

A Review: Wall Panels For Low Cost Houses

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Abstract

Now a days the cost of construction, quality and speed of construction play vibrant role in installation of structure. The rapid population growth and urbanization have made a massive demand for the shelter and construction materials. Masonry walls are the major component in the housing sector and it has brittle characteristics and exhibit poor performance against the uncertain loads. Further, the structure requires heavier sections for carrying the dead weight of masonry walls. Present investigations are carried out to develop a simple, lightweight and cost effective technology for replacing the existing wall systems. The lightweight concrete is developed for the construction. The precast concrete members are the solution of construction of structure due to economic advantages in the speed of construction. The connections between panels are tremendously important since they affect both the speed of the assembly and the overall reliability of the structure. Precast concrete wall panels have many advantages over cast in situ members, including reliable quality, speed of erection, and high strength of concrete. In recent time, precast technique is adopted to remediate this problem such as speed, quality and cost. In this paper, the study is carried out on precast concrete wall panel which is a sustainable building option, offering durability, reduced moisture and air infiltration, energy efficiency, recycled content, recyclability, light weight, and low maintenance. The connection between panels are very important since they provide the monolithic behaviour of the structure.

Keywords: – Light Weight, Water Resistant, Fire Resistant, Termite Resistant, Strong and Durable Sound Insulation, Space Saving, Eco Friendly.

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I. INTRODUCTION

Evolution of the development in construction activities around the world, the demand for construction materials is increasing exponentially. Continued extraction of natural aggregate is accompanied by serious environmental problems. Furthermore, the wall constructed with conventional masonry system contributes higher dead weight to the structure. The reduction in the weight of wall will significantly reduce the dead weight of structure which results in overall reduction in sizes of structural components. Furthermore, the improved technologies are necessary to manage the shortfall in the availability of natural aggregate materials. With these reasons, there is a need for the alternative system to fulfil the construction demand without comprising strength, affordability and environmental friendly. The concrete sandwich panels are such system, which is more suitable for wall construction. The concrete sandwich panel consists of lightweight plate with skin concrete on both sides.

II. LITRETURE REVIEW

Concrete Structures are very popular and widely used for the construction of the residential and industrial building. The major portions of wealth are spent for the construction of these structures and it becomes a key factor of social development. Researchers are very much interested in developing improved technologies for enhanced strength, safety and economy. The lightweight sandwich wall panels are one of such invention for walls and roofs in the structural construction. The masonry walls are widely used in building construction and it exhibits inferior structural performance during any uncertain loads. Attempts were made to control the deficiencies by introducing steel reinforcement and found that the performance of unreinforced masonry walls is improved. The reinforced masonry walls have slightly higher dead weight than the unreinforced walls.

The concrete walls with reduced wall thickness are more beneficial than the reinforced masonry walls. The ferrocement is also reasonably suitable for infilled wall system. Numerous analytical and experimental

studies were conducted for understanding the structural characteristics of ferrocement panels. The ferrocement wall panels have higher strength, better crack resistance, improved ductility and good energy absorption characteristics

The Construction of ferrocement wall panel requires skilled persons and moreover it has lesser sound and heat proof. The deficiencies can overcome with the sandwich wall panel. The sandwich wall panels have two ferrocement outer skins and a lightweight inner core portion. Numerous studies were carried out on sandwich panels with EPS inner core. These wall panels were investigated for both with and without shear connectors. The shear connectors are playing a vital role and affect the performance of composite wall and roof panels. Several alternative lightweight materials like bamboo, reed, rice straw etc., from the renewable sources and the non-degradable waste materials like plastic wastes, are also investigated for infilling the inner core. The availability, storage and psychological acceptability are the primary issues with these lightweight materials. The sandwich panels require lightweight inner core materials for fills

3] STUDY OF VARIOUS SMART TECHNIQUES

1] Surveying

Construction companies can save time and money in surveying locations when they work by utilizing the GPS units. Instead of training the employees for surveying they can issue GPS devices to their workers, because it's easier to use GPS devices to collect data about an area when compared to traditional surveying. They can obtain accurate and correct data by utilizing the GPS devices.

2] Smart Construction

Smart construction is building structure, design, construction and task that make full utilization of computerized advancements and industrialized technical strategies to enhance profitability, reduce life cost, increase sustainability and expand client benefits. Along these lines of working not only just change the construction industry, yet in addition expand the advantages of a home for the tenants and give them with a superior personal satisfaction and making more effective utilization of the people and assets accessible using smart sensors. In smart city construction it utilizes the available IOT devices or sensors for energy management, smart transportation, smart waste management system, smart lighting, etc. In the Fig.2 graph the red bars indicate the number of internet users for the period 1995–2020 the blue bars show the number of devices connected to the internet, while the trend lines show a logarithmic growth for human users and exponential growth for number of devices connected



3] Smart materials

Definition of smart materials Smart materials; are engineered materials which are able to provide a unique beneficial response when a particular change occurs in its surrounding environment, NASA defines smart materials as “materials that (remember) configurations and can conform to them when given a specific stimulus”, Encyclopedia of chemical technology defines smart materials and structures; are those objects that sense environmental events, a process that sensory information, and then act on the environment, The third definition refers to materials as a series of actions. In architectural definition, smart materials are high technological materials that when placed in a building they respond intelligently to the climatic changes, in different seasons (summer, winter, etc.) Either the environment is hot or cold to comfort or to get the human needs. The term “Smart materials” is applicable to materials and systems that can responsively react to change interior environments through material properties or material synthesis. Smart Materials are often considered to be a logical extension of the trajectory in materials development toward more selective and specialized performance. From this vision, they are similar to living beings, have the ability to perform both sensing, actuating functions and are capable of adapting to changes in the environment. In other words, smart materials can change themselves in response to an outside stimulus or respond to the stimulus by producing a signal of some sort. By utilizing these materials, a complicated part in a system consisting of individual structural, sensing and actuating components can now exist in a single component, thereby reducing overall size and complexity of the system. However, smart materials will never replace system fully; they usually are part of some smart systems. Now architects could begin to select or engineer the

properties of a high-performance material to meet a specifically defined need.

- 1]Immediacy: they respond in real time
- 2]Transiency: they respond to more than one environmental state
- 3] self -actuation: intelligence is internal to rather than external to the “material
- 4] Selectivity: their response is discrete and predictable
- 5] Directness: the response is local to activating event. All smart materials can be grouped into three type’s characteristics, property changing materials; energy exchanging material.

4] Building Information Modeling

In BIM (building information modeling) we provide a digital representation of physical and functional characteristics of building facilities through intelligent AEC firms (architect, engineering and construction) the insight and tools to more efficiently plan, design, construct and manage building and infrastructure. It can provide information of plan in 3D (width, height, and depth) and further dimensions such as 4D (time), 5D (cost), and even 6D (as-built operation).



5] The Internet of Things (IoT)

The Internet of Things (IoT) is an already integral piece of construction technology and massively transforming its way of working. IoT is made up of smart devices and sensors that all share data with each other and can be controlled from a central platform. The implications of this is huge as it means that a new smarter, more efficient and safer way of working is now very possible

4] CONCLUSION

Wall construction is more economical. Wall Panel provides a new method of building construction in fast track. Using rapid wall construction we can reduce man power, cost and time of construction. The use of natural resources which are now day not easily available like river sand, water and agricultural land is reduced. It reduces adverse effects on environment. The building constructed using RW panel comes under Green building categories as after constructing it energy requirement for heat insulation, sound insulation, humidity and Temperature inside is less than conventional building. It is very effective technology to beat the current rising cost of construction.

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