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# Utilization of Press mud for Improvement of Strength of Interlocking Bricks

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**Abstract -**Bricks are considered to be the most widely used and useful material of construction all over the world. In recent years, Interlocking brick has made significant advances which have resulted in economical improvements in strength of clay bricks. The economic development of nation depends upon the intelligent use of locally available materials. To overcome the use of natural resources and by attempting to use waste materials like waste Press-Mud and waste Fly ash in bricks could result in low cost construction. Waste Press mud is the byproduct of sugarcane factory which causes environmental problems because of its high production and less use. Sugar industries produce the huge amount of press mud and other waste materials. The production of press mud is significantly increased, due to increasing of the production of sugar and increasing the generation of new sugar factories also the use of waste press mud in manufacturing of interlocking bricks could help to avoid the problems related to environment pollution. An attempt has been made in this study to determine the maximum compressive strength of interlocking brick by using press mud consisting of sugarcane waste as partial replacement for fine aggregates (Grit). By using press mud, we can reduce the self-weight of brick. Interlocking bricks are used for easy construction of mortar less masonry and better appearance.

**Key Words**: Sugarcane Waste, Press Mud, Interlocking Brick, Mortar, Fly Ash, Grit.

## 1. INTRODUCTION

There is a strong demand for environmentally safe reuse and effective disposal method sugarcane press mud due to the increasing amount of sludge generated by various industries and plants in India. Landfills are commonly used for disposal of sludge in India, rapid urbanization has made it increasingly difficult to find suitable landfill sites. Therefore, incineration has become one of the few alternatives available for disposal of sugarcane press mud. The ultimate disposal of incinerated press mud can be accomplished by using it as engineering construction material. One possible solution for the management of this sugarcane press mud is to re-use it as a building material, namely, to incorporate this sugarcane waste press mud into interlocking bricks. The cement interlocking brick is a one of the most useful masonry building materials. The recycling of waste materials by incorporating them into interlocking bricks has been a popular topic of investigation over the last century, with varying degrees of success across a wide range of waste material of sugarcane press mud. This popularity is likely due to flexibility on the type of wastes which can be mixed into the brick making material, but more importantly, the high temperature involved in firing the bricks allows for the volatilization of dangerous Component, as well as the fixation of wastes into the vitreous phase of the brick. The current study investigates the potential for reusing sugarcane press mud by using it as a partial replacement of material [1].

### 1.1 What is Sugarcane Press Mud?

India is the second largest producer of the sugar in the world, with an annual output of 25 million tonnes. Among the steps leading to the production of refined sugar is the separation of sugarcane juice from the associated particulates. Upon this separation a solid residue is obtained which is called the press mud. In a typical sugar factory, the processing of 100 tonnes of sugarcane produces about 3 tonnes of press mud. In Maharashtra some sugar factory's 8–10 million tonnes of press mud are generated annually [2].

### 1.2 COMPOSITION OF PRESS MUD:

Press mud from the sugar industries is a very useful source of fertilizer as well as some substances. The major use that has recently been developed in India is in bio composting (usually trade named as Bio earth) where it is treated with the spent wash from the distillery. The composition of press mud is given in Table-1. Its usefulness as fertilizer is based on the nutrient content of the press mud and the spent wash as shown below: [2].

**Table -1:** Composition of press mud.

| Sr. No. | Composition | (%) |
|---|---|---|
| 1 | Crude wax | 5-14 |
| 2 | Fiber | 15-30 |
| 3 | Crude protein | 5-15 |
| 4 | SiO | 4-10 |
| 5 | CaO | 1-4 |
| 6 | PO | 1-3 |
| 7 | MgO | 0.5-1.5 |
| 8 | Total ash | 9-10 |

**Table -2:** Nutrientcontentsof press mud.

| Composition | Press mud | Spent wash (mg/l) |
|---|---|---|
| Nitrogen | 1.15 – 3.0 | 2630 |
| Phosphorus | 0.60 – 3.50 | 201 |
| Potassium | 0.30 – 1.80 | 222 |

### 1.3 GENERATION OF PRESS MUD:

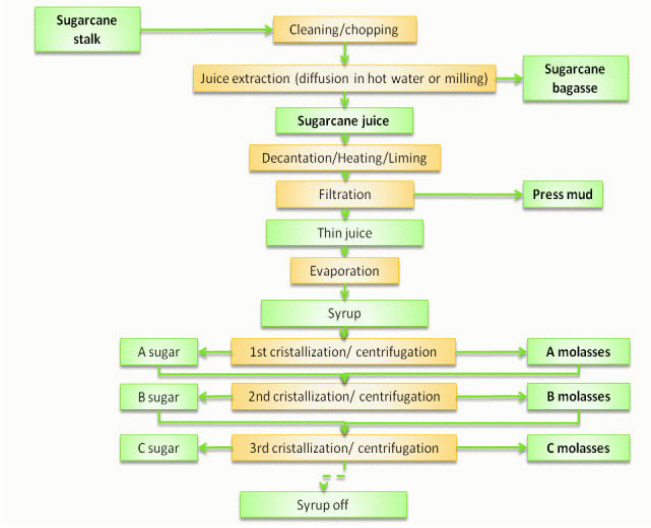


**Fig -1**: Generation of press mud.

### 2. LITERATURE REVIEW:

The waste from the industries is very harmful for the environment and also to our health, if not disposed in proper manner. The solid residue of sugarcane after crushing, extraction of its juice and before crystallization of s ugar.is known as “press mud”. India is one of the largest agriculture residues in the world [2]. The one way to dispose this waste is its use as fertilizer. But this is suitable for particular crops only. So, farmers avoid using it. The use of Sugarcane waste in brick can save the sugarcane industry disposal costs and produce an ecofriendly brick for construction. Sugarcane crop cultivation in India forms an important part of the Indian agricultural economy. The press mud can be used to recover protein, sugar and wax from press mud.

### 3. METHODOLOGY:

For the analysis purpose various interlocking brick samples are casted as per mix design with different percentage of sugarcane press mud and. the whole analysis is done in eight step which is given below.

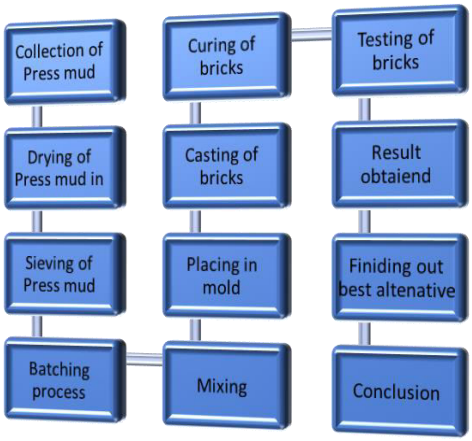


**Chart -1**: Process chart

### 3.1 COLLECTION OF PRESS MUD FROM FACTORY SITE:

**Fig -2**: Collection of press mud

### 3.2 DRYING OF PRESS MUD IN SUN:

**Fig -3**: Drying of press mud

### 3.3 CASTING OF BRICKS:

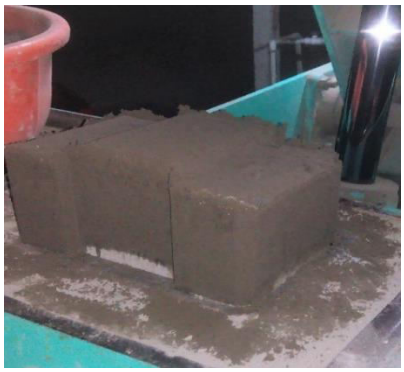

**Fig -4:** Casting of bricks

### 3.4 CURING OF BRICKS:


**Fig -5:** Placed for Curing

## 4. TEST ON BRICKS:

### 4.1. SHAPE AND SIZE TEST:

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

Results observed are:

1. One brick has not proper sharp edge.
2. Shape of brick slightly change due to breaking of edges.

### 4.2 WATER ABSORPTION TEST:

A brick is taken and it is weighted when it is dry. It is then immersed in water for a period of 24 hours. The brick is weighed again. The difference in weight indicates the amount of water absorbed by the brick. It should not exceed 20 percent of weight of dry brick.

**Table -3:** Water Absorption Test Result

| Sr. No. | Block Name | Water absorption ( % ) |
|---|---|---|
| 1 | O | 17.50 % |
| 2 | A | 20.50 % |
| 3 | B | 22.83 % |
| 4 | C | 26.00 % |

### 4.2 COMPRESSIVE STRENGTH TEST:

In this test the brick specimens are immersed in water for 24 hours. The specimen O, A, B, C is placed in compression testing machine. Then the load is applied axially at a uniform rate of 10 N/mm$^2$.The load and strength are noted accordingly.

**Table -4:** Compressive Strength Test Result

| Sr. No. | Block Name | Compressive strength N/mm$^2$ |
|---|---|---|
| 1 | O | 3.54 |
| 2 | A | 4.16 |
| 3 | B | 3.75 |
| 4 | C | 2.93 |

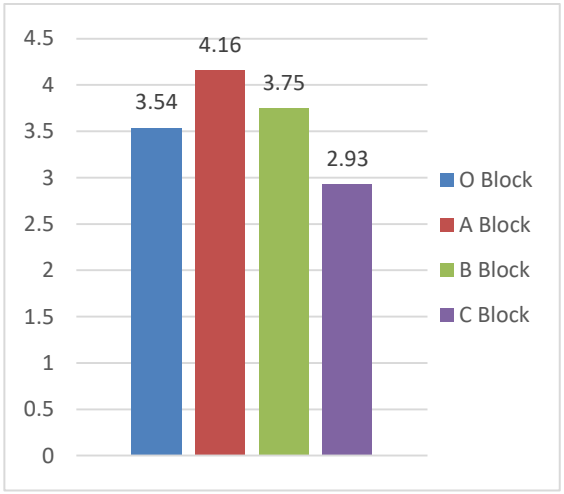


**Chart No.2:**Comparison of Compressive Strength Result N/mm$^2$ (28 Days)

## 5. CONCLUSIONS

Based on the above experimental procedure and test, we conclude as:

1. Use of sugarcane press mud in brick has solved the disposal problem; reduced cost and produced Eco- friendly brick for construction.
2. Reduction of weight of interlocking brick up to 20 % of weight of brick. As compere to normal interlocking bricks the bricks are light weight bricks.
3. In the Compressive strength result observed that block A is Shows moderately effect in increasing strength as compared to conventional brick i.e. greater than 3.5 N/mm$^2$.

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