

# Prefabricated Steel Buildings



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Prefabrication is fast becoming a preferred means of project delivery for large and repetitive types of construction.

Developing countries are a strong buyer of this type of construction method due to gaps in capacity to deliver appropriate resources to the project at the build location. Those resource deficiencies make prefabricated construction in factory conditions offshore with its associated design, management, access to material markets, and shop floor (factory) skills, an inappropriate choice for project developers lacking any of these resources. Contrary to the above, projects that occur in developed countries may have such resources available at its disposal but those resources may be at a cost which is prohibitive to the project's developer. In developed countries under such circumstances prefabrication offers the economic advantage of cheaper production.

Transport costs add no value to a project and therefore have to be minimized. The use of steel in prefabrication is the material of choice for a number of reasons. Steel offers greater capacity as a compression and tension material for its weight and cost. Steel is manufactured to exacting tolerances, can be extremely durable (when prepared appropriately), and can achieve a high grade/standard of finish. These attributes make steel an ideal material for prefabrication when compared to alternative materials.

The most common type of prefabricated steel structures consists of cold formed (light weight) steel elements. Heavy structural steel elements are used for the parts of the structure requiring larger spans or that are subject to heavier load conditions. The benefits of using cold formed steel elements in the fabrication process is its suitability for use in machinery configured and programmed to accept CAD (computer aided design) data such as cutting lists etc. Cold formed steel can also be pregalvanized as required and this reduces the production time.

A significant benefit of prefabricated building projects is the speed of construction. Most projects will be different and require different solutions for different conditions, however in prefabricated steel constructions elements and components can be selected based on experience and in keeping with project design requirements and budget.

As previously mentioned using skilled labour resources available within a factory has advantages over utilising labour resources at the build location. Most standard construction processes involve a sequence of trades to achieve the desired outcome. The use of prefabricated structures and modules reduce not only the number of tradespeople working on the construction site but also the number of trade professions (types). Reducing these tradesman types in the construction process can remove some of the stop/start progression of trades that impacts on the construction program. In developing countries certain qualified trade types may not be easy to find. The proximity of the build location to the trade resources may also impact on cost especially if and when housing the workforce on site is required. Prefabrication assists in identifying such issues and can modify the build in the factory to adapt to the specific project requirements. Other advantages of prefabrication are :

- Weather related delays minimized as production occurs within an enclosed factory.
- Laydown and storage of build materials on site and on site fabrication is significantly reduced.
- Lower probability of incidents in the field and overall improvement in safety due to more controlled safety conditions within a factory.
- Enhanced quality of finished product due to greater control of fabrication within a factory environment.
- Reduced local permit applications.
- Lighter structures require less engineered ground structures (Footings) reducing project costs.

Prefabricated steel buildings can be categorized into three main groups:



**Prefabricated Building - Abu Dhabi**

### 1. Prefabricated

A manufacturing process where various materials are produced to form a part or parts of the final installation, at a remote location.

Keyword: Component

Examples: Studs, Beams, Columns, Joists



**16.000 Preassembled Man camp - Abu Dhabi**

### 2. Preassembled

A process by which various materials, prefabricated components, and other equipment are joined together at a remote location.

Keyword: System

Examples: Wall panels, Trusses, Floor panels

### 3. Modules

A major component of/or a free standing building fabricated off site and transported and may include portions of many systems.

Keyword: Module

Examples: Accommodation Containers, sanitary modules



**Modular Units - Australia**

Prefabrication has many advantages, however preassembled and modular types have further advantages. Preassembled and modular building types are advantageous in site conditions subject to remoteness, poor weather conditions, or where availability of project resources is an issue. Prefabricated and preassembled structures have transportation advantages.

Experience in our industry has taught us a number of things, firstly, that in a great majority of our prefabricated projects, preassembled buildings are the most cost effective solution. Secondly, the bigger the prefabricated elements the greater the value achieved to the developer. These statements are accurate on the proviso that transport and erection of the prefabricated product is not overly complicated.

As a general rule or definition for the preassembled versus an ordinary prefabricated steel structure (if one considers the connection details of the structure), a structure that is connected by bolts at site can be called as a preassembled building. The reason is in cold formed steel construction as a common application smaller elements are connected by screw. Bolt connection is more suitable for larger elements.

Screw fixings are a connection detail that is not suitable for site works. Quality of the finished product may be affected as controls that exist within a factory environment are not in place on site to oversee the standards of workmanship. This is another reason that preassembled systems are preferred to ordinary prefabricated ones.

Issues that arise at the initial stages of the project are generally related to clients being unfamiliar with steel prefabricated buildings and there is an education process involved to convince them of the systems merits. Other issues relate to building methods used in particular regions and locations around the globe that is hard to break. The remaining issues that are more obvious are:

- Transportation limitations
- Some engineering man-hours may require in some cases that packing and transportation has some limitations.
- Special consultants for transport and logistics.

In conclusion we can say in a changing global market steel prefabrication offers developers economic and fast alternative solution.