

The Tensile Strength of Hooked Brick

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Abstract

The abundance of waste material in the process of making sugar needs a serious treatment . This is due to the fact that the economic value can be taken by the society from those waste. This study aims to find a design of lighter bricks that have good tensile strength.

This research method is visual observation and measurement of tensile strength from the bricks. Visual observations covers (1) the color produced, (2) water absorption (3) swell shrinkage. The data obtained from visual observations are analyzed and compared one each other. Meanwhile, in measurement of tensile strength from brick, this study will attempt to make the two samples groups of bricks. The first group is the brick with added material filter cake and the second one is the ordinary brick . Then , the two groups will analyze based on compressive strength.

Moreover, the bricks are weighted to obtain their weight. Weight bricks will affect the burden that will be loaded by construction . If the brick is lighter, it will be also lighter burden received by the construction . The results of this study shows that the admixture brick with added material filter cake is better and melt so the mixture looks like smoothly in their mixing . The admixture result also consists bagasse fiber. Finally, it does not need the addition of a mixture of straw.

It is important to take a note that if the filter cake still contains active lime so the brick will expand and produce hollow bricks . Then , if this brick is burnt, it will results the brick that crack and easily break. Therefore, it is important to think that the content of lime in using filter cake whether the lime is still active or inactive.

The color resulting of the brick with filter cake is darker than pure soil bricks . However , when it is seen by the layman , the results of the bricks has same color. It is due to the fact that there is only less difference.

Keyword: brick, tensile strength, filter cake

1.Introduction

Sugar mills results a lot of waste material . The results of waste product is about 1/3 of the sugar cane processed. This phenomenon needs to be examined and looked for beneficial solution to the sugar mill and the surrounding community . Thus, it will be happened the mutual interest and mutual respect both those elements. Finally, the harmony in the society will make the stability of environment. Based on observations to the craft man who made the brick that still use the materials of agricultural land as base material, the use of agricultural land as base material in making bricks will disturb the fertility of agricultural land. Therefore, utilization of waste material of sugar cane process can be tried as an alternative.

One of the waste results of sugar cane process is filter cake . Filter cake is solid and warm of sugar factory waste

material. In sugar factory, filter cake is not used maximally. It is because the utilization often as hoard land. Therefore, researcher hopes that the filter cake can be given economic value. It can be done by changing into valuable materials or objects of art. Even, the researcher will try to make the brick lighter .

The brick resulted from the ash of burning bagasse cane is building materials. It has base material clay and ash bagasse from the sugar mill. Brick is made with compaction, drying without/with burned. If the process in making brick without burning, brick is used after the age of 28 days. In contrast, the bricks will be used before 28 days if the process in making brick with burning. The Applications ash bagasse brick is as a buffer and a patching wall that can be exposed in the simple wall and luxury homes or in residential real estate complex. The bagasse ash brick has a compressive strength at least 50 kg / cm². It also has waterproof and can be produced in accordance with the needs of architectural design. Bagasse ash brick is building materials that efficient in energy, environmentally friendly and also has thermal properties corresponds to the humid tropical climate. It is also as structural and non-structural building materials.

A.Sugarcane waste material

According *Risvan* ^[14] Sugar factory in Indonesia in 2007 amounted to 59. Sugar cane production in 2008 for the East Java reached 17 million tons . Besides produce sugar, cane processing also produces shoots cane, bagasse, filter cake and molasses as a byproduct. Bagasse is generally used as fuel of boiler. However, according to the rules of efficient sugar mills, it can save 34.6 % of used steam and earn as much as 39 % bagasse residue.

Even, he ^[14] states that the byproducts obtained directly at the various stages in processing sugar cane is filter cake. Filter cake ,in purification processing of sap, is deposited in the clarifier. It will generate gross sap which is processed in a rotary vacuum filter .This tool will be produced sap filter and sediment which is usually called a “filter cake”. Filter cake from PG sulfites has the average moisture content 67 % , 3 % pol levels , while the moisture content of PG carbonation levels of 53 % and 2 % pol . Filter cake can be used among others for animal feed , fertilizer and wax factory . The most profitable use today is as a fertilizer in the sugar cane fields .

B.Brick

The brick is included in building materials. It has function in making screen or wall. Since the wall is not a construction so that the walls can be made from wood, asbestos and wood waste. Quality brick by Dana Foundation

Normalization Indonesia NI - 10 (1978) related to a red brick as a building material can be seen in table below:

Table 1. Quality Of Red Related To Brick Compressive Strength NI – 10

Number	Quality of Compressive Strength	average (Kg/cm ²)
1	Level I	More than 100
2	Level II	100-80
3	Level III	80-60

Source: NI-10, 1978

Table 2. Brick Compressive Strength

Kelas	The minimum average of Compressive Strength from 30 brick tested		Variation coefficient is allowed from the average of Compressive Strength brick tested
	Kg / cm ²	N / mm ²	
25	25	2,5	25
50	50	5	22
100	100	10	22
150	150	15	15
200	200	20	15
250	250	25	15

Source : PEDC, 1993, *Pengujian Bahan*, PEDC, Bandung^[4]

C.Adding material

Added material or mixture in the manufacture of red bricks is used to improve the quality of the clay as raw material in order to be a plastic material . The raw material of a red brick consists base material clay with or without use of a mixture . The commonly added materials used as mixture material , such as the ash rice husk , river sand, rice husk , sawdust , manure , or red cement while the material mixture

used in this study is the burning of ash bagasse because of the fine grained and numerous.

According *Yudha Romadono*, the benefits of the use of a mixture material as follows :

1. Rice husk , sawdust serves to simplify the process of combustion and form pores .
2. Sand , river sand serves as Reducing shrinkage and facilitate drying .
3. Water serves as the sstreamlining of processing , can soften the hard clay and increase the plasticity (workability)

Water fill in requirements of concrete production. it is also good for manufacturing of bricks . Water used for manufacture and maintenance of concrete should not contain oils , acids , alkalis , salts , organic materials or other materials that can damage the concrete , according to *PBI 1971 N. I - 2*. (*Departement Pekerjaan Umum , 1979*)^[2] .

D.The Testing Of Strength Bricks

The tools used to facilitate data collection associated with a tensile strength of bricks is a compression test machine .



II.Method

A.Observation Visual

The study involved local craft man. It has an the objective in order to there is involvement of the local community. How to manufacture and ripening uses the same a process that has been implemented by craft man . However, in this research, the brick will be added with filter cake, reduce soil and also uses the local commonly craft man method. It means that the local craft man will be able and easy to apply the results of this study.

Visual observation includes : 1) the color produced , 2) water absorption 3) swell shrinkage . Data obtained from visual observation is analyzed and compared with each other .

B.The Tensile Strength

In the second phase of this research study , the researchers makes two groups of samples bricks . The first is group of brick with filter cake as added material and the second is ordinary brick . Both groups are analyzed their Compressive Strength.

After that, both of the bricks is need to be weighed to obtain the weight of the bricks . Weight bricks will affect the burden that will be loaded by construction. if The brick is lighter, it will be also lighter burden received by the construction

III.Analysis and Discussion

After two groups of samples of bricks were made , both compared to the results of the visual observation .

A.Visual observation

Visual observation of the researchers did was emphasize the color ; water absorption ; swell shrinkage .



Figure 1: filter cake brick



Figure 2: filter cake brick

Visual observation result can be seen in the table 3 below:

Table 3. Observation result and visual analysis

Number	Explanation	Ordinary	Added material filter cake
1	color	yellowish	The more filter cake results the more black color
2	water absorption	Middle	The quantity of filter cake is more
3	Swell shrinkage	low	The quantity of filter cake is bigger

Source: Penelitian hibah bersaing tahun ketiga

Brick admixture with added material filter cake that better and melt so the mixture looks like smoothly in their mixing the resulting mixture also consists bagasse fiber so it does not need the addition of a mixture of straw. The mixture with filter cake is easier in mixing than all the paddy soil.

It should be remembered that if the filter cake still contains active lime so the brick will expand and produce

hollow bricks . Then , if this brick is burnt, it will results the brick that crack and easily break. Therefore, it is important to think that the content of lime in using filter cake whether the lime is still active or inactive.

The color resulting of the brick with filter cake is darker than pure soil bricks . However , when it is seen by the layman , the results of the bricks has same color. It is due to the fact that there is only less difference.

B.The weight of brick

The weight of bricks is showed in table 4

Tabel 4. Dispersion of weight brick

Data	Ordinary brick	Filter cake brick
1	1700	1510
2	1500	1310
3	1600	1500
4	1650	1470
5	1770	1700
6	1670	1480
7	1710	1799
8	1750	1560
9	1690	1500
10	1680	1600
11	1660	1480
12	1600	1300
13	1760	1400
14	1650	1500
15	1740	1600
16	1640	1470
17	1580	1390
18	1680	1490

19	1650	1500
20	1880	1490
21	1670	1480
22	1750	1460
23	1670	1470
24	1580	1500
25	1710	1520

Source: Penelitian hibah bersaing tahun kedua^[16]

Researcher makes graphics of weight bricks to easily in viewing the results .

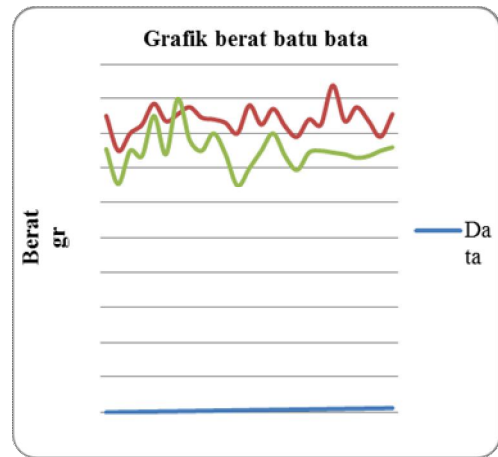


Figure 4: The grafik of weight brick

Tabel 5. The weight average in gram.

Number	Heavy		Difference
	Heavy average	average	
	Ordinary brick	Brick with filter cake	
1	1677.6	1499.16	178.44

Source: Penelitian hibah bersaing tahun kedua^[16]

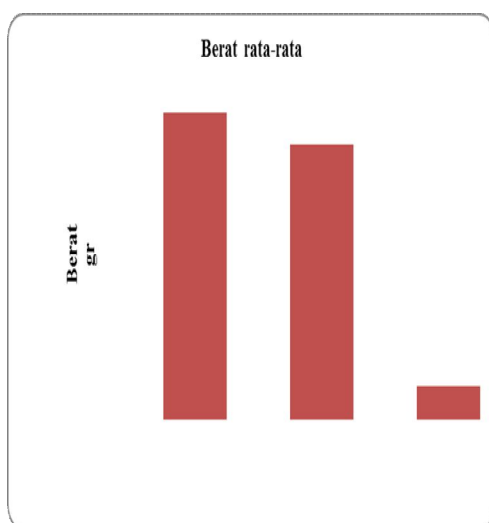


Figure 5: the graphic of average weight brick

IV.conclusion

The conclusion that can be derived from this study are

- (1) Visually filter cake has a content of bagasse , sulfur , lime , a little water , ash and glucose .
- (2) The more added filter cake material will produce a dark color and the brick will be curved .
- (3) filter cake contains residues that make bricks fibrous .
- (4) filter cake can become material for environmentally friendly bricks .
- (5) The more filter cake added makes the more moisture absorption .
- (6) active Limestone lead bricks expand and become hollow brick .
- (7) The bricks with added filter cake material is lighter than regular brick .
- (8) The average weight of ordinary brick is 1677.6 grams.
- (9) The average weight of a brick with added material filter cake is 1499.16 grams .
- (10) the measurement of ordinary brick reached 13.5 kN .
- (11) Measurement brick type 1 reached 22.3 kN and type 2 to 17 kN .

V.Suggestion

Researcher hopes (1) the factory facilitate an explanation of waste utilization . (2) The factory will help the bricks craft man related on this technology . (3) Community brick craft man can use the results of this research to the manufacture of bricks . (4) since the sugar mill waste contains many useful potential , the researchers envision people preparing industrial potential of waste . (5) The development of similar research .

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