Effective Use of Quarry Dust in Fly Ash Brick

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ABSTRACT

In India, bricks are substantially composed up of complexion, and are generally produced in traditional, unorganized small scale diligence. Bricks are important structure material and about 250 billion bricks are annually produced by the slipup diligence. Red complexion bricks making consumes larger quantum of complexion which leads to top soil junking and land declination. Large areas of lands are destroyed every time especially in developing countries due to collection of soil from a depth of about 1 to 2 m from agrarian land. An important step in slipup timber is firing of bricks in slipup kilns which beget serious environmental pollution and health problems. Brick burning largely impact the attention of hothouse feasts in the atmosphere. This causes serious air pollution and also workers in slipup diligence are prone to respiratory conditions, to avoid all this environmental pitfalls slipup made of waste that's began from the waste as a residue from the different diligence and manufactories, this types of bricks are nominated as cover ash bricks which is composed by the different accoutrements similar as lime, gypsum, beach, fly ash etc. The ideal of this paper is to explain about manufacturing of cover ash bricks in present period and advantages of using it as a construction material. In this paper author explain about advantages of cover ash bricks over burnt complexion bricks or red bricks and manufacturing process of cover ash slipup

Keywords: *Fly ash bricks, Manufacturing & Material selection.*

INTRODUCTION

The demand of energy for the developing countries in particular area is fulfilled from the combustion of coal. The disposal of the adding quantities of thermal waste from coal- fired thermal power shops is adding day by day, this disposal of the thermal waste is nominated as cover ash, which is composed of the non-combustible mineral portion of coal consumed in a coal fuelled power factory and the fine waste remained as residue from the colorful shops and factories. Fly ash is a fine substance attained from the dust collectors in the electrical power shops that use coal as energy. Flash bricks is the composition of gypsum, lime, beach, bed waste, fly ash (with composition of silica 40, alumina 7.8, magnesium and some quantum of mercury) (21). There are two introductory type of cover ash Class C and Class F (1). Where it is the fine greasepaint formed from the mineral matter in coal, conforming of the non-combustible matter in coal plus a small amount of carbon that remains from deficient combustion. Due to rise in demands and diligence, fly ash is being accumulated as waste material in large amounts near thermal power shops. As the power conditions of the country goes up, the quantum of waste produced will also increase tremendously creating problems for its safe disposal due to lack of acceptable disposal installations. Its use in the construction assiduity i.e. (in manufacturing of bricks) will be helpful in its disposal and also help in controlling pollution. The raw accoutrements are composed in asked proportions in a Pan mixer for 4-5 twinkles and compressed. The bricks suffer curing for a minimum of 14 days and are also air dried for 7 days. Strength of these bricks can be finagled by varying the compositions. These can be considerably used in all erecting constructional conditioning analogous to that of common burnt clay bricks. The cover ash bricks are comparatively lighter in weight and stronger as compared to common complexion bricks. As an industrial waste, fly ash presents some environmental and storehouse problems of our country needs roughly 250billion bricks per time for all kind of construction workshop, to make 60 billion bricks, 185 million tons of top soil is demanded.

LITERATURE REVIEW:

SR no	***Title***	***Author***	***Finding***
1	*Effect of Brick Kiln Dust & Fly ash in Cement Concrete*	*Majid Bashir*	*In this paper started proportion form 5% FA and 10% brick dust mix together in concrete by replacement of cement and fine aggregate ,last proportion taken 15% FA and 10% brick dust, with gradual increase in fly ash by 5% and simultaneously taking constant brick dust by 10% and to improve the strength of concrete. The purpose of this research is to study the effects of fly ash on the workability, compressive strength, flexural tensile strength, splitting tensile strengths, durability.*
2	*An Experimental Investigation of Fly Ash Bricks using Quarry Dust and Granite Dust*	*G. Bala Murugan, K. Abith, S.M.H. Mohamed Faslule Rahman, A. Mohamed Nazeem Fazil, A. Mohamed Salman*	*The An effort for an alternate approach in the manufacturing of bricks was accomplished by using industrial by-products like class F fly ash, granite dust and quarry dust as key ingredients. In India thermal power plants, quarry and granite industries are generating fly ash, quarry dust and granite dust in large quantities.*
3	*Techno-Economic Feasibility Study of Stone Dust Fly Ash Cement Bricks over Ordinary Clay Bricks in Affordable Housing*	*Mayank Varshney , Meenu Varshney, Amit Sharma*	*Construction cost in India is increasing approximately by 15% every year, primarily due to increased cost of basic building materials such as bricks, steel, cement, timber etc. & of course labour. This has led to cost of construction to such level that it has become difficult for persons of low & middle income group to afford a decent house.*
4	*Effect of Fly Ash on Mortar Mixes with Quarry Dust as Fine Aggregate*	*Baboo Rai, Sanjay Kumar, and Kumar Satish*	*This paper presents the results of an experimental investigation carried out to evaluate the compressive strength and transverse strength of 1: 3mortar mixes in which natural sand was replaced with 20%, 50%, and 100%quarry dust by weight which were further wodified by partially replacing cement with four percentages (15%, 20%, 25%, and 30%) of low calcium fly ash.*
5	*Compressive Strength of Fly Ash Brick with Addition of Lime, Gypsum and Quarry Dust*	*A. Sumathi, K. Saravana Raja Mohan*	*The result shows the variation of compressive strength for different mix proportions of materials mentioned earlier at different curing ages. From the results it was inferred that, the maximum optimized compressive strength is obtained for optimal mix percentage of Flyash-15% Lime-30% Gypsum-2% Quarry dust-53%.*
6	*High Performance Fly ash Bricks*	*Mr. G. Krishnaraaju, M. E., S. Divya Bharathi, Mohamed Dilshad ASHIQ, E. Endhiran, P. R. Jyothish*	*The cost-effective building materials otherwise low-cost building materials are the materials used in building construction with appropriate technology to reduce overall construction cost compared to conventional type of building. Now-a- days the quality of materials used in conventional type is not in desired standards.*
7	*Production of Lightweight Bricks Using Saw Dust*	*Mushtaq Ahmed, Mahzuz HMA1, RakashKumer Mondal, Md. Sal-Shabil*	*Clay bricks are widely used for building construction in Bangladesh. Due to rapid urbanization, use of clay bricks is increasing exponentially which leads to air pollution, as well as huge degradation of topsoil from the agricultural lands. Besides, clay bricks increase dead load of structure as they are heavy. In order to minimize these problems, Techniques must be innovated for production of low-cost lightweight and eco-friendly bricks.*

JOURNEY FROM BURNT CLAY BRICKS TO ASH BRICKS:

The brick was traditionally produced by mixing Blessed Virgin resources, forming the bricks, drying them and so firing them [7]-[8]. This trend in bricks manufacturing has major emphasis on the employment of post-consumer wastes and industrial by-products within the production process. Most of the researches went through enhancing the clay brick quality and properties by mixing the clay with various recycled wastes as foundry sand, granite sawing waste, harbour sediments, sugarcane baggage ash, clay waste and fine waste of boron, sewage sludge, waste glass from structural wall and other different wastes [9]-[10]. Furthermore researches were held in developing bricks from wholly waste materials without exploiting any variety of natural resources, so as to realize sustainability. They used entirely wastes in bricks making like waste treatment residual, granite waste, paper sludge, straw fibers, waste treatment sludge, ash and few other wastes [11]-[12]. The standard method of bricks making has caused serious environmental contamination represented by the big emissions of greenhouse gases (GHG) resulted in unusual climate changes as smog, acid precipitation and heating. Furthermore, energy as fuel and electricity showed a drastic consumption during the normal manufacturing of bricks led to highly economical expenditures. As a result, vast forests are in current deforestation so as to utilize their woods and trees as source of energy within the firing stage of bricks production. Hence, recycling the wastes within the bricks production appears to be viable solution not only to environmental pollution but also economical choice to design of green building.

METHOD OF MANUFACTURING:

Ash bricks may be prepared by the employment of various semi-automatic and automatic machines with the employment of moulds pre attached in machines, where using of manual moulds within the manufacturing method results in frequent change within the size of the bricks and will ends up in the poor exterior quality of the bricks. Approximately every ash brick factory uses machines to provide ash bricks, which led to the utilization of less labours and makes the price less of per ash bricks which may be easily afforded by low to high class families. There are 3 different proportion by which ash bricks may be prepared which depends on the materials available.

PROCESS OF MANUFACTURING:

The bricks produced per the employment of stuff originated from different factories as a residue are named as ash Bricks. Essentially the sole solid ingredient of the brick is that the powdered ash and also the main liquid ingredient is water. Other ingredients that thus far are commercially protected are only minor in quantities. The method of producing ash bricks is predicated on the reaction of lime with silica of ash to create calcium silicate hydrates (C-SH) which binds the ingredients to create a brick and acts as a bounding material. The standard of bricks obtained is very obsessed with the standard of ash [18]. Its process of producing is as follows a) the manufacturing process of brick requires ash, sand/stone dust, lime and gypsum to be mixed in appropriate proportion.

b) Lime and gypsum are first added to the hydraulic mixer machine where it's grinded finely as a dry mixture.

c) While the mixture is mixed thoroughly and uniformly the grinding of the machine is stopped.

d) After the above process, the fly ash and also the sand stone are taken within the required quantity.

e) Ash and sand /stonedust are then added into the pan – mixture to create uniform mixture.

f) When cement is employed in situ of lime, first ash and sand/stone dust is mixed in pan-mixture so cement is added into pan-mixture to possess uniform dry mixture.

g) Now the mixer machine is created in ON condition and also the above mixture is ground uniformly within the dry condition.

h) After this Water is added into the pan-mixture once the uniform dry mixture of ash, sand/stone dust and cement are achieved.

i) The water content must be added in a very required quantity because the mixture must be in an exceedingly concentration that they ought to be capable of moulded into the brick.

j) it's to be carefully noted that the number of water must not be more and for per Kg of cement the water content ratio must not exceed 0.6%.

k) When the amount of the materials is less, they're needed to be transferred through the labours.

l) When the amount of the mixture is more, then the method of transferring to the mould can be done by a conveyor.

m) Hydraulic machine consists of three pairs of brick moulds.

n) Moulds can differ in step with the machines available.

o) After the amount of the mixture content is transferred to the place of the situation of brick mould, it's needed to be filled into the holes provided within the machine which represents the brick mould.

p) The mould is generally provided at the circular table which is capable of rotating in clockwise direction.

q) After the mould is crammed with the materials, the table is allowed to rotate in clockwise direction so it remains under the part of closed portion of the machine.

r) At that portion the mixture is hydraulically pressed to get bricks then the pressed bricks are pushed outside the brick mould automatically.

s) Once bricks are taken out from the mould, they're transferred to the Planck

t) the transferring of the bricks must be administrated carefully because it is feasible to induce broken because of the pressure applied over it.

u) When the certain ratios of the bricks are completed for the aim of reference they're to be noted over the brick.

v) When the Planck is filled by the bricks then they're to be taken by the Planck lifter for the aim of air drying process where the bricks are air dried for two to three days.

w) Water curing is finished for required days and to attain the desired strength.

The bricks produced consistent with the utilization of waste matter originated from different factories as a residue are named as ash Bricks. Essentially the sole solid ingredient of the brick is that the powdered ash and therefore the main liquid ingredient is water. Other ingredients that to this point are commercially protected are only minor in quantities.

The method of producing ash bricks relies on the reaction of lime with silica of ash to create calcium silicate hydrates (C-SH) which binds the ingredients to make a brick and acts as a bounding material. The standard of bricks obtained is extremely keen about the standard of ash [18]. Its process of producing is as follows –

a) the manufacturing process of brick requires ash, sand/stone dust, lime and gypsum to be mixed in appropriate proportion.

b) Lime and gypsum are first added to the hydraulic mixer machine where it's grinded finely as a dry mixture.

c) While the mixture is mixed thoroughly and uniformly the grinding of the machine is stopped.

d) After the above process, the fly ash and therefore the sand stone are taken within the required quantity.

e) Ash and sand /stone dust are then added into the pan – mixture to create uniform mixture.

f) When cement is employed in situ of lime, first ash and sand/stone dust is mixed in pan-mixture then cement is added into pan-mixture to possess uniform dry mixture.

g) Now the mixer machine is created in ON condition and also the above mixture is ground uniformly within the dry condition.

h) After this Water is added into the pan-mixture once the uniform dry mixture of ash, sand/stone dust and cement is achieved.

i) The water content must be added in a very required quantity because the mixture must be in an exceedingly concentration that they must be capable of moulded into the brick.

j) it's to be carefully noted that the amount of water must not be more and for per Kg of cement the water content ratio must not exceed 0.6%.

k) When the number of the materials are less, they're needed to be transferred through the labours.

l) When the amount of the mixture is more, then the method of transferring to the mould might be done by a conveyer.

m) Hydraulic machine consists of three pairs of brick moulds.

n) Moulds can differ in line with the machines available.

o) After the number of the mixture content is transferred to the place of the situation of brick mould, it's needed to be filled into the holes provided within the machine which represents the brick mould.

p) The mould is generally provided at the circular table which is capable of rotating in clockwise direction.

q) After the mould is crammed with the materials, the table is allowed to rotate in clockwise direction and so it remains under the part of closed portion of the machine.

r) to obtain bricks and then the pressed bricks are pushed outside the brick mould automatically.

s) Once bricks are taken out from the mould, they are transferred to the Planck

t) The transferring of the bricks must be carried out carefully as it is possible to get broken due to the pressure applied over it.

u) When the certain ratios of the bricks are completed for the purpose of reference they are to be noted over the brick.

v) When the Planck is filled by the bricks then they are to be taken by the Planck lifter for the purpose of air drying process where the bricks are air dried for 2 to 3 days.

w) Water curing is done for required days and to achieve the required strength.

The bricks produced according to the use of waste material originated from different factories as a residue have been named as Fly Ash Bricks. Essentially the only solid ingredient of the brick is the powdered ash and the main liquid ingredient is water. Other ingredients that so far are commercially protected are only minor in quantities. The process of manufacturing fly ash bricks is based on the reaction of lime with silica of fly ash to form calcium silicate hydrates (C-SH) which binds the ingredients to form a brick and acts as a bounding material. The quality of bricks obtained is highly dependent on the quality of fly ash [18]. Its process of manufacturing is as follows –

a) the manufacturing process of brick requires fly ash, sand/stone dust, lime and gypsum to be mixed in appropriate proportion.

b) Lime and gypsum are first added to the hydraulic mixer machine where it is grinded finely as a dry mixture.

c) While the mixture is mixed thoroughly and uniformly the grinding of the machine is stopped.

d) After the above process, the fly ash and the sand stone are taken in the required quantity.

e) Ash and sand /stone dust are then added into the pan – mixture to form uniform mixture.

f) When cement is used in place of lime, first fly ash and sand/stone dust is mixed in pan-mixture and then cement is added into pan-mixture to have uniform dry mixture.

g) Now the mixer machine is made in ON condition and the above mixture is ground uniformly in the dry condition.

h) After this Water is added into the pan-mixture once the uniform dry mixture of fly ash, sand/stone dust and cement is achieved.

i) The water content must be added in a required quantity as the mixture must be in a concentration that they should be capable of moulded into the brick.

j) It is to be carefully noted that the quantity of water must not be more and for per Kg of cement the water content ratio must not exceed 0.6%.

k) When the quantity of the materials is less, they are needed to be transferred through the labours.

l) When the quantity of the mixture is more, then the process of transferring to the mould could be done by a conveyor belt.

m) Hydraulic machine consists of three pairs of brick moulds.

n) Moulds can differ according to the machines available.

o) After the quantity of the mixture content is transferred to the place of the location of brick mould, it is needed to be filled into the holes provided in the machine which represents the brick mould.

p) The mould is mostly provided at the circular table which is capable of rotating in clockwise direction.

q) After the mould is filled with the materials, the table is allowed to rotate in clockwise direction and then it remains under the part of closed portion of the machine.

r) At that portion the mixture is hydraulically pressed to get bricks then the pressed bricks are pushed outside the brick mould automatically.

s) Once bricks are taken out from the mould, they're transferred to the Planck

t) the transferring of the bricks must be allotted carefully because it is feasible to urge broken because of the pressure applied over it.

u) When the certain ratios of the bricks are completed for the aim of reference they're to be noted over the brick.

v) When the Planck is filled by the bricks then they're to be taken by the Planck lifter for the aim of air drying process where the bricks are air dried for two to three days.

w) Water curing is completed for required days and to realize the desired strength.

MATERIALS SELECTION OF INGREDIENTS:

Fly Ash bricks are manufactured from ash, lime, gypsum and sand. These may be extensively utilized in all building constructional activities, the materials that are employed in the composition of ash bricks together with its sources are as follows :-

Ash samples are directly collected from Electrostatic Precipitators (ESPs)/chemical industry in gunny bags and transported to the place of producing. Minimum requirement of ash for brick manufacturing are

• Loss of ignition should be more Availability of MgO shouldn't be greater than 15%.

• SiO2 content shouldn't be more Source of ash.

• Ash from thermal powerhouse.

• Ash from coal boiler employed in industry for generation for energy.

• Ash from Bagasse boiler employed in mostly sugar industry and plenty of other industries which are using Bagasse boiler.

Source of ash in present approx. over 72% of electricity demand is fulfilled by coal based thermal power plants. These power stations generate nearly 40 million a lot of ash annually. Ash contains Carbon di oxide emitted from thermal power plants, industries using coal as a fuel emits unwanted ash and smoke from which ash is produced. Al together the facility plants and industries, they separate the ash by using the cyclone converter. This ash is then used as stuff for manufacturing of bricks.

Lime commercially available chemically pure lime (CaCO3) obtained from industry. Lime is vital ingredient for manufacturing of ash brick, which acts as a binding material; lime should be satisfying the subsequent requirement.

• During lime slaking, it mustn't attain but 600oC temperatures and slaking time mustn't be over 15 min.

• Availability of CaO should be minimum of 60%.

• MgO content should be maximum of fifty.

• Should be in fine powdered form. Source of Lime

• It is often obtained from different industry within the style of lime hydrate sludge.

Quarry Dust It stated a waste matter obtained from pulverizing coarse aggregate which are abundantly available.

Source of quarry dust

• Quarry sand will be collected from any construction site for manufacturing of ash bricks.

Polymer TBA (tertiary butyl acrylate)

Polymer used as adhesive for the manufacturing of ash brick. Polymer is one among the wastes generated from the industry.

Cement is constructing material it used as binder within the manufacturing of Brick. Cement will be easily available at construction place.

Mould 9″×4″×3″ blocks: iron blocks are used for the manufacturing of ash cubes.

Thapi Mostly used at construction site but hear this used for the blending of ingredient in equal manner [18]

DRYING AND CURING OF BRICKS

After making of block, it absolutely was kept for sun drying for 24hrs then block is removed and kept for further drying process. Curing means watering the bricks. This

process is finished after 48 hours of producing of bricks after the method of air and sun drying.

TESTING OF BRICKS

Bricks should be passes through the subsequent tests after 7, 14 & 28 days from curing

Weight of Dry Block Weight of the block has got to taken to calculate the moisture content. As per the development norms the brick should show the ten moisture content of its weight. If the moisture content satisfies this test, it'll undergoes the subsequent test.

Size of Block Sizes of brick was checked for the slump test & to calculate the compressive strength of brick. Also through this test the uniformity of the brick was checked in six samples.

Compressive strength Compressive strength of the specimen brick was calculated after 7, 14 & 28 days of curing using the formula as follows, Compressive strength = Applied Max load x 1000 (N)/Cross sectional Area (mm2) [18]. The compressive strength of ash brick is thrice greater than the traditional clay brick. The minimum compressive strength of clay brick is 3.5 N/mm².So because the ash brick has compressive strength of 10-12 N/mm². Bricks to be used for various works shouldn't have compressive strength but as mentioned above. The universal testing machine is employed for testing the compressive strength of bricks. After the curing period gets over bricks are kept for testing. To check the specimens, the bricks are placed within the calibrated compression testing machine of capacity 3000 KN (Kilo Newton) and applied a load uniform at the speed of two.9 kN/min. The load at failure is that the maximum load at which specimen fails to supply to any extent further increase within the indicator reading on the testing machine [19].

Water absorption Ash Bricks shouldn't absorb water quite 12% by its weight. The bricks to be tested should be dried in an oven at a temperature of 105ºC to 115ºC till attains constant weight cool the bricks to temperature and weight (W1). Immerse completely dried and weighed (W1) brick up clean water for twenty-four hrs at a temperature of 27±20oC. Remove the bricks and wipe out any traces of water and weigh immediately (W2). Water absorption during which by weight = (W2 – W1/W1) x 100 [19].

Efflorescence test For this test, brick has got to be placed vertically in water with one end immersed. The depth of immersion in water being 2.5 cm, then the full arrangement should be kept during a warm-well-ventilated temperature of 20-30o C until all evaporates. When the water within the dish is absorbed by the brick and surplus water evaporates. When the water is totally absorbed and evaporated place similar quantity of water in dish and allows it to soak up and evaporate as before. Examine the brick after this and see the share of white spots to the area of brick. If any difference is observed thanks to presence of any salt deposit, then the rating is reported as "effloresced". If no difference is noted, the rating is reported as not "effloresced" [19].

Soundness Test this sound is administrated to seek out out that a transparent ringing sound is produced or not when the 2 bricks are struck with one another without breaking any of the 2 bricks. If the 2 bricks aren't broken after striking with one another and a transparent ringing sound is produced, then it means the bricks are sufficiently sound [20] 7. Crushing Strength Test this is often the most tests conducted to check the suitability of the brick for construction work. This test is executed with the assistance of compression testing machine. A brick is placed in an exceedingly compression testing machine. It's pressed till it breaks. Then the compression strength of the brick is recorded from meter of the compression testing machine. A brick after undergoing compression test, this test is disbursed for both ash bricks and similarly as burnt clay bricks [20].

OBJECTIVES:

- It reduces loading on structures thanks to light weight
- The use of waste like ash and stone quarry dust to be a viable option in conserving natural resources.
- To compare the bricks of various proportions by testing the water absorption, compressive strength and efflorescence.

CONCLUSION:

Fly ash bricks use 50% of ash but without using of clay. The mechanical properties of the ash bricks have exceeded that those of conventional brick. The study suggests that the ash from industry ash/ Electrostatic Precipitators (ESPs) is often effectively used for manufacturing of bricks. Using of ash in to manufacturing of brick, helps in minimization of the waste also this method will help to conserve natural resources like air, water, soil. Ash isn't only to boost the mechanical properties of brick but the addition of polymer and lime correlate their gape of strength and their use in helping to scale back environmental pollution and save energy. due

to uniformity of the ash bricks the standard of construction is improved surface of wall is exclusive, it can reduced the price of the plastering after the brick work, layers of the each brick shows the line.[18].It is highly fire insulation, because of high strength, practically no breakage during transportation and use, because of its uniform size of bricks mortar required for joints and plaster reduced almost by 50%, it's lower water penetration seepage of water through bricks is considerably reduced. These bricks don't require soaking in water for twenty-four hours, sprinkling of water before use is enough and on the opposite side red bricks have many disadvantages like its high water absorbing capacity, good conductor of warmth and has less compressive strength [21].

REFERENCE:

1. *G. BalaMurugan, K. Abith, S.M.H. Mohamed Faslule Rahman, A. Mohamed Nazeem Fazil, A. Mohamed Salman The shot for an alternate approach within the manufacturing of bricks was accomplished by using industrial by-products like class F ash, granite dust and quarry dust as key ingredients. In India thermal power plants, quarry and granite industries are generating ash, quarry dust and granite dust in large quantities.*

2. *Mayank Varshney, Meenu Varshney, Amit Sharma Construction cost in India is increasing approximately by 15% once a year, primarily because of increased cost of basic building materials like bricks, steel, cement, timber etc. & off-course labour. This has led to cost of construction to such level that it's become difficult for persons of low & middle income group to afford a good house.*

3. *Baboo Rai, Sanjay Kumar, and Kumar Satish This paper presents the results of an experimental investigation dole out to guage the compressive strength and transverse strength of 1 : 3mortar mixes within which natural sand was replaced with 20%, 50%, and 100%quarry dust by weight which were further wodified by partially replacing cement with four percentages (15%, 20%, 5%, and 30%) of low calcium ash.*

4. *A. Sumathi, K. Saravana Raja Mohan Compressive Strength of ash Brick with Addition of Lime, Gypsum and Quarry Dust*

5. *Athanasia Soultana and Michael Galetakis This study aims to assess the assembly of cellular micro-concrete, consisting of quarry dust, calcareous ash, cement, and aluminum powder as aerating agent. The proposed mixture design Methodology relies on a Box–Behnken fractional factorial experimental design. Testing of specimens Included compressive and flexural strength, density, water absorption, and thermal conductivity measurements.*

6. *Mushtaq Ahmed, Mahzuz HMA1, RakashKumer Mondal, Md. Sal-ShabilClay bricks are widely used for building construction in Bangladesh. Because of rapid urbanization, use of clay bricks is increasing exponentially which results in pollution, further as huge degradation of topsoil from the agricultural.*

7. *Lands. Besides, clay bricks increase loading of structure as they're heavy. So as to attenuate these problems, Techniques must be innovated for production of low-cost lightweight and eco-friendly bricks.*