

## Mass Timber Innovations

Mass timber is a category of framing styles typically characterized by the use of large solid wood panels for wall, floor, and roof construction. It also includes innovative forms of sculptural buildings and non-building structures formed from solid wood panel or framing systems of six feet or more in width or depth. A relatively new category of wood products, mass timber products include:

- Cross-Laminated Timber
- Nail-Laminated Timber
- Glued-Laminated Timber
- Dowel-Laminated Timber

The 2021 International Building Code (IBC) defines mass timber as: Structural elements of Type IV construction primarily of solid, built-up, panelized, or engineered wood products that meet minimum cross section dimensions of Type IV construction.

In practice, mass timber as defined in the IBC has been an umbrella term that includes heavy timber elements, with heavy timber materials and sizes serving as the prerequisite to be considered mass timber. A subtle difference is that most mass timber utilized in Types IV-A, B and C have a minimum required fire resistance rating (FRR) in addition to the intrinsic FRR due to the minimum prescriptive size requirements found in Type IV-HT.

With mass timber, the opportunities for innovation in design and creativity in execution are limited only by one's imagination. The more we build with wood, the more possibilities we'll be able to imagine. All around the world there are projects that stand out among the competition - mass timber products and its benefits are worth looking in to.





## Cross-Laminated Timber (CLT)

CLT is a dimensional lumber product created by gluing multiple layers together at right angles, creating structural panels with exceptional strength, stability, and rigidity. Some designers view CLT as both a standalone system and product that can be used together with other wood products; it can also be used in hybrid and composite applications. CLT is well-suited to floors, walls, and roofs, and may be left exposed on the interior for aesthetics.

**CLT Innovation:** Chicago Horizon, a Type IV public pavilion, features a beautiful exposed CLT roof – the first of its kind in the city of Chicago.

Chicago Horizon | Ultramoderne | Photography: Tom Harris



## Nail-Laminated Timber (NLT)

NLT is created from individual dimension lumber members (2x4, 2x6, 2x8, etc.), stacked on edge, and fastened with nails or screws to create a larger structural element. NLT is commonly used in floors, decks and roofs and it offers the potential for a variety of textured appearances in exposed applications. NLT lends itself to the creation of unique roof forms because it can be curved in beautiful geometric patterns.

**NLT Innovation:** Vancouver, Washington's The Hudson features floor and roof systems of exposed 2x4 and 2x6 NLT decking that adds aesthetic warmth while absorbing noise.

The Hudson | Machenzie Architects | Photography: Christian Columbres



## Glued-Laminated Timber (glulam)

Glulam is made of individual wood laminations (dimension lumber), selected and positioned based on their performance characteristics, and then bonded together with durable, moisture-resistant adhesives. Glulam has excellent strength and stiffness properties and is available in a range of appearance grades for structural or architectural applications. While typically used as beams and columns, designers can use glulam in the plank orientation for floor or roof decking. With the flexibility of glulam manufacturing, glulam 'panels' can be used to create complex curvature and unique geometry.

**Glulam Innovation:** Common Ground High School in New Haven, Connecticut features glulam in many applications including rafters and a treated bridge deck on laminate timber piers.

Common Grounds High School | Photography: David Sundberg



## Dowel-Laminated Timber (DLT)

DLT panels made from softwood lumber boards (2x4, 2x6, 2x8, etc.) stacked like the boards of NLT and friction-fit together with dowels. Dowel-laminated timber panels are a next-generation mass timber product commonly used in Europe. Among the advantages of DLT, acoustic strips can be integrated directly into the bottom surface of a panel. This can help a designer achieve acoustic objectives while keeping the wood exposed and allowing for a wide variety of surface finishes.

**DLT Innovation:** For 111 East Grand, each DLT panel was fabricated with shallower boards at its edges to create chases for housing electrical conduits.

E Grand Office | Photography: StructureCraft