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PLASTIC BRICKS

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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. 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, I 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.

INTRODUCTION:

The waste plastic will be large in household time. In many countries the compositions of waste is different, that it is affected by the socioeconomic characters, waste management programs and consumption generally the level of plastic in the waste composition is high.one of the largest component of plastic waste is polyethylene which is followed by polypropylene. Polyethylene terephthalate and Polystyrene. The large volume of materials required for construction is potentially a major area for the reuse of waste materials. Recycling the plastics has advantages since it is widely used and has a long service life, which means that the waste is being removed from the waste stream for a long period. Because the amount of clay required to make bricks is large, the environmental benefits are not only related to the safe disposal of bulk waste, but also to the reduction of environmental impacts that arise due to burning of plastics. Plastics also help to conserve energy at the home Furthermore, the U.S. Department of Energy estimates that use of plastic foam insulation in homes and buildings each year will ultimately save close to 60 million barrels of oil versus other kinds of insulation. The same principles apply in appliances such as refrigerators and air conditioners

LITERATURE REVIEW:

According to a Technical newsletter “Focus on PET”, Poly ethylene terephthalate belongs to the polyester family of polymers, one of the largest and most diverse of the polymer families. This family of polymers is linked by the common feature of having an ester (-COO-) link in the main chain, but the range of polyester materials is probably the largest of all the polymer families. And also the chemical structure of the PET is having only atomic species that are carbon, hydrogen and oxygen. Therefore melting of PET won’t result in release of noxious

gases and also its properties reveal that a melting temperature of 260 ºC is required. Also from the properties of the PET it can be understood that it has got good chemical resistance and better resistance to UV rays [9]. In a paper "An review on waste plastic utilization in asphalting of roads" [1], the techniques to use plastic waste for construction purpose of roads and flexible pavements, which were developed by various researchers has been reviewed.

And collectively emphasises the concept of utilization of waste plastic in construction of flexible road pavement. In the construction of flexible pavements, bitumen plays the role of binding the aggregate together by coating over the aggregate. It also helps to improve the strength and life of road pavement. But its resistance towards water is poor. A common method to improve the quality of bitumen is by modifying the rheological properties of bitumen by blending with synthetic polymers like rubber and plastics. This bitumen mix show better binding property, stability, density and more resistant to water. And also emphasized the availability of plastic in various forms Research on "The Use of Recycled Materials in Highway construction" [6] and "Utilization of waste plastic in Bituminous Concrete mixes" [7] to determine the suitability of plastic waste modifier in construction of bituminous mixes, where the heated aggregates are transported on conveyor belts the shredded plastic is sprayed on it. So that plastic makes a coat on the aggregate this plastic coated aggregate was later blended with hot molten bitumen to result in plastic modified bitumen. The research concluded that this waste plastic usage in bituminous concrete mixes resulted in improved resistivity to water absorption and better bonding with reduced susceptibility to stripping. "Useful products from oil and organic chemistry"[8], classifies the plastic as Thermo softening plastics (Thermo plastics) and Thermo setting plastics (Thermo set plastics). Thermo setting plastics can be made plastic and malleable at high temperatures only once. Modern thermoplastic polymers soften anywhere between 65 ºC and 200+ ºC. In this state they can be moulded in a number of ways they differ from thermo set plastics in that, they can be returned to this plastic state by reheating. They are then fully recyclable.

PET used in this project belongs to thermo plastics. Thermo-set plastics differ in that they are not re-mouldable. Strong cross links are formed during the initial moulding process that gives the material a stable structure. They are more likely to be used in situations where thermal stability is required. They tend to lack tensile strength and can be brittle. Polyester resin, Urea formaldehyde etc. belongs to this type. An attempt to utilize the laterite wastes available abundantly in the laterite quarry for the manufacture of laterite soil bricks using cement as a stabilizing agent [2]. This can be used as an alternative to the usual laterite stone. The laterite soil was procured from the laterite quarry near sullia. The study concluded that laterite soil stabilized with 7% cement for manufacturing of interlocking bricks with a good compressive strength of 4.72 N/mm2 . The concept of interlocking bricks of size 30x20x18cm was adopted which resulted in a cost effective construction [2]. As per the research work on "Use of Cement-Sand Admixture in Laterite Brick Production for Low Cost Housing" [4], in Makurdi (Nigeria) and other locations within Benue State, abundant lateritic soil deposits exist which can be harnessed for brick production. Results showed that laterite used in this study cannot be stabilized for brick production within the economic cement content of 5% specified for use in Nigeria. However, bricks made with laterite admixed with 45% sand and 5% cement attained a compressive strength of 1.80 N/mm2 which is greater than the specified minimum strength value of 1.65 N/mm2 . Cost comparison of available walling materials in Makurdi metropolis showed that the use of bricks made from 45% sand and 5% cement resulted in a saving of 30 - 47% when compared with the use of sand concrete blocks

while the use of fired clay bricks resulted in a savings of 19% per square meter of wall. The study therefore recommends the use of laterite bricks in Makurdi and other locations because it is more economical and environmental friendly than fired clay bricks.

OBJECTIVE:

As we gathered the few daily facts the waste discharged from the residential areas has been increased tremendously so we have made a low cost baler which can be kept in the residential areas to reduce the amount of waste plastic products. Considering the important factor as low cost, we have decided to design the baler which works mechanically with human help. We have designed the baler in the steel and the baler has press on its each side to get covered inside a film firmly and gives as a packed baled product inside a film.

MATERIALS USED:

The materials used for preparing bricks are

1. Heating vessel
2. Weight press
3. Stirrer
4. Furnace
5. Plastic materials
6. M-sand
7. Brick mould
8. Steel tray

EXPERIMENTAL WORKING:

Preparation of plastic bricks has undergone certain process. They are

1. Collection of waste
2. Segregation
3. Melting and mixing the mixture.
4. Moulding and drying

COLLECTION OF WASTE

Waste produced by houses is usually transferred into communal bins that are fabricated from metal, made from concrete or in combination of both. Street sweepings also find its way to community bins. These community waste bins are also used by other essential commercial sectors in the vicinity of disposal bins along with household waste except where some commercial complexes or industrial units engage municipal authorities for transfer of their waste to disposal site by paying some amount

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SEGREGATION

There is no organized and scientifically planned segregation of MSW either at household level or at community bin. Sorting of waste, is mostly accomplished by unorganized sector and seldom practiced by waste producers. Segregation and sorting takes places under very unsafe and hazardous conditions and the effectiveness of segregation is reasonably low as unorganized sector segregates only valuable discarded constituents from waste stream which can guarantee them comparatively higher economic return in the recycling market (Kaushal, Varghese, & Chabukdhara, 2012). On a number of occasions, due to improper handling the segregated constituents got mixed up again during transportation and disposal

MELTING AND MIXING THE MIXTURE

All the plastic materials should be collected and kept in a vessel. The plastic materials should be heated in a furnace. once it attains a maximum temperature, the plastic materials would melt and it converts to liquid state, add appropriate amount of sand and stir it continuously.

MOULDING AND DRYING

The mixture is placed in a brick mould which has a dimension of 190x90x90 cm. after the mixture is placed inside the mould, it is made to set for few hours until it sets with it. The mould should be kept in the room temperature to get set normally.

TESTING:

CRUSHING STRENGTH

The ultimate compressive strength of a material is that value of uniaxial compressive stress reached when the material fails completely. The compressive strength is usually obtained experimentally by means of a compressive test. The apparatus used for this experiment is the same as that used in a tensile test. Here the plastic bricks are kept under the apparatus for the compression and the crushing strength is obtained by it.

WATER ABSORPTION TEST

The test procedure involves drying a specimen to a constant weight, weighing it, immersing it in water for specified amount of time, and weighing it again. The increase in weight as a percentage of the original weight is expressed as its absorption (in percent). The average absorption of the test samples shall not be greater than 5% with no individual unit greater than 7%.

ADVANTAGES:

- They're also great at insulating against noise
- it only takes 20 bottles on average to make one brick.
- Each brick helps rid the world of discarded plastic and is cheaper
- more fuel efficient to manufacture than conventional bricks

CONCLUSION:

The compressive strength test results for plastic-soil bricks with 70% plastic content by weight of soil with the binder(bitumen) content of 2% by weight of soil will gives a compressive strength of 8.16N/mm2 which is higher than laterite stone (3.18N/mm2). And has a lesser water absorption (0.9536%) than laterite stone (14.58%). So it can be a better alternative building material from the compressive strength test results of plastic-soil bricks for various percentages of binder(bitumen) content by weight of soil with constant plastic content of 70% by weight of soil, it is observed that on increasing the percentage of binder(bitumen) the compressive strength of brick also increases up to 5% (10 N/mm2), but further increase in bitumen decreases the strength (2.04N/mm2). But from economic considerations 2% of bitumen content is taken as optimum binder content which results in compressive strength 8.16 N/mm2 that is greater than laterite stone (3.18 N/mm2). The efficient usage of waste plastic in plastic-soil bricks has resulted in effective usage of plastic waste and thereby can solve the problem of safe disposal of plastics, also avoids its wide spread littering. And the utilization of quarry waste has reduced to some extent the problem of its disposal

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