



A Review on Manufacturing of Construction Material Using Plastic Wastes of Bengaluru City

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Abstract: Plastic usage is increasing at an alarming rate. This increase has led to an increase in production of plastic waste in form of plastic bags, drinking water bottles etc. Disposal of plastic is difficult as plastic is non-biodegradable which is a major concern for every living species. Hence, working on this issue and finding an alternative solution is very important. One of the solutions can be using plastic waste or mixing it with some other ingredients like fly ash, bitumen which can result in useful construction materials. This study aims at reviewing the different types of plastic waste used as an ingredient in the manufacturing of construction material.

Keywords: Plastic, Non-biodegradable, Construction materials, Fly ash

I. INTRODUCTION

Usage of plastic is increasing day by day. This has led to massive environmental damage. There is an immediate need to come up with permanent solution. Landfills which are popular method to solve this problem is indirectly harming the nature. Landfills which are filled with waste are producing toxins that are released into atmosphere and are contaminating ground water. As plastic require many years to be decompose, they fill up the landfills faster and this demands urgency for plastic disposal problem. Re utilizing plastic waste will be a meaningful solution to the above-mentioned problem. In recent times, plastic has been used as a substitute material in construction industry as it possesses some important characteristic which is summarized in the Table 1.

Table 1. Characteristics of Plastics

1.Strength	Strong and can be used for load bearing structural members. Strength can be further increased by reinforcing them with various fibrous materials.
2.Weather resistance	Plastic made from phenolic resin are good in resisting weather effects

3.Durability	Possess sufficient durability, provided the offer sufficient surface hardness.
4. Chemical resistance	Offer great resistance to moisture, chemicals and solvents. Also, excellent resistance to corrosion
5. Thermal resistance	Posses low thermal conductivity, hence used as thermal insulators.
6. Electrical conductivity	Good insulators of electric current.
7.Lightweight	Weigh less than that of metal therefore it becomes easier for carrying them from one place to another.
8.Appearance:	Transparent therefore can be coloured to desirable colours and also be moulded into different shapes.

II. PRESENT SCENARIO OF WASTE GENERATION IN BENGALURU

In Bangalore, plastic is estimated to occupy 20% of the 4000 tons of municipal solid waste generated. According to Karnataka State Plastic Association, consumption in the city



is approximately 16 kg per person every month. Bangalore district has about 1199 plastic industries which generate about 11 metric tons of plastic waste per day. The plastic waste generated in household sector is estimated around 470 metric tons per day. Around 300 plastic reprocessing units are functioning daily with turnover of more than Rs.28 lakhs while on average 35 tons of non-recyclable plastic is being disposed indiscriminately every day in and around Bangalore. Most of the non-recyclable plastic material is disposed of in open lands that can affect soil permeability and water infiltration rate. To solve the problem of used plastic it is usually segregated at source and recycled to produce some useful items.

III. LITERATURE REVIEW

Aman Kumar et.al[1] conducted a study on the manufacturing bricks using plastic waste. In this study they used plastics waste (LDPE) and fine aggregate for the brick manufacturing. These bricks were made by heating waste plastic to temperature range of 120 to 150 °C and then mixed with sand to the molten plastic. The bricks produced were light weight, have smooth surface, fine edges and high crushing strength. It had very low water absorption of 1.5%. Average compressive strength of 5MPa was obtained and the brick weighed 2200 gm.

Ravi Kiran K et.al [2] conducted a research on plastic based concrete bricks. They used ratio of 1:3 cement to aggregate. In this study they took aggregate mixture of 20% small and medium sized plastic flakes and 80% sand with a water to cement ratio of 0.5. This mix provided the optimal compressive strength to form a concrete block that can be used to construct a wall.

Puttaraj Mallikarjun Hiremath et.al [3] investigated a study on utilization of waste plastic in manufacturing of plastic-soil bricks. In this work the bricks were made by using waste plastics in range of 60 to 80% by weight of laterite quarry waste and 60/70 grade bitumen was added in range of 2 to 5% by weight of soil in molten form and later this bitumen- plastic resin was mixed with laterite quarry waste to manufacture the bricks. The bricks manufactured possessed the properties such as neat and even finishing, with negligible water absorption and satisfactory compressive strength.

John Rogel S. Ursua [4] made a study by using plastic wastes, glass bottles and paper in sand bricks. An attempt has been made by the researcher to create an eco-brick using sand ranging from 55% to 65% by weight, plastics ranging from 29% to 39% by weight, 5% crushed glass bottles, and 1% shredded paper. The water absorption test on the different samples revealed that the absorption is less than

15% which means the manufactured brick can fall under the category of first-class brick. Moreover, the compressive strength of the bricks surpassed the minimum requirements for the concrete wall. Also, the bricks showed excellent behaviour after efflorescence.

IV. FUTURE SCOPE OF WORK

This paper presents a review on manufacturing of bricks by using the plastic waste. The study indicates the brick manufactured using plastic waste is eco-friendly and light in weight. The brick possess optimal compressive strength to be used to construct a wall. The use of plastic in making of bricks can limit the amount of plastic being disposed into the environment.

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