

## Experimental Study Of Strawbell Wall Constuction

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**Abstract :-**The first straw building in the UK was built in 1994, and today approximately 1000 new structures are being built annually all over the world. There are about 70 in the UK and 10 in Ireland at the present time, some with full planning permission and building regulation approval. Amazon Nails has been involved in approximately 40 of these. But in India this concept is totally new and we are not aware about these. Although there were only few research paper available on straw bale construction. As there is no small size bale press machine available in India, we made wooden press machine called as **“Human Power Bale Press Machine”**.

**Keyword :-**Straw Bale, Concrete, Frame Structure.

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### Human Power Bale Press

- The machine called as “Human power bale press” is used for pressing straw.
- The press machine is totally made up of wood which is nothing but a box which is open from top only.
- The press machine having compression chamber of length 800mm, width 100mm, Depth 250mm.
- It has one wooden solid plate for pressing the straw with the help of lever 1m long
- And having one door from front side with two operative locks.
- It has six hooks four at vertical and two at base side for fixing polypropylene string for tying straw bale blocks.
- The straw get inserted from top and get pressed vertically with the help of lever.
- The straw get pressed under the pressure of solid wooden plate and formed a solid compact bale.
- Then the “straw-bale” is removed from the machine and move to the desired place.

### Future Scope

- It can be used as partitioning wall in frame structures.
- Straw can be used for fiber reinforcement for providing more tensile strength.
- For reduction of global warming, straw bale housing can be proved as an eco-friendly way of construction.

### I. Introduction

Straw bale wall technique is a smart way to build a building, a house.any temporary or permanent shelter according to its use. It’s more than just a wall building technique that has yet to come into its own. It’s a radically different approach to the process of building itself. Like all innovative ideas, it has been pioneered by the passionate, and used experimentally by those with the vision to see its potential. Its background is grassroots self-build; it is firmly based in that sustainable, ‘green building’ culture that has brought to the construction industry many new and useful ideas about energy efficiency and responsibility towards the environment. It is now at a pivotal point in its development, ready to be taken on by construction firms who see its value in terms of cost-effectiveness, sustainability, ease of installation and energy efficiency. The building method itself is based on a block system, making the designs very easy to adapt from one plan to another, and giving great flexibility in its use. The accessible nature of straw means that we Indian people unfamiliar with the building process can now participate in it. This opens the door for interest groups to work together on joint projects. Housing Associations and Local Authorities etc., are ideal managers for self-build straw projects that won’t take years to complete, and which will engender an excitement and motivation that gets the job done.The atmosphere on a straw bale building site is qualitatively different to that found on the vast majority of other sites. It is woman-friendly, joyful, optimistic and highly motivated. Knowledge and skills are freely shared, and co-operation and teamwork predominate, all of which has a positive effect on health and safety on site. Working with straw is unlike working with any other material. It is simple, flexible, imprecise and organic. It will

challenge your preconceptions about the nature of building and the correct way of doing things. Its simplicity can be so disarming while doing the work.

Straw bale buildings were first constructed in the USA in the late 1800s, when baling machines were invented. The white settlers on the plains of Nebraska were growing grain crops in an area without stone or timber with which to build, and whilst waiting for timber to arrive by wagon train the following spring, they built temporary houses out of what was, to them, a waste material - the

baled up straw-stalks of the grain crop. They built directly with the bales as if they were giant building blocks, where the bales themselves formed the loadbearing structure.

This is known as the Nebraskan or loadbearing style. The settlers discovered that these bale houses kept them warm throughout the very cold winter yet cool during the hot summer, with the additional sound-proofing benefits of protection from the howling winds. Their positive experience of building and living in straw bale homes led to the building of permanent houses, some of which are still occupied dwellings today. This early building method flourished until about 1940, when a combination of war and the rise in the popularity and use of cement led to its virtual extinction. Then, in the late

1970s, Judy Knox and Matts Myrhman among other pioneers of the straw bale revival, rediscovered some of those early houses and set about refining the building method and passing on this knowledge to an eager audience of environmental enthusiasts.

Through the green and permaculture movements the ideas spread very rapidly, with most of the new buildings being this self-build, Nebraska/loadbearing style.

## **II. Barrier**

- 1) It can be used as partitioning wall in frame structures.
- 2) Straw can be used for fiber reinforcement for providing more tensile strength.
- 3) For reduction of global warming, straw bale housing can be proved as an eco-friendly way of construction.

## **III. Literature Review**

**1) Pragyant Bhattarain (2012)** studied about the straw bale in construction as a building material and its future in India. According to the survey India is the largest country enlisted in production of straw. As 46% of total land in India is a agricultural land. Straw is a waste product, but giving in tremendous features as cost effective with high health value, Aesthetic value, thermal performance, fire resistance light weight as well as eco – friendly in nature. The advancement in the field of technology have influence environment in utmost extend so everyone is worried about the environment and its tremendous impact in our life. It is obvious that people want to live in eco-friendly houses making it as a part of environment and their life. Thought it is a challenging job, we can still use our resources and manpower for the creation of innovative eco-friendly houses. Straw house can be one of the best alternative for the country like india where agriculture is still the main source of income and production of straw is tremendous. But, those straws are either burned or ploughed back to soil leading to the production of harmful gas as carbon forming black cloud which seriously cause chronic chest diseases and also burning fills the air with gaseous and particulate pollutants, and soils generally can't absorb all the materials as quickly as needed so ploughed back to soil is also not a effective implementation. Straw bale construction can be one of the best alternatives as it is renewable resources having tremendous features as cost effective with high health value, Aesthetics value, thermal performance, Fire resistance, light weight and eco-friendly in nature. We also can go with the various techniques of construction as load bearing straw bale construction or non load bearing construction as per the circumstances. Straw bale construction can be one of the best alternative for all kind of people for constructing a economic building with a sustainable material.

**2) Aisha farraj (2009)** examined the straw bale housing from inside out, investing what entails constructing a wall of straw bale using two different building techniques and then discussing the prop cons of straw bale building . The straw bale house reduce the amount of construction by 52-60% more ever the strawbale construction is used to provide housing for the homeless while at the same time money saved from this could be applied toward other initiatives. Demand for well insulated, comfortable affordable housing is worldwide for any class of people, old or young, wealthy or poor. All of humanity wants to be happy in their home, to be safe, warm and comfortable. Straw bale housing offers that solution and can be applied to almost any climate on earth.

**3) Garas G. (2006)** compared between a load bearing wall unit built with locally available rice straw bales and a traditional load bearing wall unit built with cement bricks , with an aim to reach an economic environmentally adopted system for wide application of straw bale construction. In the construction industry, selection of sustainable structural materials during the design phase leads to move towards more sustainable construction. Therefore, there is a need to select more green building materials to be used in construction. Based on the

promising vision of future needs for sustainable development this paper presents a comparative study between conventional and eco-friendly building materials using sustainability measures. A prototype of two storeys was constructed using eco-friendly building materials (integrated bricks, rice straw bales, M2 system, plain concrete, and Rockwool sandwich panels). A sustainable decision support system (SDSS) was used to compare between the structural building materials of the two structural systems. The results showed that the eco-friendly system had better sustainability rank (67%) than the conventional system (56%). In addition, the results of SDSS showed that the Eco-friendly system was better than the conventional system during the three phases of total life cycle assessment (manufacturing, construction and demolition) by 11%, 0.5% and 9%, respectively.

4) **Sanin Dzidic (2006)** tested the fire resistance of load bearing and non load bearing, plastered and unplastered walls made of straw bale. Resulted that the unrendered (non plastered) straw bale resist fire upto 30 min and rendered (plaster) straw bale resist fire upto 2 hours. Straw as construction material deserves considerable attention as a natural, energy and environmentally sustainable material in the modern period of building sustainable creation. Straw bales meet the requirements of sustainable architecture, but different researches have also shown satisfying specific significant level of certain .

#### **IV. Conclusion**

5) In this emerging world where rising need of housing is increasing day by day due to tremendous growing of rural and urban population has been a pressuring issue .Straw Bale can be one of the most promising building material that meets overall need of housing and energy efficient in India where agriculture is the backbone of development.

2) It has a good insulation property this mean energy efficiency, which help in reducing cost of cooling in summer and heating in winter.

3) Has a good sound insulation property.

4) High fire resistance with using plaster.

5) Has ability to withstand the vertical and lateral load in addition to seismic loads.

6) Has ability to balance moisture.

7) After practical work concluded that there are no technical obstacle to the use of straw bale in a manner that meets the intent of all building needs. It is more beneficial if straw is fully pressed in hydraulic press.

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