

# Comparison of Paver Block Made From Various Wastage Materials

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**Abstract**— This project study involves the use of wood waste, iron waste and PVC crushed pieces and recycled paver block materials in production of concrete paver block. It aim to study possibility of using PVC waste, recycled paver block materials in making of paver block. In this investigation is analyze the compressive strength of paver block to compare the strength of paver block with various wastes to the conventional concrete. Aggregate which passes through 10 mm IS sieve and retain on 4.75 mm IS sieve is used for making of paver block. These paver blocks are used for footpath or parking areas and also those paver block are made up of recycled material to preserve environment.

**Key words:** Paver Block, Wastage Materials

## I. INTRODUCTION

Concrete paver block is attractive and effective with cost and requires little maintenance. Generally 200kg/m<sup>3</sup> of cement is required for the production of paver block. If we use different wastes such as of wood waste, iron waste and PVC crushed pieces, recycled paver blocks in making of pavement block then cost will be minimized and wastages are utilized properly. In recent past paver block is widely used for parking lots, foot path areas. Paver block have lot of demand. Sometimes paver block are used for making of road pavement in low traffic area. In India huge amount of use of concrete which is made from natural material like M-sand, course aggregate from demolition of stone and artificial material like cement.

### A. Material Specification

- 1) Cement: The use cement ordinary Portland cement 53 Grade OPC (IS 12269-2013).
- 2) Aggregates: Materials obtained aggregate passing from 10mm and retained on 4.75 were used as coarse aggregate.
- 3) M-sand: When crushed through machine, huge amount of powder form was obtained which included all mix ingredients from concrete waste material passing from 2mm IS sieve was taken as M-sand.
- 4) Iron waste: Iron waste obtained from demolishing the iron bars after successful use of iron.
- 5) PVC waste: PVC waste obtained from used pipe lines and another waste of crushed pipes.
- 6) Wood waste: Wood waste obtained from wooden pieces cutter from sawmill waste.



Fig. 1: Iron waste



Fig. 2: PVC waste



Fig. 3: Wood waste

## II. PHYSICAL TESTS ON MATERIALS

### 1) Test on cement:

Specific gravity of cement sample = 3.05  
 Standard consistency of cement = 27%  
 Fineness of the cement = 7.1

### 2) Test on aggregate:

Specific gravity of aggregate = 2.68  
 Water absorption of aggregate = 0.05

### 3) Test on fine aggregate:

Specific gravity of fine aggregate = 2.59

### 4) Test on waste materials:

Specific gravity of iron waste = 5.0  
 Specific gravity of PVC waste = 1.38

Specific gravity of wood waste = 1.0

5) *Mix Proportion:*

All the mixes prepared are corresponds to M-25 grade. For the design of mix IS 10262-2009 & IS 15658:2006 recommendations are adopted.

Mix Design Proportion for conventional paver block

| Sample | Cement (kg) | Fine aggregate(kg) | Coarse aggregate(kg) |
|--------|-------------|--------------------|----------------------|
| I      | 1.186       | 1.726              | 2.920                |
| Ratio  | 1           | 1.45               | 2.45                 |

Mix Design Proportion for Replaced Materials

| Sample | Cement (kg) | Fine aggregate(kg) |                  | Coarse aggregate (kg) |
|--------|-------------|--------------------|------------------|-----------------------|
|        |             | M-sand (70%)       | Wood waste (30%) |                       |
| II     | 1.186       | 1.210              | 0.220            | 2.920                 |

| Sample | Cement (kg) | Fine aggregate (kg) | Coarse aggregate(kg) |                  |
|--------|-------------|---------------------|----------------------|------------------|
|        |             |                     | Aggregate (60%)      | Iron waste (40%) |
| III    | 1.186       | 1.726               | 1.752                | 1.17             |

| Sample | Cement (kg) | Fine aggregate (kg) | Coarse aggregate(kg) |                 |
|--------|-------------|---------------------|----------------------|-----------------|
|        |             |                     | Aggregate (50%)      | PVC waste (40%) |
| IV     | 1.186       | 1.726               | 1.462                | 0,762           |

| Sample | Cement (kg) | Fine aggregate (kg) | Coarse aggregate(kg) |                       |
|--------|-------------|---------------------|----------------------|-----------------------|
|        |             |                     | Aggregate (40%)      | Iron, PVC waste (60%) |
| V      | 1.186       | 1.726               | 1.462                | 0.585, 0.457          |

III. COMPONENTS OF PROPORTIONING

- 1) Grade of concrete: M25
- 2) Type of cement: OPC 53 grade
- 3) Minimum cement content : 208 kg/m<sup>3</sup> (Extreme).
- 4) Maximum water cement ratio: 0.4 % - IS 456-2000.
- 5) Type of aggregate: 10mm size coarse aggregate.
- 6) Replaced materials: iron waste, PVC waste, wood waste.

A. *Casting of Paver Blocks*

For this project we brought the materials from the store and we casted the paver blocks by compression mould machine on the site itself with the help of their equipment's. All materials are properly mixed and poured in moulds. Moulds are compacted by table vibrator.



Fig. 4: manufacturing of paver block

B. *Test Specimen and Testing Procedures*

For compressive strength test, water absorption and flexural strength test paver block of dimensions are unmeasurable size were casted. The moulds were prepared with different percentage of waste materials are mixed. The samples were cured in water at 7, 14 and 28 days. For determining the compressive strength samples were tested in compressive testing machine and flexural strength test was conducted using universal testing machine. The compressive, flexural and water absorption tests are conducted as per IS: 15658:2006. In each category three moulds were tested and their average value is reported.



Fig. 5: Compressive strength test

C. Test results

1) Compressive strength of paver block

| S.no | Sample | Breaking load (KN) | Area (mm <sup>2</sup> ) | Compressive strength (N/mm <sup>2</sup> ) |
|------|--------|--------------------|-------------------------|---|
| 1    | I      | 1390               | 0.042                   | 33.2                                      |
| 2    | II     | 800                | 0.042                   | 19.04                                     |
| 3    | III    | 2050               | 0.042                   | 48.80                                     |
| 4    | IV     | 1790               | 0.042                   | 42.61                                     |
| 5    | V      | 1580               | 0.042                   | 37.61                                     |

Table 1: compressive strength (14 days)

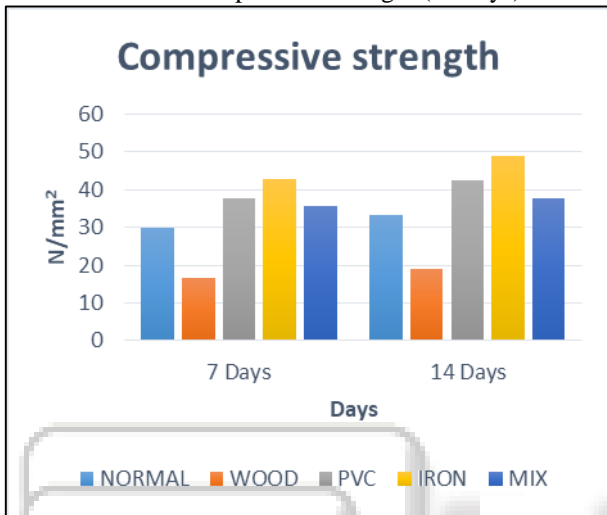


Fig. 6: Compressive strength test result

IV. COST COMPARISON

A. Economic Feasibility

| S. No | Materials  | Rate (Rs/kg) |
|-------|------------|--------------|
| 1     | Cement     | 7            |
| 2     | M-sand     | 1.10         |
| 3     | Aggregate  | 1.34         |
| 4     | Wood       | -            |
| 5     | Iron waste | -            |
| 6     | PVC waste  | -            |

| S. No | Sample | Avg Cost (Rs)/Mould |
|-------|--------|---------------------|
| 1     | I      | 14.1                |
| 2     | II     | 12.20               |
| 3     | III    | 11.14               |
| 4     | IV     | 11.30               |
| 5     | V      | 10.90               |

Table 2: Cost of materials

V. CONCLUSION

We can conclude from the above discussion that the use of PVC and Iron can be possible to improve the properties of concrete which can act as a one of the reusable method.

- [1] Eco friendly -By using waste PVC in paver block 20 – 40% of plastic may reduce, it is also dangerous to environment and wildlife.
- [2] Strength increases up to 30-35% Strength could be increased by using this iron in the paver block by 30 to

35% by normal paver block and also help in reducing waste by 20 to 40%.

- [3] Economical -As the plasticizer are not used in PVC and iron concrete paver block the cost of plasticizers is reduces.

VI. REFERANCES

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