

# construction

# HQ

constructionhq.world  
July 2019  
Vol. XXXIV  
Issue 07

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# Prefabrication: An Innovative and Viable Method of Construction Delivery

The construction industry experts believe that the Modular Construction will change the region's topography in the days to come because of the planned and ongoing construction projects aimed at addressing the unprecedented population growth in the GCC. The combined population of the Middle East & Africa is set to surpass that of India and China, the two most populous countries on the planet, by 2050 as reported by World Economic Forum in May 2018.

## What is prefabrication?

Prefabrication or Modular Construction is an innovative, sustainable and viable method of construction delivery which allows the consultants, the architects and the building contractors to plan, design and manufacture an entire building or parts of it in a factory-controlled environment as per the locally as well as internationally accepted QHSE rules and regulations. The prefabricated elements are later shipped to and adjoined at the project site to mark a successful project commissioning and completion. A prefabricated house can be manufactured using wood, light gauge steel profiles, sandwich panels or pre-owned containers etc. The principal of mass production and customization is adequately implemented to attract the various end users.

## An alternative to conventional construction:

Prefabrication saw the light of day in ancient times. In days gone by, the prefabricated houses, made of wood and stones, were used to shelter the family members and protect them from external threats. Although it is an age-old concept, it rose to prominence during the World War Second. Britain was heavily bombed during the WW-2. As a result, more than 3 million houses were destroyed that led to housing crisis across the country. Prefabricated houses, marriage halls and military camps sprouted out everywhere across the country to address the



growing civilians and military needs. Although intended to offer a temporary housing solution for the war-affected population, majority of these houses lasted for over 60 years after the war.

## How are the prefabricated buildings manufactured?

In modular construction, same construction codes and standards are used and implemented to manufacture different elements of the modular building. The case to study here is the prefabricated building made up of Light Gauge Steel profiles which are globally known for reliability, durability, functionality and production rapidity.

**Floor:** To construct the floor, several M S Angles are fixed to the I Beam for higher strength and longer durability. Cement Fiber Boards are mechanically fixed to the joist which result into the prefabricated floor.

**Walls:** Walls of the prefabricated building are made up of light gauge steel profiles which are first coated by Zinc or the mixture of Zinc and Aluminium to protect them from any corrosion. To fill the hollowness, glass wool insulation is used which controls the room temperature. External



cladding of the wall is made of Cement Fiber Board mechanically fixed to the wall panel. Cement Fiber Boards provide additional strength to the wall and remain unaffected during the rainy days. Gypsum Boards are used for internal cladding which provides higher smoothness of the building wall.

**Roof:** Most of the building roofs can be manufactured by using Light Gauge Steel trusses. These trusses are durable, lightweight and easier in installation. G I sheets are mechanically fixed to the G I Purlins to make the roof cover.

**Advantages:** The prefabricated method of construction is fast gaining in popularity and worldwide acceptance as it offers temporary as well as permanent housing solutions and thwarts the weather challenges because major part of the project is executed indoors. The growing use of BIM (Business Information Modeling) and other technologies have led to the speedy project execution and delivery. Although, the architects follow the same code of construction, quality varies from building to building thanks to the variations in mechanical properties of the materials used to manufacture it. Modular construction is gaining ground and witnessing a powerful surge as it offers many advantages that traditional construction doesn't.

**(1) Time & Cost Saving:** A construction project, large or small, involves many variables which are interconnected with one another. If a single variable is not completed on time, it causes the project delay. Thanks to the cause and effect system in place, the construction industry has earned a reputation or notoriety, if I may say, being behind time and schedule. Prefabricated method of construction offers a solution as it is known for - Speedy Project Execution, Quality Control.



As it is designed and produced in the factory and adjoined at the site, it allows two different activities to be carried out at the same time; first, the production of building elements in the factory and second, the civil and foundation work at the project site.

**(2) Fire & Weather Resistance:** Most of the manufacturers use fire-resisting materials which are used to manufacture walls, floors and roofs. The fire resisting capacity of these materials vary from project to project and as required by the end users. Commonly, the GCC-based prefab manufacturing companies use high quality fire-rated materials that resist fire up to 60 - 120 minutes. Weather doesn't impede the production cycle as the prefabricated modules are produced in the factory plants specifically meant for modular elements.

**(3) Minimum Site Disruption:** Since a major part of the project is completed in the factory, we can see a scale-down in site disruption if compared to the conventional method of construction. Thanks to this advantage, we can see less movement of vehicles, cranes and other equipment which are used and employed in the construction industry.



**(4) Eco-friendly:** As the efforts are being made to go green everywhere, the prefabricated buildings are lauded for energy saving. They are manufactured in a way that doesn't challenge or harm natural resources like air, water, earth, to name a few.

#### **An increase in the market demand:**

The construction industry is in the league of the industries that generate maximum profits and the role of modular construction is central in revolutionizing the construction industry. A recent survey titled, "Prefabrication and Modularization in Construction" conducted by FMI/ BIM Forum-2017 reports that:

- \* The amount of project work using prefab has almost tripled between 2010 and 2016.
- \* The Contractors using prefab on more than 50 percent of their projects are more effective compared to those who do less prefab.

The growth of Modular Construction is not uniform across the globe. It receives higher acceptance rate in the region known for higher population density. Asia Pacific region leads the pack and supposed to take an unstoppable lead over other regions because of the fastest developing economies like China, India, Indonesia. As per a report published by BusinessWire - Asia Pacific is set to dominate the Modular Construction Market which expected to grow at a CAGR of 7.87 percent over the forecast period i.e. 2019-2025 to reach USD 84.34 Billion by the end of 2025 from USD 46.61 Million in 2017. This forecast leaves the North American Modular Construction Market segment on second spot which is expected to grow at a CAGR of 6.77 percent over the forecast period i.e. 2019-2025 to reach USD 44.37 Billion by the end of 2025 from USD 23.76 Billion in 2015.

The GCC remains one of the smallest markets for Modular Construction because the idea of prefabrication has not yet penetrated the residential sector. However, it is believed that growing urbanization coupled with robust investment by the governments in infrastructure development, tourism, transport, education sectors will clear the way for its absorption.



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