

# Manufacturing Process of Plastic Paver Blocks

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**Abstract-** Plastic waste which is increasing day by day becomes eyesore and in turn pollutes the environment, especially in high mountain villages where no garbage correction system exists. A large amount of plastic is being brought into the tourist trekking regions are discarded or burned which leads to the contamination of environment and air. Hence, these waste plastics are to be effectively utilized. Hence we can use plastic waste in manufacturing of paver blocks by replacing cement.

**Keywords-** Manufacturing Process, Tests on Paver blocks, Paver Blocks, Plastic Waste.

## I. INTRODUCTION

Paver block paving is versatile, aesthetically attractive, functional, and cost effective and requires little or no maintenance if correctly manufactured and lay. Most concrete block paving constructed in India also has performed satisfactorily but two main areas of concern are occasional failure due to excessive surface wear, and variability in the strength of block. Natural resources are depleting worldwide at the same time the generated wastes from the industry and residential area are increasing substantially. The sustainable development for construction involves the use of Nonconventional and innovative materials, and recycling of waste materials in order to compensate the lack of natural resources and to find alternative ways conserving the environment. So in order to save nature resources from depleting we can go for plastic paver blocks which are eco-friendly and cost effective.

## II. LITERATURE REVIEW

[A]R.Mahadevi et.al, “An experimental investigation on concrete paver block by using PVC plastic material”:

The aim of their research is to reduce the unit weight, cost of block and also to reduce the environmental pollution. Disposal of plastic in an environment is considered to be a big problem due to its low biodegradability and presence in large quantities. The PVC plastic is used in the form of powder as partial replacement of fine aggregate in percentage of 0, 10 and 30. Using 197x167x61mm bone shaped paver block molds

and M30 grade of concrete mix are used. The compression and water absorption tests are carried out.

[B]Dinesh A, et.al, “Utilization of waste plastic in manufacturing of bricks and plastic paver blocks”:

In this study High-density polyethylene (HDPE) and polyethylene (PE) bags are cleaned and added with sand and aggregate at various percentages to obtain high strength bricks that possess thermal and sound insulation properties to control pollution and to reduce the overall cost of construction, this is one of the best ways to avoid the accumulation of plastic waste which is an on-degradable pollutant. The plastic waste is naturally available in surplus quantity and hence the cost factor comes down.

[C]Manhal A etal, “Strength and Behavior of Concrete contains Waste Plastic”:

This paper presents a method of strengthen concrete by the addition of percentages recycled waste plastic (polyethylene). Samples are investigated at time interval of 7 days using 1%, 3% and 5% from fine aggregate recycled waste plastic (polyethylene). It is found that when waste plastic bottles increased from zero to 5% of the sand in the mix, the compressive strength increase by 4.1% at 7 days age.

## III. MANUFACTURING PROCESS OF PLASTIC PAVER BLOCKS

### A. Melting Of Plastic

Light a small fire under the metal drum and gently heat it. Add the plastic waste. As it warms up it will reduce in size. Light the plastic at the top using a small flame to help it melt down. Make sure the fire does not get too hot. Keep adding plastic gently at the side of the melted plastic until it melts down to a black liquid. Do not stand directly over the melting barrel try to avoid breathing any gases from the fire and take care as tools can get hot.

Remember, melting plastics will produce fumes which can be harmful if inhaled. Make sure to melt them in a

well-ventilated area. And if you're doing it in a room, it is nice to have an exhaust fan in there.



### B. Adding of Sand

Other than the unity candle, the sand ceremony may be the most well known wedding unity ceremony. It involves both partners pouring sand into a single container, symbolizing their life-long commitment and the joining of their two lives. Sometimes parents are included as well, to symbolize the blending of families.

### C. Mixing of Plastic & Sand

Keep mixing thoroughly until all the plastic has melted and there is a consistent black liquid. Sometimes plastic lumps can remain even at very high temperatures. Stirring and heating must continue until all lumps are removed and a homogenous paste is obtained, since they affect the strength of the material. This can take up to 20 minutes. Do not let the liquid get so hot that it burns strongly it will not work as a building material if this happens. A few flames from the liquid are acceptable. Add sand until you have the required mixture and keep mixing so that the plastic, which acts as a binder, is very well mixed in and looks like grey cement.



### D. Molding

Prepare the mould by making sure it is very clean, with no pieces of plastic on it from previous molding, and well oiled. Quickly remove the mixture using the spade with the metal shaft and put it into the mould with the trowel. Since the mix being very hot be careful and wear gloves. Place the mix in the mould such that there will be no air gaps. Allow the hot

mix in the mould to set for a few hours. Unscrew the mould and remove the block. These blocks can be used as footpaths, garden areas, cycling zone.



### E. Drying

The paver block should be placed in water for 2 to 3 hours in order to reduce the heat absorbed by paver block by melting of plastic at high temperature.

### F. Testing of Paver Blocks

#### 1. Water Absorption Test:

This test checks on how the paver block absorbs water, specimen to be tested is immersed in water, room temperature are required when it has been immersed for 24 hr. plus or minus two hours then specimen is removed from water and drains the water on it, for too invisible water can be removed by damp cloth, its weight is taken and then dried at temperature of within 107°C and should not exit a period of 24hrs. successive weight are taken every 2 hrs. To determine the loss weight greater than 0.2 per cent, new weights are recorded. In this the 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 are wiping out with cloth. Then the difference between the dry and wet paver blocks percentage are calculated.

#### 2. Compressive Strength Test:

Plastic paver blocks of size 200mmx200mmx 80mm for each side were casted. This is also called crushing strength of bricks and paver blocks. Generally 3 specimens of bricks are taken to laboratory for testing and tested one by one. In this test a brick and paver block specimen is put on crushing machine and applied pressure till it breaks. The ultimate pressure at which brick is crushed is taken in account. All 3 specimens are tested one by one and average result is taken as brick's compressive /crushing strength.

Compressive strength (N/mm<sup>2</sup>) = (Ultimate load in N / Area of cross section (mm<sup>2</sup>)).

## 3. Efflorescence Test:

The presence of alkalis in bricks is harmful and they form a grey or white layer on brick surface by absorbing moisture. To find out the presence of alkalis in bricks this test is performed. In this test a brick is immersed in fresh water for 24 hours and then it is taken out from water and allowed to dry in shade. The plastic sand brick has low alkali content and so a little white patch is formed over the surface.

## 4. Hardness Test:

In this test a scratch is made on brick surface with steel rod (any hard material can be used) which was difficult to imply the bricks or blocks were hard. This shows the brick possess high quality.

## 5. Fire Resistance Test:

The Plastic is highly susceptible to fire but in case of Plastic sand bricks/Paver blocks the presence of sand imparts insulation. There is no change in the structural properties of block of bricks up to 650<sup>0</sup>C above which visible cracks are seen and the blocks/bricks deteriorate with increase in temperature.

## 6. Acid Resistance Test:

In this test, we put the plastic paver block in the concentrated Sulphuric acid (H<sub>2</sub>SO<sub>4</sub>) for 24 hours after 28days of casting.

#### IV. CONCLUSIONS

The manufacturing of plastic paver blocks were so easy and cost effective compared to concrete paver blocks. So we can reduce the cost , plastic waste disposal problem, reducing depletion of natural resources.

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