

# MODULAR CONSTRUCTION

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*Revolutionizing Architectural Landscape*



## Introduction:

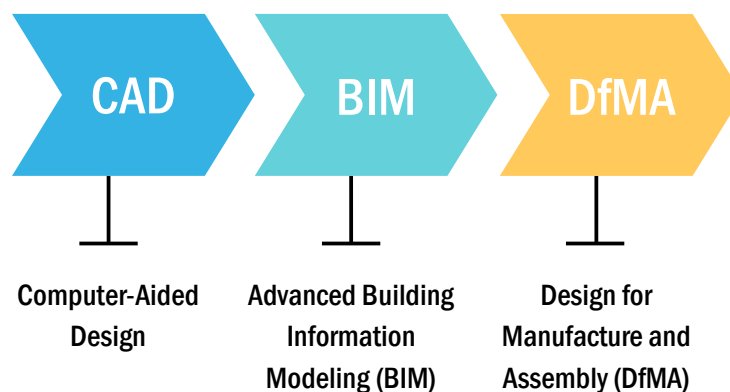
Modular construction is an emerging technique of building components or modules in a controlled assembly line, usually in a plant, using the same materials and conforming to the same norms and standards as conventionally built structures. These modules are put together on-site to mirror the architectural intent and requirements of the site-built building. Common materials used in building structures are either steel framing or wood. It may also include concrete or wooden flooring.

## Modular vs Prefabricated:

Although the terms modular and prefabricated are interchangeable, there are subtle differences. Prefabricated (often referred to as prefab) is a much wider term, and modular is a type of prefab. In a prefabricated construction process, modules are manufactured and assembled beforehand in a plant and then shipped to the construction location. The construction of prefab modules in a factory setting helps eliminate several obstacles that might take place on the construction site. These obstacles include safety hazards and weather delays. In modular construction, repeated sections known as modules are manufactured in a factory and then assembled on-site. These modules usually constitute rooms of a specific building and are identical as they go through the same factory process. To conclude, modular building units are the parts merged intending to build prefabricated building structures.

## Technologies Used:

The modular building components or modules are designed to fit the building layout. As these components or modules cannot be easily rearranged on-site, several precise design practices and construction techniques are implemented. Some of these include:



These technologies reduce manufacturing errors and flawlessly incorporate project information, such as material reports, cutting lists, and drawings, facilitating faster project completion.

## Types of Modular Construction:

Type	Pros	Cons
Permanent Modular Construction (PMC)	<ul style="list-style-type: none"> <li>• High-quality control</li> <li>• Reduced waste</li> <li>• Suitable for mixed-use application</li> </ul>	<ul style="list-style-type: none"> <li>• Rigid or immovable</li> <li>• Requires a dedicated modular construction company</li> </ul>
Relocatable Building (RB)	<ul style="list-style-type: none"> <li>• Ease of relocation</li> <li>• Greater flexibility</li> <li>• Accelerated depreciation schedules</li> <li>• Fast delivery</li> <li>• Affordable reconfiguration</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced resell value</li> <li>• Costly transportation</li> </ul>

## Cost of Modular Construction:

The cost of modular construction varies depending on the material used and the scale of the project. Factors such as the addition of interior fittings and fixtures may also impact the cost. However, case studies suggest that modular construction offers substantial savings over traditional construction. These savings are attributed to the ability to build structures off-site, resulting in reduced completion lead times while the construction site is being prepared.

## Durability of Modular Construction:

The durability of modular construction significantly depends on the design, i.e., permanent or temporary. A permanent modular building can last for many generations with the proper care and maintenance.

### Expected Life of Modular Building Components

Category	Minimum Service Life
Roofing Systems	20 Years
Electrical and Plumbing Systems	25 Years
Building Structure	Permanent: 50 Years, Temporary: 25–30 Years
Foundations	Forever
Interior Finishes	5–10 Years
Mechanical Systems	20 Years
Windows and Siding	30 Years

## Volumetric Modular Construction:

In volumetric modular construction, most of the construction work is completed off-site. For instance, bathroom fittings are installed off-site in a modular built room before attaching to the rest of the building structure. Such construction projects save significant time on the building site. The number of workers required on-site can be substantially reduced by implementing volumetric construction, which further enhances health and safety, and helps reduce the project's completion time.

### Benefits of Modular Construction over Traditional Construction:

Factor	Modular	Traditional
Completion Time	Low	High
Quality	High	Low
Wastage	Low	High
Cost	Low	High
Location Accessibility	High	Low
Scalability	High	Low
Durability	High	Low

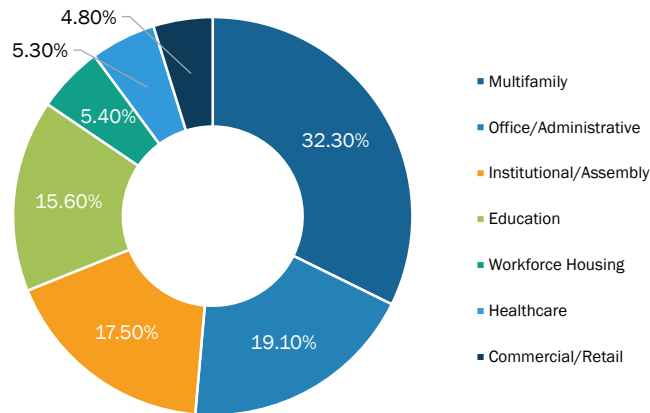
## North America Market Scenario:

According to Modular Building Institute (MBI), the North American permanent modular construction industry accounted for US\$ 12 billion in 2022, holding 6.03% of all new construction.

The multifamily sector held the lion's market for the modular industry for the third consecutive year, capturing nearly 1/3<sup>rd</sup> of all factory output. Other major end-user markets comprise office, administrative, education, and institutional and assembly. Further, reported revenue to MBI for relocatable buildings industry revenue surpassed US\$ 2.2 billion in 2021.

## Projects Utilizing Modular Construction in North America in 2022

Modules were built for the following markets



Source: Modular Building Institute

### Industry Landscape:

North America comprises over 250 players operating in the modular manufacturing industry generating revenue from the commercial sector. Also, the relocation building industry is experiencing several mergers and acquisitions, and six major companies hold nearly 80% of the market share. Around 2/3<sup>rd</sup> of the revenue is generated from construction site offices and relocatable classrooms.

## Major Players:

### **BOXX Modular:**

BOXX Modular (founded in 2003) enables customers to lease or rent permanent modular buildings (PMB), including standard buildings and customized structures such as temporary offices, portable classrooms, mobile office trailers, relocatable buildings, office complexes, and specialty buildings.

### **Whitley Manufacturing:**

Whitley Manufacturing is one of the prominent players in the US modular construction industry. The company is engaged in the production of high-quality modular construction solutions. With an experience of over 75 years, the company offers pre-designed and custom-built options to its customers. These include commercial buildings, floor plans, and industrial buildings.

### **S2A Modular:**

S2A modular places a unique emphasis on environment-friendly, luxury structures. The company boasts a unique mega-factory, allowing swift and precise construction. Rapid construction processes and the availability of net-zero energy alternatives have resulted in ranking S2A as one of the most eco-friendly construction companies in the commercial space. The unique custom-build options offered by the company include net-zero options, Tesla Powerball technology, off-grid tech, and 100% electrified builds.

### **VESTA Modular:**

VESTA Modular is a North American modular construction company offering temporary and modular buildings to its clients. It provides purchasing and leasing options for commercial modular buildings. The company's broad range of modular structures includes modular classrooms, dorms, office complexes, specialty buildings, portable storage, job site and construction offices, and modular medical buildings for various end-use customers, such as healthcare, education, commercial, manufacturing, industrial, and government. It also provides a "Beyond the Box" package, including a range of products, such as furniture and accessories, accessibility features, concierge services, connectivity & security services, and sanitation services.

### **Satellite Shelters:**

Satellite Shelters provide customers with custom-built modular solutions that can fulfill traditional construction standards. Moreover, it offers mobile offices, along with numerous solutions and options to safeguard clients' requirements. The company's products include portable classrooms, ground-level offices, and modular buildings. Also, its "Satellite Specialty Products" portfolio offers

furniture and other necessary amenities, such as office furniture, steps & ramps, portable restrooms, holding tanks, and security screens.

**Nadler Modular Structures:**

With an experience of over 45 years, Nadler Modular Structures is one of the key players specializing in temporary and permanent modular structures. The company serves both the commercial sector and the government. In the government sector, Nadler Modular Structures is a certified GSA vendor. In the commercial sector, it serves various end-user industries and offers products such as daycare centers, dorms, healthcare facilities, mobile offices, and storage containers.

**Pac-Van Offices:**

Pac-Van is part of a multi-national publicly traded company General Finance Corporation based in California. Pac-Van has more than 50 offices in the US and Canada. It offers storage containers and vans, mobile offices, liquid storage tanks, modular buildings, and ground-level offices to a broad-ranging industry. These include several end users, such as construction, education, government, industrial, health care, retail, commercial, and mining/energy sectors. The company also provides mobile office trailers with many upgrade options, including wood siding, carpeting, and wall coverings.

**Ramtech Building Systems, Inc.:**

Ramtech Modular began operations in 1982 as a modular dealership in Texas. Later, the company transformed from a dealer to a direct sale manufacturer. It offers permanent and relocatable modular buildings and structures to a broad range of industries, education, government, commercial, and healthcare facilities.

**Palomar Modular Buildings:**

Palomar Modular Buildings is a direct manufacturer of advanced modular buildings. The company offers modular buildings to several industries, apartments, multifamily, education, government, healthcare, and commercial setups.

**WillScot:**

WillScot offers turnkey modular storage and space solutions. The company acts as a one-stop shop for customers in need of modular offices. They offer structures with storage, fittings, furniture, services, and many more accessories. In 2020, WillScot merged with Mobile Mini, enabling it to expand its portable storage portfolio. Major products include mobile offices, movable storage units, portable classrooms, and toilet trailers.

## Recent Developments in North American Modular Construction Industry:

- July 2023: AMB Modulaire (AMB Modular), a pioneer in developing, selling, and leasing prefabricated modular structures targeted largely at the educational market, received an investment from CDPQ.
- May 2023: CertainTeed, a top North American provider of sustainable building materials, announced the extension of its prefabricated construction solutions. The company launched ONE PRECISION ASSEMBLIESTM (OPA), completely assembled wall, floor, ceiling, and roof panels.
- May 2023: Belimed Inc. and RAD Technology Medical Systems announced a partnership in portable sterilization services. Belimed's services for the sterilization, disinfection, and cleaning of medical and surgical instruments will be combined with the healthcare building skills of RAD Technology, a producer of design-built modular facilities. The two businesses will work together to offer fully functional portable sterile processing department (SPD) solutions to the expanding US surgical industry.
- April 2023: Greystar announced the opening of Modern Living Solutions. It is the company's flagship manufacturing facility focused on the modular construction business.
- February 2023: RISE Modular and module installer ProSet announced the successful completion of the setting of 205 modules for The Eddi Apartments, a 202-unit multifamily community offering both market-rate and affordable living options in the Minneapolis suburb of Edina, Minnesota. The Eddi Apartments, designed by Cunningham, will be one of the largest commercial wood-frame volumetric modular projects in the US. It will be a six-storey structure with five floors of RISE-manufactured modules above a one-storey concrete platform.
- February 2023: McGrath RentCorp, one of the key business-to-business rental companies in North America, acquired Vesta Modular for a cash purchase price of US\$ 400 million.
- January 2023: Triple M Modular Housing, a top North American manufacturer of factory-built modular housing with headquarters in Lethbridge, Alberta, was bought by ATCO Ltd.'s Structures division. Within Canada, Triple M will operate as a specialized housing division for ATCO Structures.
- January 2023: Pacific Mobile Structures acquired Sustainable Modular Management (SMM), a family-owned modular building company based in Frisco, Texas.



## About Author:

Anupriya Shukla is an accomplished Team Lead professional at the Insight Partners, boasting an extensive tenure of over 7 years. With comprehensive background deeply rooted in research methodologies, Anupriya adeptly navigates intricate and voluminous datasets, precisely extracting salient trends and strategic outlooks.

She has a profound understanding in Market Research and Business Consulting and has been instrumental part of various critical projects in delivering data-driven analysis and actionable insights. During her tenure, Anupriya has worked in multi-domain research studies, analyzing the industry/market for new trends in process.

Anupriya holds MBA degree in Management from BVP, Pune.



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**Team Lead**

## About us

The Insight Partners is a global research and consulting company that teams up with industry players to address their most pressing business difficulties and explore growth opportunities. We are a one-stop shop for providing qualitative and quantitative insight gleaned through industry research.

Through our market intelligence services our clients can better identify its market segment, market penetration, and overall opportunity with the aid of multi-level information in the analyses. Inclusion of competitor intelligence, focusing on details about a company's description, competitors, products and services, latest developments, and financial information can help strategy and marketing leaders choose the right decision based on the underlying information.

Our team of subject matter experts and consultants are dedicated to offering our clients the best possible research and analysis at an affordable cost. Our success depends on a culture of close cooperation and a large, diversified global community that is committed to improving the world and one another every day. Our success depends on a culture of close cooperation and commitment to improving decision making for business growth and prosperity.



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