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Interlocking Plastic Blocks (IPB)

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Abstract: ***The aim of this project is to reduce waste plastic accumulation and produce useful construction material from waste plastic. By replace ordinary block with (waste) plastic block. In India produce nearly 3.3 million metric tons of plastic waste per year. These plastics are discarded or burned which led to contamination of environment and air. The degradation rate of plastic is also very slow process.***
Hence, these waste plastics are to be effectively utilised. the plastics are collected, cleaned, added with sand and coarse aggregate in various percentage to obtain strength of block. That possess thermal, sound insulation and other properties. It's used to reduce the overall cost of construction. This is one of best way to avoid accumulation of plastic waste. Hence, this project helpful in reducing plastic waste in useful way.
Keywords: Interlocking, waste plastics, blocks.

I. INTRODUCTION

Plastic is the very hazardous material and very difficult to decompose it is main problem in the world. Use of plastic is high in our daily life such as polythene bags, disposals, furniture's, packing food packets and other accessories. Disposal of waste plastic is huge problem faced in environment.
Currently about 3.3 million metric tons of plastic waste are produced in India in every year. The dumped waste pollutes the surrounding environment. As the result it affects both human beings and animals in direct and indirect ways.
Plastics disposed by burning or landfills process. They emit large amount of hazardous and toxic gases. These gases effect on the human health and also animals.
Human suffers by the toxic gases such as cancer, high blood pressure, Asthma. Etc. Hence it necessary to dispose the plastic waste properly as per the regulations provided by our government. We can't able to stop the use of plastic but we are able to recycle and reuse it by many ways and minimum effect on environment. Hence, we have made interlocking plastic block. Ordinary wall construction is made with bricks (or) concrete blocks with cement mortar as binder, which increases the overall cost of construction.
Interlocking plastic block laying is versatile, aesthetically, functional, and cost effective and requires little or no maintenance if correctly manufactured and laid. Plastic waste used in this work was brought from the surrounding areas. The replacement of plastic waste for cement provides potential environmental as well as economic benefits.

A. Scope

This project deal with replacement of ordinary concrete block with plastic block and construction method with interlocking mechanism.
The design and shape of our block is different from the existing one. Ordinary wall construction is made with blocks and cement mortar as binder. But, in our project we have replaced ordinary block with block made with waste plastic and instead of binder (cement mortar) interlocking mechanism is used, which reduces the cost of construction.

B. Objective

1) To reduce pollution cause by plastic waste to environment.
2) To reduce the accumulation of plastic waste and turn them into a useful construction material.
3) To replace ordinary wall construction by interlocking method.

C. Materials

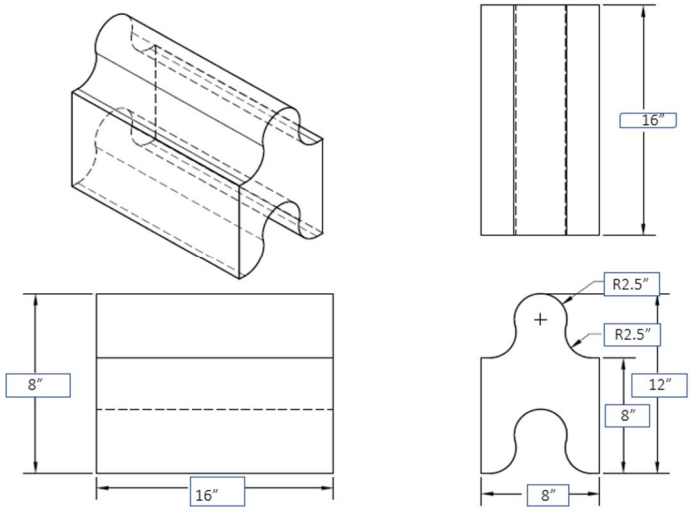
1) Plastic
2) Fine aggregate
3) Coarse aggregate

Table I. Properties of materials

MATERIAL	SP. G	SIZE (mm)	UNIT. WT (kg/m^3)
PLASTIC	0.96	-	940
FINE AGGREGATE	2.67	0.6	1200
COARSE AGGREGATE	3.0	6	1450

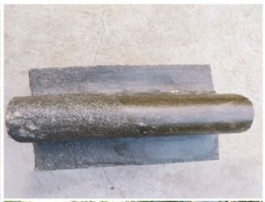
II. METHODOLOGY

A. Design



B. Experimental Procedure

The waste plastic are collected and cleaned properly. The waste plastic are sherded into small pieces. The sherded waste plastic melted at 200°C and the fine aggregate and coarse aggregate are added in various composition to the melted plastic and mixed slowly untill the mixture mixed uniformly.The mixture is poured into the mould and kept for 18hrs to set completely.



III. TEST ON BLOCKS

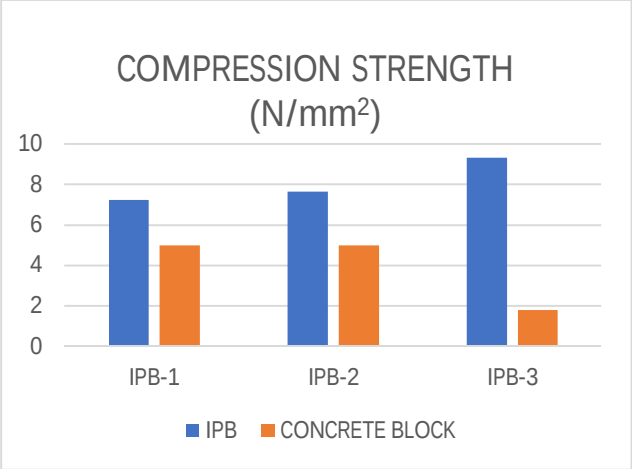
A. Compression Test

Compressive strength testS, for testing block specimen of size 200mm x 200mm x 400mm are used. These specimens are tested by compression testing machine after 14 days. Align the specimen centrally on base plates of the machine and place the top plate. Rotate gently by hand so that it touches the top surface of block. The load is applied gradually without shock and uniformly until this specimen fails.

Table II. Compression strength results of blocks:

Proportion Name	Plastic waste	F. A	C.A	Compression strength (N/mm^2)
IPB-1	0.75	1	1	7.23
IPB-2	1	1	1	7.64
IPB-3	1	1	2	9.33

B. Comparison of IPB (vs) Conventional Concrete Block



C. Water Absorption Test

Water absorption test, for testing block specimen of size 200mm x 200mm x 400mm are used. The specimens are dried for a specified time and temperature. The cleaned specimen soaked in water of 23°C for 24 hrs.

Table III. Water absorption results of blocks:

Proportion name	Proportion	Water Absorption
IPB-1	0.75:1:1	1.8
IPB-2	1:1:1	0
IPB-3	1:1:2	2.13

D. Oven Test

The blocks are made out of plastic it is required to know the heat resistance of blocks. Hence the blocks are placed in oven to know the heat resistance.

Table IV. Oven test results:

SPECIMENS	TEMPERATURE (°C)	REMARKS
IPB-1	50	No changes
	100	No changes
	150	Starts to melt
IPB-2	50	No changes
	100	No changes
	150	Starts to melt
IPB-3	50	No changes
	100	No changes
	150	Starts to melt

IV. CONCLUSION

A. The cost of interlocking plastic block is lesser when compared to the concrete block, reduce construction cost and time.
B. Plastic blocks are highly resistance to water absorption, algae and effloresce action.
C. Used to construct compound wall, non-load bearing and partition wall.
D. Thermal and sound insulated wall also can be constructed with plastic blocks.
E. The utilization of waste plastic in production of interlocking plastic blocks has productive way for disposal and reduce accumulation of waste plastic.

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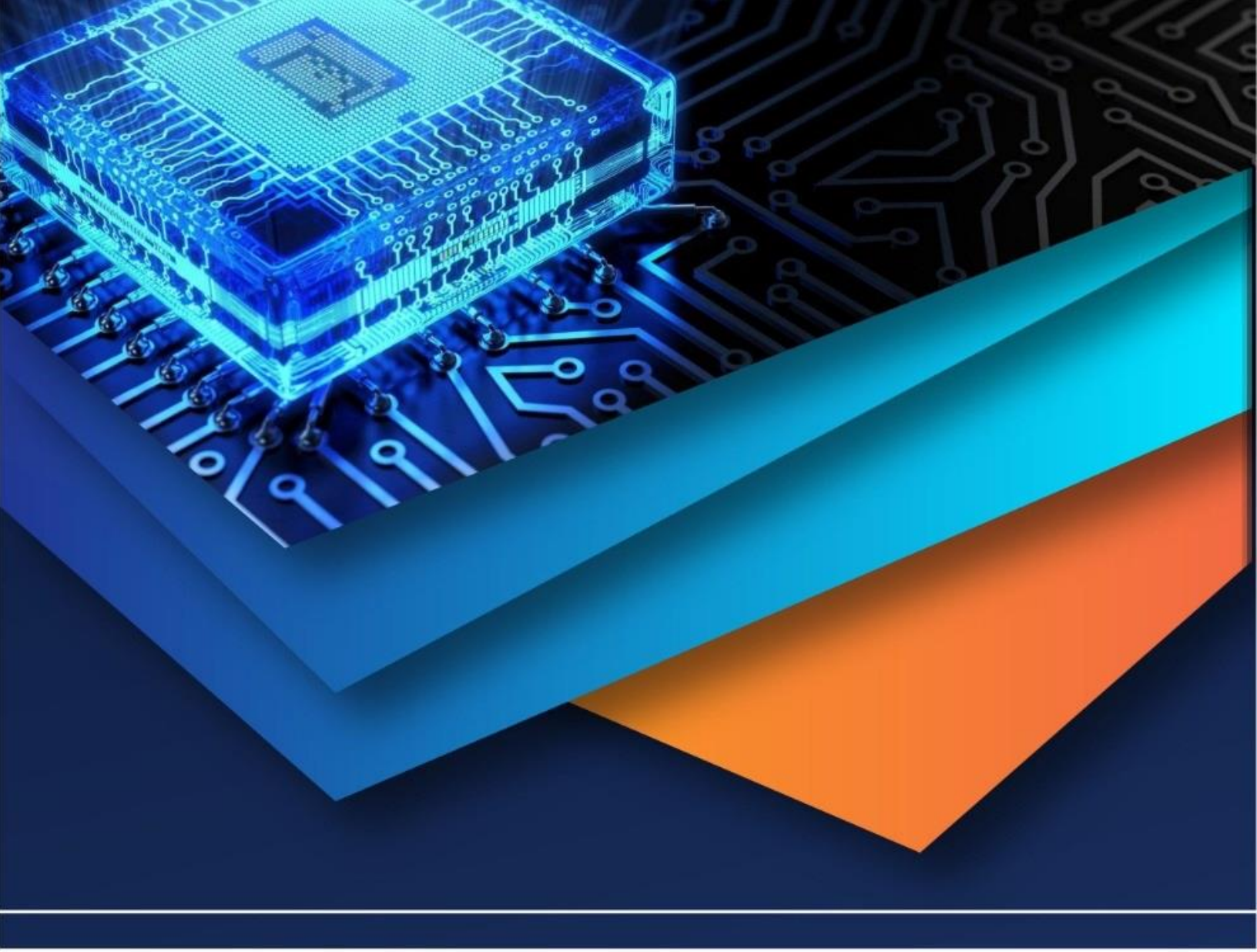

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