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EXPERIMENTS ON THE FIRED CLAY BRICKS USING RECYCLED CIGARETTE BUTT (CBS) AND HUMAN HAIR AS A FIBER

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ABSTRACT

In this world there are numerous types waste that incorporate in environment without any suitable treatment which causes health problems and directly pollute the entire environment. Cigarette butts and human hair are less biodegradable and lasts for long time. This paper is the experimental study of cigarette butts and human hairs waste in bricks. Properties like weight of bricks, water absorption, shape and size, weight and color are found. The bricks are made with 0%, 2.5%,3.75%, 5%, and 1% 1.5%, 2% of cigarette butts and human hair respectively. Result showed that the weight of bricks reduced than that of normal bricks and water absorption of bricks including CBs and human hairs are seen. As cigarette butts and human hair are light weight it reduces the dead load of the structure and it could be easy to transport. Disposal of this waste material is harmful for the environment and not feasible. Therefore it is good to use it in clay bricks

Keywords: Cigarette Butts CBS, Human Hairs, Light Weight.

I. INTRODUCTION

Cigarette butts and human hair are very dangerous material for environment .there is large demand of cigarette butts and much human hair disposed in the environment which degrades slowly so it could be managed by including it in a fire clay bricks. National Green Tribunal (NGT) and Union Ministry of Environment and Forest (MOEF) estimated that 100 millions of Cigarette butts are disposed off into whole environment every year. By the MOEF by 2025, Cigarette butts waste could be increased by 50% which is very harmful for the environment. Toxic substance that is cellulose acetate, nicotine and other substances are indulge in cigarette butts filter can be leached out, in cigarette smoke more than 4000 chemical components are available of which 3000 are in gas phase and 1000 are in tar phase and it could be very dangerous to the environment. These non biodegradable substances can be used in the construction materials such as concrete, fired clay bricks, etc. Hairs could have more tensile strength than a copper wire of same diameter. So it can be used as a material in fired clay bricks.

1.1 Incineration

It includes burning of waste which is not very sustainable for the environment.

1.2 Land Filing

It is disposal method of high toxic amount material and organic matters which may pollute underground water.

1.3 Reuse

Could be used as construction material which is practical use. Bricks are most important masonry units as building material due to its property. Attempts have been made to indulge CBs in production of brick.

Human hairs are non biodegradable material. In India this non biodegradable waste are used as fiber in construction material such as reinforce concrete ,fired clay brick ,fly ash brick etc.

Fibered fired clay brick are more advantageous than normal fired clay brick as per following aspects. Less water absorption low weight, better finishing, high strength less mortar consumption for joints filing reduced wastage.

Why hair as a fiber?

It has a high tensile strength which is similar to that of a copper wire with similar diameter. Hair a non biodegradable matter is creating an environmental problem so its use as a fiber reinforced material can minimize the material.

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It is available in abundance and also at a very low cost.

1.4 Materials

1) Cigarette butts (CBs)
2) Human hairs as a fifer
3) Clay for making bricks
4) Water

II. METHODOLOGY

The cigarette butts and human hairs required for experiment were collected from different pan shop in locality and hair salon respectively the collected cigarette butts and human hairs contains some impurities such as tobacco, pieces of papers, chocolate rappers, blades etc. These impurities were distributed from CBs and human upon reaching the CBs were disinfected at 105 degree Celsius for hours in oven, while human hairs were washed with shampoo water and allow it to drying for 2 days. All CBs and Human hairs were weighted according to percentage by weight of brick and packed in sealed plastics bags. The silty-sandy clay soil use for manufacturing of bricks. This bricks are made by using mould of dimensions of 299mmx111mmx7mm which includes the cigarette butts and human hairs by their % i.e 0%, 2.5%, 3.75%, 5% CBs and 0%, 1%, 1.5%, 2% of hairs. According to this the brick is made and after that it is allowed to get dried for 3-4 days. And after that bricks sent to blast furnace that is most commonly used at temperature of 900 degree Celsius to 1100 degree Celsius for 7-8 days. Tests on bricks like water absoption test, weight, density are performed.

Sr. No.	Sample	Percentage of cigarette butts by weight(%)
1	1	0
2	2	2.5
3	3	3.75
4	4	5

Sr. No.	Sample	Percentage of Human hairs by weight(%)
1	1	1
2	2	1.5
3	3	2

TESTS

1. Weight:

The well burnt fired clay bricks from bricks manufacturing plant are directly weighted on weighing machine

2. Density of fired clay bricks:

The density of bricks is determined by dividing weight. Weight of brick with volume of brick and the density is given by formula.

Density(Y) = Weight by Volume in Kg/m3

3. Water Absorption:

As per IS Code dry the specimen in a ventilated oven at a temperature of 105^0 to 115°C till it attain substantially constant mass. Cool the specimen to room temperature and obtain it weight W_1. The use of warm-to-the-touch specimens is prohibited. Immense completely dried specimen in clear water at a temperature of 27±2°C for 24 hours. Remove the specimen and wipe out any traces of water with a damp cloth and weight the specimen. Complete the weigh 3 minutes after the specimen has been withdrawn from W2 Water Absorption mass after 24 hours immersion in cold water is given by the following formula

WATER ABSORBTION = Wet weight of bricks – Dry weight of bricks X100
Dry weight of bricks

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4. Shape and size test:

In this test, a brick is closely inspected. It should be of standard size and its shape should be truly rectangular with sharp edges. For this purpose, 3 bricks are selected at random and they are stacked length wise, along the width and along the height.

6. Efflorescence test:

This test is carried out to obtain the presence of alkaline substances in bricks. First, bricks are fully submerged in fresh water for 24 hours. After 24 hours they are collected from water and let them to dry. After completely dried, the bricks are closely observed to find the presence of alkali. If a white or grey layer is formed on the brick surface, it means alkali is present in the brick

7. Impact test:

In this test, few bricks are dropped from 1 m height. If bricks are broken it indicated low. impact value and not acceptable for construction work. Good quality bricks do not break at all.

8. Soundness test:

In this test, two randomly selected bricks are hardly punched with each other. If they produce a clear metallic sound and remain unbroken then they clear metallic sound and remain unbroken then they are good bricks.

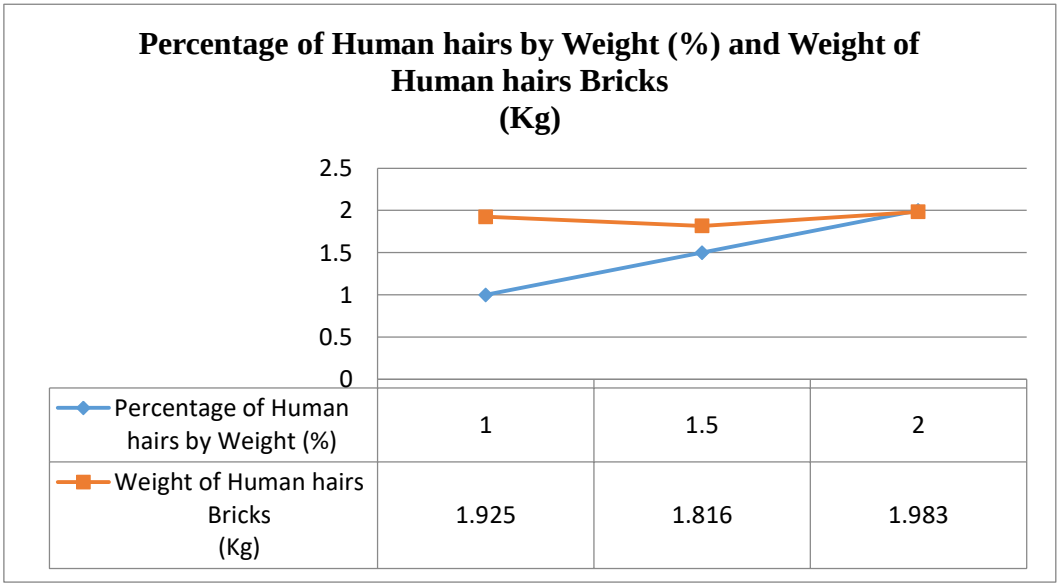
9. Hardness test:

In this test, scratches are made on the surface of the brick by a one-rupee coin. If it does not leave any impression the brick surface then it will be considered as good quality bricks.

III. RESULTS AND DISCUSSION

- **The Weight of bricks with Cigarette butts and Human hairs found to be:**

Sr. No.	Percentage of CBs by Weight (%)	Weight of CBs Bricks (Kg)	Weight of Normal Clay Bricks (Kg)
1	2.5	1.844	2.65
2	3.75	1.611	2.65
3	5	1.504	2.65
Sr. No.	**Percentage of Human hairs by Weight (%)**	**Weight of Human hairs Bricks (Kg)**	**Weight of Normal Clay Bricks (Kg)**
1	1	1.925	2.65
2	1.5	1.816	2.65
3	2	1.983	2.65



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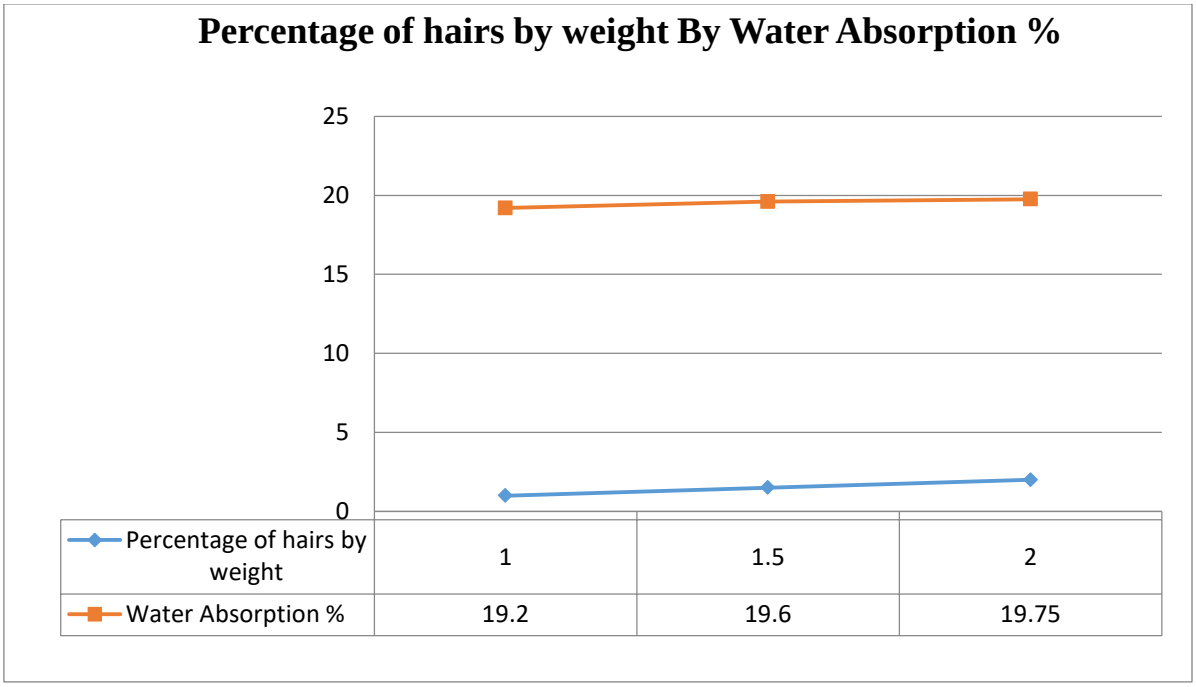
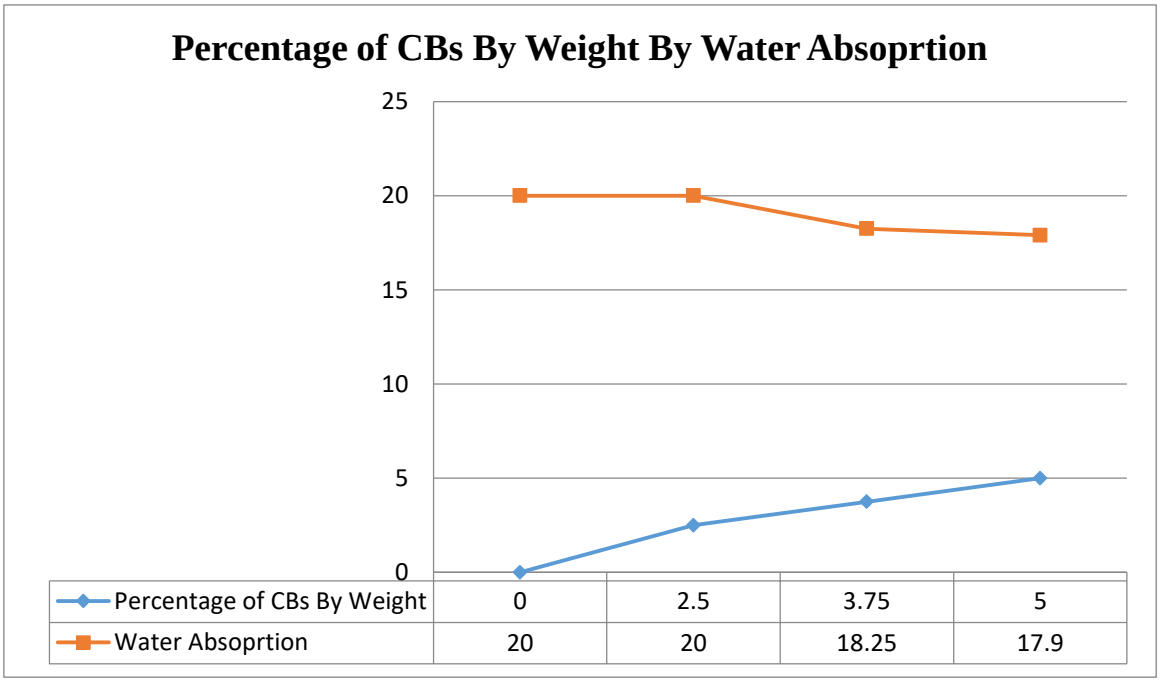


Percentage of hairs by weight	1	1.5	2
Water Absorption %	19.2	19.6	19.75



Percentage of CBs By Weight	0	2.5	3.75	5
Water Absoprtion	20	20	18.25	17.9

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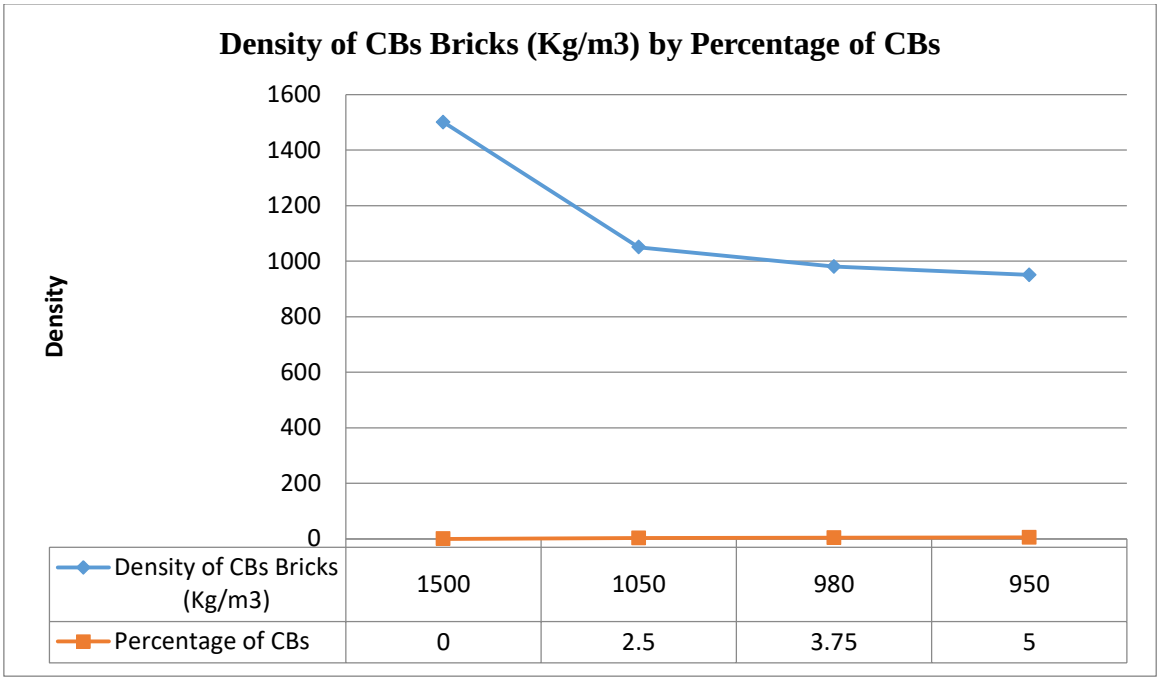

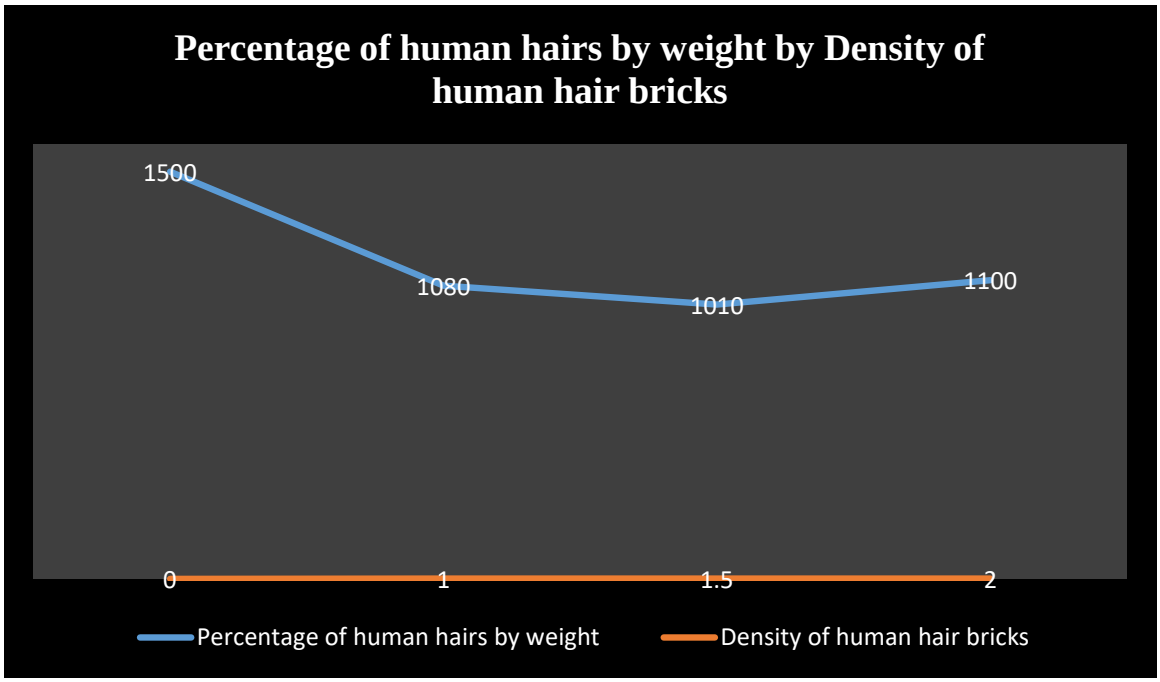

- Compressive strengths of the bricks of different class:

Compressive Strength of bricks	
Types of bricks	**Strength (Kg/cm2)**
First Class Bricks	105
Second Class Bricks	70
Common Building Bricks	35

- According to this data the result is found that Optimum rate is found in water absorption test.
- The bricks including Cigarette butts and Human Hairs bricks are light weighted.
- Sharp edges of the bricks are found.
- Soundness test results very good.

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- And the Compressive strength of the bricks remains same as per class of bricks with the inclusion of Cigarette butts and Human hairs as a fiber.

IV. CONCLUSION

The results found in this investigation are very promising. It is concluded that cigarette butts can be regarded as a potential addition to the raw materials of new types of light-weight burned bricks for non-load-bearing and load-bearing applications, provided the mix is formulated and prepared suitably for the requisite qualities.. Considering the number of bricks produced around the world every year, recycling CBS into bricks could contribute considerably to a long-term solution to one of the world's most critical pollution concerns.

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