Use Of Plastic Waste for Floor Tiles

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Abstract*— In many industries flooring is done by concrete tiles. Damping materials such as rubber is provided between machines and floor to avoid damages due to vibration from machines to floors. Solid waste management is becoming as an emerging area by the impact of plastic wastes. The used PET bottles are also one of the major solid wastes. The concept of reduce, recycle & reuse is used now a day for better solid waste management. The fibers from the PET bottle wastes taken to improve the flexural capacity of the concrete can be proven by many of the researchers. Our project is about to make compare the results of normal concrete tile to the waste plastic tiles. These are easy to manufacture and install. These kinds of tiles reduce cost and waste, easily recycle the wastes and reuse them in innovative. The adverse effect associated with the surge in uses of non-biodegradable plastic products include the blockage of drains, suffocating some animal life, who accidentally take them as food, grounds impermeable to water and several other hazards.

***Indexed Terms*— Types of plastic waste, Water absorption Test, Abrasion resistance an Flexural Test**

I. INTRODUCTION

Waste is defined as any material that is not useful and does not represent any economic value to its owner. Depending on the physical state of waste, wastes are categorized into solid, liquid and gaseous. Solid Wastes are categorized into municipal wastes, hazardous wastes, medical wastes, and radioactive wastes. Note that, gaseous waste that is held in a closed container falls into the category of solid waste for disposal purposes. However, this study will be focused on biodegradable and photodegradable materials to decompose the waste, along with sufficient moisture and nutrients to sustain microbial action. Thus, the deeper these plastics are buried in the landfill, the less likely they are to decompose. Therefore, it is reasonable to say that that the market for plastic recycling Managing solid waste generally involves planning, financing, construction and operation of facilities for the collection, transportation, recycling and final disposition of the waste.

We are in the fast-growing infrastructure and the need of the industries and residential buildings. The need of building materials also plays a role development of infra with minimum cost. In many industries flooring is done by concrete tiles, in order to reduce cost, easy manufacturing & installation.

The materials provided between machines and floor to avoid damages due to vibration from machines to floors becoming important one i.e way by modern techniques. Plastic is defined as synthetic or semi-synthetic materials which are polymeric and are composed of large molecules of organic substances known as monomers. The large molecules that are formed during a process known as pol as polymerization are known as polymers.

Plastic recycling is the process of recovering plastic wastes and turning old or scrap plastic into useable products that can re-enter the manufacturing chains. This will in turn generate revenue, create more job opportunities and reduce the hazards associated with improper disposal of plastic waste.

II. OBJECTIVES

1. The main objective of this study was to assess the effect of plastic waste materials on the physical and mechanical characteristics of floor tiles.
2. The study of preparing different building material from waste.
3. To use various waste materials in construction.
4. Controlling the impact of plastic waste on the environment.

III. METHODOLOGY

3.1 Plastic

3.1.1. Origin of plastic: The world plastic was derived from the words plasticus (latin for capable of moulding) and plastikos (Greek fit for moulding).

Plastic are organic polymer (synthetic or natural) of high molecular weight .The plastic is basically

formless material which can be moulded under heat and pressure.

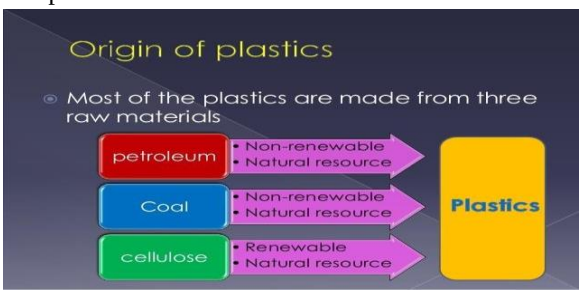

Fig 3.1.Origin of plastic

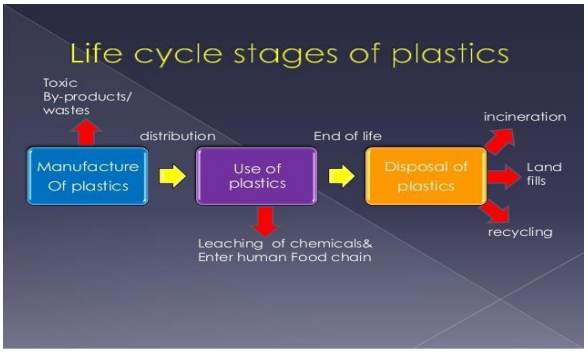

Fig 3.2. life cycle stage of plastics

3.1.2. Chemical composition

Recycling Codes for Polymeric Materials in the United States

Number	Abbreviation	Polymer	Polymer Structure
1	PET or PETE	Polyethylene Terephthalate	
2	HDPE	High-density Polyethylene	
3	V or PVC	Polyvinyl Chloride	
4	LDPE	Low-Density Polyethylene	
5	PP	Polypropylene	
6	PS	Polystyrene	
7	Other	Polycarbonate	

Table.3.1. polymer structure

3.1.3. Types and grade of plastic

1) Polyethylene terephthalate

Fig.3.3. Polyethylene terephthalate

Polyethylene Terephthalate sometimes absorbs odor and flavor from foods and drinks that are stored in them. Items made from this plastic are commonly recycled. PET(E) plastic is used to make many common household items like beverage bottles, medicine jars, rope, clothing and carpet fiber.

Advantages

- It has higher strength and stiffness .
- It is lightweight & hence easy and efficient to transport.
- It exhibits excellent electrical insulating properties.

Disadvantages

- Lower impact strength than PBT
- Affected by boiling water
- Attacked by alkalis and strong bases

2) High density polyethylene

Fig. 3.4. High density polyethyle

High-Density Polyethylene products are very safe and are not known to transmit any chemicals into foods or drinks. HDPE products are commonly recycled. Items made from this plastic include containers for milk,

motor oil, shampoos and conditioners, soap bottles, detergents, and bleaches. It is never safe to reuse an HDPE bottle as a food or drink container if it didn't originally contain food or drink.

Advantages

- Offer smooth interior surface
- Relatively higher resistance to corrosion.
- High degree of crystalinity.

Disadvantages

- Resistance to stress cracking.
- It has lower stiffness.
- High mould shrinkage and poor UV resistance.
- They are expensive but will last long.

3) Polyvinyl Chloride:

Fig.3.5. Polyvinyl Chlorides

Polyvinyl Chloride is sometimes recycled. PVC is used for all kinds of pipes and tiles, but is most commonly found in plumbing pipes. This kind of plastic should not come in contact with food items as it can be harmful if ingested.

Advantages

- Better general appearance.
- Less liable to damage through storms or lighting.
- Low maintenance cost.
- Less chances of faults.

Disadvantages

- PVC does not offer the same level of mechanical protection as a steel.
- A separate circuit protective conductor must be run inside the conduit.

4) Low density polyethylene:

Fig.3.6. Low-Density Polyethylene

Low-Density Polyethylene is sometimes recycled. It is a very healthy plastic that tends to be both durable and flexible. Items such as cling-film, sandwich bags, squeezable bottles, and plastic grocery bags are made from LDPE.

Advantages

- Produce under high pressure moderate temperature, oxygen containing catalysts.
- Low degree of crystallinity hence less scattering of light.
- Cheap & good chemical resistance.

Disadvantages

- Low strength, stiffness and maximum operating temperature.
- Poor UV resistance.

3.2. Types of different solid waste

1) Dry waste:

Fig.3.7. collection of dry waste

Dry waste is typically defined as any waste which will not rot or disintegrate over time and has little or no moisture content. Dry waste can also be described as inorganic or non biodegradable waste given its lack of food products..This includes both recyclable and non-recyclable materials. Dry waste includes items such as

bottles, cans, clothing, plastic, wood, glass, metals and paper. On site, the capacity of dry waste is 10 TPD.

2) Wet waste:
Wet waste is biodegradable waste and includes cooked and uncooked food, fruits, vegetables peels, flower waste, and other organically decomposable waste. This waste is collected on a daily basis and can be handed over in a green bin. On site, the capacity of wet waste is 15 TPD. In 1 tone, the 700 to 800 kg/day dry waste or wet waste transfer on site.

3) Domestic waste:
Domestic waste includes or organic and inorganic refuse from residential area. Organic waste consist of food waste, paper, cardboard, rubber, plastic, and yard waste. Inorganic waste consists of metal, batteries, oil, glass, bottles etc.

Fig.3.8. Collection of wet waste

4) Commercial waste:
Commercial waste is generated from commercial sources like stores, offices, warehouses, etc. which consist of large number of papers, card board, plastic, glass, packaging material etc.

5) Industrial waste:
The waste is generated from consumer goods, agricultural goods i.e. industry during manufacturing termed as industrial waste.

6) Agricultural waste:
Agricultural waste generated from agricultural activities during planting, harvesting, animal farm, poultry farm etc. agricultural waste includes crop residue, animal waste, dead plants manure etc.

7) Biomedical waste:
Biological research center, hospitals are the main causes for generation of biomedical waste which includes human tissues from surgery, bandages, hospital waste, dead animals etc.

10) E-Waste:
E-Waste means it is term used to cover almost all types of electrical and electronic equipment that has or could come in waste stream. Electronic waste may be discarded computers, office electronic equipments, mobile phones, etc. simply we say E-Waste means discarded electrical or electronic devices.

3.3. PROCESS OF MAKING PLASTIC TILE

Reasons of Making Plastic Tiles from Waste Plastic:

“India generates 1500 tonnes of plastic waste every day and we just throw it away.” “Plastic waste is such a big problem for our country, we have made so many rules and regulations for it, you see that in animals, especially in cows, there is so much plastic found in their stomach, that causes them a lot of distress,” With the same plastic we are making tiles used to make structural element.” One of the challenges is segregating the plastic waste from other kinds of waste. For the tile making process the plastic waste is further segregated into low density plastic, mostly used to make bags, high density plastics, used in bottles, and Polypropylene (PP) used in packaging material. These are then shredded into millions of pieces, some bland some boisterous. Mixers are added to the to generate pellets that are then heated and cast into moulds. The tiles can be used for pavements, jogger paths, for constructing structures.

About 600 plastic bags are used in the manufacture of one tile. Currently they have an order for 5 lakh tiles from CSIR itself. However, the demand for plastic tiles is limited at present because ceramic tiles are widely used and preferred.The plastic tiles cost Rs. 50-60 per sq feet. Production will start on October 19 at the Shayna Ecounified plant in Delhi.

Disposal of Plastic Waste is a major problem. It is non-biodegradable & it mainly consists of low density polyethylene plastic bags, bottles etc. Burning of these waste plastic bags causes environmental pollution. The main objective of the present project is to utilize waste plastic bags for designing of materials for

utilization of tiles in building of toilets and rooms for general public for societal benefits. Applications: These waste plastic bags tiles can be used for designing struct

3.4 MATERIAL USED FOR MAKING OF PLASTIC TILE:

1)Sand,

2)Plastic Waste

3)Manual sorting:

4) Washing:

5) Chipping:

6) Melting of plastic waste:

7) Placing of Mixture (Plastic Sand) in Moulds

8) Demolding

IV. RESULT AND DISCUSSION

1. Water Absorption Test:

Sr No	Test	Test Result For Different Percentage Of Waste Plastic			Normal CementTile
		40%	50%	60%	
1.	Water Absorption (%)	1.90%	1.73%	1.10%	8.70%

2. Abrasion Resistance (Average Loss in Thickness in cm):

Sr No.	Test	Test Result for Different Percentage of Waste Plastic			Normal Cement Tile
		40%	50%	60%	
1.	Abrasion Resistance (Average loss in Thicknessin cm)	0.82 cm	0.72 cm	0.24 cm	0.79 cm

3. Flexure Test:

Sr No.	Test	Test Result For Different Percentage Of Waste Plastic			Normal Cement Tile
		40%	50%	60%	
1.	Flexural Test (Breaking load) in N	195.69 N	228.61 N	258.27 N	244.30 N

V. CONCLUSION

1.With reference to the Results obtain after performing Test on tiles, plastic waste can be used as a binding

agent instead of cement in the manufacture of tiles, in pavement construction etc.

2. The waste plastic with proportions of 10% and 20% by weight of sand were found to be insufficient to prepare tile.

3.Test results for 60% of waste plastic by weight of sand is found to have transverse resistance better to normal cement tile and the other properties like water absorption, resistance to impact and abrasion resistance were on higher side. Hence 60% of waste plastic content can be considered as an ideal for preparation of floor tile using waste plastic as binding agent instead of cement

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