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Bricks made from Plastic and of Waste Brick

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ABSTRACT: 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. 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.

I. INTRODUCTION

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 is 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 are used like - clay bricks, concrete bricks, fly ash bricks, foam bricks. In this project we try to use plastic based bricks which have better characteristics than any other type of bricks. Bricks Made From Waste Plastic and wastebriks are cheaper than normal bricks. People can easily afford these types of bricks.

Objectives-

1. To develop an efficient way and to effectively utilize the waste plastics.
2. To reduce the consumption of natural resources such as clay for the manufacturing of bricks.
3. To minimize and reuse generation of waste plastic on the land and water to avoid land and water degradation and consequent pollution hazard.
4. To reduce the dumping area of waste plastics.
5. To produce cost-effective materials which a common person can afford easily.
6. To reduce the plastic in waste streams saving non renewable resources.

II. METHODOLOGY

1 Collection of Plastic Materials and Waste Brick Pieces:-

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.

The waste brick pieces should be collected from new construction site, the brick pieces should be unusable or damaged

2 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 then proceed for burning.

3 Melting of Waste Plastic

After completion batching the plastic waste were taken for melting 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 90-110 degrees centigrade.

4 Mixing

Mixing of materials is essential for the production of uniform and strength for brick. The mixing has to be sure that the mass becomes homogeneous and consistency. We adopted hand mixing until the entire plastic and Brick powder 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 time. Hence mixing process should not consume more time.

III. LITERATURE REVIEW-

1. UTILIZATION OF PLASTIC WASTE IN MANUFACTURING OF PLASTIC SAND BRICKS(2018)

(The author states 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.)

We understand from the paper 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.

In this, they get to crush the plastic waste into fine particles and heated on a furnace (Bhatti).They use stone dust as fine aggregates (size below than 4.75mm),heated on a furnace (Bhatti). They mix heated plastic waste and heated stone dust and pour into mould and form bricks and tiles.

2. UTILISATION OF PLASTIC WASTE FOR MAKING PLASTIC BRICKS(2019)

The author states that they try to finding efficient way to solve this problem of plastic waste. So, they added this plastic wastes into the bricks and create the bricks by using plastic wastes. It is most economical solution present in the construction industry and it is also economical and environment friendly solution of the plastic wastes.

We understand from the paper that the plastic brick is economical and environment friendly solution in construction industry.

Due to increasing population, the demand of plastic Materials and necessary requirement also increases. Brick is Largest materials used in the construction industries and Occupied in very large amount of materials of the project especially in residential projects. We find the different properties of bricks by conducting various tests on it. Among them compression and Water absorption test is most common test conducted on Bricks by the various researches. But the use of such types of Bricks is very limited in the industry.The quantity of plastic waste In Municipal Solid Waste (MSW) is expanding rapidly.

3. EXPERIMENTAL STUDY ON STRENGTH BEHAVIOUR OF PLASTIC SAND BRICK (2020)

(The author states that to minimize the nonbiodegradable plastic wastes and to provide an effective way to minimize plastic wastes by producing quality bricks in the construction.

We understand from the paper that minimizes plastic waste in effective way by producing quality bricks from plastic waste which is nonbiodegradable material in the construction.

The aim of the project is to minimize the nonbiodegradable plastic wastes and to provide an effective way to minimize plastic wastes by producing quality bricks in the construction. The main objectives are: To develop an efficient way to utilize the plastic wastes .To produce cost effective materials.

4. PLASTIC BRICKS (2017)

(The author states that the ecobricks are a collaboration powered technology that provides a zero-cost solid waste solution for individuals, households, schools and communities. . Main important think while using the waste in ECO BRICK was it can not made by recycling but just burn to plastic waste without adding any additives and it can also be used for atleast 30-40 years in a construction industry.

We understand from the paper that the ecobricks are zero cost solid waste solution for individuals, households, school and communities. Eco brick cannot be recycling but just burnt to plastic waste without adding any additives and it can also be used for atleast 30-40 years in a construction industry.

Ecobricks are plastic drinking bottles packed with non-biological waste to make a reusable building block An ecobrick is a plastic bottle stuffed solid with non-biological waste to create a reusable building block. Ecobricks are used to make modular furniture, garden spaces and full scale buildings such as schools and houses.

5. FABRICATION AND TESTING OF PLASTIC SAND BRICKS (2019)

(The author states that the traditional Bricks are made by clay, which puts stress on soil and also leads to soil erosion. The use of plastic sand bricks can be beneficial and would help to reduce waste. Thus the use of plastic bricks is a promotion to sustainable development and eco-conservation at the same time.

We understand from the paper that plastic brick is more beneficial than traditional Bricks. Plastic sand brick would help to reduce stress on soil and reduce soil erosion.

Non-biodegradable also causes land and water pollution. Among the various types of plastics used, Polyethylene (PE) is one of the most used. It is usually used in single use plastics such as carry bags, plastic bottles etc. One viable solution to using this plastic waste can be Plastic bricks. These bricks will eventually be able to enhance our management of plastic along with promoting sustainable development.

6. ECO-BRICKS

Vikram Pakrashi et al. examined Eco-brick is a viable resource for construction purposes with a number of possible applications. The bricks are relatively easily manufactured with controlled weight and packing. Eco-bricks have relatively good compressive strength, with values matching that of basic concrete cubes. The weight of Eco-brick was observed to hold a nearly relationship with load at failure and with specific strength. Eco-bricks have a relatively good specific strength. They are lightweight but strong for the weight they bear.

Testing :-

The different sorts of tests on plastic bricks were led to check the characteristics of blocks for developments. This kind of brick tests are led at both in building site and in laboratory center. This brick blocks are most established and imperative development materials in view of their toughness, loading bearing strength, quality and minimum cost.

Compression test (BS 5628: Part 1:1992)

This test is done to get the idea about compressive strength of brick. This strength is also called as crushing strength. There are 3 specimens of different proportion of ingredients of bricks are taken in laboratory for testing of compression test and then tested one by one. In this test, a single brick specimen is put in between two jaw of crushing machine and applied the pressure till it breaks. After that the ultimate pressure on which brick is crushed is noted. Each specimens are tested one by one and then the value of specimen is taken as compressive or crushing strength of bricks.

3.2.2 Water absorption test (IS 3495-1992 Part-I)

In this test, the weight of bricks were taken in dry condition and then immersed for 24 hours in fresh water. But during this period, the bricks were immersed in water and after 24 hours the wet weight of bricks were taken. If the water absorbed by brick is less then it shows its better quality. A brick of Good quality doesn't absorb water more than 20% of its own weight.

Hardness Test on Bricks

A good brick should resist scratches against sharp things. So, for this test a sharp tool or finger nail is used to make scratch on brick. If there is no scratch impression on brick then it is said to be hard brick.

3.2.4 Shape and Size Test on Bricks

Shape and size of bricks are very important consideration. All bricks used for construction should be of same size. The shape of bricks should be purely rectangular with sharp edges. Standard brick size consists length x breadth x height as 19cm x 9cm x 9cm. To perform this test, 20 bricks randomly from brick group and stack them along its length, breadth and height and compare. So, if all bricks similar size then they are qualified for construction work.

3.2.5 Colour Test of Bricks

A good brick should possess bright and uniform colour throughout its body.

3.2.6 Soundness Test of Bricks

Soundness test of bricks shows the nature of bricks against sudden impact. In this test, 2 bricks are chosen randomly and struck with one another. Then sound produced should be clear bell ringing sound and brick should not break. Then it is said to be good brick.

3.2.7 Efflorescence Test on Bricks

A good quality brick should not contain any soluble salts in it. If soluble salts are there, then it will cause efflorescence on brick surfaces. To know the presence of soluble salts in a brick, place it in a water bath for 24 hours and dry it in shade. After drying, observe the brick surface thoroughly. If there is any white or grey color deposits, then it contains soluble salts and not useful for construction.

Graph of Compressive Strength:-

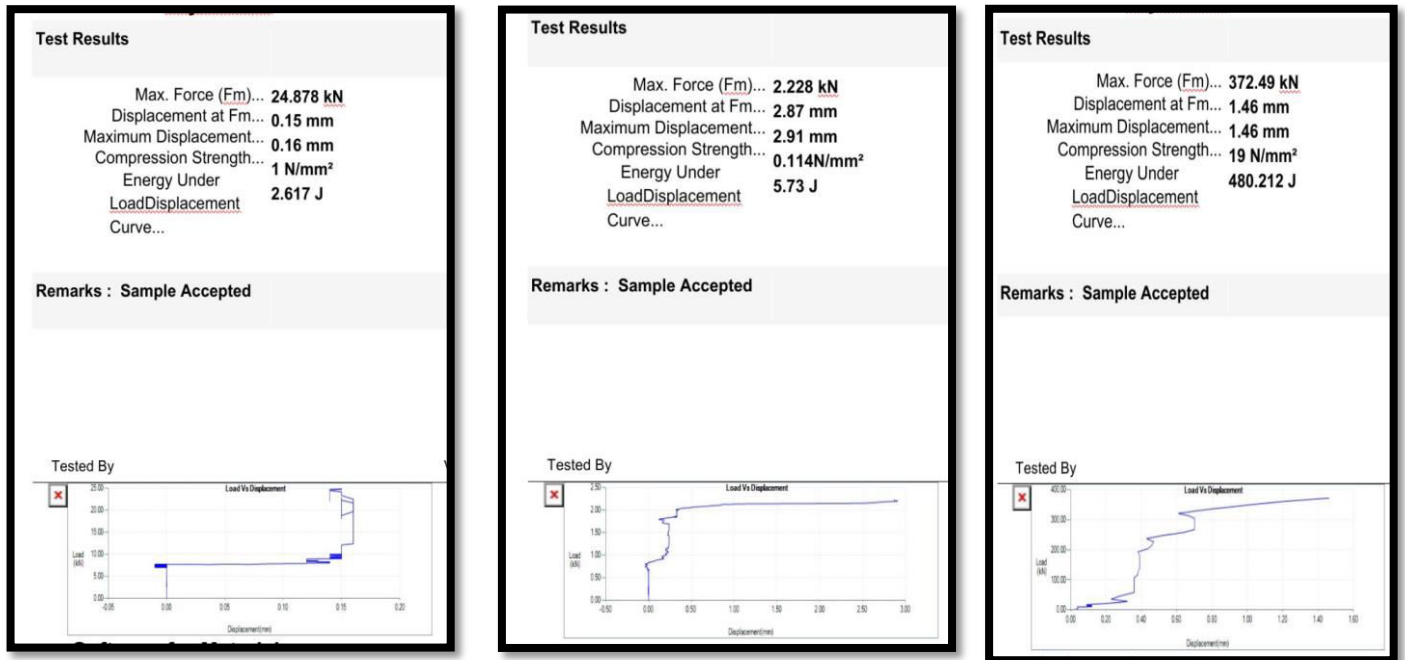


Fig. 1. Compressive strength and graph results

Advantages

- i. Allow recycling of waste plastic.
- ii. If made with hollow cells, they can be filled with compacted dirt, increasing their potential utility for projects lasting several years.
- iii. They can be used for insulation
- iv. They should be sufficiently economical, with potential for easy recycling. Under submerged conditions they should last much longer.
- v. Exotic shapes are possible for decorative purposes.
- vi. Overall cost of brick will be reduced.
- vii. Mortar is easy to apply.
- viii. These brick is strong as compare to normal clay brick.
- ix. Light in weight.
- x. People can be easily afford this type of bricks.
- xi. When we are melting plastic for preparation brick it emits toxic-gases into atmosphere due to release of carbon dioxide. We can collect powder form of carbon and it can be use for ink production or carbon paper.

3.6 Limitations

- I. Plastic may appear strong, but it would deform under pressure.
- II. As such they would have a limited lifespan due to degradation by UV. Extreme arctic weather would make them brittle. Or else, they would crack in several years due to thermal cycling.
- III. Skilled labours are required.

IV. When we are burning plastic for preparation plastic brick it emits toxic-gases into atmosphere due to release of carbon dioxide. We have solution for it

IV. RESULT

Observation Table:-

Sr. No	Brick No.	Brick Proportion (Plastic% +Brick Powder%)	Comprehensive Strength
1.	1 st	70% + 30%	1N/mm ²
2.	2 nd	60% + 40%	0.114N/mm ²
3.	3 rd	80% + 20%	19N/mm ²

The 20% brick powder+80% plastic waste brick have more comprehensive Strength than Clay brick and 70% + 30% and 60% +40% proportioned brick.

V. CONCLUSION

As compare to 1st brick of proportion of 30%+70% and 2nd brick of proportion 40% + 60% the 3rd brick of proportion 20%+ 80% have more strength , even surfaceand sharpedgesso 20% + 80% proportionedbrickis suitablefor casting.

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 BRICKS MADE FROM PLASTIC AND OF WASTE BRICK.

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8. Photo Gallery:-



Fig. 2.Preparation of bricks in mold



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