

Manufacturing of Paver Block by using Waste Plastic

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Abstract -

In day to day life used of plastic is increasing. The India produce 26000 tones plastic every year which is very harmful to environment. The degradation process of plastic is very slow because of that in our project we utilize the plastic for the manufacturing of paver block. In this process we replace the cement by plastic waste. The project is very helpful to reduce plastic waste. In this project we use different materials like sea sand, quarry dust in proper proportion.

Key Words: Plastic waste, Paver block

1. INTRODUCTION

Plastic are made from natural materials such as cellulose, coal, natural gas and crude oil through polycondensation process. Plastic is material consisting of synthetic and semi-synthetic organic that are malleable and easily molded in solid object. Plastic is used to multiple products like paper crafts and space crafts. Plastic is strong and durable so it gives better strength. Then it is less in weight, it is weather resistance, chemical resistance. It is easy to give any shape to plastic. Plastic polymer have long chains of atoms bonded of each other. Plastic is typically organic polymer of high molecular mass but they are often containing other substance. Due to above properties of plastic can be used as a good binding material.

1.1 Paver Block

Block paving also known as brick paving is a commonly used decorative method of creating a pavement or hard standing. The main benefit of brick over other material is that individual bricks can later be lifted up and replaced. This allows for remedial work to be carried out under the surface of the paving without leaving a lasting mark once the paving bricks have been replaced. Typical areas of use would be for driveways, pavement, patios, town centers, precincts and more commonly in road surfing.

1.2 Experimental Properties

1. Plastic Waste

In this process plastic used is plastic bottles which is collected from surrounding area. The basic properties of plastic are given below.

Table- 1: Properties of plastic bottles

Sr. no.	Particulars	Value
1.	Melting point	115 C
2.	Thermal coefficient of expansion	Ca.0.6 x 10 ⁻⁴ to 2.3 x 10 ⁻⁴
3.	Density	0.920 - 0.950
4.	Tensile strength	0.20 - 0.40 ((N/mm ²))

2. Quarry dust

Crushed sand less than 4.75 mm is provided from rock using state of crushing plants. The properties of quarry dust are below:

Table- 2: Properties of Quarry Dust

Sr. no.	Description	Value
1	Specific gravity	2.620 & 2.70
2	Grading zone	Zone II
3	Fineness modulus	2.952

3. Sea sand

The sea sand is stands for higher strength, so we used the sea sand. The paver block is prepared and tested and results are compared to concrete paver block.

Table - 3: Properties of Sea sand

Sr. no.	property	Value
1	Natural water content [%]	10.7
2	Specific gravity	2.59
3	Unit Weight	1.602
4	Fineness modulus	2.70

2. Methodology

The paver block of size 190X90X40mm its stand for Plastic: Quarry dust: Sea sand were prepared. Then melt the plastic in a metal container at 150°C. After melting the plastic add quarry dust and sea sand in proper proportion and mix it well. Clean the mould by using cloth. Then apply the oil on the mould. After applying oil add the mixture on mould. The mixture is hot in condition so handle it carefully and compact it to reduce internal pores. It is kept for 24 hours for drying. After the 24 hour removed the mould and it is ready for use.

2.1 Testing of Specimen

1. Compressive strength for paver block

Plastic paver block of size 190X90X40mm were casted. The maximum load at failure reading was take and average compressive strength is calculated using the following formula:

Compressive strength (N/mm²)= (Ultimate load in N/ Area of cross section (mm²))



Fig -1: Experimental Setup for Compression test

2. Water Absorption Test

In this paver block first weighted in dry condition and they are immersed in water for 24 hours. After that they are taken out from water and they wipe out with cloth. Then the difference between the dry and wet block percentage are calculated:

$$\text{Water absorption} = \left\{ \frac{W2 - W1}{W1} \times 100 \right\}$$

Where, W1 = weight of dry block

W2 = weight of wet block

3. Oven test

The paver block is made of plastic it is required to know its heat resistance. Hence plastic paver block is placed in oven for 2 hours.

2.3 Results

1. Compressive Strength Test

Table- 4: Compressive Strength Test

Specimen	Plastic waste	Quarry dust	Sea sand	Compressive stress(N/mm ²)
Specimen-1	1	1	1	10.52
Specimen-2	1	1	1	11.69
Specimen-3	1	1	1	14.61
			Average	12.27

2. Water Absorption Test

Table- 5: Water Absorption Test

Sr. No.	Specimen	Water absorption
1.	Specimen- 4	2.303
2.	Specimen- 5	1.570

3. Oven Test

Table- 6: Oven Test Result

Sr. No.	Specimen	Water absorption
1.	PPB- 4	2.303
2.	PPB- 5	1.570

3. CONCLUSION

1. Plastic is an innovative material therefore it is using in construction purpose.
2. Plastic sand paver possess more advantage which includes resources efficiency.
3. Plastic paver block is a productive way of disposal of plastic waste.
4. It shows better results such as strength, good heat resistance, etc.

5. It can be used in light traffic road or footpath.
6. It requires less time for manufacture.
7. The cost of paver block reduced when compared to that of concrete paver block.
8. The compressive strength is low when compared to the concrete paver block.

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