

# “EFFECTIVE UTILIZATION OF WASTE PAPER INTO BRICKS / PAPERCRETE WALL PANELS”

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**Abstract** – A large number of non-renewable resources are used by the construction industry worldwide.. This paper describes the various aspects of use of paperwaste in producing bricks and wall panels. The construction industry has been known as one of the largest consumers of nonrenewable resources. On the opposite hand, greater waste paper finally ends up in landfill or unload paperwaste sites than the ones recycled. Consequently, recycling waste paper to be used as a production fabric constitutes a step in the direction of sustainable development. The reason of this studies is to decide the weight, compressive strength, water absorption capacity, heat resistance, hardness and so on of papercrete brick with the aid of using the use of waste papers (newspapers, invitation cards, magazines and so on.) Papercrete will offer a way to treat trash paper into a good use of creating inexpensive brick walls, wall membranes that are quite strong, high sound adsorption, well insulated and also provides good aesthetical appearance as well. The high volume of concrete offers a complete solution to the problems which meets the increasing demands for concrete in the future in a sustainable manner and with reduced cost.

Key words: Papercrete Hollow Block, Waste Paper, Low Cost Material, Light Weight Material.

## 1. INTRODUCTION

Since the large demand has been placed on the construction industry, especially in the last decade due to increase in pollution which cause a persistent scarcity of building resources the civil engineers were challenged to transform the commercial waste to beneficial constructing and creation materials. One exceptional recycle possibility is the use of waste paper as a creation material. Since the construction industry uses up a terrific quantity of nonrenewable resources, therefore the potential characteristics of waste paper for producing a low cost and light weight composite brick for construction not only delivers the potential use of waste paper recycling however it is going to likewise convey down the call for strain on international natural resources. In recent years, there has been a renaissance of interest in traditional building material, particularly those made from renewable or recycled materials “papercrete” is one of such materials attracting public interest. Papercrete is a complicated material comprising of Portland cement, waste paper, water and/or sand. The aggregate of those materials, which may also offer a manner to offer less expensive housing on a massive scale. The surroundings effect of paper is significant, which has brought about modifications in industry. With the usage of present day technology, harvesting wood, disposable paper has come to be a reasonably-priced commodity which has brought about a excessive degree of intake and waste. The manufacturing and use of paper has some of unfavourable results at the surroundings which might be called paper pollution. Discarded paper is a main aspect of it. Taking this issue into account, construction material known as papercrete is invented.

### 1.1 Project Viewpoint

The purpose of present research is to utilize the waste materials like paper and to replace the costly and rare uncommon traditional building construction brick which satisfies the following characteristics:

- └ Required
- └ Cost effective
- └ Environmental friendly
- └ Less weight
- └ Inflammable
- └ Easily available

## 2 MATERIALS:

Material collection is the basic and important step in any project. Also, the material that's utilized in a project will now no longer purpose any harm to the environment. In this research, waste substances had been used to make constructing bricks.

### 2.1 Brick:

A brick is material of construction applied to make partition walls, street pavements and different factors in masonry construction. Traditionally, the time period brick relate to a unit tranquil of clay, however it is now used to refer any rectangular assembly laid in mortar. A brick may be mixture of clay bearing soil, sand, and lime, or concrete materials. Rectangular assembly laid in mortar. A brick may be mixture of clay bearing soil, sand, and lime, or concrete materials. Bricks are made in lots of classes, sort, materials, and sizes which vary with place and time period, and are produced in mass quantities.

### 2.2 Paper:

Paper is a natural polymer which include wood cellulose. Cellulose is manufactured from entirely of monomer glucose. Although comprising numerous hydroxyl groups, cellulose is water insoluble. The explanation is the stiffness of the chain and hydrogen bonding between two OH groups on side by side chains. The chains additionally bundle often regularly in locations to make hard, solid crystalline location that yields the package deal chains even extra balance and strength.. Paper is a thin material made by the adjuratory unneurotic moist fibers of cellulose pulp taken from wood, rags or grasses, and air dried them into flexible sheets.

### 2.3 Cement:

Cement is one of the binding material in this research. Cement is the important binding material in today's construction world 53 grade Ordinary Portland Cement (OPC) confirming to IS: 8112-1989 cement used.

### 2.4 Sand:

Sand particles consist of small grains of silica (SiO<sub>2</sub>). It is shaped via way of means of the decay of sand stones because of diverse outcomes of weather. According to natural sources from which the sand is obtained, it's far termed as pit sand, river sand and sea sand. According to the scale of grains, the sand is assessed as fine, coarse and gravel.

### 2.5 Water:

Water is an important ingredient of papercrete as it is involved in the chemical reaction with cement. Potable water should be used for both soaking and mixing of papercrete. It must be free from biological constituents and the pH value should be between 6 and 7.

## 3. LITERATURE REVIEW

1. Experimental Study on Papercrete as a Sustainable Construction Material. Published By- Annoy Kumar Ghosh. Publishing Date : International Research Journal of Engineering and Technology (IRJET), Volume 05 Issue: 10, Oct 2018:

They found the water absorption and water resistance of papercrete to be high and increased with growing waste paper content material even as the bulk density and compressive strength of papercrete werelow and reduced with developing waste paper content. Papercrete was recommended to be an effective and sustainable material for the production of light weight and Fire-resistant hollow or solid blocks to be used to make partition partitions of mainly high-storey buildings. Mix proportions were encouraged for manufacturing of hollow and solid blocks using papercrete.

2. Experimental Investigation on Mechanical Properties of Papercrete Published By – G .B. Ramesh Kumar Publishing Date : Indian Journal of Pure and Applied Mathematics, Volume 119 No. 17, 2018, 87-93

They had done an experiment on "Comparative Study on Papercrete bricks with Conventional Bricks". They have done an experimental syudy which shows the potential use of paper waste for producing a low cost and light weight composite brick as a building material. They investigated three different mix proportions of fly ash mixed papercrete blocks with ad without sand. In entire three bricks ,the compressive strength was more than the needed i.e 3.5Mpa. The bricks have water absorption greater than 20%. papercrete blocks did not burn with an open flame. They smoldered like charcoal. If the indoors plaster and outdoors stucco is furnished on bricks, the bricks won't burn at all. The outcomes indicates that if we surge the proportion of paper then the strength will be often decreased.

3. An Efficient use of Waste Paper Published By – YD Shermale, MB Varma Publishing Date: Recent Trends in Civil Engineering & Technology, Volume 5, Issue 3, Oct 2015

They worked on mechanical properties of papercrete by taking various samples and experimenting on them and have achieved the average compressive strength which includes 5% paper-cement replacement ratio was 34MPa and water-binder ratio hardly affected compressive strength rapidly. According to them, the density of papercrete was reduced while the substitute ratio of waste paper of papercrete increased. The splitting tensile strength additionally reduced through which include better substitute ratio of waste paper.

4. Experimental Research Paper on Plastic – Papercrete Roads Adding Plastic as an Additive Material Published By – Akarsh KV Publishing Date: International Journal of Engineering Research & Technology (IJERT), Volume 9 Issue 04, April 2020

In this authors done research on papercrete and gave results as light weight, low cost and as per the experimental results the compressive strength of paper decreases with more use of paper pulp in the concrete but the tensile strength. Related to this paper the authors done a experiment observation and gave the results as papercrete materials are fire resistant, lightweight, low cost and are as materials made by waste materials and this paper also gives the bried information about the wastage available abundantly in society. In authors done research on papercrete and resulted that these papercrete materials are flexible, light weight, low cost and could not contract or expand.

#### **4. METHODS**

The technique to be followed and the modeling to be executed are defined on this chapter. The technique and is the reason the process follows the whole project.

A) **Crumbling of paper waste:** The waste paper is to be used for the alternative of clay as it has the binding property. By the addition of waste paper the brick may be labeled because of the mild weight brick. The paper waste is incredibly crumbled through the electric-powered mixer so that it will achieve the workability.

B) **Evaluating of materials:** The materials that are used for making of bricks are weighed below weigh batching. The weighing technique is extra essential as the strength relies upon the percentage of every materials used on this project. This process calls for excessive accuracy so weigh batching is preferred.

C) **Mixing:** All the materials required for the producing of bricks are blended efficiently by using hand mixing or by mechanical mixing. Hand mixing is preferred to mix the each ingredient in this work. The materials used in this project are listed as follows:

- Clay soil
- High silicate powder
- Paper mill waste
- Water

D) **Formation of bricks:** The paper obtained from the industries was Brick. utilized for commercial Fired clay brick manufacturing. The binding substances like clay and excessive silicate powder had been combined with the diverse proportions of paper with the aid of using a measured weight by including a small quantity of water. Now the mixture is absolutely blended after couple of minutes clay soil is blended withinside the mixer. If the paper isn't combined nicely the water absorption might be excessive, so that it will cause breakage of block.

E) **Drying:** After casting process, the bricks had been dried for four days to achieve the high strength. Drying process was completed through ordinary technique by sunlight. The bricks are casted in the required dimensioned mould to get the right form for every brick in order to dry it uniformly without any abnormal floor surface and heating process.

F) Burning of Bricks: After drying process burning is the important process in order to reduce the formation of voids in the bricks. Burning must be uniformly done in order to get the formal form and color.

G) Testing of Bricks: Typically the bricks are burned for 2-3 days, so that it gains full strength. Then there are some field tests.

## 5. CONCLUSION

This study was conducted with an aim to learn the small scale preparation of papercrete blocks, its design and construction skills and also had a focus on the assessment of the properties of this building blocks. The study recognized papercrete as a sustainable building material and emphasized on more research towards its performance parameters. The manufacturing, processing and construction techniques are still not developed enough to facilitate its use and this requires extensive amount of research. Papercrete can be developed as a material which is suitable for low cost housing and temporary shelters and offices and can help reduce carbon footprint. It is thus evident that it can be looked upon as a sustainable building material and has a promising future.

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