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Experimental Studies on Properties of Different Types of Cement Mortar Bricks and Clay Bricks by Using Wheat Husk Ash, Saw Dust and Egg Shell Materials.

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Abstract

In Construction Industry Brick Masonry plays an important role. This study deals with the significant of the Natural Masonry Behaviour in various composition condition, the Cement Mortar Bricks and Clay Bricks variations have initiated the addition of waste materials in it.Therefore the various materials like Wheat Husk ash, and Saw dust in cement mortar and Egg Shell in clay mortar were used, thenit is proceed for compressive strength of the Clay bricks and Cement Mortar bricks. The bricks are tested for the 7 days and 28 days analysis of the test. By using this we can reduce the certain amount of cement, fine aggregate and clay. Then we can get the bricks in low cost. The main aim is to reduce the emission, cost of the bricks and to attain good strength.

Keywords: WHA-Wheat Husk Ash, Saw Dust, Egg Shell, Plastic Wastes

Introduction:

In many countries the brick is used in all the part of the building. Due to its good heat insulation it was used widely in the construction fields. The brick has the Good compressive strength and it has easy availability. The good bricks will be found by using its good soundness, durability and its cost is also less. So it is widely used in all countries. And it is non-homogeneous, inelastic and it is described as orthotropic. In this project, we have executed the formation of bricks with different form of various waste materials and executed the project. Therefore various studies were referred and analysed by the compression behaviour by using the UTM machine and Compression testing machine which is used for checking the compression strength. The experiment is carried out by using 1.5 ratio.

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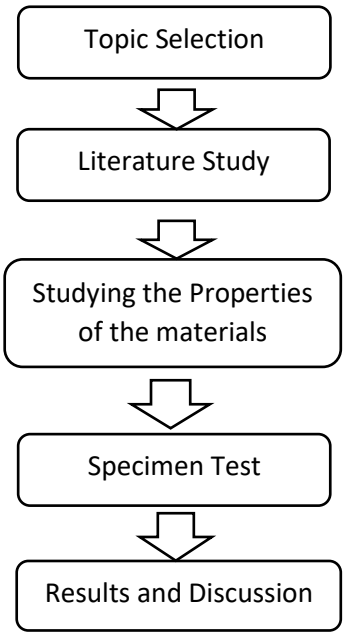
Methodology:



Material's used:

1. Cement
2. Fine aggregate
3. Wheat husk ash
4. Saw dust
5. Clay
6. Egg shell powder

Properties test on materials:

Cement:

Cement is used as a binding material. According to IS 456 2000, OPC 53 grade is adopted. According to IS 12269 1987, the physical test for cement is carried out.

Testing on cement

S.No	Properties	Result
1	Specific Gravity	3.17
2	Fineness	3%
3	Initial Setting time	44 min
4	Final Setting time	10 hours
5	Standard Consistency	33%
6	Compressive Strength	36 M pa

Fine Aggregate:

According to IS 383 1970, the manufactured sand is confirmed and adopted to this project. By crushing the hard granite stone the manufactured sand is produced. And hence it is a replacement for river sand.

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Testing on Fine Aggregate

S.No	Properties	Result
1	Specific Gravity	2.67
2	Fineness	2.9
3	Size	Passing through 4.75 mm sieve
4	Water absorption	8.11%

Wheat Husk Ash:

In India Wheat is harvested mostly in Punjab. The wastages of wheat husk is used in this project by burning them.

Testing on WHA

S.No.	Properties	Result
1	Specific Gravity	2.45
2	Fineness	8.4
3	Initial Setting time	12 min
4	Final Setting time	1 hour
5	Standard Consistency	21%

Saw Dust:

While shaping the wood for making the furniture, the wastages of dust will be appeared. That wastages is known as saw dust, the material used in this project.

Testing on Saw Dust

S.No	Properties	Result
1	Specific Gravity	2.2
2	Fineness	75µ
3	Size	0.075

Clay:

Clay is a naturally available material and it is available in most of the villages. And hence we have adopted the clay.

Testing on Clay

S.No.	Properties	Result
1	Specific Gravity	2.54
2	Fineness	2.5
3	Liquid limit	45
4	Plastic limit	23
5	Water content	43%

Egg shell powder:

Now-a-days we are consuming egg in our daily food. We are just consuming the inner part

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alone. The shell is considered as a waste materials. So we have used that egg shell powder in this project.

Testing on Egg shell powder

S.No	Properties	Result
1	Specific Gravity	0.88
2	Fineness	3.3
3	Moisture content	1.20
4	Bulk density	0.9
5	Standard consistency	35%

Mix Proportion:

In this study, the cement and fine aggregate is mixed together to attain certain strength. The mix ratio cement mortar is 1:4. The adopted dimension is 19x19x9 cm. Then the clay is used for another set of the specimen.

Scope of the project:

For cement mortar brick, the adopted mix ratio is 1:4. Cement is added with wheat husk ash. By adding wheat husk ash as 3%, 6%, 9%, 12% as a partial formation of cement, saw dust is added with fine aggregate. 10%, 15%, 20%, 25% were added as a partial formation of fine aggregate.

For clay brick, the adopted mix proportion is 1:4. The experiment is carried out by adding the egg shell powder. Along with that, egg shell powder is also used as a partial addition of clay. 8% of egg shell powder is used in this project.

Specimen Preparation:
Cement mortar brick:

Type 1 **Type 2** **Type 3**



The cement mortar brick contains the materials of cement, fine aggregate, and wheat husk ash and saw dust. The adopted mix ratio is 1:4. By mixing these materials, the experiment is carried out. The size of the brick is 9x4x3 inches. By adding the various materials like wheat husk ash and saw dust we casted the 3 different shaped bricks. They are varied in the sizes.

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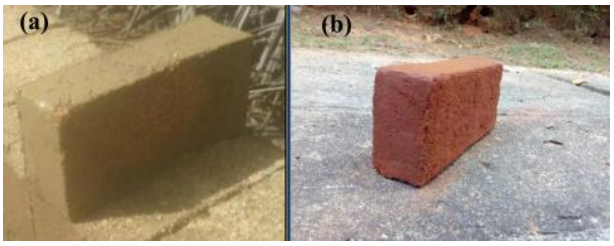
Clay bricks:



The clay brick contains the materials of clay, egg shell powder. The adopted mix ratio is 1:4. By adding these materials the proportional quantities be will assigned. The size of the brick is 9x4x3 inches.

Compression test:

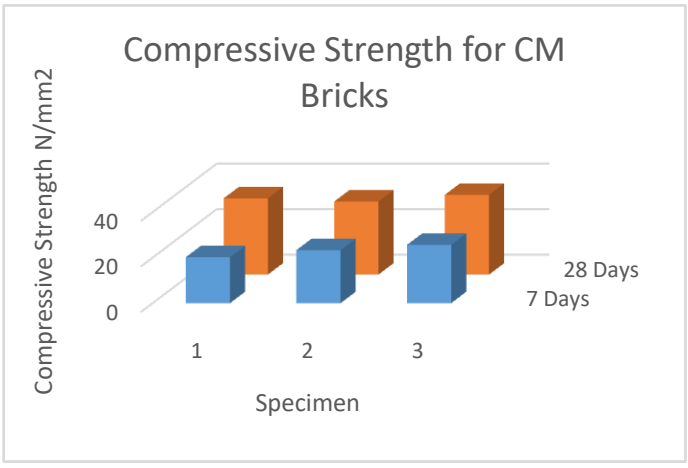
Compression Test for Mortar Bricks:

By adding suitable recycling wastes the preparation was made. The form of the brick preparation was carried out by using this formation. It will assure the specimen. It is observed that the brick is burnt well and to reform the following category that they have tested by using Compressive testing machine. It should attain the correct burning formation then only thecompression strength will be successful. It is observed for 7 days and 28 days.

Compression Test for Cement Mortar Bricks

Days of curing	Specimen No.	Compressive Strength ($N/mm^{2)}$
7 Days	Type 1	20.2
	Type 2	23.3
	Type 3	25.6
28 Days	Type 1	33.5
	Type 2	32.12
	Type 3	35.05

Graphical Representation for CM Bricks



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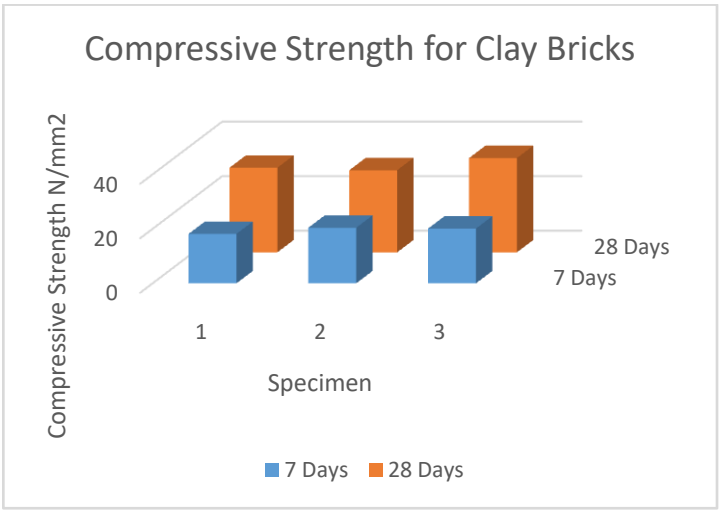
Compression Test using Compression Testing Machine

Compression Test for Clay Bricks

Compression Test for Clay Bricks

Days of Curing	Specimen No.	Compressive Strength N/mm^2
7 Days	1	18.14
	2	20.4
	3	20.1
28 Days	1	31.05
	2	30.13
	3	34.6

Graphical Representation for Clay Bricks



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Compression Test using UTM Machine

Results and Discussion:

- By using the Cement Mortar we have got more strength.
- By increasing the saw dust and wheat husk ash the compression strength gradually increased. Usually the clay has more strength, it just increased its capability while adding the egg shell in it.
- The type 1 brick achieved its strength while adding 12% of the Wheat Husk ash and Saw dust powder.
- The type 2 brick achieved its strength while adding 9% of the combination.
- The type 3 brick achieved it strength while increasing the content to 6%.
- The flow has increased up to 25% by the use of cement mortar.
- By use of clay it has increased up to 23%.

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