

UTILIZATION OF PLASTIC WASTE IN MANUFACTURING OF PLASTIC SAND BRICKS

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ABSTRACT -Plastic waste is a non-biodegradable waste which cannot decompose and this creates water, land pollution and air pollution. Also, while we burn the plastic waste in Dumping Ground, the percentage of plastic waste is increasing rapidly. It is estimated that the plastic waste will double after a decade as we use hundreds grades of plastic in our daily life. We can recycle, reuse the plastic waste. As a civil engineer we have to innovate something new related to this, which is a boon for civil engineering. So, here we try to do something innovative as PLASTIC SAND BRICKS/ TILES. Basically in bricks and tiles, we used earth based clay. Due to excessive use of the clay, it shows the result of resources depletion and environmental degradation. In plastic waste we consider Drinking Water Bottles (polyethylene terephthalate), Carry Bags, Bottles Caps, house hold Articles (High Density Polyethylene), Milk Pouches, Sacks, Carry Bags, Bin Linings, Cosmetics and Detergent Bottles (Low Density Polyethylene), Bottle Caps and Closures, Wrappers of Detergents, Biscuit (Poly Propylene), Electricals Fittings, Handles and Knobs (Urea Formaldehyde), Casting, Bonding Fibers (Polyester resin) etc. In this, we get to crush the plastic waste into fine particles and heated on a furnace (Bhatti) . We use stone dust as fine aggregates (size below than 4.75mm),heated on a furnace (Bhatti).

Now, we mix heated plastic waste and heated stone dust and pour into mould and form bricks and tiles. We observed that the characteristics of bricks and tiles is far much better than normal bricks and tiles as minimum water absorption, highly compressive strength, smooth surface, unbreakable, less weight etc.

Keywords : Plastic Waste, Plastic Sand, Plastic Bricks, Mix, Caps.

INTRODUCTION

Plastic is a very useful substance in our daily life work, but after the use of plastic it is very difficult for us to dispose of it because it is a non-biodegradable substance. After its usage it is a hazardous material.

Plastic is a new engineering material in which researchers take more interest to invest their 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. They are malleable and ductile and remold into any solid substance.

Plastic is used in various objects which we use in our daily life like polythene, plastic cups, furniture, bags, packaging of food and other accessories, drinking containers, bottles, frames, basins etc.

We need to use better advance techniques and methods to dispose plastic waste properly, otherwise, the time is not too far away where we see it as a big challenge for us to dispose it.

In India, we use incinerators to dispose the plastic waste in which plastic waste burns on high temperature. The gases which evolve during this burning process pollute air and water. Due to this, a large number of people get affected and suffer from many harmful diseases.

Researchers suggest that if plastic isn't disposed of soon, it can sustain for 4500 years without degradation. Now, these days the rate of plastic use keeps increasing. So the collection of plastic waste increasing at a rapid speed.

The usage of plastic can't be banned, but we can reuse it in many ways. Plastic can be reused in various sectors like marketing, manufacturing, transportation etc. In construction sector, we can use the plastic waste on a very large scale after recycling it, which means the problem of plastic waste can be removed for a long time period. It seems to be more practicable and efficient method to solve this problem.

In construction field, many types of bricks and tiles are used like - clay bricks/tiles, concrete bricks, fly ash bricks, foam bricks. In this project we try to use plastic based bricks/tiles which has better characteristics than any other type of bricks. Plastic sand bricks/tiles are cheaper than normal bricks/tiles. People can easily afford these types of bricks/tiles.

OBJECTIVE

- ❑ To develop an efficient way and to effectively utilize the waste plastics.
- ❑ To reduce the consumption of natural resources such as clay for the manufacturing of bricks/tiles.
- ❑ To minimize and reuse generation of waste plastic on the land and water to avoid land and water degradation and consequent pollution hazard.
- ❑ To reduce the dumping area of waste plastics.
- ❑ To produce cost-effective materials which a common person can afford easily.

METHODOLOGY

- I. First, we need to collect the plastic waste and separate it from other wastes.
- II. Second, we should dry the plastic waste if it is wet and has a content of moisture. We have to use dry plastic waste.
- III. Then, we crush the plastic waste in small particles by crushing machine.
- IV. Then, the small particles crush into fine size particles.
- V. The ratio of plastic and stone dust which we use is 3:7
- VI. The stone dust which we use in manufacturing of bricks/tiles is sieved for a size less than 4.75mm using sieve analysis.
- VII. Then, we heated the stone dust on a furnace (Bhatti).
- VIII. The fine particles of plastic waste also heated on a furnace (Bhatti) till it is in a liquid form.
- IX. Then, we add the stone dust into melt plastic.
- X. Then, we can mix it properly and make a mix.
- XI. Then, we poured the mix into moulds.
- XII. Then keep it the mould for dry and demould it on a next day.
- XIII. The weight of the brick is 2.5Kg.



Fig 1: Making of Plastic Sand Bricks

RESULT

1. Water absorption Test = 0 %



Fig 2 : Water absorption Test

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



Fig 3 : Shape and Size Test

- 3. Colour Test = Mud Colour as present on plastic pieces and present even after 24 hours in water



Fig 4 : Colour Test

- 4. Efflorescence test = No efflorescence visible
- 5. Soundness test = ringing sound produced and bricks are not break
- 6. Hardness test = little bit scratch visible



Fig. 6: Hardness Test

- 7. Compressive strength test
Plastic sand brick = 5.6 N/mm²
Fly Ash brick = 3.83 N/mm²
3rd class clay bricks = 3.5 N/mm²
2nd class clay bricks = 7 N/mm²
1st class clay bricks = 10.5 N/mm²



Fig 7: Compression Test

CONCLUSION

1. Waste plastic, which is available everywhere, may be put to an effective use in brick/tiles making.
2. Plastic sand bricks/tiles can help reduce the environmental pollution, thereby making the environment clean and healthy.
3. Plastic sand bricks/tiles reduce the usage of clay in making of bricks/tiles.
4. Plastic sand bricks/tiles give an alternative option of bricks/tiles to the customers on affordable rates.
5. Water absorption of plastic sand brick is zero percent.
6. Compressive strength of plastic sand brick is 5.6 N/mm² at the compressive load of 96 KN.
7. We conclude that the plastic sand bricks are useful for the construction industry when we compare with Fly Ash bricks and 3rd class clay bricks.

FUTURE WORK

Plastic sand bricks give us hope and a way to work on innovative things related to the plastic 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. Such as, in going for plastic sand wall in framed structures as a partition wall, plastic sand benches in the parks, plastic sand tracks for running and jogging in place of concrete or stone tracks.

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