

APPLICATION OF RUBBER PROPERTIES IN CLAY BRICKS

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Abstract:- The main objective of this study is to find the strength characteristics of a clay brick when it is mixed with epdm rubber and stone dust. The specimens are prepared by adding Epdm rubber in percentages 10%,20%,30%,40%,50%,stone dust with 50%,40%,30%,20%,10% and maintain clay soil percentage as 50% in all conditions. Prepared specimens are dried for 7 days and after that sent to burning at a temperature of around 900 c at Raja ram brick manufacturing factory in Ghatkesar. Manufactured bricks are tested for the compressive strength, tensile strength and obtained results are compared with conventional clay brick. Modified bricks with epdm rubber at 20% and stone dust at 40% have given good compressive strength.

Key words: Modified bricks, EPDM rubber and stone dust.

I. INTRODUCTION:

Many researchers have done their contribution to increase the strength of bricks, but the addition of epdm rubber and stone dust in clay bricks has not yet blended before. With increase in population there is an increase in demand for construction. The quality of bricks plays a key role in the strength of structure, the addition of raw materials like epdm rubber and stone dust will improve the strength of brick and also improves environmental conditions.

II. LITERATURE REVIEW:

- 1) Andre L.N. Inacio et al (2017): Thermoplastic composites reinforced with natural fibers are increasingly gaining attention, not only for environmental concerns, but also for economic reasons. Bamboo is a fast growing lignocellulosic material composed of high strength natural fibers and is a valuable contribution to the production of alternative materials and as reinforcement of matrices.
- 2) Niki D.Beskou et al (2016): Fatigue crack has been recognized as one of the main forms for structural damage in asphalt concrete pavements. These additives are Polypropylene (PP), Crumb rubber (CR), Cellulose fiber (CF), Asbestos fiber (AF) and Gilsonite (GS).
- 3) Azza MohamedElleboudy et al (2017): Performance of geogrid in gravel roads subjected to repeated loads was investigated through laboratory testing. Conducted cyclic plate load test on unpaved roads.
- 4) Iman Mohammadi et al (2014): Applying water-soaking treatment on CRC pavements was investigated. Fresh and hardened characteristics of rubberised-concrete were evaluated. Water-soaking treatment significantly enhanced mechanical properties of CRC. An equation for estimating strength of CRC was introduced.
- 5) Lei Gao et al(2018): RAP (reclaimed asphalt pavements)mixtures has low temperature performance when compared to the new mixture, new mixture has a worse indirect tensile resistance than RAP mixture, RAP mixture has worse fatigue performance.
- 6) Suo Zhi et al (2012): He said that Modified polymer bituminous materials are better than unmodified bituminous materials for crack resistance.
- 7) D. S. V. Prasad et al(2009): Cyclic load tests are carried out in the laboratory by placing a circular metal plate on the model of flexible pavements
- 8) Mohd Kashif Khan et al (2015): He finally concluded that the use of stone dust and tyre used for concrete will reduce the pollution and perform as low weight concrete and used in road base.

III. EXPERIMENTAL WORKS:

2.1 Materials

2.1.1 Soil: soil used in this study has brought from Bogaram area. The proportion of this soil is 50% in all proportions mixed with epdm rubber and stone dust. Laboratory tests were conducted on soil. Table.1. shows the physical and chemical properties of soil.

Table.1.Physical and chemical properties of the soil

S.NO.	SOIL PROPERTIES	VALUES
1.	Moisture content%	18
2.	Specific gravity	2.1
3.	Liquid limit%	28
4.	Plastic limit%	19
5.	Clay%	51
6.	Silt%	27
7.	Sand%	15
8.	Ph	7.5

2.2.2 Epdm Rubber: A sample of recycled epdm rubber has been collected from the local vendor Alfa polymers in Hyderabad. Epdm rubber is a type of synthetic rubber, it is an elastomer characterized by a wide range of applications. It consist high content of ethylene and it resists high temperatures and tensile stress. It has low specific gravity.

**Fig.1** Epdm Rubber

2.3.3 Stone Dust: stone dust used in this research was brought from deposits located in tandur mining area. Table.2. shows the physical and chemical properties of stone dust.

Table.2.physical and chemical properties of stone dust

S.NO	PROPERTIES	%
1	Moisture content	1.21
2	Specific gravity	2.56
3	SiO ₂	25.21
4	cao	35.2

2.4.4 Specimen preparation: Soil obtained from Bogaram area is cleaned from organic matter, later it is crushed and made in to powder form. Then recycled EPDM rubber with percentages of 10%, 20%, 30%, 40%, 50% and stone dust with 50%, 40%, 30%, 20%, and 10% is added to the powdered soil by maintaining clay soil percentage as 50% in all conditions. Initially 26% of water is added to the clay soil. Clay soil mixed with water and raw materials with different percentages is placed in wooden brick mould for specimen preparation. Specimens prepared are dried for 7 days and sent for burning at a temperature of 900C. After that brick is tested for compressive strength.

2.5.5 Compressive strength test: Specimens are immersed in water at a room temperature for 24 hrs after that take them from water and allow drying for 1 hr at room temperature. Wipe out if any water or moisture content present on bricks with clean cloth. Then specimens are placed in compressive testing machine. Apply load and note the reading at which failure occurs.

IV.RESULTS AND CONCLUSION:

From the experimental results it was found that the combination of 20% Epdm and 40% of stone dust is showing the maximum compressive strength. By Increasing the percentage of Epdm and decreasing the percentage of stone dust is showing decrease in compressive strength, because of less stone dust proportion in specimens. Stone dust is having main chemicals SiO₂ and CaO which are acting as binders. Epdm rubber is non degradable material and dumping of epdm rubber occupies more land area at the same time dust produced from quarries or from crushing units of rocks produces fine material in the form of dust. This

stone dust is lighter material and it occupies more area for storage and causes air pollution which is a major issue these days. To overcome issues like shortage of space to dump and air pollution these materials can be used in preparation of bricks so that pollution can also be controlled.

Table.3 Compressive strength of bricks

S.NO.	Bricks with 50% clay and % epdm rubber	Bricks with 50% clay and % stone dust	Compressive strength(mpa)
1	50%clay &10% epdm	50%clay &50% stone dust	15.1
2	50%clay &20% epdm	50%clay &40% stone dust	17.1
3	50%clay &30% epdm	50%clay &30% stone dust	13.2
4	50%clay &40% epdm	50%clay &20% stone dust	11.6
5	50%clay &50% epdm	50%clay &10% stone dust	10.2

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