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Design Of Agro Wastes Bricks For Tribals

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1.1 ABSTRACT-

Agro waste which is increasing day by day becomes eyesore and in turn pollutes the environment, especially in villages where no waste disposal system exists. A large amount of agro waste is being generated into the tribal regions are discarded or burned which leads to the contamination of environment and air. Hence, these waste are to be effectively utilized. Agro Waste are added with soil at particular percentages to obtain high strength bricks that possess thermal and sound insulation properties to control pollution and to reduce the overall cost of construction; this is one of the best ways to avoid the accumulation of agro waste. The agro waste is naturally generated in surplus quantity and hence the cost factor comes down. Hence in this thesis, an attempt is made to study regard the properties of the brick which is manufactured using agro wastes. The present work deals with the manufacturing and analysis of bricks made with waste and soil. The bricks produced are light weight, have smooth surface and fine edges, do not have cracks and have high crushing strength and very low water absorption.

Index Terms- Agro Waste, Environment, Compressive strength, Water Absorption, Brick.

1.2 INTRODUCTION

Rice Husk (RH) is the most common waste material generated worldwide and can be used as construction materials as a building component. However they pose great threat to the environment as their effective disposal is a herculean task. They are not easily degradable; it usually takes more than ten years to decompose. As they require many years to decompose, the only solution used was burning. Rice husk can be reused for making bricks. Bricks are the basic components of a building and are required in bulk. By using RH in making the brick, the overall cost of the brick will get reduced as, waste is being reused. Brick earth is costly, and digging of brick earth poses some damage to the environment. Hence using rice husk to make bricks is not only cost effective and eco friendly but also the bricks have a smooth finish, devoid of cracks and have low water absorption value, and will not have problems like efflorescence in future.

1.3 PRESENT SCENARIO OF WASTE GENERATED IN INDIA

Growth of population has increased our urbanization as a result rising standard of living due to technological innovations have contributed to an increase both in the quantity and variety of solid wastes generated by industrial, agricultural activities, mining and domestic. Globally the estimated quantity of wastes generation was 12 billion tones in the year 2002 of which 11 billion tones were industrial wastes and 1.6 billion tones were municipal solid wastes (MSW). About 19 billion tons of solid wastes are expected to be generated annually by the year 2020. Annually, Asia alone generates 4.4 billion tons of solid wastes and MSW comprise 795 million tons of which about 48 (6%) MT are generated in India. MSW generation in India, is expected to reach 300 Million tones and land requirement for disposal of this waste would be 169.6 km2 as against which only 20.2 km2 were occupied in 1997 for management of 48 Million tones. As it is studied that apart from municipal wastes, the organic wastes from agricultural sources alone contribute more than 350 million tons per year. However, it is reported that about 600 million tons of wastes have been

generated in India from agricultural sources alone. The Quantity of wastes generated from agricultural sources are sugarcane baggage, paddy and wheat straw and husk, wastes of vegetables, food products, tea, oil production, wooden mill waste, coconut husk, jute fiber, groundnut shell, cotton stalk etc.

1.4 LIERATURE REVIEW

01: Investigator ROY AVIK MATHEW DEEPAK JOHN Conducted a test on bricks from waste.-- Results : 1) Strong Correlation of thermal conductivity with board density. 2) Internal bond strength was good at relatively low density . Suitability : Ceiling and wall application to save energy

02 : Investigators : V Ramasamy , S Biswas , W Xu , SA Menon. Materials used : Rice Husk Ash (RHA) –Results : After burning at optimum combustion temperature (600˚C) , it can partially replace cement as mineral admixture for construction purpose. RHA enhances the strength and reduces the water absorption of concrete.

03 : Investigators : Sudarshan S. Shankare (2019) have published a paper Manufacturing of Bricks Using Rice Husk Ash Results : In there research rice husk ash was varied by 4, 8, 12, 16 and 20 percentage by weight and Engineering properties like compressive strength, water absorption, soundness, shape and size have been studied according to Indian Standard Specifications and compared to all other proportions. The test outcomes discussed that increasing rice husk in product decline the compressive strength because the combusted ice husk replace with three space in the product which effect the density and compressive strength.

04 : Investigators : J. Sutas (2011) Effect of Rice Husk and Rice Husk Ash to Properties of Bricks

properties of bricks.

Results : There research has aims to study effect between rice husk and rice husk ash on Comparative adding between rice husk and rice husk ash were varied by 0 -10% by weight. The results showed that more adding rice husk less compressive strength and density of specimens.

1.5 MATERIAL USED

1. Soil samples

SL NO.	PROPERTIES	VALUES
1	Specific gravity	2.42
2	Bulk density	1474 kg/m^3
3	Fineness modulus	3.58
4	Classification zone	Zone 2
5	Moisture Content	18.24%

TEST ON SOIL SAMPLE

1) Water content and water absorption test
2) Sieve analysis test
3) Specific gravity test

2. Rice Husk

Bulk density of rice husk is low and lies in the range 90–150 kg/m^3.

Water content and water absorption test

Water content= 25% Water Absorption=18%

SAMPLE	S1			S2		
CONTAINER NO.	04	05	06	13	14	15
WEIGHT OF EMPTY CONTAINER(W1)	19.56	16.63	13.79	13.68	14.56	14.30
WEIGHT OF CONTAINER+WEIGHT OF SOIL (W2)	61.35	68.5	62.89	81.13	66.55	68.77
WEIGHT OF CONTAINER + DRY SOIL (W3)	51.79	58.24	53.07	68.12	55.95	57.62
WEIGHT OF MOIST (W2-W3)	9.56	10.36	9.82	13.61	10.60	11.15
WEIGHT OF DRY SOIL (W3-W1)	38.23	41.61	39.34	54.44	41.39	43.32
WATER CONTENT (%)	25	24.95	24.96	25	25.44	25.73
WATER ABSORBTION (%)	18.45	18.24	18.5	19.97	19.42	19.35

Specific gravity test

3.3 Specific Gravity Test:

S1=2.7 S2=2.46

(as per IS:8112-1989)

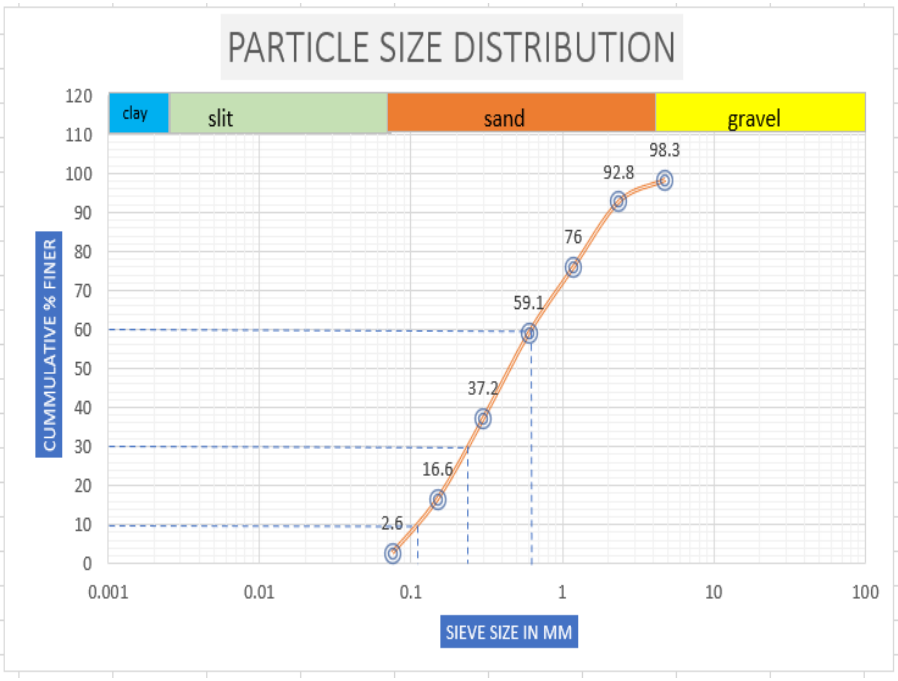
SAMPLE	S1			S2		
BOTTLE NO.	1	2	3	4	5	6
ROOM TEMP.(°C)	27	27	27	27	27	27
WEIGHT OF BOTTLE (W1)g	25.53	23.65	24.48	25.12	23.19	19.43
WEIGHT OF BOTTLE + DRY SOIL (W2)g	35.64	33.70	34.97	35.11	33.21	29.47
WEIGHT OF BOTTLE + SOIL + W (W3)g	56.64	54.86	56.05	56.16	55.56	52.43
WEIGHT OF BOTTLE + WATER (W4)g	50.41	48.71	49.02	50.20	49.6	46.48
CALCULATION	2.61	2.58	2.91	2.47	2.47	2.46

Sieve analysis test

DRY SIEVE ANALYSIS RESULT TABLE

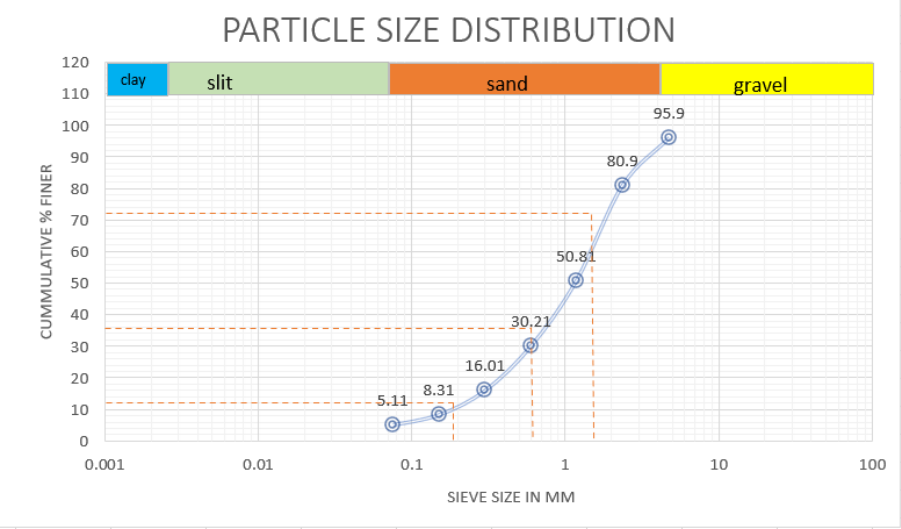
IS SEIVE (mm)	WEIGHT RETAINED (g)		CUMULATIVE RETAINED (g)		CUMULATIVE (%)		FINENESS PASSING	
	S1	S2	S1	S2	S1	S2	S1	S2
4.75	44	17	44	17	4.4	1.7	95.9	98.3
2.36	153	55	191.9	72	19.7	7.2	80.3	92.8
1.18	294.9	138	491.9	240	49.19	24	50.81	76
0.6	205	169	696.9	409	69.69	40.9	30.31	59.1
0.3	143	219	839.9	628	83.99	62.8	16.01	37.2
0.15	77	207	916.9	835	91.69	83.5	8.31	16.5
0.075	32	139	948.9	974	94.89	97.4	5.11	2.6
PAN	52	20	1000	994	100	99.4	0	0.6

DRY SIEVE ANALYSIS ON SOIL



$$Cu = \frac{D60}{D10} = 6.2$$

$$Cc = \frac{D30^2}{D60 * D10} = 1.09$$



$Cu = \frac{D60}{D10} = 7.44$

$Cc = \frac{D30^2}{D60 * D10} = 1.300$

METHODOLOGY:

COLLECTION OF MATERIAL ⇨ BATCHING ⇨ MIXING ⇨ MOULDING ⇨ CURING

1. **Collection of Materials**:-The soil and RH which is an agriculture waste is been collected from the tribal regions.
2. **Batching :-** Measurement of materials for making brick is called batching. After collection of materials we separate other waste present in the collected material and check that any water content is in sample collected then proceed for mixing.
3. **Mixing :-** Mixing of materials is essential for the production of uniform and strength for brick. The mixing has to be ensuring that the mass becomes homogeneous, uniform in color and consistency. Generally, there are two types of mixing, Hand mixing and mechanical mixing. In this project, we adopted hand mixing. The soil and rice husk is mixed in specified proportions so as to get required brick.
4. **Moulding :-** After completion of proper mixing we place mix into required mould. In these projects we use the normal brick sizes (19x9x9 cm). After that we remove the brick from the mould and then done curing.

5. **Curing :-** The test specimens after moulding were allowed to dry for a period of 24 hours under sunlight.

TESTING ON SPECIMEN

1. Compressive Strength Test:-

This test is done to know the compressive strength of brick. It is also called the crushing strength of brick. Generally, 3 specimens of bricks are taken to laboratory for the testing and tested one by one. In this test, a brick specimen is put on compressive strength is put on Compressive Strength testing machine and applied pressure at a constant rate till it breaks. The ultimate pressure at which brick is crushed is taken into account. All three brick specimens are tested one by one and average result is taken as bricks compressive/crushing strength. The Compressive Strength of the brick is calculated by the formula = (max load taken before failure/ Area of the Brick surface) N/mm2.

2. Water Absorption Test:-

In this the bricks first weighted in dry condition and they are immersed in water for 24 hours. After that they are taken out from water and they are wiping out with cloth. Then the difference between the dry and wet bricks percentage are calculated. They weight of the three plastic bricks has been taken and then the average weight of the bricks is calculated.

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