



Eco-Conscious Bricks

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ABSTRACT

The Plastic, a harmful threat to the environment, so we have decided to reduce the usage of plastics by making supplementary changes or recycling methods. Though several recycling techniques had been made in treating the plastic waste, it couldn't made to owe for 100% reuse or nullify the effect of it. So, we came through the term "Eco-Conscious Bricks" which is made using the plastic waste as a core part is done by referring the project of the plastic roads being utilized in Jamshedpur for about 48 to 50 km. The test sample was made using the moulds and we have observed positive result on compressive test. The strength obtained was 1.2 times that of the normal bricks. And the brick manufactured in this technique yields a good finish and perfect shape with economically cheaper rate than usual.

Keywords: *Plastics, bricks, recycled plastic in construction, new bricks in way.*

1. INTRODUCTION

The "Eco-Conscious or Plastic bricks" is the recycled product which mostly makes use of the wasted plastics with the proportioned mix of Cement, Sand, Fly ash. Usually, the bricks make use of the wide variety of natural and artificially made resources i.e., Cement, Sand/Stone dust, Fly ash. To overcome the extinction of the natural and natural based resources, we have to make use of those harmful products in the development of the commercial activities. Hence in this project, we are using the harmful plastics as the core of the bricks to retreat the effect of degradation problems.

PLASTICS

Plastics are an organic polymer of natural materials with high molecular mass of light weight so generally the peoples owe for this usage. It was invented using cellulose by Alexander Parks in 1862 kept first at a London exhibition. Leo Hendrik Baekeland who is called as "Father of Plastics" invented using chemicals. Americans are generating more plastic trash than ever, and very little of it gets recycled. Plastics and their byproducts are littering our cities, oceans, and waterways, and contributing to health problems in humans and animals. In our country, government had made a mandatory rule of production only microns above 35. India is the third place in plastic production in the world. India recycles about only 10 % with that of the total production. The complete recycling or wipe out technique for this disastrous plastics is not yet found

But they are just finding only the current disposal techniques is definitely a flaw.

Bricks

The term “Bricks” usually refer to composition majorly consisting of red soil once, but now it is made using a proportioned mix of clay bearing soil, sand, lime, or concrete materials. They can be joined together using mortar, adhesives or by interlocking them. Bricks are of various types categorized under several methods, usage and place of origin. The nominal size of the conventional bricks is 19 x 9 x 9 cm.

Fly-ash bricks

The term “FlyashBricks” have been found as replacement for the red soil by using fly ash or Pulverized Flue Ash or Coal Ash as the major component in the bricks. The Fly Ash used is of Class C or Class F Flyash. Fly Ash is the inorganic mineral residue obtained after burning of coal/lignite in the boilers. Fly Ash is that portion of ash which is collected from the hoppers of Electrostatic precipitators and pond ash is collected from the ash ponds. Bottom ash is that portion of ash which can be collected from the bottom portion of the boilers. The Flyash bricks contain 50-80% Flyash, 30% Sand, 10% Lime, 15% Gypsum and least amount of Portland cement. The bricks made are compressed at 28 MPa and cured for 24 hours in 66 °C steam bath and then toughened with air entrainment agents like alkali salts from resin acids, sulphonated resin acids, alkali sulphonates, alkyl sulphonates, alkylarene sulphonates, fatty acid salts, etc. The subjected bricks last for more than 100 freeze-thaw cycles. These Flyash bricks are lighter and stronger than clay bricks with enough smooth surfaces and sharp edges.

Plastic bricks

The “**Plastic bricks**” involves the technique of sandwiching the plastic in the core part of the bricks to avoid the domination of cementitious materials in the bricks. These plastic bricks brings inspiration to dispose the non-bio-degradable things in an effective manner without affecting the land, soil and water. These bricks make use of fly ash, cement and M-sand in a proportionate manner. This plastic core can be easily dismantled from the bricks and can be used for further brick manufacturing it.

Plastic bricks size

Overall size of the brick that has been moulded is as same as that of conventional bricks that is of **19 x 9 x 9 cm**.

The molten recycled plastics that have been used as a core part has a specified dimension to overcome the internal friction with the cementations materials which is proportionately added. The specified dimension used is **15 x 5 x 5 cm**.

MOLTEN-FROZEN PLASTICS

The Molten-Frozen plastics are termed as plastic core that have been achieved by melting and alternative freezing. The freezing does not require any proposed method; natural cooling makes it a hard solid surface. Freezing methods can also be made utilized for quick generation of plastic core. This plastic core is a hard surface that is purposely made to comfort the binding properties of cementations materials that have been proportioned in the mix.

To avoid fixation issues, the binding holes have been correspondingly made in the plastic core. Each binding holes is of one inch with an appreciable distance from corners and between them.

SUPPORTABLE PLASTICS

The plastics that have been used in the bricks are of microns which can withstand melting process and freezing time. Most of all, only up to the micron level that the government fixed

As a safe usage level.

MIX PROPORTION

Average amount of molten-frozen plastics utilized as a core is about approximately 200grams in each bricks. Gypsum of about 2% is added as an admixture in mix proportion.

Qualified Mix proportion ratio 1: 2: 4.5 of Cement, M-Sand and Fly ash is used in making this bricks.

MANUFACTURING PROCESS

The brick manufacturing process involves the step by step sequential procedures which is as follows,

1. Primarily, plastic recycling centre has been visited and with their help, the plastics of microns on and above of 40 have been separated and subjected to the sequential melting and freezing process.
2. For a single brick, a wasted plastic of 200grams is melted and frozen for making the plastic core part.
3. The 200gms of the plastic that have been melted is subjected to cooling by filling it in the mould of size 15 x 5 x 5cm.
4. And the mould is left for cooling in the ambient temperature for about a day.
5. When once the plastic core part of the brick is made, then the cementations materials filling can be done.
6. Now, the mould of nominal brick size 19 x 9 x 9cm is made. And the bottom layer is filled with the cementations proportioned cover of 2 cm.
7. The levelling of cementations material is done and the plastic core made is inserted in the middle leaving 2cm for cover on all sides.



Fig 2: Mould and Plastic core

1. And the remaining area of the mould is filled with the cementitious materials for better binding
2. When once it is completed, the surface of the mould is levelled and marking for the frog is done.

3. After all sequential process, the mould is removed and the brick is left in the atmosphere for setting up in the sunlight for a day.
4. And the brick is left for 28 days curing in the curing tank and the respective tests have been made.

Table 1: Mix proportion of Bricks

1	Conventional Flyash Bricks	1: 3: 6
2	Plastic Bricks	1: 2: 4.5

TEST FOR PLASTIC BRICKS

The plastic bricks have been tested under normal provisions of testing as follows,

1. Compression Test
2. Water Absorption Test
3. Hardness Test
4. Soundness Test
5. Efflorescence Test

Compression test



Fig 3: Compression test of Plastic Brick

The sample bricks are subjected to compression test to determine the load carrying capacity under compression using compression testing machine. Three numbers of bricks are subjected to compression to calculate the average compressive strength of the bricks.

The load carrying capacity of the brick is 145kN and the average compressive strength of the brick is 8.5N/mm².

Water Absorption Test



Fig 4: Water Absorption Test

Water absorption test is conducted to understand the water holding capacity of the bricks as that it could not be affected due to changes in weathering and it is responsible for the degree of burning. We had conducted this test and we have observed positive results when compared with conventional bricks.

The result obtained is of 15% whereas the absorption capacity of conventional bricks is 20%.

All other tests are on progress, which could definitely yield the positive results.

REFERENCE LINKS:

1. <https://theconstructor.org/building/plastics-construction-material/12438/> “Study on the properties of the plastics so for the construction”
2. <https://www.plasticroad.eu/en/> “A Plastic road – a revolution in building roads”
3. <https://www.slideshare.net/sagar22account/utilization-of-plastics-in-flexible-pavement> “Plastic in flexible pavements”
4. <https://www.recyclingtoday.com/article/isri2019-kirei-recycled-pet-acoustic-building-materials/> “Building with recycled plastics”

Conflict of Interest

None of the authors have any conflicts of interest to declare.

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