

Short communication

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TRIDIPANEL System (3D-panels)

Qasim Mohammed Shakir*

Department of Civil, University of Kufa, Iraq

*Corresponding author: Asst. Prof. Dr. Qasim Mohammed Shakir, Faculty of Engineering, Department of Civil, University of Kufa, Iraq.

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Introduction

The 3D panel system is a structural system in the form of a three-layer structural plate as shown in Figure 1. Such system consists of two layers of BRC mesh with opening of 5 cm size with a

polystyrene core between the BRC meshes which are cross welded to each other with wires of diameter 10 mm or 12 mm that placed diagonally inclined through the core layer to form a composite panel of suitable thickness [1].

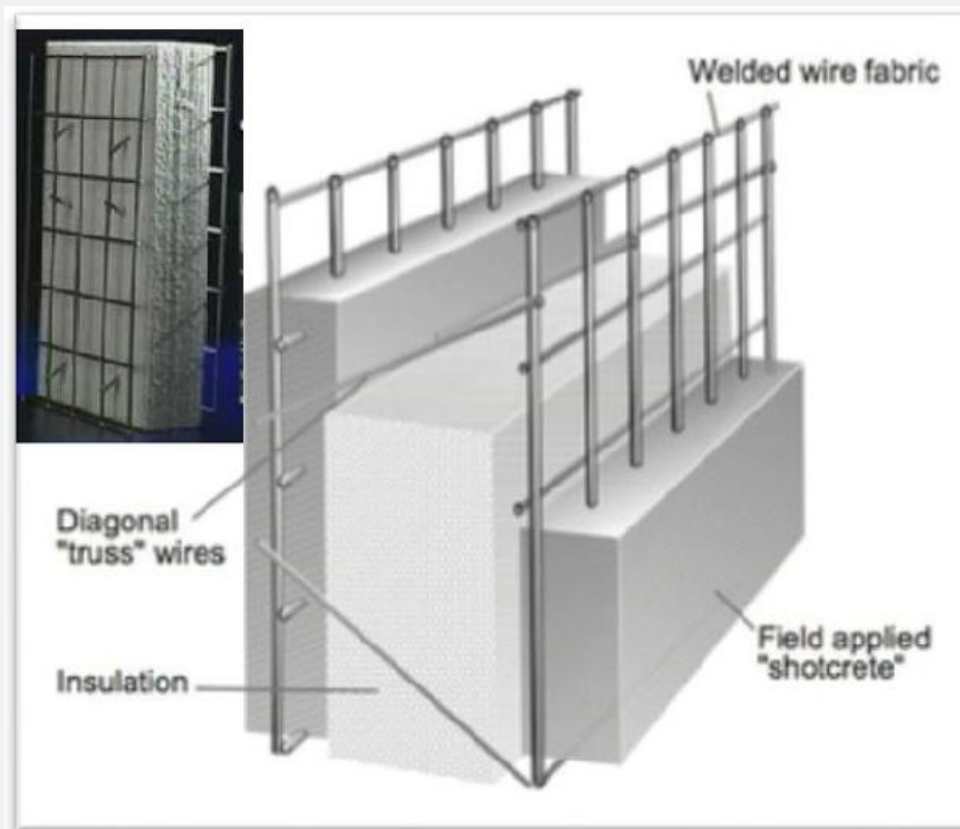


Figure 1: 3D-panel system.

The resulting structure forms a truss-like structure for conveying stress and providing rigidity. The cross bars provide the ability to transfer the shear between the two sides of the plate. The wall panels (the board), after being installed on site, shall be coated with a layer of cement mortar in any suitable manner, such as the manual method, although it is better to use the shotcrete, Figure 2, for this purpose. The panels of this system are equipped in the

laboratories by specialized welding machines, Figure 3. then to be transported to the site. The cement mortar must be used in this system that does not contain gravel and that it must be of small size, because the process of placing the dough on both sides is either to be by manual squirting or sprinkling, both of which cannot be used with coarse gravel Figure 2 & 3.



Figure 2: Coating of 3D-panel with shotcrete.



Figure 3: 3D-panel making machine.

This system first appeared in Austria and used in buildings with one story initially since 1992 and then developed its uses for two floors then in multi-story structural buildings for architectural purposes. Electricity or plumbing services and fixtures are installed by removing a part of the polystyrene core by heating to create a cavity or groove through which the tubes to be installed [2].

The foundations are very similar to the traditional method with leaving the rebar dowels, Figure 4, that extending vertically outside the foundation concrete for attaching the 3D-panel with it on both

sides before plastering by cement mortar. Care must be taken to ensure the proper alignment and spacing are maintained. The panels must be placed so that the dowels rebar becomes between the mesh and polystyrene. When the panels are placed on previously casted floors, holes can be drilled to stitch the rebar pieces (Dowels). There are other methods for anchoring prefabricated panels using epoxy systems, at which time it is necessary to ensure that all clay and debris are removed from the bonding area before placing the panels in place Figure 4.



Fig 4: Installation of 3D-walls in site.

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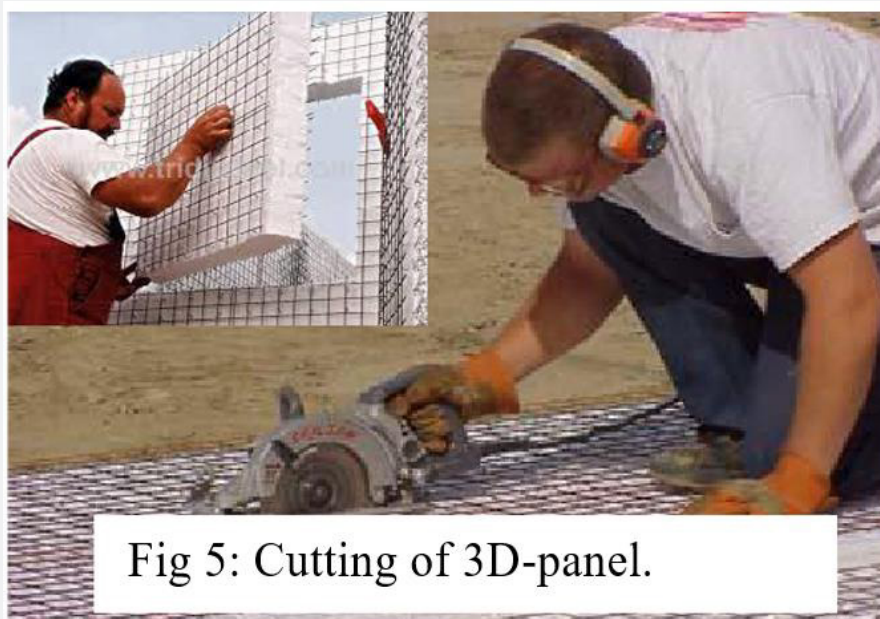


Fig 5: Cutting of 3D-panel.

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Door and window openings can be cut before or after installing the panel. With a simple saw, Figure 5. Some reinforcing mesh

should be added around the openings and the lintel details to ensure that cracks do not occur in such locations, Figure 5 & 6.

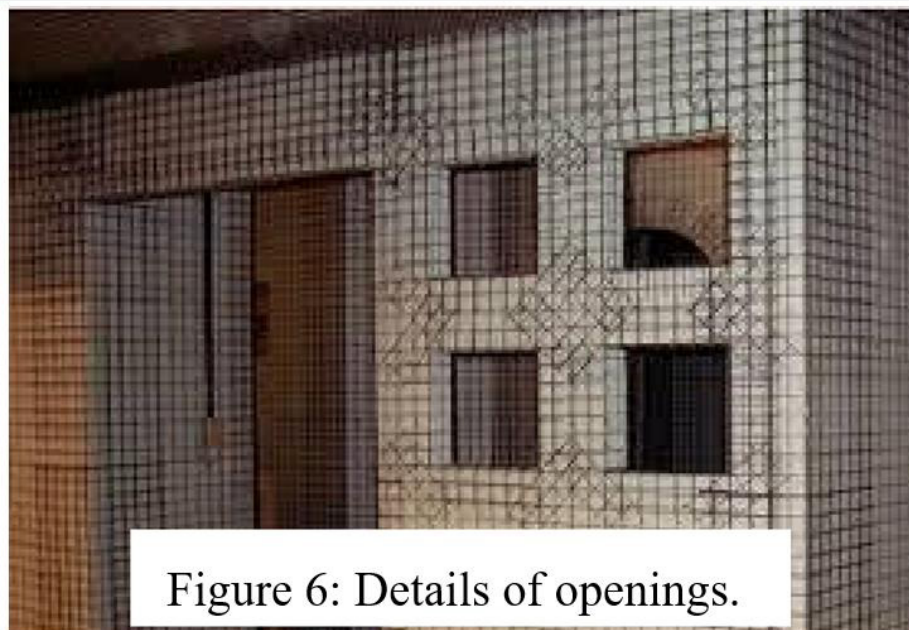


Figure 6: Details of openings.

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3D-PANEL System Features

Quality and economy

This system is characterized by being fast to accomplish and results in significant savings at the time of implementation and a significant reduction in the construction crew as it mostly includes cheap cork material. Moreover, the panels of this system are light in weight, so there is no need to use heavy equipment at work, and it is flexible and easy to use to build walls, floors and ceilings, as it can be used instead of metal walls or wooden frames and masonry walls [3].

Highly durable

As the use of cork does not significantly affect the bearing of the structural member, it also helps to reduce the self-weight significantly, which reduces the dimensions of the pillars and the foundations for them and reduces the occurrence of landing in the facilities and the need for deep pillars and the accompanying issue of groundwater drainage. In addition, the polystyrene board is not exposed to the risk of decomposition as in wood or rust, as in iron. It is noteworthy that the structures created using the 3D panel system are stronger than other traditional structures such as brick walls, thermo stones and concrete ceilings due to the tight connection of the two wallpapers. Also, there are no levels of separation between the parts of the building, as in the prefabricated building, as the concrete from the foundation of the house is linked to the concrete

of the walls.

Safety

Where the 3D-panel system is characterized by excellent performance in earthquake zones, which is a non-combustible structure and provides from 18% to 30% on fire insurance as the rate of fire resistance ranges between (1.5-4) hours and according to the thickness of the two mortar sheets. Moreover, it has excellent resistance to winds of up to 225 mph and has good resistance to insects, termites, rodents, mold and fungi.

Environment friendly system

Using this system supports the philosophy of green (sustainable) buildings because it saves energy by 50 to 80% of heating and cooling costs, and it greatly reduces fuel consumption, and reduces the size and cost of construction materials used.

Flexibility in design

It provides conditions of comfort and flexibility in design, as it can be formed in many shapes by cutting and fitting using simple equipment. In addition, such buildings provide good sound insulation.

Applications of 3D-Panel System

Figures illustrates some of these applications (Figure 7 to Figure 12).



Figure 7: Residential houses.



Figure 8: Walls and fences.



Figure 9: Shells.

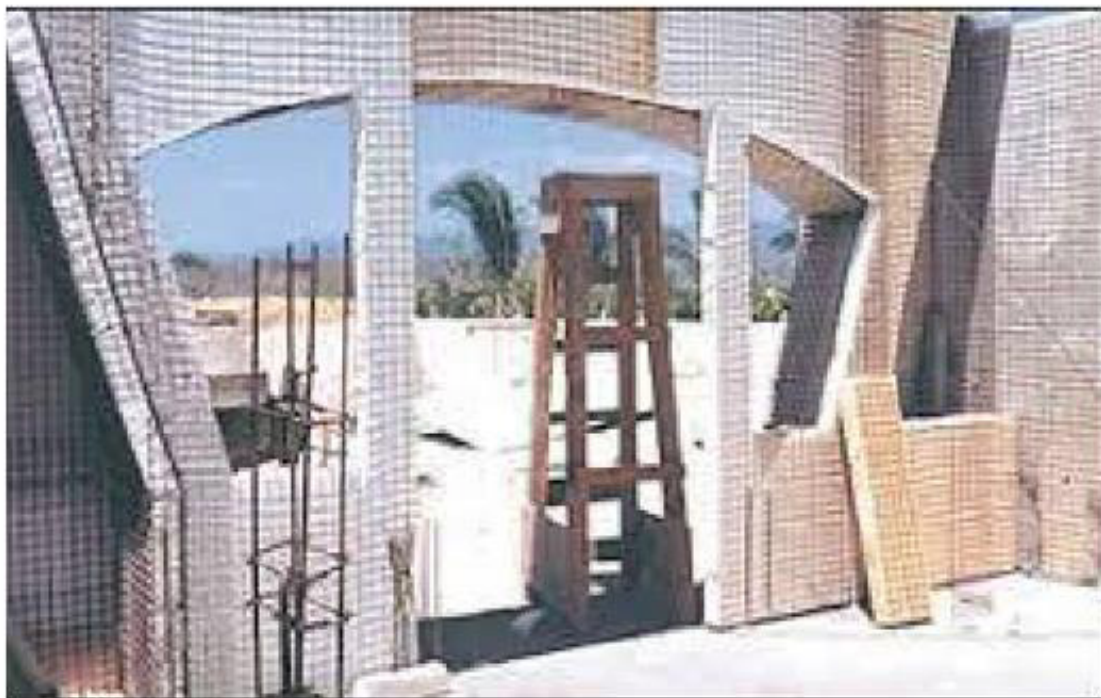


Figure 10: Architectural works.

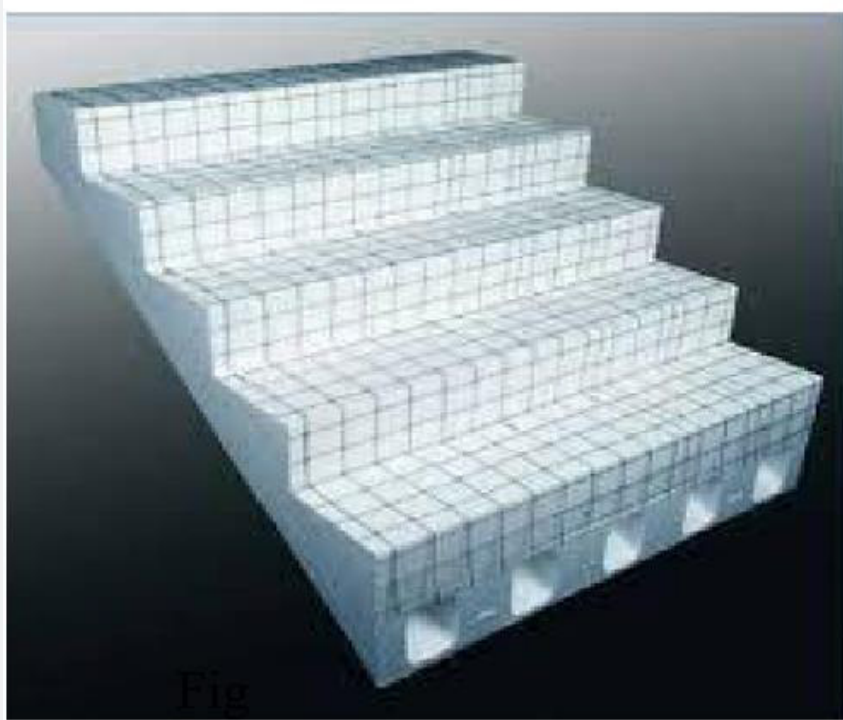


Figure 11: Stairs.



Figure 12: Circular tanks.

Acknowledgement

None.

Conflict of Interest

No Conflict of interest.

References

1. (1991) "Structural Engineering Handbook-structural Analysis of ICS 3-Dwall Panels" by the consulting Engineers Group, INC.
2. Alternative building system ideal for disaster-proof homes and structures, WEBSITE: www.tridipanel.com.
3. Assembly Manual For The TRIDIPANEL 3-D/Evg Building System.
4. (2012) 3D-TRIDIPANEL Construction Solution- Assembly Manual, by INSTEEL PANELMEX ,S.A. DE C.V.