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Vibration Analysis of Recycled Plastic Brick

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ABSTRACT: This project reviews one of the sustainable and effective ways of managing plastic waste in urban and rural parts of India in order to minimize their adverse environmental impacts. Plastics are key resources in circular economy and recycling after the end of useful life with economic value creation and minimal damage to environment is the key to their sustainable management. Studies in a large stream of researches have explored impregnating waste plastics in concrete and reported encouraging results with multiple benefits. The present study makes a critical review of some of these findings and gleans some common useful trends in the properties reported in these studies. The requirement for such a research is validated as it is desirable to change the unsustainable arrangement of consumption, production and disposal associated with these materials. After studying the whole scenario, we developed an effective way of utilizing the soft plastic waste and recycling it into plastic bricks which are very light in weight and can withstand high amount of pressure as compared to standard modular bricks. However due to some physical and chemical properties of plastic which can be disadvantageous to the brick created from it, some changes in its design and manufacturing processes can be made.

The purpose of this system is to segregate the Waste into 4 different categories. In this system the waste will be fed to the conveyor belt through an automatic feed system which will comprise of a hopper and other mechanisms. Then using various techniques, the waste is segregated into four different categories which are Metallic waste, Organic Waste, Recyclable waste and the last category is of the remaining unclassified waste. The organic waste can then be further treated and be used as fertilizer, metallic waste can be reused, the recyclable waste can be recycled and the remaining unclassified waste can be sent for landfills and incinerated. Due to the environmental aspect as well as increasing prices for raw and recyclable materials, waste separation is a global topic and also the business model of the future.

I. INTRODUCTION

Today, the generation of plastics waste is a measure issue, as the plastics is not biodegradable, the waste today can be produced wherever human footprints be existed, and remind him that they have not chosen the appropriate method of exploitation of the nature at the present time. The concept of manufacturing the ECOBRICKS was we utilise the plastics waste, which is generated by people door to door, also the construction industry take huge market in current scenario, utilization of waste in such construction industry may play major roll. Main important think while using the waste in ECO BRICK was it cannot made by recycling but just burn to plastic waste without adding any additives and it can also be used for at least 30-40 years in a construction industry.

It is a well-known fact that plastic waste is an important issue for everyone and needs to be resolved on an urgent basis, as it's hazardous effects is deteriorating life on earth. Waste in form of plastic is increasing day by day, but a permanent solution to it is still not found. Landfills, which is used as a method to solve the problem of plastic disposals

indirectly harming the nature. Even landfills are glut with waste, hence demanding an urgency for the plastic disposal problem. Plastic to humans is available in a variety of forms such as LDPE, HDPE, PET, Bakelite, etc. It is generally made from long chains of hydrocarbons along with additives and can be easily moulded into desired finished products.



II. OBJECTIVES

- To develop an efficient way and to effectively utilize the waste plastics.
- To study of behavior of plastic bricks under various mechanical loading
- To minimize and reuse generation of waste plastic on the land and water to avoid land and water degradation and consequent pollution hazard.
- To reduce the dumping area of waste plastics.
- To reduce crack formation in foundation material.

III. OVERVIEW OF EARLIER RESEARCH WORK DONE

In order to have to have more about vibration analysis of recycled plastic brick we referred Research Papers. It gave us information about different techniques used for recycling with their advantages and disadvantages.

We referred research paper “Annual report 2018-19” published by Maharashtra Pollution Control Board. The paper describes according to the survey done by MPCB, around 4.1 lakh tones of plastic waste generated in the year of 2018-2019 in Maharashtra.

We referred research paper “Bricks from waste plastic” published by Shikhar Shrimali, Civil engg., NIT. The aim of project is to study the plastic waste management strategies and provide an effective way to minimize it and use it for a beneficial purpose. He reviewed the methods for waste collection, transportation and disposal as available for municipal solid waste.

We referred research paper “Plastic bricks” published by Sachin Anant Kamble, Dnyandev M Karad. The idea of the project is by re-Using the plastics bottles as the building material can have substantial effect on saving the building embodied energy by using them instead of bricks in wall reducing the co2 emission.in manufacturing by cement reducing the % of cement.

We referred research paper “Manufacturing and testing of plastic sand bricks” published by Ms. Rambha Thakur. This paper introduces the development and low cost housing in India made by plastic sand bricks.

We referred research paper “Utilization of plastic waste in manufacturing of plastic sand bricks” published by Arvind Singhal, Dr. Omprakash Netula. Arvind Singhal & Dr. Omprakash Netula developed plastic based bricks which has better characteristics than any other type of bricks. Plastic sand bricks/tiles are cheaper than normal bricks/tiles.

IV. DESIGN AND DEVELOPMENT OF PLASTIC BRICK

4.1 PLASTIC BRICK MANUFACTURING

Material Requirement for one brick:

1. Clean LPDE (200 Plastic Bags) – 2 Kg
2. Clean Sand (3 times the plastic weight) – 6 Kg
3. Brick shape mould

4. Barrel for melting plastic
5. Burner (Heat source)
6. Stirring equipment
7. Gloves, Masks & Shoes (Safety)



2.3 Batching of Plastic Sand Brick

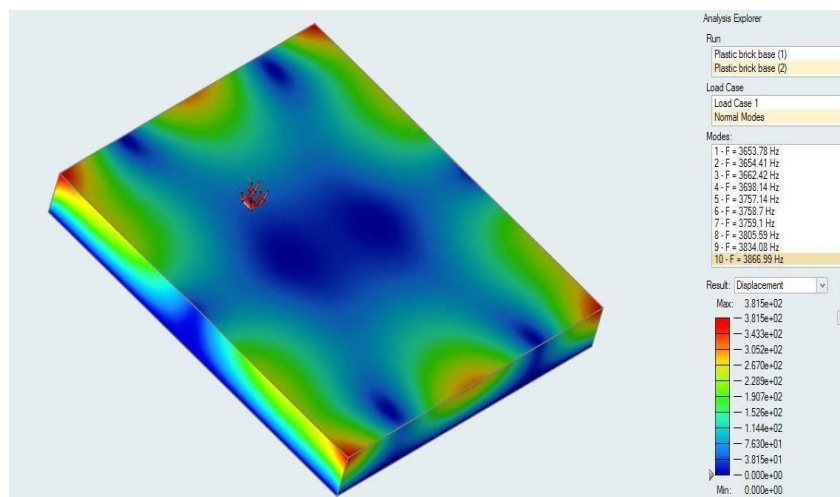
Mix Ratio	1:3	1:4	1:5
For 1 Brick (gram)	1000:3000	800:3200	670:3350
For 4 Brick (grams)	4000:12000	4000:12000	2680:13000

4.2 SAND TO PLASTIC PROPORTIONS

4.3 METHODOLOGY

1. First we need to collect the plastic waste and separate it from other wastes.
2. Second, we should dry the plastic waste if it is wet and has a content of moisture. We have to use dry plastic waste.
3. Then, we crush the plastic waste in small particles by crushing machine.
4. Then, the small particles crush into fine size particles.
5. The ratio of plastic and stone dust which we use is 1:3.
6. The stone dust which we use in manufacturing of bricks/tiles is sieved for a size less than 4.75mm using sieve analysis.
7. Then, we heated the stone dust on a furnace.
8. The fine particles of plastic waste heated in barrel till it is in a liquid form.
9. Then, we added the stone dust into melt plastic & mix it properly.
10. Then, we poured the mix into moulds; keep the mould for dry and demould it on a next day.

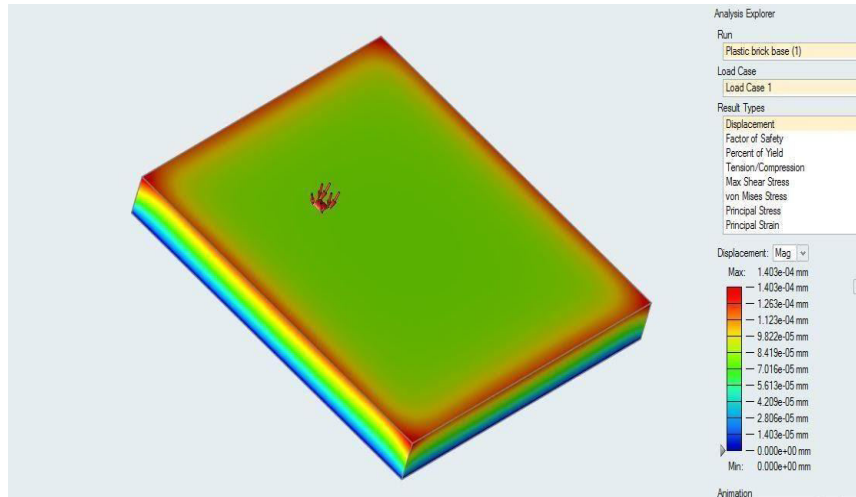
V. ANALYSIS & RESULTS



5.1 STATIC ANALYSIS OF BRICKS

Bricks max displacement under static loading of 800 kg - 0.0001 mm

5.2 RESONANCE FREQUENCY OF BRICK



Resonance frequency of brick – 3867 Hz

VI. CONCLUSION

After preparing a brick out of plastic waste it can be concluded that this project will be proved very helpful for the rural and coastal region people and will have a great impact on environmental pollution created by plastic wastes. Local people of these areas will be free from the hazardous issues of waste around them and this brick will be used for redesigning their houses which used to get washed away in the monsoon season. This project is an innovative and new idea in itself because it deals with the problem at a very macro level but solves it in a very micro perspective view. This

project can be further implemented in the other parts of the world after its success in India. Plastic sand bricks give us hope and a way to work on innovative things related to the plastic and to try to invent some new civil engineering materials which shows some remarkable response in future industry and changes the thoughts of the researchers, users and industries Such as, in going for plastic sand wall in framed structures as a partition wall, plastic sand benches in the parks, plastic sand tracks for running and jogging in place of concrete or stone track.

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