



GAUCRETE BRICKS NATURAL BUILDING MATERIAL AS AN ENVIRONMENT FRIENDLY SOLUTION

Sanjay Dangi

Transport Engineering and Management, Maharshi Dayanand University,
Rohtak, Haryana

Cite This Article: Sanjay Dangi, "Gaucrete Bricks Natural Building Material as an Environment Friendly Solution", International Journal of Multidisciplinary Research and Modern Education, Volume 9, Issue 1, Page Number 104-107, 2023.

Copy Right: © IJMRME, 2023 (All Rights Reserved). This is an Open Access Article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium provided the original work is properly cited.

Abstract:

In the last decade, a job blow is looking for a sustainable construction material the pressure for In the last decade, a job blow is looking for a sustainable construction material the pressure for improved construction methods also leads to the search of a new material. The study on natural building construction material starts with the research on cow dung, mud and slaked lime. For an eco-friendly construction and sustainable material. It incorporates the results on a survey which is carried on the different levels from university students and professors to rural and urban people for ecological awareness to benefit the humans and development prospects of this material in India. People were surveyed to know their opinion on the natural construction material available in eco-system for residential building and can also be used for partition of walls in commercial buildings or skyscrapers.

Key Words: Intend to Construct, Sustainable Construction, Carbon Negative Houses, Devoted, Contemporary Necessity, Pre-Historic, Impressive, Abundant, Relevant, residential buildings, skyscrapers.

Introduction:

Study on earthen architecture is devoted to the architectural use of natural building material to make structure of human kind the subject is closely related to eco-friendly construction material and sustainable development. In contemporary world Joe blow is looking towards environment friendly and sustainable construction. In 20th century concrete and cement industry has trounce the construction industry to such an extent that Joe blow has leave the practise of any another eco-friendly material for construction one side Joe blow is facing threat of health issues due to burning of fossil fuels like gas, diesel, petrol while making of these materials and transportation activities every construction project results in these gas emissions of carbon dioxide methane and other waste projects that pollute the air and are believed to contribute to global warming. So its time to take a necessary steps towards sustainable development.

Mud bricks was the contemporary necessity of humans archeologists have found evidence of mud bricks buildings constructed from pre-historic times around 10k years ago in north Africa and middle east also the impressive buildings found upto 10 stories have been recorded in an unbroken architectural tradition that continues today therefore creating individual mud structures is a commonly practise in most of areas at global level today. Practise of reshaping the mud to create a human environment is quasi known to us.

Man has always built structures with natural materials, structures with mud the almost all the natural building material creates the special challenge. Like non water proof properties, and to some extent strength also. Therefore all the previous pursuit for replacing these with a more plastic, environmental friendly materials has been resulted into a region of the structural of technical dimension of the architecture, with building mud offers unique possibility of amalgam (combination). So we came with a innovative natural construction bricks made from mud, slaked lime and cow dung known as Gaucrete bricks.

As an research into the possibilities of Gaucrete bricks as an building material is mainly relevant at a global level and country like India where at large scale these materials are available in abundant form we are not able to use them upto a mark so it is a opportunity for us to use these materials available locally and naturally, eco-friendly natural material. The superiority and possibilities of Gaucrete brick construction are endless. Conceptually or Imaginary this eco-friendly material for construction can be used to merge conventional elements into modern or current contest.

Understanding Sustainable Development:

The development that meet the need of present generation without compromising the ability of future generation to meet their respective need. The underlying notion or spirit of above definition is there should be judicious use of resources as against mindless exploitation of resources. This very theme is well summarised is one of the Mahatma Gandhi's quote line "The earth has sufficient resources for the need of man but not for greed". A sustainable home is integral for a greener future. In ancient times Joe blow used the locally available material for the construction of house. Thus cowdung, mud, a soft, sticky matter resulting my mixing the water and cow-dung was the most common material for the construction in pre-historic times and mud and water alone was also used for construction of shelter. Mud was either used in form of mud blocks or raw nature for

wall construction known as rammed earth walls. The mixture of mud, water, cow-dung was also used for flooring, roofing and plastering the walls in ancient times. The feasibility of mud, cow-dung, water as construction material has been very much surveyed in the ancient times and in today's scenario it is still practised in the European, Egyptian and Arab countries.

Health Impact of Materials:

All materials used in buildings have a health impact on the occupants. A sustainable material should have the smallest negative effect on largest positive effect possible on them. The biggest concern with materials is any toxic or harmful substances that may be contained in or released by them. Other examples of unhealthy, unsustainable materials are asbestos insulation, and lead-based paint. Any materials that contain dangerous substances, like lead-based paint, should be avoided if possible, as it can be a health threat to VOC - Containing paints. VOC's or volatile organic compounds are substances that evaporate from paint allowing it to dry and are very toxic to humans. Even after the paint has dried VOC's can continue to be released from the paint from year's thus harming occupants. The easiest solution is to use paints that do not contain VOC's and instead contain a non-harmful drying agent pressure - treated lumber can also be a health risk, as the chemicals used to make the lumber can contain the problem, but paint wears and chips away with time while this lumber is very useful is exterior or other exposed areas, one should be very careful in making sure that it will not be a threat to the building's occupants, if it is to be used at all. While these are only a few examples of unhealthy and healthy building materials, how healthy any particular material is should be taken into consideration when construction materials are being selected for a product. If materials that may be hazardous to occupants should be taken too ensure the safety and well - being of the occupants.

Materials Used:

The Gaucrete is produced by mixing of cow dung, hydrated lime and clay

Cow Dung - cow dung has a huge amount of proteins and fibers which makes it a great natural binding substance like enzymes, mucosa and dead cells.

Slaked Lime - Hydrated lime provides the properties of being fire resistant and water resistant.

MUD - It increases the load bearing capacity of Gaucrete which makes them more durable in construction.

How to Prepare Material for Gaucrete Bricks:

The Gaucrete bricks are made by mixing and processing of materials like clay, Slaked lime, cow dung. Mix these all 3 materials as per formula required for different different needs and then cover the material properly for next 12 hours and then again mix the same material after 12 hours properly and again cover it properly we have to repeat this procedure for 6 times at the interval of 12 hours then the mortar is ready for making bricks. Now this mortar is put into the blocks and sundried for 8 to 10 days and the bricks are ready for construction use. The mortar for construction is also used same material which is used for making bricks and same procedure to be followed. After construction plaster is also done with same mortar and the surface area of walls is increased due to wavy walls which results into more purification of air due to increased area of walls.

Types of Gaucrete Bricks:

The formula for this is as follows-

1st Formula - 2 parts of cow dung and one-part mud this formula is normally used in making accessories like pots, bowls etc.

2nd Formula - 2 parts of cow dung and 1 part of mud and 5% slaked lime mortar or material made by this formula gives us waterproof bricks.

3rd Formula - 80% cow dung and 20% slaked lime give us a fire resistance and waterproof bricks.

Advantages of Gaucrete Bricks:

- Gaucrete bricks are capable of absorbing air pollution due to their breathing properties like human body.
- Houses made from Gaucrete bricks remain warm in winter and cold in summer due to its natural insulating properties. It is due to the fact that Gaucrete bricks observe moisture from Environment and when this Gaucrete bricks walls are heated by the sunlight the moisture in the wall is evaporated living behind the cooling effects.
- The Gaucrete bricks also absorb pollution, smoke, and foul-smells. 4- The Gaucrete bricks are waterproof so there will be no dampness.
- The houses made by Gaucrete bricks have long life due to its properties like dampness and fire resistance, water resistance.
- Gaucrete bricks are economical because it can be used directly in its raw form without getting the materials processed which not increase its production cost.
- Gaucrete bricks are made from the material that is available in nature without changing their properties which makes the bricks a natural substance which can be decomposed naturally into the environment easily.
- Gaucrete bricks can also absorb shocks released due to earth quakes which also makes them earth quake resistance material.

- Gaucrete bricks not require water during the making of it.
- Gaucrete bricks do not require curing after the construction which results into much of saving water and time.

Conclusion:

India being a developing nation with problem such as mass un-employment high poverty and increasing eco-logical disintegration we as a nation need development along with the environment and not development v/s the environment .so we got a positive response for Gaucrete bricks from people and get ascent on approval of eco-friendly buildings and eventually and readiness to invest money on such a sustainable building material which will not harm the environment in future and present. Peoples are intended to construct house made up of Gaucrete bricks due to its environment friendly properties and sustainable construction material and carbon negative houses. The target is to make the multi-storey building and, in the hospitals, where people get treatment so that they can be benefitted by the natural properties of Gaucrete. The product should be broadly exposed to control the pollution and reduce the global issue and we can save the environment for future and present.

“Gaucrete Bricks are similar to human bodies, Gaucrete walls being porous can breathe like our skin. This helps in maintaining comfortable indoor temperature, irrespective of extreme weather conditions outside” says Dr. Shiv Darshan Malik. It is important to take serious steps towards the Gaucrete Technology for future and Equally important to continue adapting sustainable Gaucrete houses to protect the world or light environment and the invention also helps in promoting Animal Protection by utilizing the waste produced by cattle.

References:

1. Thermal conductivity of cement, cement-concrete, brick and layer (W/ m-K).
2. Thickness of cement, concrete, brick and mud layer respectively (m).
3. Heat gain through roof, walls and windows respectively (kJ/s).
4. Heat loss due to ventilation (kJ/s).
5. Total heat gain and heat loss (kJ/s).
6. Density (kg/m³), Volume (m³) and Specific heat (kJ/kg-K) and Mass (kg) of room air respectively.
7. Energy saving potential of the house with mud layer in roof.
8. Analysis of a House with Mud Layer in Roof for Summers
9. Handbook of functional requirements of buildings (other than industrial building). SP: 41(S&T) (1987). New Delhi: Bureau of Indian Standard. p. 37.
10. Chel Arvind & Tiwari, G.N. (2009). Performance evaluation and life cycle cost analysis of earth to air heat exchanger integrated with adobe building for New Delhi composite climate”. Energy and Buildings, 41, 56–66.
11. Eben, S.M.A. (1990). Adobe as a thermal regulating material. Solar Wind Technology, 7, 407–416.
12. Harvey, F. (2009, April). Efforts increase to improve sustainability. Energy Efficient Buildings, Financial Times. 1-3.
13. Jadhav, R. (2007). Green architecture in India: Combining modern technology with traditional methods. UN Chronicle, 154 (2), 66-71.
14. Naseer, M. A. (2013). Energy Efficient Building Design: Revisiting Traditional Architecture. The Asian Conference on Sustainability, Energy & the Environment, Official Conference Proceedings, Osaka, Japan, 2013 (pp. 470-482).
15. Pal, R. K. (2012). Analysis of Geothermal Cooling System for Buildings. International Journal of Engineering Sciences & Research Technology, 1(10), 569-572.
16. ISSN: 2180-1053 Vol. 8 No.1 January – June 2016 39
17. Journal of Mechanical Engineering and Technology
18. Pal, R. K. (2015). Thermal Performance of Mud Houses. Research Journal of Engineering and Technology, 6(4), 439-442.
19. Uthapattarakul, Dh. (2004). Mud-house construction technique. Building the house with mud. Suan-ngarn-mena Press, Bangkok, 27-50.
20. WBCSD (2009). Energy efficiency in buildings: Transforming the market. A Report by World Business Council for Sustainable Development.
21. Brzozowska-Backiel, B. (2014). Clay and straw building. Initial assessment of selected aspects of durability. Ecological Engineering 4: 108-2016.
22. Golański, M. (2012). Energy efficiency with the use of nonconventional construction materials. Zero energy building. Przegląd Budowlany 12: 68-74.
23. Kamieniarz, M. (2016). Inovative and ecological clay building. Magazine of Architecture. Civil and Environmental Engineering, JCEEA, XXXIII, 63 (3/16): 151-158.
24. Return of natural building. Architecture. Krakowski Rynek Nieruchomości 14: 14-15.
25. Natural building as an environment, Kapłańska, W. (2015). Ecological building and energy efficient

- building of the future.
26. Development. *Przegląd Budowlany* 2: 36-41.
 27. Radwan, MR., Kasyout ALHB., EL Shimy, H G., Ashour, SF. (2015). Green building as
 28. concept of sustainability. Sustainable strategy to design Office building. Radzymińska, M., Jakubowska, D., Mozolewski, W. (2015). Ecological behaviors and attitudes toward the natural environment. *Handel Wewnętrzny* 2(355): 346-356. Runkiewicz, L. (2016). Issues of environment protection and 'Ecology and Architecture'.
 29. Wasilewska, A. W., Pietruszka, L.B. (2017). Natural materials in eco-building. Ecology vs. Architecture. *Przegląd Budowlany* 10: 50-53.
 30. Zhang, Y., Kang, J., Jin, H. (2018). A Review of Green Building Development in China from the Perspective of Energy Saving. [in:] *Energies* 11 (2): 334.