
Brief Report of ONE Day Project Exhibition cum Competition on Solid Waste Management

Date- April 21, 2018

Venue: Centre Circle, SIT, Main Building

Introduction: Solid waste refers to the range of garbage arising from animal and human activities that are discarded as unwanted and useless. Solid waste is generated from industrial, residential and commercial activities in a given area. Regardless of the origin, content or hazard potential, solid waste must be managed systematically to ensure environmental best practices. As solid waste management is a critical aspect of environmental hygiene, it needs to be incorporated into environmental planning.

Objective: The objectives of the event are as follows

- To motivate the students of Siliguri Institute of Technology on to think about the abatement of solid waste pollution
- To make the participants step outside their comfort zones and challenge the institution of conventional thinking.
- To discover the new solutions of the one of the burning problem throughout the world, i.e., solid waste pollution.
- To prepare a project for the competition at the university level.

Outcomes: The outcome of the event is as follow:

- One of the projects named as “MANUFACTURING OF PAVER BLOCK BY USING NON-DEGRADABLE SOLID WASTE” supervised by Prof. SHAKYASEN DEBNATH of Dept. of Civil, SIT, has been selected as the best by the judges and recommended for the assessment at university level at MAKAUT by expert committee.



Siliguri Institute of Technology

H.C.Road , Sukna, Siliguri -734009



Project Exhibition cum Competition on Solid Waste Management

21st April, 2018

Organised by

Solid Waste Management Unit, SIT

VENUE: Centre Circle, SIT Main Building

Dr. Susanta Kumar Saha
Coordinator

Dr. Baidyanath Ghosh
Convener

Invited Persons: The following judges are invited from industry

	Judge 1	Judge 2
Name	Anuj Duggal	Arun Mugesh
Company/ Industry	Intel Corporation	Intel Corporation

Participants: The following numbers of students are participated

Sl. No	SEMESTER	STREAM	No. of Students
1.	2nd	CSE	05
2.	4th	CE	03
		ECE	12
3.	6th	EE	03
4.	8th	CSE	03

Workshop/Seminar Committee members:

Chairperson	Dr. J. Jhampati, Director, SIT
Advisor	Mr. J. Guha, Administrator, SIT
Coordinator	Dr. S. K. Saha, Asst. Professor of Chemistry, DESH, SIT
Convener	Dr. B. Ghosh, Asst. Professor of Chemistry, DESH, SIT
Members	All HODs, Jt. Conveners, R & D Committee

Report of the winning project:

MANUFACTURING OF PAVER BLOCK BY USING NON BIO-DEGRADABLE SOLID WASTE MATERIALS

MENTOR

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Abstract:- The objective of the project is to manufacture paver blocks and tiles by using non-biodegradable waste material such as plastic, building waste, broken glass etc. India produces nearly 25000 ton waste plastic per day. The degradation rate of plastic waste is also a very slow process which produces harmful gases and diseases. So our initiative will help to reuse and recycle those non-degradable wastes by manufacturing paver blocks and tiles by using those waste materials. This will help us getting a pollution free environment and decorative products like this paver blocks and tiles. In this project we have used plastic waste in different proportions with glass and building waste to prepare paver blocks.

Keywords:- Paver block, Plastic waste, Glass waste, Building waste.

1. INTRODUCTION

Paver block paving is widely used now-a-days because of its durability, flexibility, easy installation, long life, easy repair and maintenance, custom design, aesthetic etc. For manufacturing paver blocks, cement, sand and stone chips are generally used. As a result price per blocks is costly too.

Natural resources are depleting worldwide and at the same time the generated wastes from the industry and residential area are increasing substantially. Currently 25000 tons of plastic and other solid waste is dumped everyday in India which creates pollution. As the result it affects both human beings and animals in direct and indirect ways. So, we can say that waste materials are easily available in the environment.

In this project all the waste materials like plastic waste, broken glass, building wastes like broken marbles, ceramic tiles, brick and stone dust etc. are collected from the surroundings with a very minimum cost. In conventional paver block, cement is used as binding material. But in this project plastic waste is the binder and glass, marble, tiles, brick and stone waste pieces will be the coarse aggregate.

2. MANUFACTURING PROCEDURE

2.1 Plastic Waste

Plastic wastes are collected from the surroundings and the waste plastic vendors at very low cost. Generally LDPE (Low-density polyethylene) type of plastic such as heavy duty plastic bags, squeezable bottles etc are collected to have low pollution while melting.

Sl.No.	Particulars	Value
1	Melting point	150°
2	Thermal co efficient of expansion	100-200X10 ⁻⁶
3	Density	0.910-0.940
4	Tensile strength	0.20-0.40(N/mm ²)

PROPERTIES OF LDPE

2.2 Glass Waste

Glass bottles wastes are easily available in waste dump yard. Even all the glass shop where cutting of glass is done can supply glass waste. After collecting the broken glass waste, it is then crushed to size passing through 10mm sieve which is used as coarse aggregate.

2.3 Building Waste

As building waste materials are not preferable to reuse in building construction work, we can use those preparing paver blocks, tiles etc. Building waste materials like broken bricks, tiles, marbles are easily available and collected from the surroundings only. Then those waste materials are crushed to a size same as the glass.

2.4 Marble and Ceramic Waste

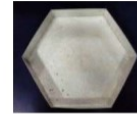
Broken marble and ceramic tiles pieces are easily available in any hardware shops and warehouses. Similarly these are crushed like above and used as coarse aggregate.

2.5 Fine Aggregate

For fine aggregate, sand from the building waste is used.

2.6 Size & Shape of The Block

We have purchased a conventional hexagonal paver block from market to measure the surface area of the block. So, similar metal mould is manufactured by local welding shops. The surface area of our mould is 464.5 sq. cm.(0.5 sq.ft.) and thickness is 5 cm.



2.7 Mix Ratio

As of now, we have prepared paver blocks with only one mix ratio.

Plastic:Coarse aggregate:Fine aggregate=3:1:2

2.8 Preparation of Test Specimen

Plastic wastes are heated in a metal bucket at a temperature of above 150°. As a result of heating the plastic waste melt. The coarse and fine aggregates as described in previously are heated and added to it in right proportion at molten state of plastic and well mixed. The metal mould is cleaned through at using waste cloth. Now this mixture is transferred to the mould. It will be in hot condition while compact it well to reduce internal pores present in it. Then the blocks are allowed to dry for 12 hours so that they harden. After drying the paver block is removed from the moulds and ready for the use.



3.1 Compressive Strength

Plastic paver blocks were casted. The maximum load at failure reading was taken and the average compressive strength is calculated using the following equation.
Compressive strength (N/mm²) = (Ultimate load in N / Area of cross section in mm²)

3.2 Oven Test

As the paver block is made of plastic we need to know its melting point hence over test is performed. The paver block is kept in oven for 2 hours and after 2 hours its condition is verified.

4. RESULTS & DISCUSSION

4.1 Compressive Strength

The compressive strength of the sample is found to be 5.6N/mm²

4.2 Oven Test

Since 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.

Specimen	Temp (°C)	Remark
1	50	No change
	100	No change
	150	Melts
2	50	No change
	100	No change
	150	Melts
3	50	No change
	100	No change
	150	Melts

4.3 Conclusion

The following conclusions were drawn from the experimental investigation

- The utilization of waste plastic in production of paver block has productive way of disposal of plastic waste.
- The cost of paver block is reduced when compared to that of concrete paver block.
- It also shows good heat resistance.
- Though the compressive strength is low when compared to the concrete paver block it can be used in gardens, pedestrian path cycle way etc.
- It can be used in Non-traffic and light traffic road.
- It can be used as decorative tiles.

5. FUTURE WORK

In future we are planning to use different mix proportions to check the variation of strength of the blocks. We are searching for new waste materials to use so that we can improve the strength also.

6. REFERENCE

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