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Recycle Plastic Waste Brick

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Abstract: ***Disposal of large quantity of plastic waste has emerged as an important environmental challenge, and its recycling is facing a big problem due to non-degradable nature. Due to plastic does not decompose biologically, the amount of plastic waste in our surroundings is steadily increasing. The proposed sand bricks which is made up by adding plastic waste in crush form in sand bricks may help to reuse the plastic waste as one of the additives material of bricks, and to help the disposal problem of plastic waste.***

The properties of plastic bricks which contain varying percentages of plastic were tested for compressive strength, water absorption and efflorescence. It shows that an appreciable improvement in the performance of bricks can be achieved by introducing crush type of plastic waste into plastic bricks. In view of utilization of plastic waste material for developing sustainable construction material, the present paper reviews plastic waste materials in different compositions of 0% to 20% that were added to the raw material to develop plastic waste bricks. The compression strength of the bricks is reviewed and recommendations are suggested as the outcome of the study. It was found that the reduction in compressive strength, due to replacement of plastic by waste plastic waste, is minimal and can be enhanced by addition of super plasticizer. The water absorption and efflorescence however showed excellent performance

Keywords: Plastic Waste, Compressive Strength, Water Absorption, Efflorescence, Environmental Issue.

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 great problem with plastic is its disposal. Plastic is made of polymer chemicals and they are not bio degradable. This means that plastic will not decompose when it is buried. Though plastic is a very useful material that is flexible, robust and rigid they become waste after their use and they pollute the atmosphere.

Recycling is processing used materials (waste) into new products to prevent waste of potentially useful materials. The increase in the popularity of using environmental friendly, low cost and lightweight construction materials in building industry has brought about the need to investigate how this can be achieved by benefiting to the environment as well as maintaining the material requirements affirmed in the standards. To protect the environment as well as to take advantage of plastic, recycling procedure is used.

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. In this study, plastic waste in factory will be used to incorporate with cement and sand to produce plastic bricks. The bricks will then be tested to study the compressive strength, water absorption and efflorescence.

In the recent past research, the replacement and addition have be done with the direct inclusion of polyethylene or plastic fiber, polyethylene terephthalate (PET) bottles in shredded form, chemically treated polyethylene fiber, PET in aggregate form by replacing natural coarse aggregate. Most of replacements have been done by volume calculation, and showed the decreased in compressive strength as the plastic waste increased. In this study, recycled plastic bottle have been introduced in crush form as the fiber [5]. The replacement has been done by weight calculation instead of volume calculation.

A. Collection Of Materials

1) First we need to collect the plastic waste and separate it from other waste, EX .Hospital waste, industrial waste, factory waste etc.
2) Natural river sand.
3) Construction waste (Fine aggregate)

II. CRUSHING WASTE PLASTIC

1) We should dry the plastic waste if it is wet and has a content of moisture.
2) We have to use dry plastic waste, then we crush the plastic waste in small particles.
3) The small particles crush into fine size particles.

A. *Mixing*

1) The fine particles of plastic waste also heated on a furnace (Bhatti) till it is in a liquid form.
2) Plastic is melted over 200-250 degree Celsius.
3) We add the sand into melt plastic.
4) We mix sand and melted plastic properly.
5) Fine aggregate.

B. Moulding

Fill the mix into mould's (size 190mm*90mm*90mm). keep the mould for dry.

C. Testing

1) Compressive Strength Test: The cube specimens was placed in compression testing machine and the load is to be applied without shock and increased continuously at a rate of approximately 140 kg/cm^2 min until the resistance of the specimen to the increasing load breaks down and no greater load can be restrained. The maximum load applied to the specimens is to be recorded and the appearance of the brick and any unusual features in the type of failure is noted.

$$\textbf{Compressive strength} = \frac{\textbf{Maximum load}}{\textbf{Area of the specimen}}$$

$$= P/A$$

Where,

P -Maximum load (kN)

A - Area of the specimen (mm^2)

Comparison of compressive strength of Plastic waste bricks

Sample 1	Sample 2	Sample 3
5.5N/mm	4.7N/mm	5N /m m

Plastic waste Brick Compression Strength Test

2) *Water Absorption Test:* In this test, bricks are weighed in dry condition and let them immersed in fresh water for 24 hours. After 24 hours of immersion, those are taken out from water and wipe out with cloth. Then, brick is weighed in wet condition. The difference between weights is the water absorbed by brick. The percentage of water absorption is then calculated. The less water absorbed by brick the greater its quality. Good quality brick doesn't absorb more than 20% water of its own weight

Water absorption = {[W2 – W1] / W1} x 100 Where,

W_1 = Weight of dry brick (kg)

W_2 = Weight of wet brick (kg)

Water absorption test of Plastic waste bricks

Wt.of dry brick w1 (kg)	Wt. of water absorption brick w2 (kg)	Water absorption w2-w1/w1 *100
2.285	2.297	0.525
2.331	2.344	0.557
2.289	2.303	0.611

Dry red Brick Water Absorption

Wt.of dry brick w1(kg	Wt. of water absorption brick w2 (kg)	Water absorption w2-w1/w1*100
3.125	3.570	1.424
2.970	3.405	1.464

3) *Hardness Test:* In this test a scratch is made on brick surface with steel rod (any hard material can be used) which was difficult to imply the bricks or blocks were hard. This shows the brick possess high quality.

4) *Soundness Test:* The soundness test is also done in the field. After the manufacturing of the brick are allowed to dry in air for 2days.Then the bricks are made to hit each other the ring sound produced during the process, which denotes the quality of the brick that it is good. Good quality bricks produce the clear ringing sound. In our project both fly ash bricks and plastic sand bricks clear ringing sound produced.

III. CONCLUSIONS

Plastic sand brick possess more advantages which includes cost efficiency, resource efficiency, reduction in emission of greenhouse gases, etc., Plastic sand brick is also known as “Eco-Bricks” made of plastic waste which is otherwise harmful to all living organisms can be used for construction purposes.It increases the compressive strength when compared to fly ash bricks. By use of plastic sand bricks, the water absorption presence of alkalies was highly reduced. Owing to numerous advantages further research would improve quality and durability of plastic sand bricks

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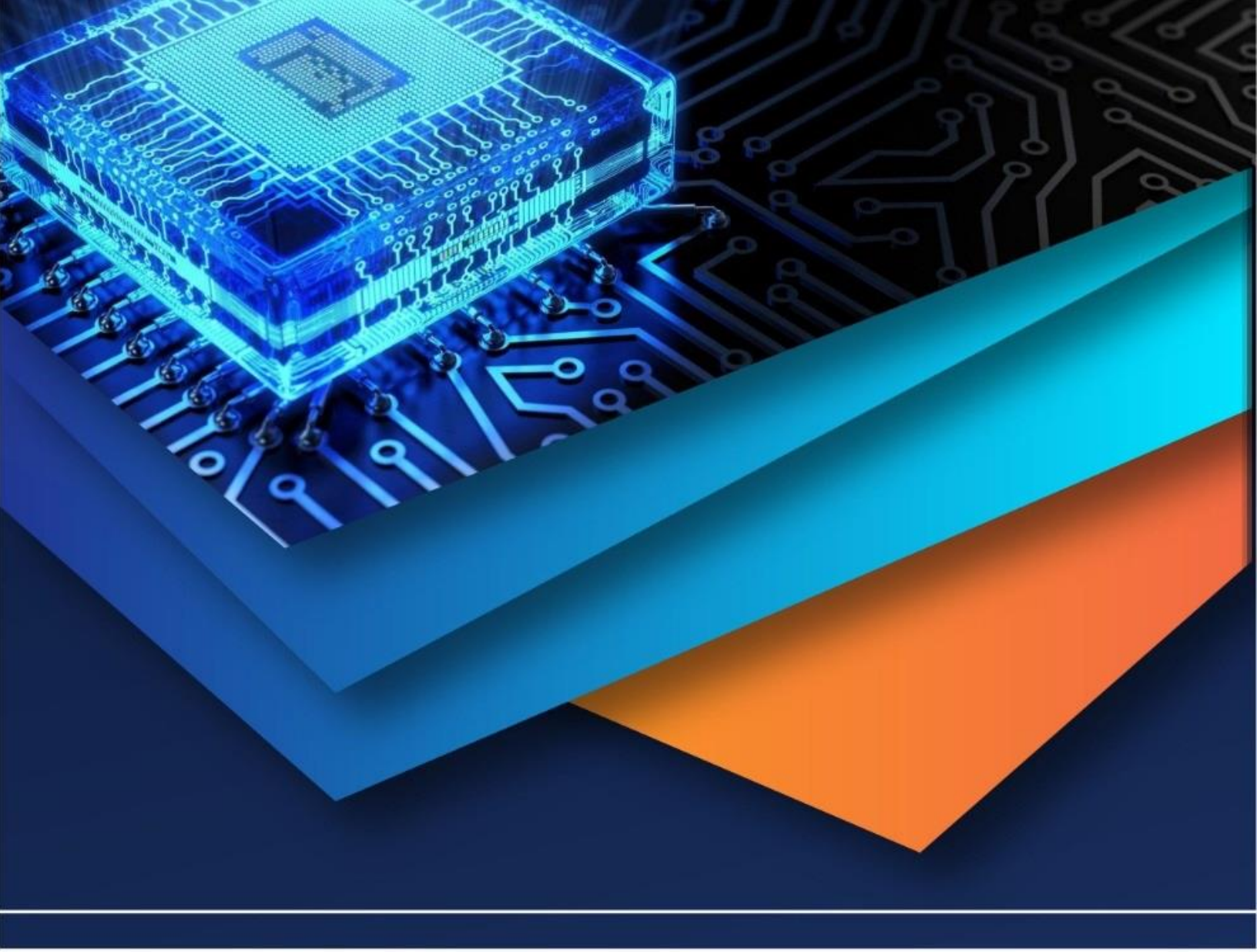

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