



# A Review Paper On Characteristic Study Of Plastic Waste For Construction Industry

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**Abstract:** The policy and practise around plastic garbage generated in homes, institutions, and industry in its cities are rapidly changing. The degradation of soil and land by plastic accessories is growing daily. Plastic moulding of a pliable material is possible with or without fracture. It is therefore inexpensive, non-sharp, and water-resistant. Plastics are widely employed on various scales. Because it is the largest industry across all economic sectors and the biggest user of raw materials, the construction industry is used in a variety of ways. Different methods of recycling waste are less frequently used in the building business as plastic waste has been proven to be efficient. In the process of building roads, plastic waste-coated aggregate is combined.

**Key Words:** Plastic waste, Waste management, Use of plastic construction.

## I. INTRODUCTION

Plastics are a class of semi-synthetic organic molecules that are typically made from fossil fuels, while unique bioplastics can also be made from biomass that is grown sustainably. Plastics may be moulded into any shape and have a remarkable resistance to corrosion thanks to their simple malleability. Their opacity, thickness, elasticity, and thermal properties can be altered with the right additions. It is hardly surprising that plastic has become a necessary component of human society. Plastics are materials with good thermal and electrical insulating qualities that are inexpensive, lightweight, robust, durable, and corrosion-resistant. (Andrade *et al.*, 2016) The variety of polymers and the flexibility of their characteristics are exploited to create a wide range of goods that enhance technology and medicine, save energy, and benefit society in a variety of other ways. (Thompson *et al.*, 2009). As a result, over the past 60 years, the output of plastics has significantly expanded, going from about 0.5 million tonnes in 1950 with over 260 million tonnes at this time.(Saxena and Singh, 2013). Thermoplastics and thermoset plastics are the two primary groups into which commonly used polymers fall. Heat causes thermoplastics to soften while thermoset plastics harden, keeping the original shape. For instance, thermoplastics are used to make soft drink bottles and PVC pipes while thermoset plastics are used to make electric kettles, plugs, etc.

## II. SOURCE OF PLASTIC WASTE

The Madurai Corporation has said that it has increased the efficiency of its garbage collection in the past one year, which has led to the daily collection of garbage 550 tones to 810 tones. The waste floating on water bodies and thrown around the dumper bins continues to be a common sight. It also said that wet waste collection done with the help of members of SHGS has also improved, as the daily collection.

However, Unsegregated plastic still piles up on road sides and water bodies, including the river. The main sources of plastic debris found in the ocean are land-based, coming from urban and storm water runoff, sewer overflows, littering, inadequate waste disposal and management, industrial activities, tire abrasion, construction and illegal dumping.

## III. PROPERTIES OF PLASTIC

Plastic is one of the most disposable materials in the modern world due to its many excellent qualities, including its adaptability, low weight, hardness, resistance to chemicals, water, and impact, and resistance to all of these. In both urban and rural locations, it makes up a sizable portion of streetside litter. Landfills are quickly becoming choked-off water bodies as a result (Jalaluddin, 2017). The use of thermoplastic and thermoset polymers, which come in two main varieties, depends on the application. One may be repeatedly reused whereas the other cannot, which is the primary physical distinction between the two. Since there is no chemical bonding when thermoplastics are heated, the material's physical characteristics are unaltered. Thermoplastics can thus be repeatedly moulded, melted, and reshaped into a variety of shapes, sizes, and objects. Thermoset plastics are polymers that are similar to thermoplastics but often stronger due to the molecular cross-linking of the polymer. They get their name because, when mixed and moulded, the polymers undergo a chemical shift during processing that results in the formation of an irreversible chemical link. The plastic is "set" once it has been moulded and consolidated, which is a process known as curing.

Types of Plastics	Characteristics	Usage of recycled plastic
Low density polyethylene (LDPE)	Unless a colour is added, milky white soft, flexible plastic	packaging, soft film, and plant packing
High density Polyethylene (HDPE)	widely used material that is either white or coloured	Mobile trash cans, detergent bottles, crates, and compost bins
Unplasticised Polyvinyl chloride (UPVC)	stiff, hard plastic that is clear	Tiles, plumbing, detergent bottles for toiletries, and dishwasher bottles
Plasticized Polyvinyl chloride (PPVC)	Clear, elastic, and flexible plastic	Industrial flooring and the inner core of hoses
Polyethylene Terephthalate (PET)	lucid hard plastic that is fiber-compatible	For packaging and packing, rug fibres, and raincoats, use clear and soft film.
Polystyrene (PS)	brittle plastic that is stiff. Clear and shiny in appearance	coat hangers, video/CD boxes, and laundry pegs
Polypropylene (PP)	Flexible but tough plastic	Recycling boxes on the curbside and compost bins

#### IV. PLASTIC WASTE MANAGEMENT IN MADURAI CITY

As the Use of Plastic is increasing at a very fast pace, plastic waste management becomes the utmost priority. Plastic can be managed in two specific ways-either it can be recycled or reprocessed in to a secondary material or it can be incinerated. In order to sustainably manage plastic waste management Rules, 2016 which were further amended in 2018 introduced extended producer Responsibility (EPR) and PWRM 2021 defined single. use plastic. Recently introduced PWM (Amendment) Rules, 2022 sets out clear guidelines regarding EPR. The proper operation, separation and treatment of waste is important to people. Madurai is one of the many metropolises in tamilnadu working to treat all the waste it generates. The help achieve this megacity has come up with an innovative strategy. It has placed a group of marginalized women at the van of a crusade to clean megacity. The workers insulate the waste that they collect in to recyclables paper, plastic, Polythene and paper glass or plastic waste and plastic wrapper.

#### V. USE OF PLASTIC IN CONSTRUCTION

When it comes to construction, plastic have been extensively used by various construction companies. The components such as hinges, screws and bigger construction parts are made from plastic and are used in wall. From olden days, fibres have been employed to strengthen fragile materials. Throughout classical era, bricks have been reinforced and their structural instability has been stabilised by the use of straw. Fiber reinforced concrete (F.R.C.) is a relatively new building material that was created over the course of the last three decades through considerable research and development work (Patil et al., 2016). It has a wide range of everyday uses and has shown to be a durable building material with better performance than regular concrete. Due to improvements in tensile strength, cracking resistance, impacts wear resistance, ductility, and fatigue resistance brought about by the addition of different fibres to concrete,

FRC is now utilised in a variety of structures, including airport pavement, bridge decks, machine foundations, blast-resistant structures, sea-protective structures, etc. It was estimated that using recycled plastic bottles as building materials can significantly reduce the amount of energy that goes into manufacturing cement by using them instead of bricks in walls and by cutting the amount of cement used overall. The architectural and construction industries are interested in it because it is one of the foundation's green projects. Typically, the glass residences have a sustainable building design, which suggests that even though it's cold outside, it's warmth inside, and vice versa. Designers may reduce the overall cost of building a house by 45% by using plastic bottles as the walls, joist ceiling, and concrete column.

When different cost factors are separated, it can be seen that using local labour to create bottle panels can result in cost savings of up to 75% when compared to using brick and concrete blocks to construct walls (Shoubi and Barough, 2013). A particular type of concrete called plastic fibre reinforced concrete (Combination of physical) integrates or incorporates various types of plastics to the basic elements of concrete. In order to use waste plastics that are harmful to the environment effectively and limit the amount of plastics disposed away, this has been done. This work aims to make a contribution to the efficient use of household wastes (plastics) in concrete as fibres in order to avoid the environmental harm they cause and to reduce the use of natural resources (Ramadevi and Manju, 2012). The results of this study highlight on an M20 mixture that included 0.5% of polythene fibres (domestic waste plastics). Concrete's cube compressible strength improves by 0.68% and 5.12% over the course of 7 and 28 days, respectively. In 28 days, concrete's cylinder compressible strength increases by 3.84%. In just 28 days, concrete's split tensile strength increases by 1.63%. Katte et al. investigated how plastics may substitute natural sand to varying degrees, ranging from 0% to 50%. To create green concrete, natural sand can be replaced in concrete by 10% to 20% plastic trash. Additionally, sand can be replaced by up to 30% in building components that do not carry heavy loads. (Ananthi et al., 2017).

#### VI. CONCLUSION

Even while plastic is ruining ecological systems, it can still be a valuable resource in the building industry provided the waste is processed, used, and then prudently recycled as needed. To do this, facilities that burn recyclable plastic waste for energy production would need to gradually phase them out (Law, 2017). Given that incineration facilities considerably contribute to the heating requirements of towns, this would be a considerable difficulty. The supply of waste plastic would be one of the main obstacles to plastic recycling, but banning the incineration of recyclable plastic trash would remove this obstacle. It might deliver a sizable amount of waste with inconsistent quality. Therefore, a ban on incineration would necessitate complementary actions such as capacity growth and sorting and recycling technology development (Government of Sweden, 2015). This demonstrates the necessity for additional study into biodegradability management, taking into account various applications and the need for infrastructure to handle biodegradable plastics in the end.

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