

Analysis on Manufacturing of Clay Bricks Using Plastic as a Raw Material

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ABSTRACT

Now a days competition is the thing which can be help to improve the human life as well as their living status. Every person wants a car, huge building to live because they made to them as necessary think to develop them self. As cost of land get increase because of the lands cannot available at huge amount. In this condition to overcome the human problems the human can increase height of buildings They can use so many construction materials like bricks ,stones ,etc. The main component is to PET waste is a plastic waste that very difficult to recycle in large scale, so it was causing environmental pollution. In this project plastic used as main material of bricks . A regular brick has a cement sand ballast cement and water. All these elements have a weight implication whereas our paver blocks only have sand or ballast and plastics

The brick can be sustaining the load when it is used in two or more stored buildings. It can be made a proper bond between the mortar and other bricks because there is special arrangement i.e., frog Due to frog it is sustain the different loads in different in different ways. The compressive strength is very high as compared to other construction materials. These bricks are very economical because it requires raw materials like coal powder, biogas, wooden powder , water which are very economical materials. So, the other construction materials having high cost which is not affordable for normal person.

Keywords: Waste Plastics, Wooden powder, Clay, Absorption, , Ash of bricks.

INTRODUCTION

Generally, the analysis of manufacturing of clay bricks using plastic as a raw material. In those day the modern lifestyle and developed cities and countries are facing one of the major problems of environmental pollution. One major component is responsible for all type of pollution is plastic waste. So, we use the plastic waste in bricks , it is beneficial in both ways that is it increase strength of bricks and bonding of bricks and also controlling pollution in environment. Good bricks should be always perfect in all direction to be used as construction materials. To check all parameters i.e., size, shape, color, soundness, hardness, efflorescence, strength, water absorption etc. various tests carried out in bricks these tests carried gives the specific value or result by which we can decide brick is useful or not.

ADVANTAGES & DISADVANTAGES OF BRICKS

Advantages:

- 1) good thermal insulation properties.
- 2) Light weight.
- 3) As strong as normal bricks.
- 4) Made from recycled plastic hence helps in cleaning the environment.
- 5) If such brick is covered with aluminum foil, perhaps glued with epoxy, they would withstand UV much better .
- 6) They should be sufficiently economical, with potential for easy recycling.

Disadvantages:

- 1) Lesser fire resisting qualities as compared to conventional bricks /stones.
- 2) Required extra inclusion of details when extra

decorative addition is required.

3) plastics bags are non -biodegradable.

A) AIM OF PROJECT

- 1) To decrease the environmental pollution by using the waste plastics carry bags is not decomposed.
- 2) Also to increase the engineering properties of bricks such as strength, load bearing capacity, hardness, toughness.
- 3) To decrease the porosity , water absorption, efflorescence of the bricks.

B) TYPES OF BRICKS

1)Conventional Bricks / Traditional Bricks :

The dimension of conventional bricks varies from 21 to 25 cm in width and 7.5 cm in height in different parts of country . The commonly adopted nominal size of the conventional brick is 23x11.4x7.6cm.

2) Standard Bricks/Modular bricks : To achieve the manufacturing of uniform size of bricks all over Indian Standard Institute has established a standard size for the brick is known “Standard Bricks”. The size of brick is taken as 19*9*9cm and its normal size is 20*10*10cm

a. COMPONENT OF BRICKS

- | | |
|---------------|-----------|
| 1) Arises | 5) Lap |
| 2) Bed | 6) Closer |
| 3) Bed joints | 7) Bat |
| 4) Perpend | 8) Frog |

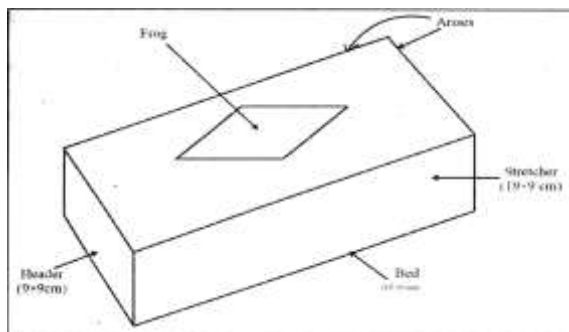


fig 1.Component of Bricks

MANUFACTURING OF BRICKS

Following are the material used in preparation of bricks:

1. Clay (Poyata) :This is main component material in brick. This is special type of clay which is obtained from river bed. This clay is very sticky in nature gives more strength.



Fig1: Clay (Poyata)

2. Buygas: This is the second most important component material in brick. Buygas is mixed in clay before 1 day of preparation of the bricks. Buygas can be used for purpose in brick while burning of bricks process in kiln.



Fig 2:Buygas

3. Coal powder: Coal powder is not used in large amount while preparing bricks but it plays important function. When amount of water exceeds than required amount of water in the mixture. Another type of coal is powder is applied in the mould before preparing as well as after preparing bricks coal powder is spread on bricks.



Fig 3: Coal powder



Fig 6: Plastic carry bags

4. **Wooden powder:** This is also one of important component material bricks. The wooden powder cannot be used in large amount as compare to buygas. This is also used for firing purpose while burning the bricks. It decrease the porosity of brick.



Fig 4: Wooden powder

5. **Water:** Water is the major component in manufacturing of brick. Without water the mixture of clay, buygas, coal powder, and wooden powder cannot be possible. The can help to mixing the mixture thoroughly.



Fig 5: Water

6. **Plastic Carry Bag:** We are using the waste plastic carry bag as raw material in preparation of brick. We cut the plastic carry bags in the form of small strips which are easy to mix in clay mixture.

TOOLS USED FOR MANUFACTURING OF BRICKS

1. Mould
2. Wooden float.
3. Water Drum
4. Gameian
5. Wheel Borrow

COST ANALYSIS

Cost analysis table for ordinary bricks:-

Sr. No.	Particulars	Cost per brick Rs.
1.	Material :-	
	a) Poyata clay	0.87
	b) Buygas	0.01
	c) Coal powder	0.54
	d) Coal	0.80
2.	Labour charges (including skilled labours)	0.70
3.	Water Charges	0.12
4.	Transportation Charges and Breakage etc.	1.00
	Total =	4.04

Table 11:- Cost Analysis for Ordinary Brick

Cost analysis table for bricks including plastic fibers:-

Sr. No.	Particulars	Cost per brick Rs.
1.	Material :-	0.87
	a) Poyata clay	0.01
	b) Buygas	0.54
	c) Coal powder	0.80
	d) Coal	0.70
2.	Labour charges (including skilled labours)	0.12
3.	Water Charges	1.00
4.	Transportation Charges- and Breakage etc.	0.87
5.	Transportation Charges for plastic	0.03
	Total =	4.07

Table 12:- Cost Analysis for Bricks Including Plastic Fiber

RESULT AND DISCUSSION

The main purpose of using plastic carry bags as a row material to reduce the plastic bags in environment which cannot be decomposed and hence to reduce the pollution and also to increase the strength of bricks and other engineering properties. The main problem in environment is not decomposition of plastic , but it can be reuse or recycle. In daily life plastic is used widely because of many attractive properties such as color, various shapes and also it is available in various forms such as bags, homemade appliance, office appliance, toys and many more. The main is that any kind of wasted plastic cannot decomposed and it is remains as it in dumping ground, on road river banks or any water flow or any other places. This wasted plastic bags cause very hazardous effect on all surrounding. If it is remains in water flow, it pollutes water, if it remains on earth surface it cause soil pollution, if it burns openly it cause air pollution. It means the waste plastic carry bags are vary hazardous in environment. Only way to reduce it is reusing or recycling of plastic.

The plastic bags are used in bricks in the form of fibers and the fiber are very small thread like element having small size and shape. Quality should not be taken more than 5%. Plastic bags are cut into fiber of small size strips of size generally 5cm*1cm. The percentage os plastic fiber is added by the wet weight of brick. generally wet weight of brick is near about 3kg. The plastic fibers are added in the proportion of 0.1%, 0.2%, 0.3%, 0.4%, and 0.5% of total wet weight of brick.

At the time of preparing mixture of clay, buygas, coal powder, water simultaneously plastic fibers are added then bricks are manufactured as the typical way. After the burning of the bricks in kiln it is observed that the bricks having 0.5% of plastic fiber are very blackish in color and these are very brittle in nature. They are not sustaining more loads. These are not well in condition to use as a construction material. It does not have any good engineering properties. So the 0.5% amount of plastic fiber is rejected.

To check their suitability, to use as construction materials, the various test are carried out by two methods ;

- A. Field Tests
- B. Physical Tests

Field Test : following are the field tests to be carried out on brick:

TEST NO. 1 SIZE AND SHAPE TEST

Sr. No.	Percentage Of Plastic	Observation/Remark
1.	0%	Rectangular in shape, square edges
2.	0.1%	Rectangular in shape, square edges
3.	0.2%	Rectangular in shape but not perfectly squared
4.	0.3%	Cracks are observed
5.	0.4%	Little brittle in nature
6.	0.5%	Brittle in nature and fully cracks are observed

Table 1 :- Remark for Size and Shape Test

TEST NO.2 COLOR TEST

Sr. No.	Percentage of plastic	Color of brick	Class of brick
1.	0%	Reddish	2 nd class
2.	0.1%	Copper color	1 st class
3.	0.2%	Reddish	2 nd class
4.	0.3%	Yellowish	3 th class
5.	0.4%	Blackish	4 th class
6.	0.5%	Blackish	4 th class

Table 2:- Remark for Color Test

TEST NO.3 SOUNDNESS TEST

Sr.No.	Percentage of plastic	Observation / Remark
1.	0%	Metallic sound
2.	0.1%	Metallic sound
3.	0.2%	Less metallic sound
4.	0.3%	Less metallic sound
5.	0.4%	No metallic sound
6.	0.5%	No metallic sound

Table 3:- Remark for Soundness Test

TEST NO. 4 HARDNESS TEST

Sr. No.	Percentage of plastic	Observation / Remark
1.	0%	Hard in nature
2.	0.1%	Hard in nature
3.	0.2%	Less hard in nature
4.	0.3%	Little Brittle nature
5.	0.4%	Brittle in nature
6.	0.5%	Brittle in nature

Table 4:- Remark for Hardness Test

TEST NO.5 EFFLORESCENCE TEST

Sr. No.	Percentage of plastic	Observation/Remark
1.	0%	1 5% efflorescence
2.	0.1%	10% efflorescence
3.	0.2%	20% efflorescence
4.	0.3%	25% efflorescence
5.	0.4%	35% efflorescence
6.	0.5%	50% efflorescence

Table 5:- Remark for Efflorescence Test

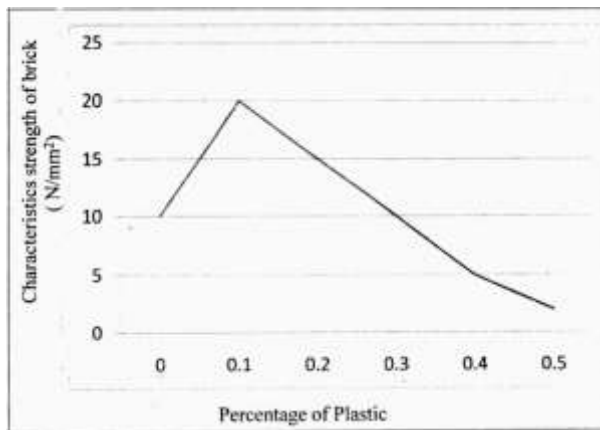
Physical test : following are physical test to be carried out on bricks

- 1) Compression test
- 2) Water absorption test

TEST NO. 1 COMPRESSION TEST

Sr. No.	Percentage of Plastic	Load on brick (N)				Avg. Load (N)	Strength (N/mm ²)
1.	0%	17100	20520	13680	17100	10	
2.	0.1%	30780	34200	37620	34200	20	
3.	0.2%	22230	30780	23940	25650	15	
4.	0.3%	20520	13680	17100	17100	10	
5.	0.4%	11970	85500	51300	85500	5	
6.	0.5%	34200	51300	17100	34200	2	

Table 7:- Compressive Strength Table

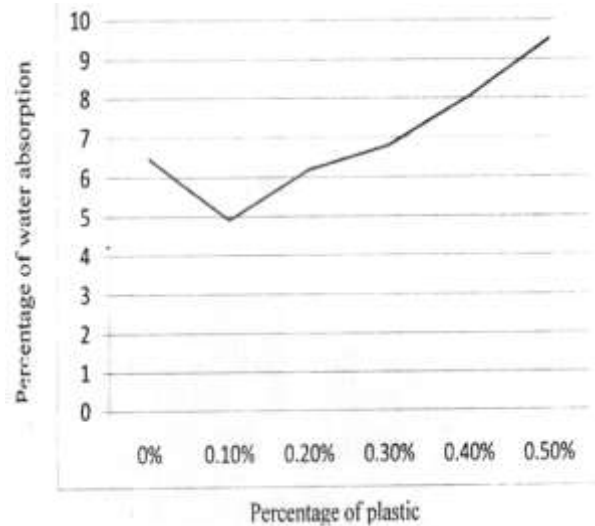


Graph No 1 : Compression Test

TEST NO. 2 WATER ABSORPTION TEST

Sr. No.	Percentage of plastic	Average Dry Weight (Kg) (M ₁)	Average Wet Weight (Kg) (M ₂)	(M ₂)-(M ₁)/M ₁ (Kg)	Percentage of water absorption (%)
1.	0%	2.132	2.27	0.138	6.472
2.	0.1%	2.136	2.241	0.105	4.915
3.	0.2%	2.182	2.317	0.135	6.186
4.	0.3%	2.192	2.341	0.149	6.797
5.	0.4%	2.143	2.315	0.172	8.026
6.	0.5%	2.090	2.289	0.199	9.521

Table 10:- Water Absorption Table



Graph 2: Water Absorption

RESULT

Above table shows the comparison of bricks at different percentages. It gives more strength as well as absorbs less water. It is well condition to be used in masonry. From this table it can be seen that the result of brick having 0.1% plastic is good in all response.

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