

# Making the Case for Wood Construction

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## THE PROBLEM

Cross-laminated timber has been used as a method for constructing buildings in Europe for many years, but is considered a relatively new technology in the United States. Currently, there are only three manufacturers of cross-laminated timber in North America: two in British Columbia, Canada, and one in Oregon.

The state of Arkansas is currently producing more wood than it is using to make paper, lumber, and other wood products. The production of cross-laminated timber in the state could provide a use for this excess supply of wood and make the technology more accessible to designers and builders in the East and South United States.

## THE PROJECT

This project studies the validity of using CLT in building construction. The first portion of this project addresses the overall quality of CLT as a structural material, addresses common concerns of using wood in construction (such as susceptibility to fire), and incorporates precedents to show how CLT is being used as a structural material in buildings today. The second portion of this project speculates on how an all wood live-learn residents hall could be constructed for liberal arts students at the University of Arkansas.

## THE OUTCOME

The environmental, economic, and construction factors presented by using CLT in building construction all support the use of wood as building structure. Precedents show that CLT buildings are viable in a variety of environments and can be designed to meet the users needs.

## SUSTAINABILITY

Using cross-laminated timber in building construction impacts both built and environmental systems. Cross-laminated timber made from managed forests provides a use for the excess wood that Arkansas is producing while also sequestering carbon in the built environment. The lighter weight of wood structure compared to steel or concrete allow for smaller foundations and reducing the amount of concrete needed for a given project. Utilizing cross-laminated timber reduces the need for steel and concrete, the production of which is much more damaging to the environment than that of cross-laminated timber.

This project enriched my experience at the University of Arkansas by providing an opportunity to explore an underutilized method of building construction. This study has shown the possibilities for using cross-laminated timber in place of less sustainable materials such as steel and concrete. This study has given me the knowledge base needed in order to thoughtfully propose the use of wood as structure in future projects I will work on in my career in addition to more traditional sustainable building practices.



## COMMON MISCONCEPTIONS

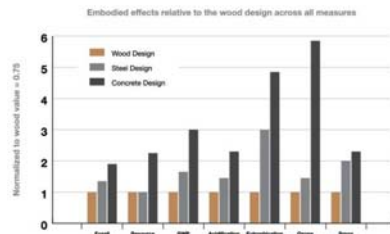
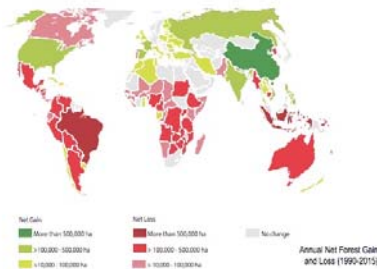
**“CLT is a wood product and, therefore, easily catches on fire.”**

Heavy timber, such as CLT does not catch fire easily. When it does catch fire it wants to put itself out, and the outer layer of the panel chars and protects the inner portion of the panel. The rate of charring for CLT also slows down over time. One study found that at 45 minutes the char rate for one CLT panel was 1.90 inches per hour. By 120 minutes the char rate had decreased to 1.58 inches per hour.



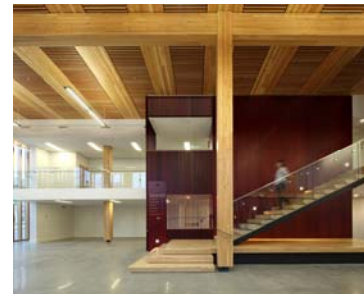
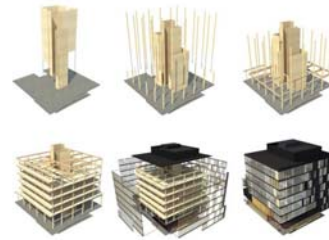
**“Mass timber is not good for the environment since many trees need to be cut down to create the building material.”**

CLT is harvested from sustainably managed forests. In the United States less than 2% of standing trees were harvested, while net growth was at 3%. In 2015 in Arkansas the total net growth was 173% of the removals of softwood and 177% of hardwoods removed that year.



## PRECEDENTS

Wood Innovation and Design Centre  
Michael Green Architecture  
British Columbia, Canada

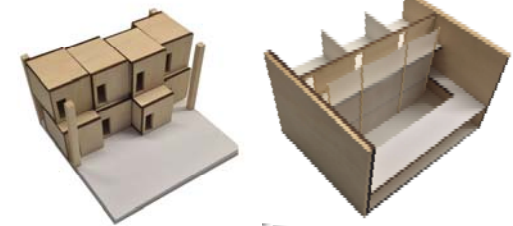


## LIVE-LEARN RESIDENCE HALL

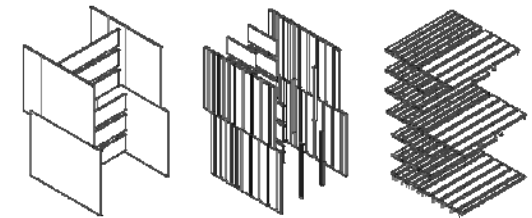
Explorations of possible configurations for all-wood live learn residence at the University of Arkansas



Massing Study



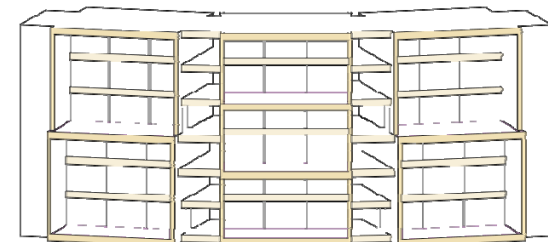
Studies of dorm rooms in relation to community spaces



CLT Shear Walls  
10'x30'x6" CLT Panels  
(exterior)  
36'x8'x6" Panels

Other Vertical Structure-  
CLT and Glu-lam  
2'x30'x1' or 4'x30'x1' CLT  
Panels  
12'x12'x30' Glu-Lam  
Columns 12' O.C.

Horizontal Structure-CLT  
and Glu-lam  
2'x30'x1' or 4'x30'x1' CLT  
Panels Staggered  
12'x24'x24' Glu-lam  
Beams 12' O.C.



Main CLT boxes in relation to community spaces