

# EXPERIMENTAL INVESTIGATION ON REPLACEMENT OF PLASTIC IN BUILDING BLOCKS

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**Abstract—** This experimental investigation is based on replacement of traditional building blocks by custom shaped and molded plastic blocks, which are made from the shredded waste plastics thereby, make use of the waste plastic in an effective manner.

**Keywords—** waste plastic, custom Mould, plastic blocks

## I.

## INTRODUCTION

There has been problem of rising cost of building in the developing countries for some time. this is especially in rural areas where the local income has often increased at the same pace as the national average and this has been a source of concern to governments. The population now resides in the urban area meanwhile the overwhelming amount of plastic crowding in land fills to combat these issues the concept of plastic building blocks is introduced by this type of construction people can easily build their homes on their own. The concept of plastic building blocks is to recycle the plastics and convert it into building blocks. This concept work with local municipalities for the source of plastics. By these building blocks people can even build their emergency shelters, community halls, classrooms. The designed blocks fit together like LEGOs. These blocks put an additive that makes the product fire resistant. The blocks take more than 500 years to degrade. The building blocks can be detached whenever needed. These building blocks put an additive that makes the product fire resistant and since the blocks are made of plastic, they'll also resist the earthquake. It also gives a cheaper mode of construction. Each blocks help rid of the world discarded plastic and is cheaper and more fuel efficient to manufacture than conventional bricks. it's also less energy intensive than recycling the plastic into other forms such as in building blocks, bricks etc.,

## II.

## MATERIALS USED

### A. Tin container

Most of the samples are produced using an open cuboid shaped tin container of dimension 300x300x600mm.

### B. Shredded plastics

These are the waste plastics which are shredded into small sized plastics which is available in municipal office.

### C. River sand

This sand is collected from the construction site after sieving it completely to get rid of stones and other wastes present in that.

**TABLE 1: PROPERTIES OF RIVER SAND.**

S.NO	EXPERIMENTS	RESULTS
1	Natural water content (%)	10.7
2	Specific gravity	2.48
3	Unit weight (g/cc)	1.59
4	Fineness modulus	2.89

### III. MOULD AND SPECIMEN PREPARATION

The Mould is designed as interlocking building block sections using wood having high fire-resistant property. The dimension and shape of the Mould is given in the below figure. The materials are collected from municipal office with the permission of city health inspector. The availed plastic doesn't meet up with our need so we purchased extra plastics in retail. We purchased plastics in the form of shuddered plastic pellets. The tin container used for heating plastics is purchased from local garage. Sand is taken from the nearby construction site. The designed custom wooden Mould is manufactured in nearby carpentry.



**Fig 3:** Wooden mould



**Fig 4:** Casted Specimen

For production of blocks the Mould is custom made as in the form of interlocking pattern which can be detached and reused several times and the Mould is made up of fire proof wooden sheet which has a long-life time. For melting the plastics, gas stoves and tin are used. After melting the mixture, it is poured into the Mould with the help of proper productive wearing. Before pouring the inner side of the Mould is wrapped by aluminum foil. By which the plastic block can be removed from the Mould easily. After pouring the molten mixture is then left for 10 to 12 days for solidification and cooling.

### IV EXPERIMENTAL INVESTIGATION

Transparent Concrete was designed for M20 grade of concrete using IS 10262 – 2009. The proportions were arrived and the specimens were cast with the addition of Optical Fibres of 4% by total volume which was compacted using the table vibrator, cured and tested after 7 and 28 days.

#### A. Compression Test

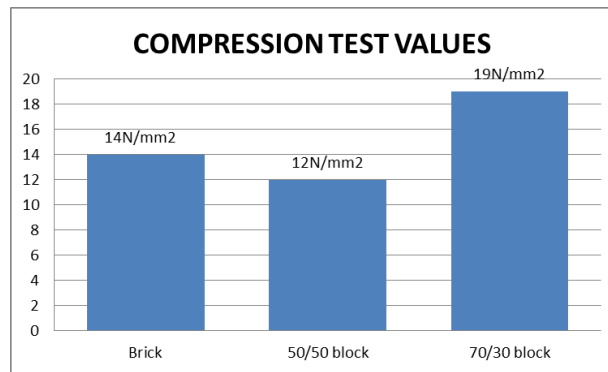
A compression test is any test in which a material experiences opposing forces that push in ward upon the specimen from opposite sides. The test samples is generally placed in between two plates that distributes the applied load across the entire surface area of two opposite faces of the test samples, and then the plates are pushed together by a UTM (universal testing machine) causing the sample to flatten. The goal of the test is to determine the behavior of the material while it experiences a compressive load by measuring fundamental variables such as stress, strain, and deformation. By testing it in compression the compressive strength yield strength ultimate strength elastic limit and elastic modulus may be determined. The normal compressive strength of brick ranges between 7-14N/mm<sup>2</sup>.



**Fig 5:** Compression Test

**Table 2:** Compression test

Plastic/sand proportion (%)	Compressive strength(N/mm <sup>2</sup> )
50/50	12.38
70/30	19.64



**Fig 6:** Bar chart

#### B. Fire resistance test

Fire resistance test determine the behavior of such element of construction when exposed to defined heating and pressure condition which maybe encountered in a full developed fire. The fire resistance capacity of our mold ranges up to **180** degree.

#### C. Water absorption test

Water absorption test is used to determine the amount of water absorbed under specific condition. factors affecting water absorption include: type of plastic, additives used, temperature and length of exposure.

Water absorption = [(Wet Weight-Dry weight)] x 100

The water absorption value is **0.67%**.

#### D. Soundness test

Soundness test shows the nature of blocks against sudden impact. In this test 2 specimens are chosen randomly and struck with one another. The sound produced should be clear bell ringing sound.

#### E. Hardness test

In this test a scratch is made on the surface of the specimen with the help o a finger nail. If no impression is left on the surface the specimen is sufficiently hard.

#### Advantages

- they are thinner and lighter than the conventional bricks
- they have heat insulating properties
- they are strong as their stony counter parts
- they have high sound insulating properties
- cheaper than the conventional bricks
- less energy intensive than recycling the plastic into other forms

#### Disadvantages

- While heating of plastics it may lead to air pollution
- On heating the near by person have chance to get some health hazards
- While handling the heated plastics maximum care should be taken, otherwise it will lead to injuries.

## V. CONCLUSION

The plastic building blocks mainly help in removing waste products thus abolishing land requirement for the dumping of plastic wastes. His method is suitable for the countries which has the difficulty to dispose/recycle the plastic waste. The manufacturing cost can be further reduced by replacing the river sand with fly ash or other waste products. Further research in this project will improve the quality and durability of the building blocks.

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