

# **Mass Timber: Products, Manufacturing and Markets**

**Wisconsin Council on Forestry  
May Meeting  
May 8, 2019**

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Forest Products Team Leader  
Wisconsin Department of Natural Resources**

# For today

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- Mass timber overview
- CLT manufacturing processes and standards
- State of the US industry
- Wisconsin projects and efforts

# Mass Timber



# Mass timber overview

Mass timber is a type of building system that uses panelized solid wood construction for structural applications

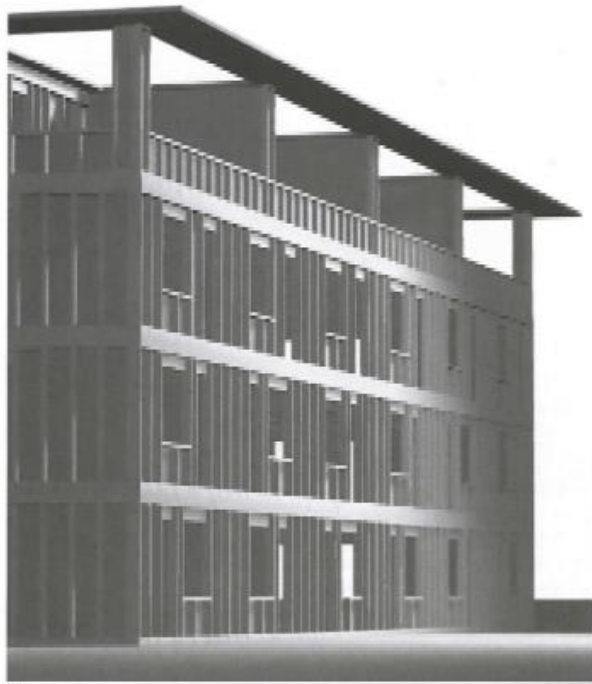
## ■ Examples

- Cross-laminated timber (CLT)
- Glued-laminated timber (Glulam)
- Nail-laminated timber (NLT)
- Dowel-laminated timber (DLT)
- Mass-plywood panels



# Mass timber: comparison

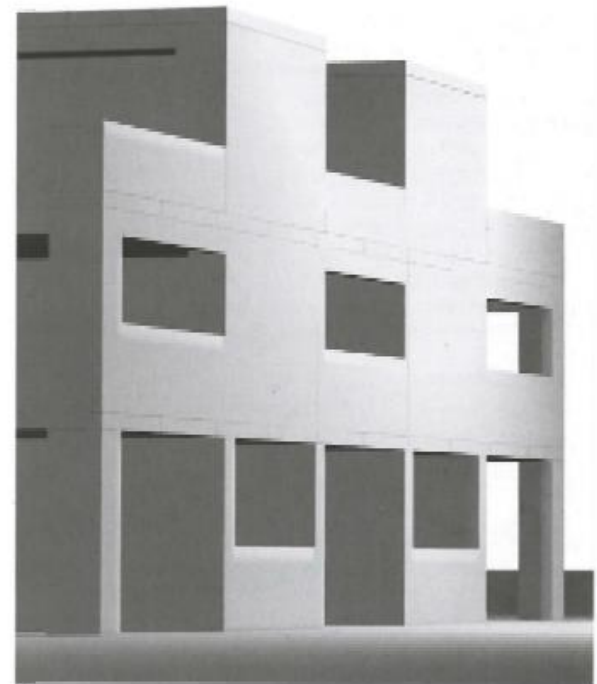
**LIGHT WOOD-FRAME**



**POST + BEAM**



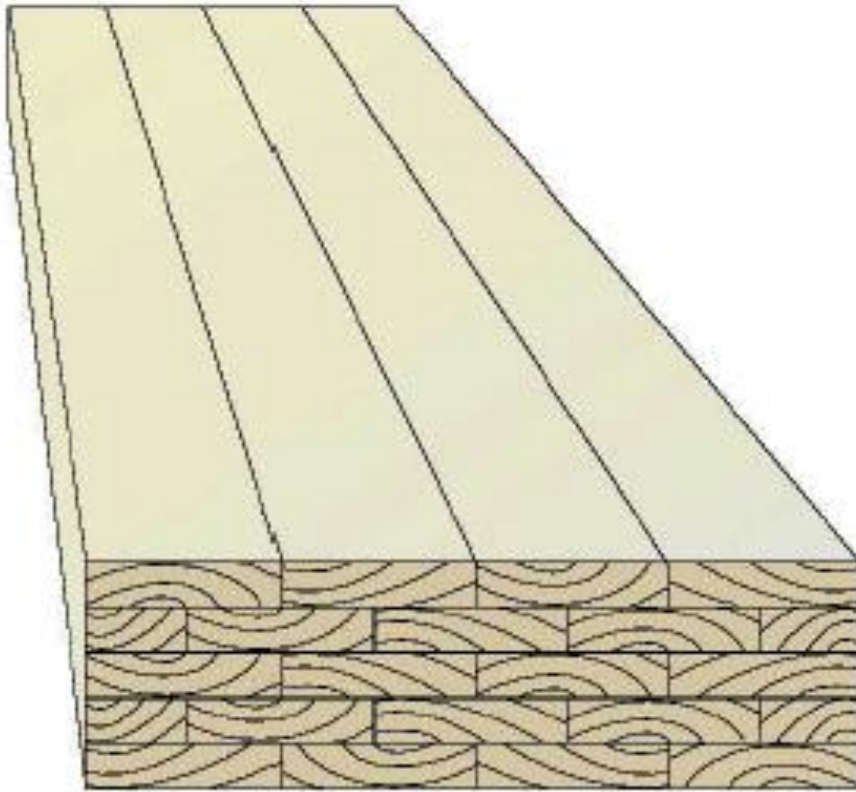
**MASS TIMBER**



Source: Rethink wood

# Glued-laminated timber (glulam)

Glulam



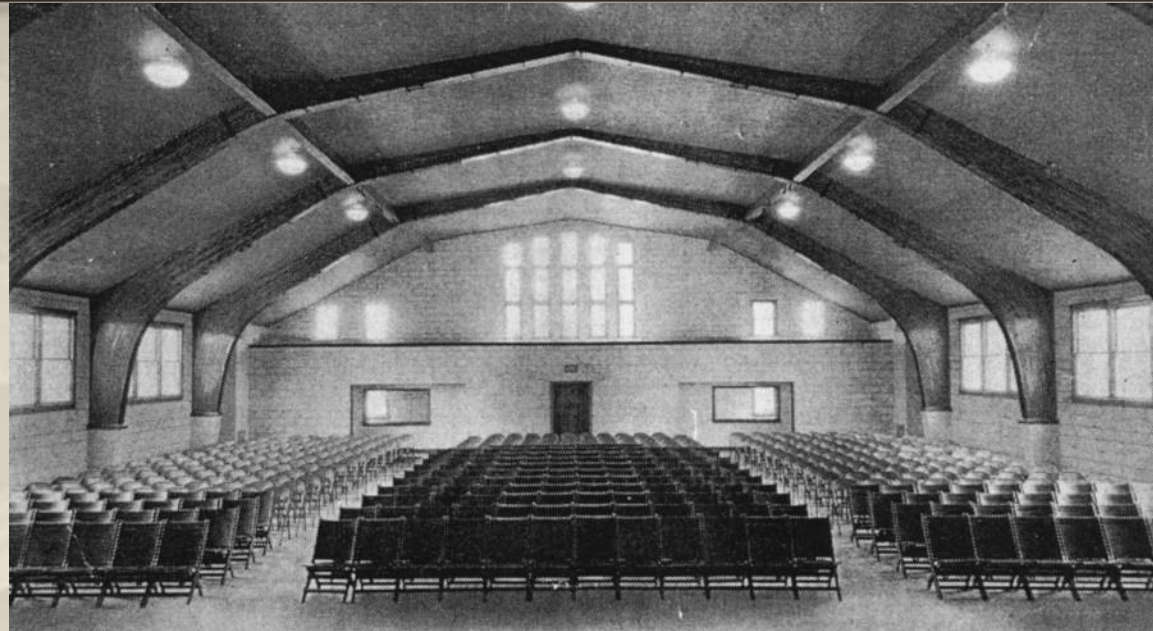
# Glued-laminated timber (glulam)

- Dimension lumber (e.g. 2x6, 2x8)
- Bonded together with adhesives
- Laminations run parallel with the length
- Often SYP/DF
- Red pine and hardwoods considered in AITC standards





# Glue-laminated timber (glulam)

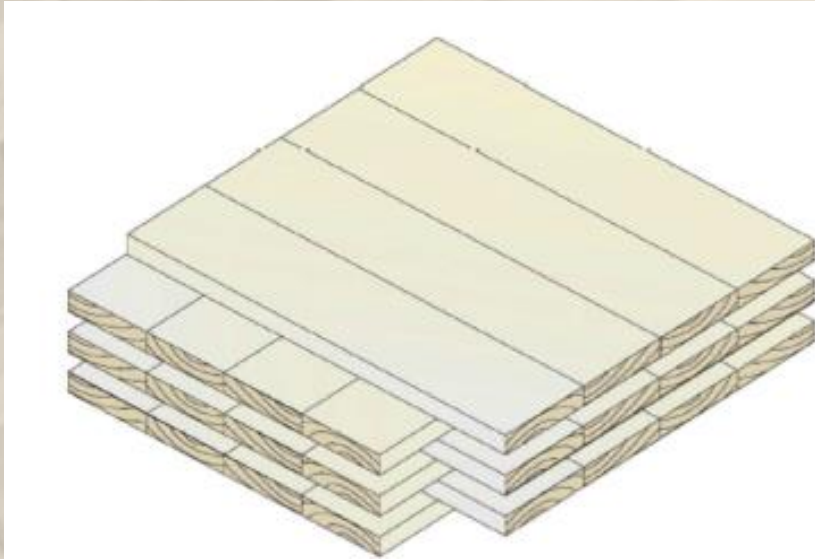


Source: Andreas Rhude

- Applications: beams, columns
- U.S. manufacturing dates back to the 1930's
- First use of glulam in U.S.....Peshtigo, WI
  - Sentinel Structures—Peshtigo
  - Timber Technologies—Colfax



# Cross laminated timber (CLT)



Source: CLT Handbook



Source: LEVER Architecture



# Cross Laminated Timber (CLT)

- Three to seven layers, oriented perpendicular to one another
- Applications: floors, walls, roofs
- Interior can be left exposed
- Growing in popularity, markets still emerging



# Nail Laminated (NLT)



Photo: ReThink Wood



Photo: StructureCraft

- Nailed dimension lumber, stacked on edge
- Application: floors, decks and roofs
- Prefabricated or fabricate on site
- Versatile with regard to species



# Dowel Laminated Timber (DLT)

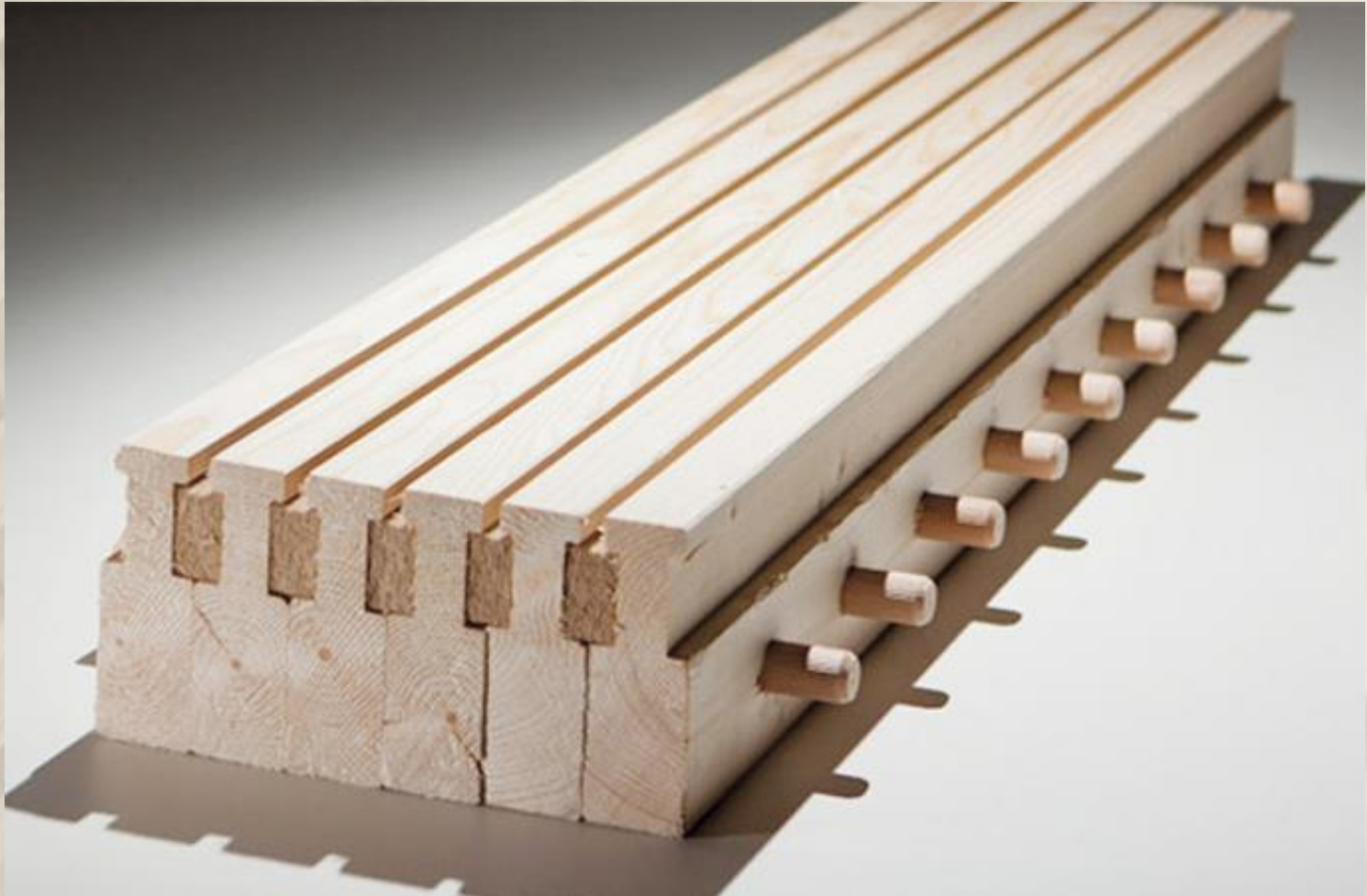
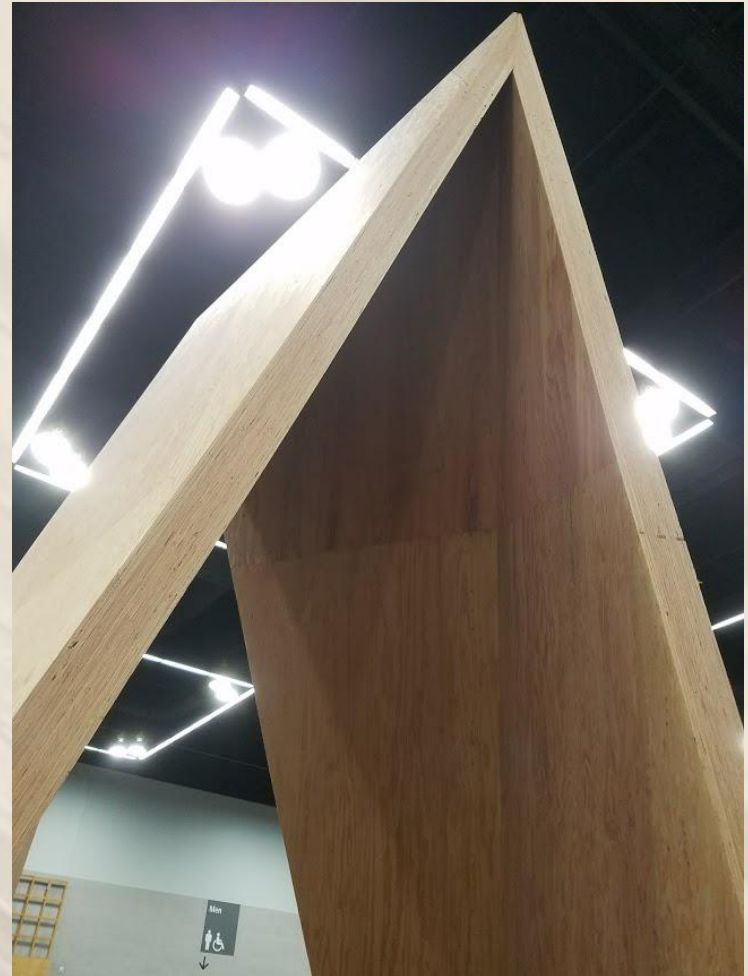


Photo: StructureCraft

# Mass plywood panels



Source: Collin Buntrock



Source: Collin Buntrock



# Mass timber “look-alikes”



Photo: Sentinel Structures, River Road Bridge, Lake Tomahawk



Photo: Sterling Lumber



Photo: Bell Lumber & Pole



# Why the interest in mass timber?

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- Efficiency in construction
- Cost-competitive
- Less energy/resource intensive to manufacture
- Fire/seismic tolerance
- Energy efficiency
- Aesthetics and health benefits
- Renewable



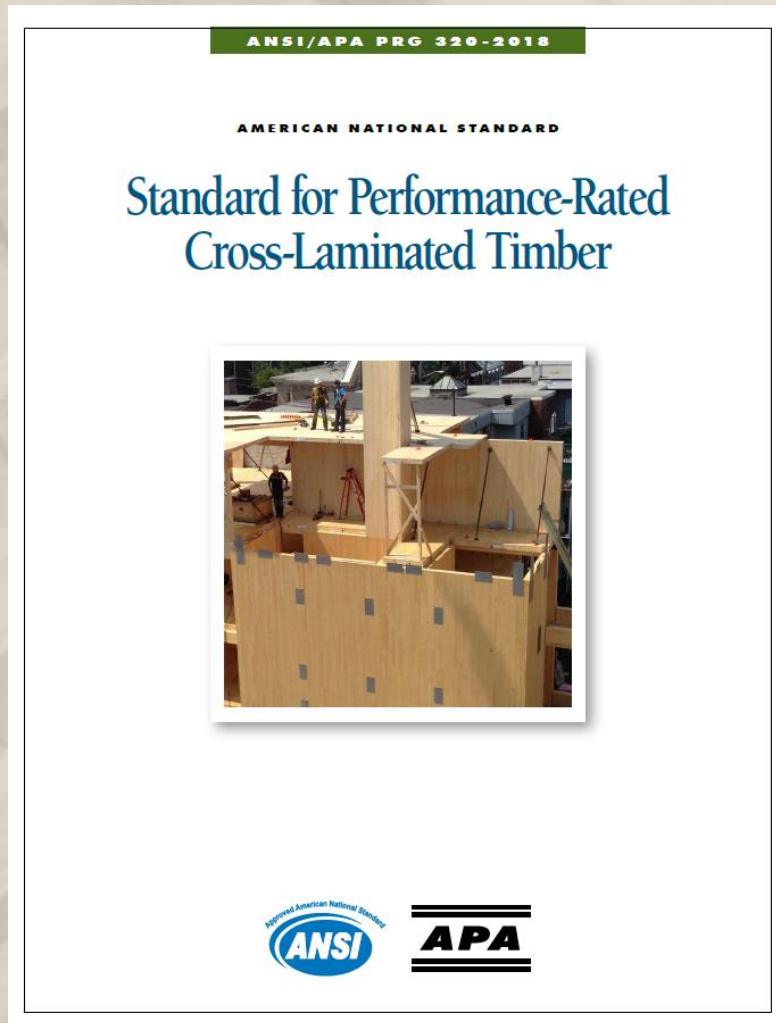
# CLT Manufacturing

# CLT manufacturing

- Computer-aided design and engineering
- Lumber sizing (planing, fingerjointing)
- Adhesives
- Pressing/curing
- Sanding
- Product sizing (CNC)
- Coordinated shipping to job site



# CLT manufacturing



ANSI/APA PRG-320

## American National Standard

- Defines CLT
- Component requirements
- Performance criteria
- Qualification
- Quality assurance
- Terminology

# CLT raw material (PRG-320)

- Machine Stress Rated or Visually Graded Dimension Lumber
  - Douglas-fir, southern yellow pine, SPF, **SPFs**
  - **SPFs**= e.g. red pine, jack pine, white and black spruce
  - Specific gravity > 0.35
  - Grade stamped
    - Parallel layers: #2 or better (visual)
    - Perpendicular layers: #3 or better
- Thickness not less than 5/8" or greater than 2"
  - **2 by 4, 6, 8, 10** common in North America
- Dried to 12% moisture content before layup

# North American CLT Manufacturers

## Producing

### Canada

- Nordic Structures (Quebec)
- StructureCraft (BC)
- Structurlam (BC)
- Element5 (Quebec)
- LEAF (Ontario)

### United States

- DR Johnson (OR)
- SmartLam (MT)
- Freres (OR)
- Euclid (UT)
- Sterling (IL)
- International Beam (AL)
- Texas CLT (AR)

## Announced

### United States

- Vaagen Timbers (WA)
- Katerra (WA)
- SmartLam (ME)
- Sterling (TX)

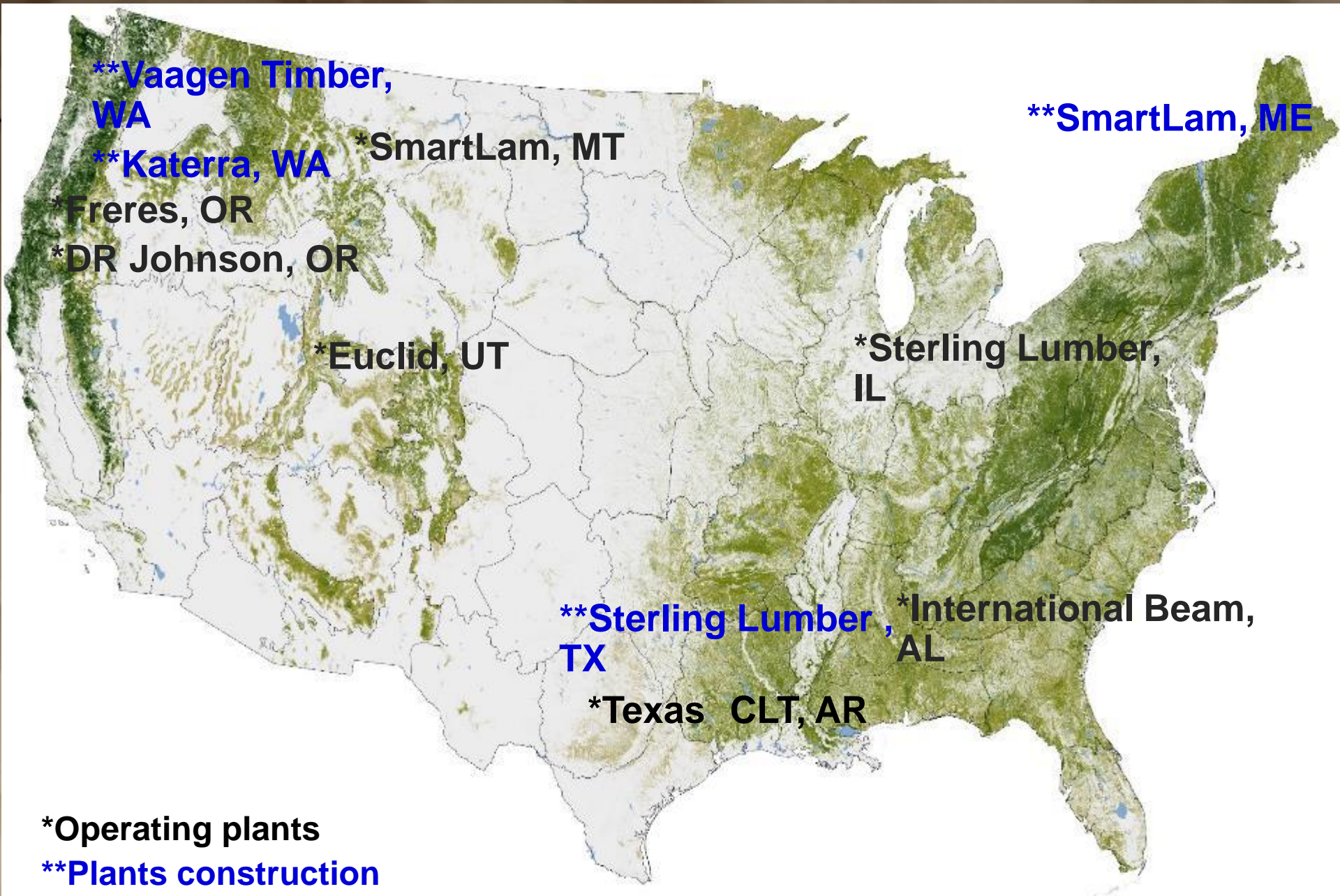
### Canada

- Kalesnikoff Lumber (BC)



Company	Location	Species	Estimated Lumber (MMBF)	2019
DR Johnson	Oregon	Douglas fir	20+	CLT, Glulam
Smartlam	Montana	Douglas fir, SPF	20-30	CLT
Freres	Oregon	Douglas fir	30+ eq. (veneer-based)	Mass Plywood
International Beam	Alabama	Southern pine	30+	CLT, Glulam
Sterling Lumber	Illinois	Southern pine	100+	Industrial CLT
Katerra	Washington	Douglas fir, SPF	100+	Spring/summer startup
Vaagen Timbers	Washington	Douglas fir, SPF	40-50	Under construction
Sterling Lumber	Texas	Southern pine	100+	Under construction
Smartlam	Maine	SPF	??	Announced
Texas CLT	Arkansas	Southern pine	??	Announced

Source: Beck Group, Brian Brashaw (2018)

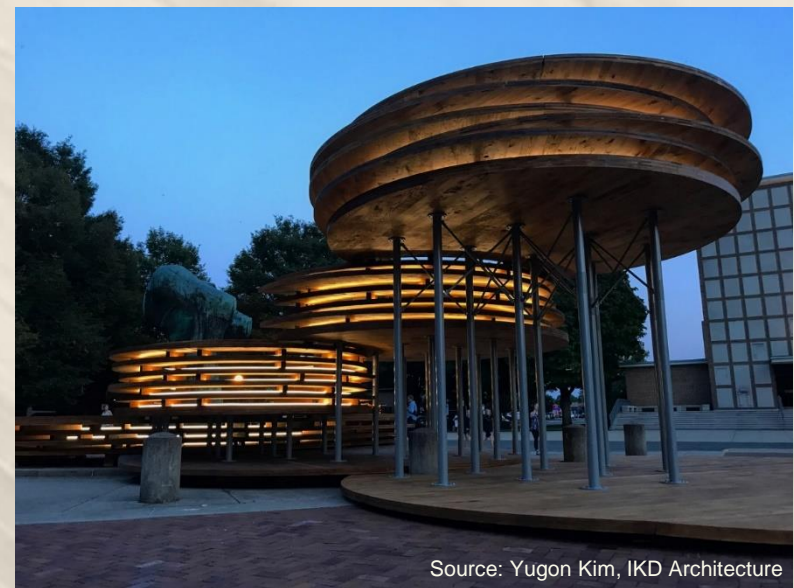
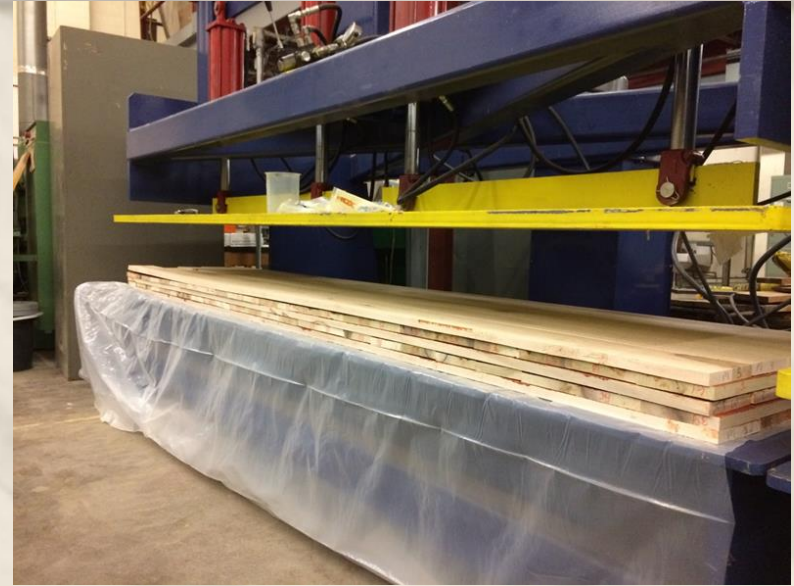


**\*Operating plants**

**\*\*Plants construction  
and/or announced**



# Hardwood research







# *Projects*

# Projects

## ■ Promega Corporation—Madison, WI



Source: Uihlein/Wilson Architects



# Projects



Photo: USDA Forest Service Forest Products Lab



Photo: Uihlein/ Wilson Architect



# Projects

## Tallisen School—Spring Green, WI



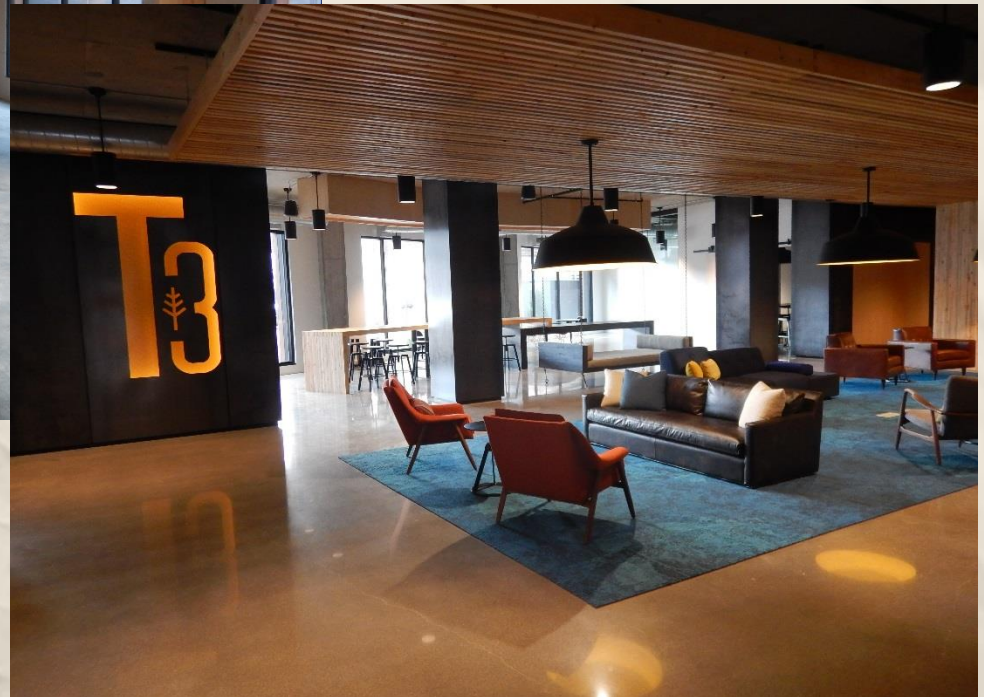
Source: Scott Lyon, Wisconsin DNR

# Projects

## T3 Building —Minneapolis, MN



Source: Brian Brashaw, USDA Forest Service



Source: Brian Brashaw, USDA Forest Service



# Project Examples

## ■ T3 Building —Minneapolis, MN



Source: Brian Brashaw, USDA Forest Service





Ascent, Milwaukee, WI: Planned for 2019 courtesy **KORB + ASSOCIATES ARCHITECTS**

# Mass Timber Projects In Design and Constructed in the US (December 2018)



**WoodWorks™**  
WOOD PRODUCTS COUNCIL

## Stage

■ Construction Started / Built  
● In Design

Stage	Mass Timber	# of Projects
Construction Started / Built	CLT	85
	NLT	5
	DLT	4
	Heavy Timber Decking	44
	Post & Beam	39
	<b>Total</b>	<b>177</b>
In Design	CLT	141
	NLT	21
	DLT	3
	Heavy Timber Decking	35
	Post & Beam	110
	<b>Total</b>	<b>310</b>
<b>Grand Total</b>		<b>487</b>

State	Stage		State	Stage	
AL	Construction Started / Built	2	MS	In Design	
	In Design	6	MT	Construction Started / Built	
AR	Construction Started / Built	3		In Design	
	In Design	3	NC	Construction Started / Built	
AZ	In Design	1		In Design	
CA	Construction Started / Built	26	ND	In Design	
	In Design	40	NE	Construction Started / Built	
CO	Construction Started / Built	9		In Design	
	In Design	7	NH	In Design	
CT	Construction Started / Built	3	NJ	In Design	
	In Design	5	NM	In Design	
DC	Construction Started / Built	2	NY	Construction Started / Built	
	In Design	1		In Design	
DE	In Design	1	OH	Construction Started / Built	
FL	Construction Started / Built	15		In Design	
	In Design	13	OK	Construction Started / Built	
GA	In Design	11		In Design	
HI	In Design	1	OR	Construction Started / Built	
IA	In Design	1		In Design	
ID	Construction Started / Built	1	PA	Construction Started / Built	
	In Design	2		In Design	
IL	Construction Started / Built	4	RI	Construction Started / Built	
	In Design	10		In Design	
IN	Construction Started / Built	1	SC	Construction Started / Built	
KS	In Design	1		In Design	
KY	Construction Started / Built	1	TN	Construction Started / Built	
LA	In Design	1		In Design	
MA	Construction Started / Built	15	TX	Construction Started / Built	
	In Design	21		In Design	
MD	Construction Started / Built	1	UT	Construction Started / Built	
	In Design	6		In Design	
ME	Construction Started / Built	1	VA	Construction Started / Built	
	In Design	9		In Design	
MI	Construction Started / Built	1	VT	Construction Started / Built	
	In Design	2		In Design	
MN	Construction Started / Built	1	WA	Construction Started / Built	
	In Design	2		In Design	
MO	Construction Started / Built	4	WI	Construction Started / Built	
	In Design	4		In Design	
			WV	Construction Started / Built	
			WY	In Design	

**Considering mass timber for a project?**  
**Ask us anything.**

For free project support, contact:  
[help@woodworks.org](mailto:help@woodworks.org)  
[woodworks.org/project-assistance](http://woodworks.org/project-assistance)



# Wood Products Seminar



## Wood in Construction: Mass Timber and Beyond

September 2017  
Madison, WI



**AIA**  
Wisconsin

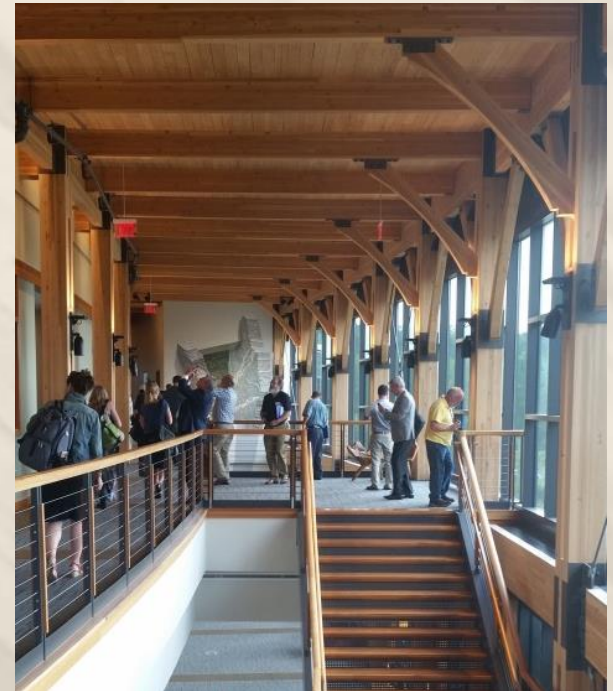




- ~ 70 participants including architects, structural and civil engineers, developers, forestry organizations

## Topics:

- Considerations with wood products and mass timber
- WI building code overview
- Environmental benefits of wood products and applied research
- Designing with urban wood
- Available project assistance



# USDA Mass Timber University Grant

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- Promote the construction of mass timber buildings on campuses across the U.S.
- Institutions of higher learning
- \$1 million total, \$100,000 per award
- Engineering/design costs, code review, alternate cost analyses
- Proposal deadline: May 28, 2019

# Partnerships in wood products



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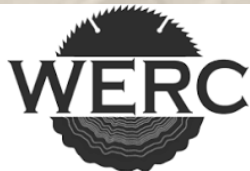
AMERICAN WOOD COUNCIL



Forest Products  
Laboratory



INTERNATIONAL  
**MassTimber**  
CONFERENCE  
March 19-21, 2019



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WOOD EDUCATION  
AND RESOURCE CENTER

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**WOOD®**



American Hardwoods™



# Thank you!

**Collin Buntrock**

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