



IIT MADRAS

Indian Institute of Technology Madras

Technology Transfer Office TTO - IPM Cell Industrial Consultancy & Sponsored Research (IC&SR)



FOLDABLE AND PORTABLE PREFABRICATED STRUCTURES AND METHODS OF FABRICATION THEREOF

IITM Technology Available for Licensing

Problem Statement

- Most prefabricated shelter structures require **special fasteners and hardware** in order to produce a shelter with **desired rigidity and ruggedness**
- Often, additional training and a **skilled workforce is required** to assemble the structures on site.
- If special hardware is lost, the replacement of the parts necessary to assemble the materials may be **difficult**
- There is a need in the art for an **improved pre-fabricated building structure** that is easy to assemble, disassemble, expand and safe and rugged too..

Intellectual Property

- IITM IDF Ref. 1483
- IN 480904- Patent Granted

TRL (Technology Readiness Level)

TRL 6 Technology demonstrated in relevant environment

Technology Category/ Market

Category- Civil Infrastructures & Structural Engineering

Industry Classification:

- NIC (2008)- 25112-** Manufacture of metal frameworks or skeletons for construction and parts thereof ((towers, masts, trusses, bridges etc.); **25119-** Manufacture of other structural metal products
- NAICS (2022)- 332311-** Prefabricated Metal Building and Component Manufacturing

Applications- Rapid housing, slum rehabilitation, emergency shelter, portable shelter etc.

Market report: Indian prefabricated buildings market is USD 2.3 billion in 2024 and is anticipated to register a CAGR of over 13% in the period 2024-2029

Research Lab

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Figure: Schematic representation of the invention in a fully assembled position

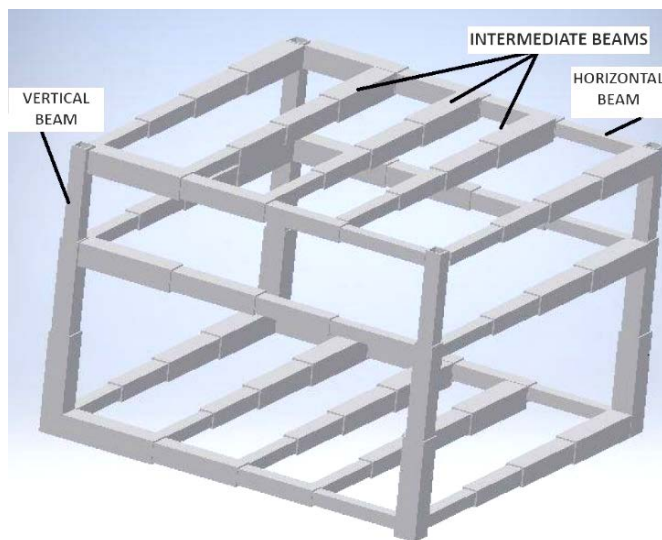


Figure: Schematic representation of the telescopic beams in the prefabricated structure

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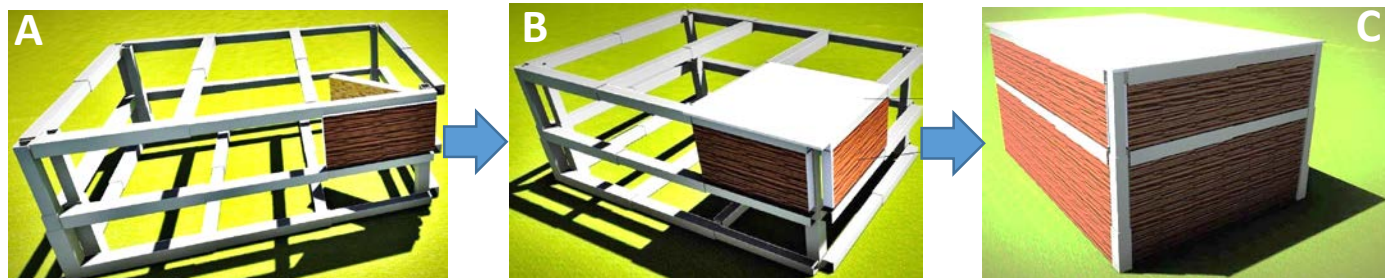


Figure: Schematic representation of the deployment of the prefabricated structure with extension of telescopic beams (A), fixing of panels (B) and fully deployed structure (C).

Technology



The outer frame is basically a skeleton made of beams and columns which are telescopic. This allows the frame to be folded in all three dimensions making it compact. When folded, the volume gets reduced by a great factor (12 to 48 or even more).



When the beams move relative to one another, a guidance system comprising a linear bearing system that restricts the motion of beams in undesirable directions is embedded within the beams to make the movement between beam segments smooth.



Apart from the main beams; intermediate beams are present to support flooring, roofing and intermediate wall systems.



Different types of foundations such as pad foundation, bolting and Surefoot can be used.



A scaled down version of the original model was built as a prototype with 2 key parts- the frame and the wall, floor and roof panels. The prototype made of aluminum is scaled down version of original model.

Key Features / Value Proposition

- The prefabricated structure is compact and easy to transport. Which simplifies logistics and reduces redeployment cost.
- The house is very cost effective compared to the conventional temporary structures used.
- The model is strong, sturdy and durable with at least 12-15 years of expected lifetime. Hence making re-usability a major factor in increasing lifetime value of the product..
- Better thermal insulation and higher standards of living at affordable prices. Also, these structures help in creating a clean, safe and hygienic environment.
- This structure is highly versatile and hence it gives the user the freedom to design the structure as per requirement.
- Foldability reduces the volume by a factor of 12 to 36 or even more, which makes possible to transport big structures in a folded condition.
- The model doesn't require high technical skills and knowledge for setting up. As the structure is pre-engineered, every part is pre-fabricated. Whereas, conventional prefabricated buildings required skilled labor to make prefabricated structures usable.

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