

SUSTAINABILITY ADVANCES IN WOOD CONSTRUCTION

Wood is one of the oldest construction materials and has been used for thousands of years in frames and trusses of infrastructure. It is also the only material available that grows naturally and is renewable and significantly reduces the carbon footprint of the building project. Trees naturally absorb carbon dioxide and store it in to each part of the tree. However, as trees get old and start to break down, it releases the carbon that it stored back into the atmosphere. Therefore by being able to use the wood for construction, it prevents the carbon from reentering the atmosphere for as long as the life of the building or longer if the wood is recycled into another project.^[1]

There are three main types of wood frame construction: balloon, platform and braced. There are also three common truss types: parallel chord truss, a peaked roof truss, and a bowstring truss.^[2]

Improvement in Sustainability

To begin, the given definition of sustainability is meeting the needs of the present without compromising the ability of future generations to meet their needs. The manufacturing of wood unlike steel and concrete requires less energy and results in fewer greenhouse gases. The world of engineering has already begun making improvements on wood sustainability. For instance, there have been changes to building codes such as the International Building Code (IBC) and the International Green Construction Code (IgCC). In 2012, IBC made changes in order to accommodate for all types of commercial structures made from wood. Standards and ratings are also significant in determining the reusability of structures and how much impact the project has on the environment.^[3]

Background and Construction Applications

As one of the oldest construction materials, wood had an important impact on world exploration and trade mostly used by merchant ships and navies. Wood was also commonly used with railway



Redwood Trees

engineering and construction. However, wood has been replaced by other materials such as steel and concrete.^[4]

Wood Frames have been around for the past 50-100+ years. The braced frame has been around the longest and is the oldest type of construction using 4x4s for the main columns with full 2x4s infill studs. The balloon frame is the next oldest is commonly found being used in private dwellings. This method is unique because only the outside walls of the building have studs horizontally running the full length of the building and vertically from the foundation to the roof. This method withstands well in large vibrations and wind loads. The platform frame is the most recent and consists of a method called segmented construction where each floor is erected separately and anchored to the floor.^[5]

Trusses have been around for a long time, some patents go back to the 1800s. There are two types of parallel chord trusses. The first one being the Pratt truss which is used mainly for floor sections and girders and apply to triangular shapes . The second o



Wood truss system

ne is the Warren truss is also used for floor sections and girders. These two methods look very similar to each other. The next type of truss is a bowstring truss. This common old truss is easily identifiable from exteriors of buildings. The final truss design is the peaked roof truss and are used in many condos, townhouses, and fast food restaurants.^[6]

Advantages and Disadvantages

Advantages^[7]

- Wood is Readily Available
- Wood has a long-term performance and durability
- Easily scheduling and speed of construction is faster than other materials
- Wood has natural insulating properties
- Nice aesthetics

Disadvantages^[8]

- Not fire retardant
- Most wood is subjected to a form of biological attack
- Toxic finishes

Examples

Wood is being used in many ways, not only does it have a great aesthetic value resulting in bookshelves, countertops, trim, paneling, doors, and more, but also in structural systems whether it is the exterior of the building or the interior.^[9]

One example takes place at the Arena Stage in Washington, D.C. This infrastructure stores about 215 metric tons of carbon dioxide which is the equivalent of removing 129 cars from the road for a year. However, comparing it to concrete, the U.S. Environmental Protection Agency (EPA) estimates that up to 1.1 tons of carbon dioxide is produced for every ton of cement that is produced.^[10]

Source : <http://letu-cefs.wikispaces.com/Sustainability+Advances+in+Wood+Construction>