

CROSS-LAMINATED TIMBER

DELIVERY, HANDLING AND STORAGE



SMARTLAM
| NORTH AMERICA |

OUR COMPANY

SmartLam North America is a Mass Timber Solutions Company. Our focus is to develop practical, innovative, and sustainable solutions to satisfy customers' project requirements for glulam and cross-laminated timber. Now with production facilities located in Columbia Falls Montana and Dothan Alabama, SmartLam can offer cost-competitive engineered wood products to both the east coast and west coast construction markets.



Glulam and CLT

Dothan, AL

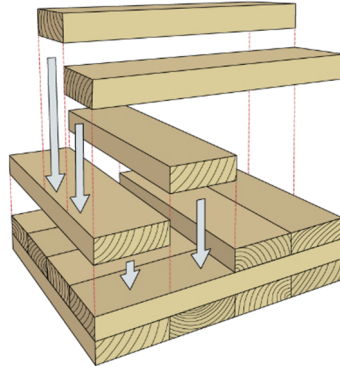


Columbia Falls, MT

CLT

CROSS-LAMINATED TIMBER (CLT)

CLT is a prefabricated, engineered wood panel product made up of layers of sawn lumber that are laminated together using structural adhesives. As a sustainable solution to building construction, CLT is often used as a substitute for concrete or steel floor or roof systems due to its comparable structural performance and inherent beauty.



Similar to other manufactured wood products, CLT is available in various grades which are dependent on the species and classification of wood used in the manufacturing process.



SERVICES AND SOLUTIONS

ENGINEERING AND DESIGN

Our engineering and design team can provide services on all phases of a project including conceptual design, schematic design, design development, construction documents, deferred submittals, shop/fabrication drawings, and construction support services. We are equipped with tools, and have the expertise, to optimize engineering, detailing and the fabrication process.

CONSULTING

Our team of experts can assist you through every step of the project including code interpretation, assembly options, engineering services, drafting services, logistics and more. We are solution driven and committed to satisfying your project requirements.

DELIVERY AND TRANSPORT METHODS

Depending on the project size, location, schedule and installation method, SmartLam provides several delivery method options.

Just-in-Time (Sequenced) Delivery

CLT panels arrive on the project site as needed for installation. Limited on-site storage is required and shipments are arranged based on expected completion of other building trades and rate of installation. Just-in-time delivery is SmartLam's most common delivery method and minimizes the risk of damage.

One-Time Shipment

All CLT panels are shipped to a project site and stored prior to installation. Depending on project size, large staging areas may be required.

Phasing

Some projects are designed and constructed in phases. This type of project delivery method often requires additional coordination, however, construction schedules may be accelerated. CLT can be shipped according to design and construction phases as agreed upon between SmartLam, the design team and installers.



Several modes of transportation can be used to ship CLT to a project site. Shipping plans are important to the overall success of the project as transportation modes and costs could dictate panel sizes used for design. In the U.S., each state has specific transportation laws and regulations. Transportation planning should be conducted for the specific state in which a project is located.

Flatbed Trucking

As the most common shipping method, commercial trucking provides shipping services to most locations in the country.

Freight Rail

SmartLam's Montana manufacturing facility is located adjacent to in-service rail lines. For projects located in excess of 1,000 miles, cost savings may be seen through freight rail. Commercial trucking is often required to transport loaded containers from rail yards to the project site. Panel sizes may be limited based on container dimensions.

JOBSITE CONSIDERATIONS

SmartLam is dedicated to supplying high quality CLT for every project. Through our stringent Quality Control and Assurance programs at our manufacturing locations, we ensure that all panels meet U.S. product standards and are never sent out for delivery if damaged or do not meet architectural specifications. To prevent panel damage at the jobsite and ensure reduced installation times, planning and preparation will be required.

Access

Jobsite access has the potential to dictate several phases of the project from design and manufacturing to installation.

Design and Manufacturing

Limited access at a jobsite may restrict panel size for delivery or installation. Owners and installers should work with SmartLam and the design team to optimize panel size for erection.

Delivery

Depending on access roads to the jobsite, large flatbed trucks may not be able to deliver the panels. Additionally, limited staging area may dictate the delivery method selected (Just-in-Time delivery vs. One-Time Shipment).

Equipment

Forklifts, telescoping handlers and cranes are the most common types of lifting equipment used to install CLT. The total weight of panels and reach distance typically determine the size of equipment needed. Support soils and clearances should also be considered when selecting lifting equipment.

Jobsite Preparation and Staging Area

For One-Time shipment delivery options, SmartLam will ship panels to a jobsite prior to the installation schedule. To facilitate erection and on-site storage organization, panels are typically shipped in reverse installation order so that the last shipment contains the first panels to be installed.

A designated area should be selected and prepared for CLT storage.

CLT should be stored on a clean, level surface with good drainage.

Never store panels directly on the ground or in standing water

Ensure that the storage and staging area has adequate air flow to prevent fungal growth.



Woodward Lofts
Saint Louis, Missouri



Conversation Plinth
Columbus, Indiana

RECEIVING AND INSPECTION



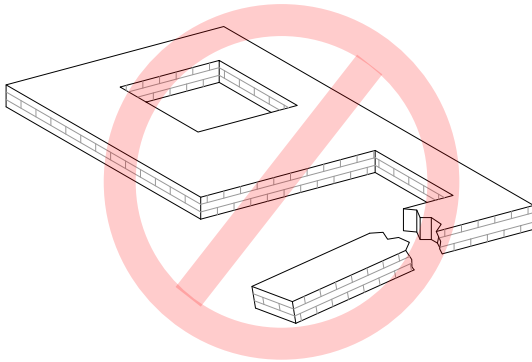
When a shipment arrives at the jobsite, carefully inspect the condition of each CLT panel prior to unloading when possible. Note any missing units, types of damage and the number of units involved on the bill of lading before accepting the delivery. Also record information from the driver as to how any units were damaged.

SmartLam will not be held responsible for missing or damaged materials not reported within 48 hours of delivery.

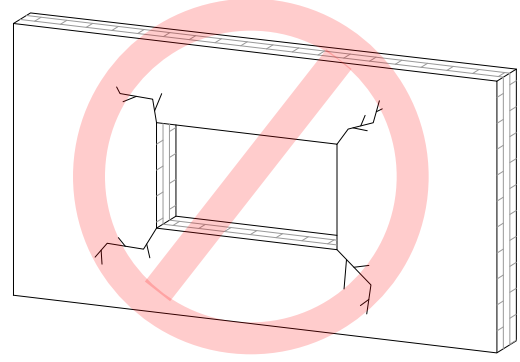
All technical information provided by SmartLam and certified product reports assume that the condition of the CLT is in new or like-new condition. Panels that appear to be damaged or weakened should not be installed or removed from service and evaluated by a qualified person.

Proper inspection of CLT should include – but not be limited to –looking for these common types of damage:

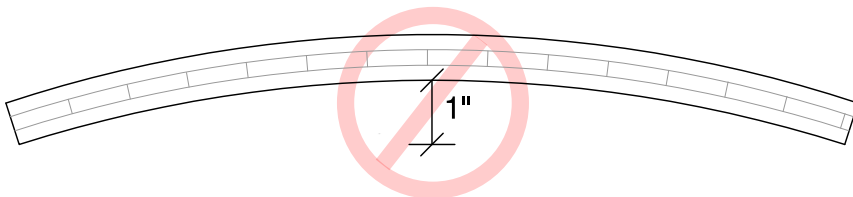
Missing and/or Damaged Material



Cracks around Openings



Cupping Exceeding 1/2"

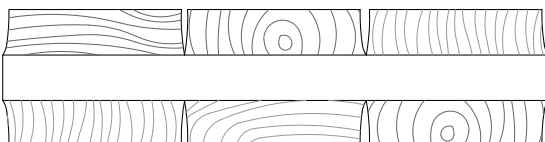


Mold or Fungal Growth



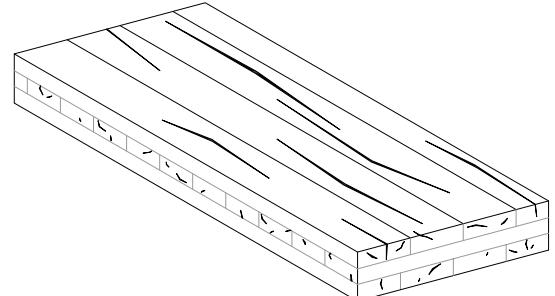
As a product of dimensional lumber, CLT is prone to swelling and shrinkage due to changes in internal moisture content. When the wood shrinks, surface gaps may appear and internal stresses may result in surface and end checking. This phenomenon is part of the naturally occurring seasoning process of wood and typically has no effect on the structural performance of the CLT panels.

Differential Shrinkage



Surface Gaps Due to Differential Shrinkage

Surface and End/Edge Checking



OK

MISC. MATERIAL AND CONNECTION HARDWARE

To facilitate the installation of CLT elements, SmartLam often coordinates design with other suppliers and can source miscellaneous building materials and connection hardware. Depending on the size of the project, these additional shipment items may either be placed on the first delivery truck or sequenced with the panel shipments. The contractor or installer should coordinate with SmartLam for the sourcing and delivery of these materials and hardware.

Miscellaneous Materials

Steel

Typical connections between CLT and concrete foundations often utilize steel members. SmartLam has the in-house experience required to fabricate steel elements such as base angle, holdowns, straps or other connectors. Alternatively, SmartLam will work closely with the steel fabricator of your choice and coordinate CLT production to ensure proper fit at the jobsite.



Plywood Splines

Panel-to-panel floor or roof connections typically include structural plywood. SmartLam sources and precisely cuts all plywood spline material to ensure proper floor diaphragm performance.



Glulam

As a mass timber element, glulam is often designed to be the supporting framework for CLT. SmartLam can supply Southern Pine glulam from our Dothan production facility or will work closely with the fabricator of your choice.



Connection Hardware

SmartLam will source and ship fasteners and connection hardware as defined in the Sales Agreement. SmartLam typically sources all fasteners required for CLT-to-CLT connections and CLT-to-structural framework. Fasteners used for other building materials, or that are not part of the direct load path of the CLT, are usually not included.

Connection hardware will be packaged in a separate crate and will be clearly labeled.



Fasteners will be organized by level or designated installation areas as coordinated with the contractor or installer.

SOURCES OF DAMAGE

From the time CLT panels leave one of SmartLam's manufacturing facilities, they are susceptible to damage from adverse weather conditions, handling and other uncontrollable circumstances. As a result, every precaution should be taken to protect panels as to not compromise the structural integrity or appearance. The best practice to avoid unintended damage is to minimize the handling and on-site storage by utilizing a Just-in-Time delivery method.

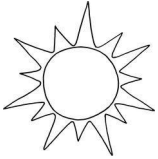
Rain



If left unprotected, rain and moisture will cause CLT to swell. During the shop drawing and fabrication phases of a project, all CLT is designed and cut to precise tolerances while maintaining an acceptable wood moisture content. Despite having exceptional dimensional stability due to cross layering, **swelling during transit or on the jobsite may cause installation issues.**

Rain and excessive moisture will cause staining of CLT panels. For panels that are to remain exposed in a finished structure, extra measures should be taken for protection. Additionally, **unprotected steel or fasteners may rust and drip on CLT causing undesired stains.**

Sun



If left uncovered, **exposure to direct or indirect sunlight over a period of time will cause CLT to change color.** This process is known as "sun tanning". Sun tanning during transit or jobsite storage can result from tears in the factory wrap or failure to properly cover the panel with opaque tarps. CLT may also tan after installation if located near windows.

Cold Weather Acclimation



Rapid changes in moisture content can cause CLT to check and split. When heat is suddenly applied to a structure, the rate of change in moisture content of the panels will increase and extensive damage may occur to the panel aesthetics. To minimize checking and splits once installed, raise the temperature slowly over several weeks if possible. The slower the moisture content of the CLT equalizes with the environment, the better. Sealers or coatings may help to regulate the change in moisture content and minimize checking and splits.

Handling



Improper handling can compromise the structural integrity and visual quality of CLT panels. Surface marring, gouging, scraping and soiling are among the most common types of damage observed from careless handling procedures, however, all these damages are avoidable with the proper equipment and procedures.



SMARTLAM PROTECTION MEASURES

Before any shipment leaves the manufacturing facility, SmartLam takes several measures to prevent damage and ensure delivery of high quality CLT panels. If desired, SmartLam will work with the owner and installer to provide additional measures of protection.

Coatings and Sealers

As a first line of defense against extreme conditions encountered during transportation, jobsite storage and installation, SmartLam applies a sealer on every panel before it leaves the manufacturing facility. Typical sealing includes one coat of Sansin KP12W to all faces and edges. If severe conditions are expected, two coats of sealer are recommended. Other sealers or coatings may be factory applied to provide additional protection from water or sunlight (UV). **All factory applied coatings or sealers are intended for temporary protection only.** Final coatings and finishes should be applied per Architectural specifications once the building has been enclosed and the CLT has reached moisture equilibrium.



Stacking with Dunnage

One of the most efficient ways to transport CLT to a jobsite is to flat-stack panels on a truck bed or rail car. To provide access for unloading and lifting and reduce the risk of marring, gouging or scarring, dunnage is used to separate panels.



Factory Wrap

To provide additional protection beyond sealing the CLT, SmartLam will factory wrap panels with lumber paper.

Wrapping prevents direct water contact or sun exposure while providing minimal protection against surface scarring during handling. Once on the jobsite, it is important to ensure proper airflow within wrapping to prevent fungal growth.



Tarpping During Transport

Once panels are stacked and loaded, SmartLam ensures that all shipments are covered with heavy duty opaque tarps. **Tarps prevent damage from adverse weather, roadway debris and soiling from chemicals such as oils or automotive fluids.**

UNLOADING

Depending on CLT panel geometry and final installation orientation, panels may be unloaded in a flatwise position or tipped up into a vertical position. Unloading and lifting may result in high stresses that panels were not specifically designed for, especially those containing window, door or mechanical penetrations. **Improper unloading techniques may cause non-repairable damage and compromise the structural integrity of panels.**

Always:

Use lifting equipment properly sized for panels

The weight of a CLT panel is related to the ply thickness and grade. Contact SmartLam for project specific panel weights. Undersized lifting equipment may increase the risk of dropping a panel from an elevated height, serious injury or even death.

Lift panels from the center of gravity

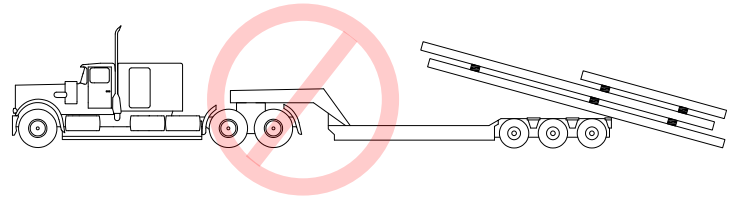
Attempting to lift panels off-center may result in dropping a panel. It may be difficult to determine the center of gravity of panels with complicated geometries or those containing penetrations. Contact SmartLam for individual fabrication drawings to locate the center of gravity.

Protect the wood during unloading

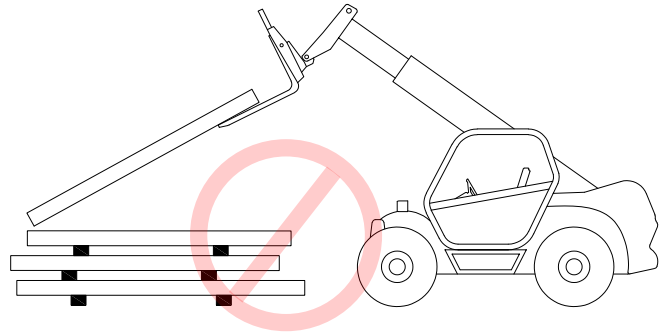
The method and type of protection will be related to the equipment and machinery used for unloading.

Never:

Dump or drag panels off trucks

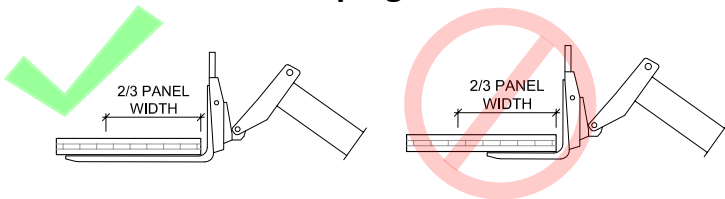


Drop panels from elevated heights

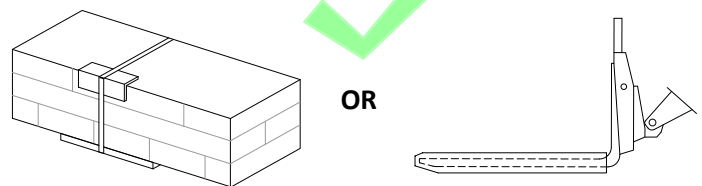


Good Practice and Panel Protection for Lifting Equipment:

Forklifts and Telescoping Handlers



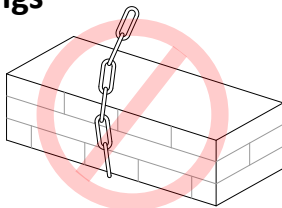
Use forks at least 2/3 of panel width



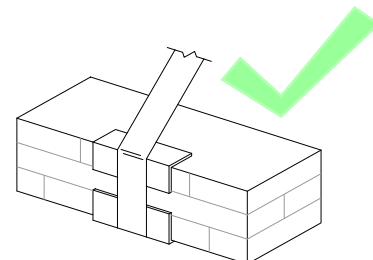
OR

Protect panels from scraping with blocking or fork padding.
 SmartLam will provide 1/4" plywood blocking secured to panels with nylon strapping upon request.

Cranes and Slings



Use wide plastic or nylon slings that will not scrape or mar panels.
Never use chains or cables in direct contact with panels.

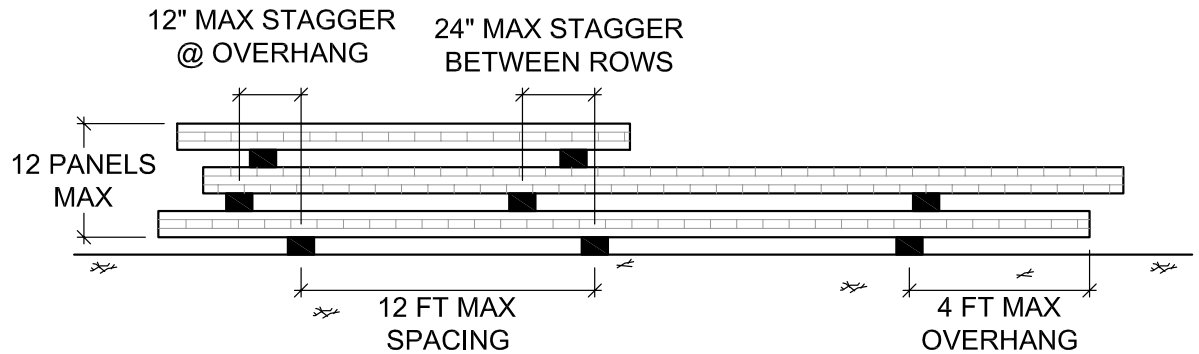


Protect corners of panels with steel or plastic angles when lifting with slings. Angles should be clean and free of defects.

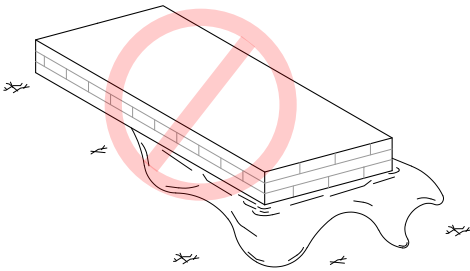
JOBSITE PROTECTION MEASURES

Once a shipment of CLT arrives at a jobsite, it is the responsibility of the contractor or installer to protect and maintain the structural integrity and visual appearance of the panels. Proper handling and storage will reduce the risk of damaging the CLT.

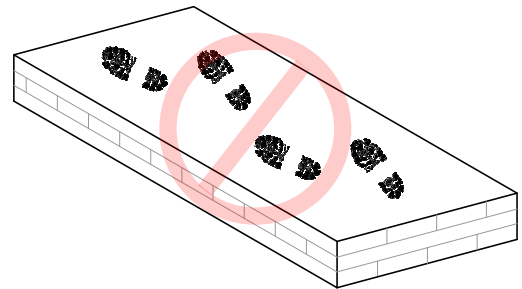
Panel Storage



Place panels on 6" to 12" blocks according to the general spacing requirements shown. The staging area should be clean and level with good surface drainage and adequate air flow to prevent fungal growth.

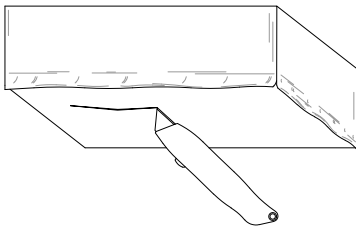


Never store panels directly on the ground or in contact with standing water

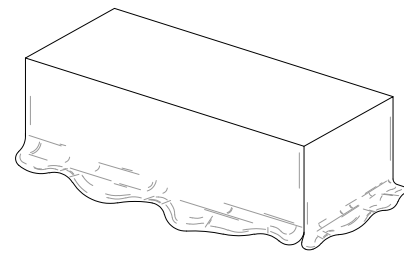


Do not walk on unprotected panels or handle with soiled hands or equipment

Tarping During Storage and Installation



Slit or puncture wrapping on bottom of panel (when provided) to allow for drainage



Cover CLT units with moisture resistant material as soon as possible with paper wrap or canvas tarp.

Do not use plastic coverings as they will cause moisture to accumulate on the panel. Do not use clear coverings as they will allow sun tanning.

Once installed, CLT panels may remain exposed to environmental conditions for a period of time before the structure is "dried-in". Tarp installed panels as required to prevent damage from adverse weather until the structure is enclosed and panels are protected.

Finish Coatings

Protection during in-service conditions is achieved with field applied finishes per Architectural specifications. Final coatings and finishes should be applied after the CLT has reached moisture equilibrium and a majority of the shrinkage or swelling has ceased.