes can result into hazardous effects to human life. Therefore, need for proper disposal, and, if possible, use of these wastes in their recycled forms.

Fig.1 Waste Plastics

B. Sand

The sand shall consist of natural sand, crushed stone or crushed gravels or combination of any of these. The sand shall be hard, durable, clean and free from organic matter.

Sand used is of different sizes passing through the IS sieves 4.75mm,2.36mm,1.18mm, 600micron, 300micron, 150micron.

Fig 2. Sand

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Step 1: Collecting Waste Plastic

We have collected the waste plastic from our college campus

Step 2: Collecting Sand From Brick Factory

We have taken the sand about 25kg from the brick factory near by college.

Step 3: Melting The Mixture

The mixture is melted using a pan at a lower flame. Including all the safety factors.

Step 4 : Moulding

The mixture of sand and plastic is filled into the moulds of size 20*10*10mm,once the mould is filled the load is been applied to avoid the expansion of plastic

Step 5 : De-Moulding

After De-moulding the bricks are kept into the water in order to avoid the cracks.

III. EXPERIMENTAL INVESTIGATION

Compressive Strength

- Brick specimen to be tested is placed on a horizontal surface and the specimen is to be centered between the plates.
- Apply the load at a uniform rate till the failure occurs.
- Note down the maximum load at failure.

Fig. 3 : Compressive Strength on plastic brick

IV. RESULT AND DISCUSSIONS

A. COMPRESSIVE STRENGTH (for 80% plastic)

Sl. No	Length (mm)	Breadth (mm)	Area (mm^2)	Load at failure (KN)	C.S= L/A	Avg. CS
1	200	100	20000	105(PP)	5.25	5.25
2	200	100	20000	100(PP)	5	
1	200	100	20000	15(PET)	0.75	0.675
2	200	100	20000	12(PET)	0.60	

B. COMPRESSIVE STRENGTH (for 50% plastic)

Sl. No	Length (mm)	Breadth (mm)	Area (mm^2)	Load at failure (KN)	C.S= L/A	Avg. CS
1	200	100	20000	180	9	8.75
1	200	100	20000	170	8.5	

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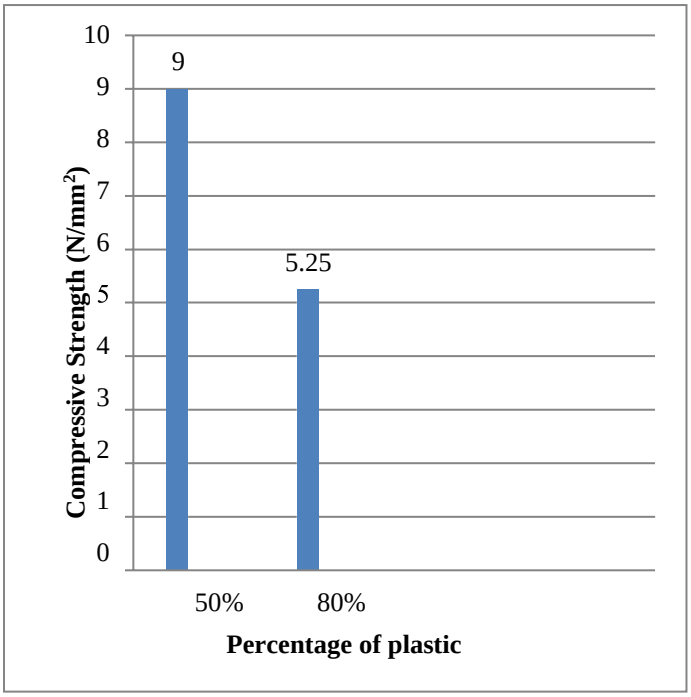

C. WATER ABSORPTION TEST (for 80% plastic)

Sl. No.	Dry weight (W 1)	Wet weight (W 2)	WA = (W2-W1) x100
1	0.740	0.770	3%
2	0.835	0.860	2.5%

Average = 2.75%

D. WATER ABSORPTION TEST (for 50% Plastic)

Sl. No.	Dry weight (W 1)	Wet weight (W 2)	WA = (W2-W1) x100
1	1.770	1.782	1.2%
2	1.560	1.580	1.5%

Average = 1.35%

E. FIRE IGNITION TEST :

When brick made using 80% of plastic catches fire easily than the brick from 50% plastic, because of higher percentage of plastic used.

Fig. 4 : Fire Ignition test

V. CONCLUSIONS

a) These work effectively converts waste plastic into useful building materials like bricks and floor interlocks which can effectively reduce the pollution and further decreases the problem of waste plastic in society.

b) The value of the recycled product is significantly less than the cost for producing.

c) Recycling is the only way to reduce the intensity of plastic on the earth surface.

d) The use of waste plastic is favourable to use in construction sector effectively and efficiently

FUTURE SCOPE:

a) Recycling the plastic and using as a construction material
b) Increasing their strength by adding some other materials.
c) Protection of environment
d) Establishing industries.

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