



A Review on use of Plastic Waste in Manufacturing of Clay Bricks

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Abstract : Today's world is facing biggest challenge regarding waste management especially regarding plastic waste. Plastic is daily increasing and rapidly expanding material. Everyday large amount of plastic waste is collected but enough amount of plastic is not treated or recycled. A large amount plastic is thrown in water bodies and burned daily. Release of plastic waste in the environment is hazardous to both plant and animal life. The plastic waste in the form of PET (Polyethylene terephthalate) has an important environmental challenge and its recycling faces a big problem due to its non-degradable nature. Large amount of materials are required for construction purposes, so to meet this increasing demand bricks made up of using plastic waste can become solution for plastic waste as well as construction industry.

Index Terms – Plastic Soil Bricks, Poly Ethylene Terephthalate (PET), Eco Bricks.

1.INTRODUCTION

Plastic is one of the daily increasing useful as well as a hazardous material & it is non – biodegradable that remains on earth for several years impacting environmental hazards. The quantity of plastic waste in Municipal Solid Waste (MSW) is expanding rapidly due to growth of population, Urbanization & change in life style. The increase in popularity of using environmentally friendly, low cost and lightweight construction materials in building industry has brought the need to investigate new how this can be achieved by benefiting the environment.

Plastic soil brick possesses more advantages which includes cost efficiency, resource efficiency, reduction in emission of greenhouse gases, etc., Plastic soil 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 soil bricks, the water absorption presence of alkalis was highly reduced. Owing to numerous advantages further research would improve quality and durability of plastic soil bricks.

2.NEED OF THE STUDY

In India, annually 3.5 million plastic waste is generated out of which only 25% waste is recycled. Modern world is facing a serious situation of waste management, especially plastic waste. Everyday thousands of tonnes of plastic are dumped to the garbage but there is no enough method to treat and recycle the plastic world. A large amount of plastic is been discarded or burned daily which leads to the contamination of environment and air. Accumulation of plastic waste in the environment is hazardous to both plant and animal life. The plastic waste in the form of PET (Polyethylene terephthalate) has an important environmental challenge and its recycling faces a big problem due to its non-degradable nature.

The large volumes of materials required for infrastructure construction is potentially a major area for the reuse of waste materials. Thus, to overcome this problem the plastic waste is been treated with soil to make brick for construction purpose. This project studies the properties of bricks manufactured by mixing soil and waste plastic and its suitability as a building unit. The waste plastic and soil are batched properly and waste plastic is given heat from below. Soil was added in respective proportions into the molten plastic paste for the manufacturing of plastic soil bricks and is poured into moulds of required size. This alternatively saves the quantity of sand/clay that has been taken away from the precious river beds/mines, and is the one of the best ways to avoid the accumulation of plastic waste which is non-biodegradable pollutant.

3.MATERIALS USED

3.1 Soil

Soil is a mixture of organic matter, minerals, gases, liquids, and organisms that together support life. Earth's body of soil, called the pedosphere, has four important functions:

- As a medium for plant growth
- As a means of water storage, supply and purification
- As a modifier of Earth's atmosphere
- As a habitat for organisms

Soil is a major component of the Earth's ecosystem. The world's ecosystems are impacted in far-reaching ways by the processes carried out in the soil, from ozone depletion and global warming to rainforest destruction and water pollution. With respect to Earth's carbon cycle, soil is an important carbon reservoir, and it is potentially one of the most reactive to human disturbance and climate change. As the planet warms, it has been predicted that soils will add carbon dioxide to the atmosphere due to increased biological activity at higher temperatures, a positive feedback. We dig some soil near our college and graded it by sieving it which is 4.75mm passing and 90 μ , lesser than 90 μ particles of soil will form lumps and does not bind properly which affect the strength of the bricks, the particles greater than 4.75mm will creates voids which also affect the strength of the soil.

3.2 Waste Plastic

Plastics are made up of synthetic organic polymers which are widely used in different applications ranging from water bottles, clothing, food packaging, medical supplies, electronic goods, construction materials, etc. In the last six decades, plastics became an indispensable and versatile product with a wide range of properties, chemical composition and applications. Although, plastic was initially assumed to be harmless and inert, however, many years of plastic disposal into the environment has led to diverse associated problems. Environmental pollution by plastic wastes is now recognized widely to be a major environmental burden, especially in the aquatic environment where there is prolong biophysical breakdown of plastics, detrimental negative effects on wildlife, and limited plastic removal options. The different sources of origin of plastic will be given below.

Waste plastic	Available As
Polyethylene Terephthalate (PET)	Drinking water bottles etc.
High Density Polyethylene (HDPE)	Carry bags, bottle caps, house hold articles etc.
Low Density Polyethylene (LDPE)	Milk pouches, sacks,carry bags, bin linings, cosmetics and detergent bottles.
Poly Propylene (PP)	Bottles caps and closure, wrappers of detergents, biscuits etc.
Urea Formaldehyde	Electrical fittings, handles and knobs.
Polyester Resin	Casting, bonding fibers (glass, carbon fiber)

4.RESEARCH METHODOLOGY

4.1 Stage 1: Collection of materials.

1.1: Collection of plastic waste

The plastic waste material can be collected from the college campus, canteen waste and Municipal solid waste (MSW) and also food packages and plastic bottles this will come under the LDPE plastic type.

1.2: Collection of soil.

Soil can be collected from near college campus area which is free from lumps and other type of waste. Further sieve sieve test should be done before using for manufacturing of bricks.

4.2 Stage 2: Preparation of bricks.

In first step we should collect the waste plastic bags and bottles. Next the collected waste bags are cleaned with water and dried to remove the water present in it after this the plastic waste is melted by using stones and firewood. The stones are arranged to hold the pan and the Firewood is placed in the gap between the stones and it is ignited. The pan is placed over the above setup and it is heated to remove the moisture present in it. Then the plastic bags are added to the pan one by one and the soil is added to the plastic when it turns into hot liquid. The soil is added is mixed thoroughly using rod and trowel before it hardens. The mixture has a very short setting hence mixing process must not consume more time on the other hand the process should be complete. These mixtures are then poured in to the brick mould and they are compacted using steel rod and surface is finished using trowel. Before placing the mixture into the mould, the sides of the mould are oiled to easy removal of bricks. After completion of proper mixing, we place mix into required mould. The size of brick mould should standard as per IS 1077:1992, we use the normal brick sizes (19x9x9cm).

4.3 Stage 4: Tests on Bricks

Followings tests should be conducted on bricks to know their properties.

- Compression Strength test (BS 5628: Part 1: 1992)
- Water Absorption Test (IS 1077-1970)
- Efflorescence Test
- Soundness Test

4.4 Stage 4: Comparison of strength of plastic brick with ordinary brick

Detailed comparative study should be done with ordinary brick and final results should be provided with respect to above mentioned tests and also considering time consumption and economic factors.

ACKNOWLEDGMENT

The work described in this paper was substantially supported by department of civil engineering of JCEP, Walwa, India.

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