



“EXPERIMENTAL INVESTIGATION ON EFFECTIVENESS OF WASTE PLASTIC IN THE DEVELOPMENT OF ECO-BRICKS”

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Abstract : Plastic are a wide range of synthetic or semi-synthetic materials that use polymer as a main ingredient, plastic can be made into different shapes when they are heated in a close environment. Nowadays due to development and urbanization, plastic becomes a part of our daily life as it is a compact and light in weight material. This research elaborates the work done by the writer to use plastic as a construction purpose as a ecofriendly building material to replace the clay brick as well as to find a way to effectively utilize the waste plastic a source of raw material. In this study we have selected locally available waste plastic from hubli-dharwad region. Maximum compressive strength for the proportion plastic: sand=1:1.5 was 9.87 N/MM². Water absorption of the given brick is 0.7840 which is < 1%.The scratch is made using a finger nail on the brick surface we observed no scratch marks on it. Two bricks are struck against each other to see if a clear ringing sound is created.

Index Terms – Eco Bricks, Waste Plastics

I. INTRODUCTION

Plastic is a very common material that is now widely used by everybody in the world. Plastic plays a predominant role in reusable in this era, as it is compact and light in weight. Common plastic items that are used are covers, bottles, and food packages. The great problem with plastic is its decomposition. Plastic is made of polymer chemicals and they are non-biodegradable. This means that plastic will not decompose when it is placed in earth. The increase in the popularity of using Eco-friendly, low cost and light weight construction materials in building industry has brought about the need to investigate how this can be achieved by benefiting to the environment as well as maintaining the material requirements and their standards. 8 million tonnes of plastic finding its way into oceans every year. Only 9 percent of all plastic waste ever produced has been recycled, while 79 percent end up in landfills, dumps or the natural environment. India generates 15 million tonnes of plastic per year but only one fourth means 3.75 million of this is recycled due to lack of functioning. For clay brick, depending on the kind of kiln and fuel used for the firing, a brick kiln releases roughly 70–282 g of carbon dioxide, 0.001–0.29 g of black carbon, 0.29–5.78 g of carbon monoxide (CO), and 0.15–1.56 g of particulate matter per kilogram of brick burn. In India, common burned clay brick is primarily used for structural walls, however in order to save building costs and time, an alternative to these bricks is required. Plastic looked to be an economical and effective raw material due to mass manufacturing, non-recyclable property and its economic revolution. With the growing concern about adopting eco-friendly, cost-effective, and light-weight construction materials in building materials, we can help meet our material needs without sacrificing the environment. Furthermore, moving construction materials manufacturing from concrete to PET will only help to reduce the Greenhouse effect, since cement production accounts for 5–8% of anthropogenic CO₂ emissions. this study elaborate the best use of waste plastic in construction industry and converting it into ecofriendly materials.

Objectives: 1.To collect waste plastic and other materials from Hubli- Dharwad 2.To Design and fabricate different size and shape of moulds.3.To conduct different tests to check the suitability of eco-friendly building materials 4.To comment on its rates with current market status.

II.METHODOLOGY

Collection of material like waste plastic and sand from Hubli-Dharwad region by cutting it in small pieces and mix it with the mixture of cement sand and aggregate. Some of them burn plastic and then mix it with iron chips, bitumen, rice husk and several other materials. Here we melt plastic and then mix sand with it. The types of plastic which we are using are Low density Polyethylene (LDPE), Polystyrene (PS), High density polyethylene (HDPE), Polyphenylene ether (PPE). For making this plastic brick, these four types of plastic got collected and we have to clean it with the help of water to remove impurities and after washing, put it to dry naturally. If we directly put these plastic in its shape then it takes time to melt, so we reduce its surface area so that it can easily melt. Plastic and sand are mixed in the various proportions as 1:1, 1:1.5, 1:2, 1:2.5, and 1:3 by weight.



Fig: Waste plastic & other materials

III.RESULTS AND DISCUSSIONS

The maximum Compression Strength is achieved for the proportion 1:1.5. The obtained value of Compression test value is 9.87 N/MM²

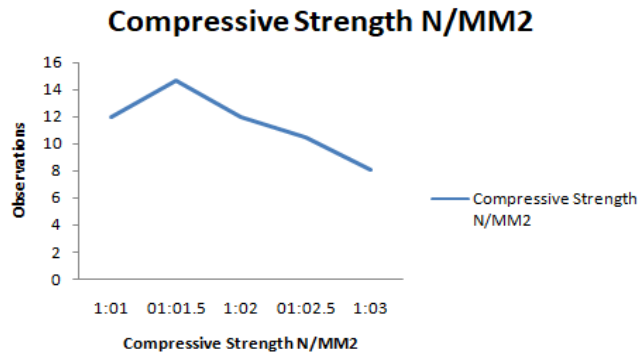


Fig: Compressive Strength Test

Water absorption of the given brick is 0.7840 which is < 1%. The scratch is made using a finger nail on the brick surface we observed no scratch marks on it. Two bricks are struck against each other to see if a clear ringing sound is created.



Fig: Water and Sound Test

IV.CONCLUSION

On the basis of laboratory experiments conducted following conclusions are made

1. The maximum Compression Strength is achieved for the proportion 1:1.5 by weight.
2. The obtained value of Compression test value is 9.87 N/MM²
3. Water absorption of the given brick is 0.7840 which is < 1%.
4. In compared to native clay bricks, plastic bricks are more cost-effective, have stronger compressive strength, have negligible water absorption, and are lighter in weight.

REFERENCES

1. Kumar, R., Kumar, M., Kumar, I. and Srivastava, D., 2021. A review on utilization of plastic waste materials in bricks manufacturing process. *Materials Today: Proceedings*, 46, pp.6775-6780.
2. RajarapuBhushaiah, Shaik Mohammad, D. SrinivasaRao “*Study of Plastic Bricks Made From Waste Plastic*” international Research Journal Of Engineering And Technology (IRJET) Volume:06 Issue: 04 April 2019.
3. Edmund T.S.J. , Jun Hon C., F Hejazai and M.S. Jaffar“*Wate Plastic as a partial replacement for aggregates*” IOP Conf. Series: earth and Environment Science 357 (2019) 012018.
4. Majid Ali “*Natural Fibre as a construction Building Material*” Journal of Civil engineering and Construction Technology Vol. 3(3), pp. 80-89, March 2012.
5. SiddharthTalsania, Dr. JayeshkumarPitroda, ChetnaMukeshkumarVyas“*Effect of Rice Husk Ash on Properties of Pervious Concrete*” March 2015.
6. BhavyaRana, Prof JayeshkumarPitroda, Dr F S Umrigar“ *SugarCane Bagasse Ash For Eco Friendly Fly Ash Bricks*” Proceeding of National Conference CRDCE13, 20-21 December 2013, SVIT, Vasad.

