

# Mass Timber Rigging

Thursday December 13 @10:00 PST | 1:00PM EST

# Rigging Mass Timber

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Reference: Unknown



# MyTiCon Yoke Anchoring System

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# About MyTiCon

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## **Your Host**

- Neda Naderi, MEng, EIT

## **Myticon**

- Specialized Mass Timber Connection System Supplier

# Objectives of the Webinar

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- **What?**

  - Simple lifting solution

- **Why?**

  - Safe and tested solution

- **How?**

  - Rigging Design Guide

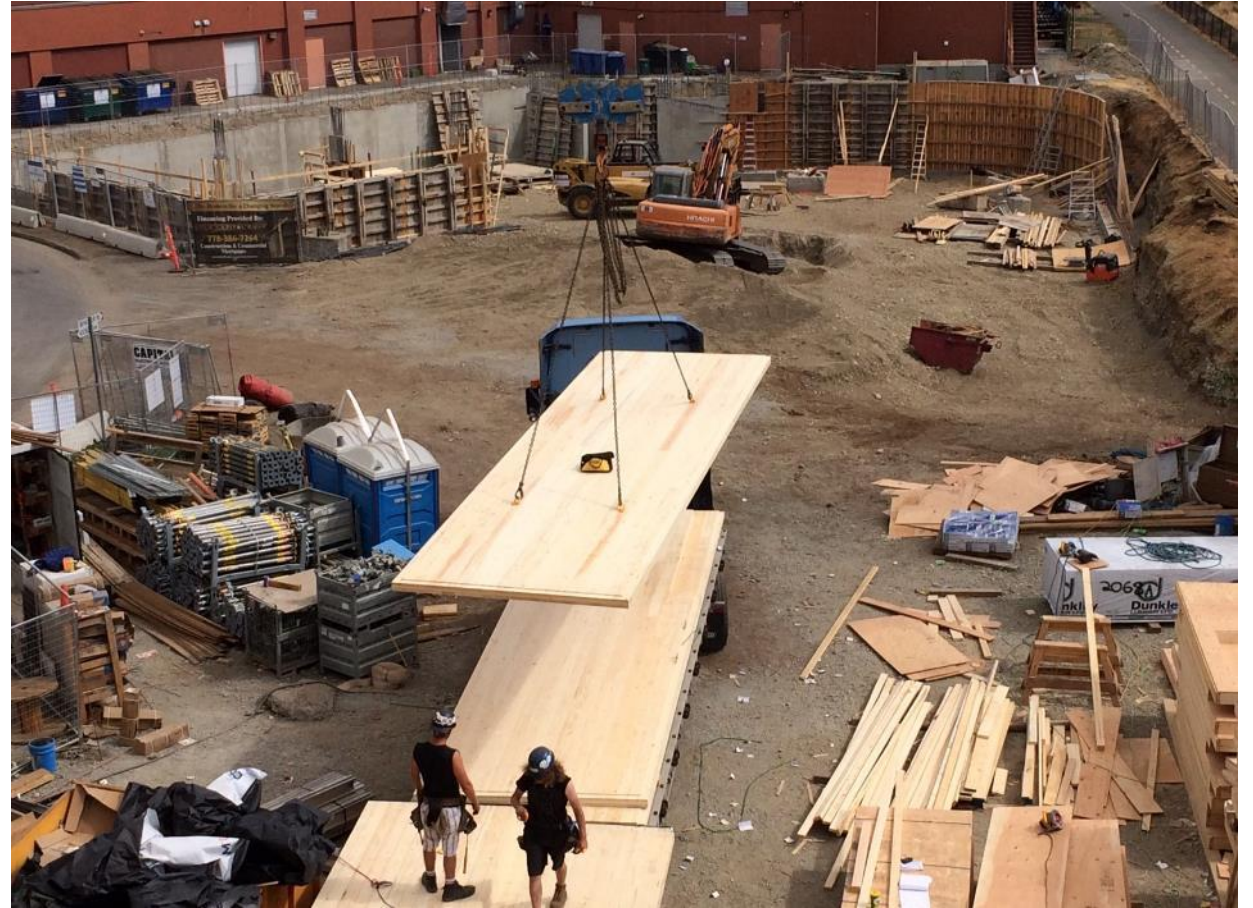
What?



# Yoke Anchor System

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- Unique to Myticon
- Screwed hoist anchoring system



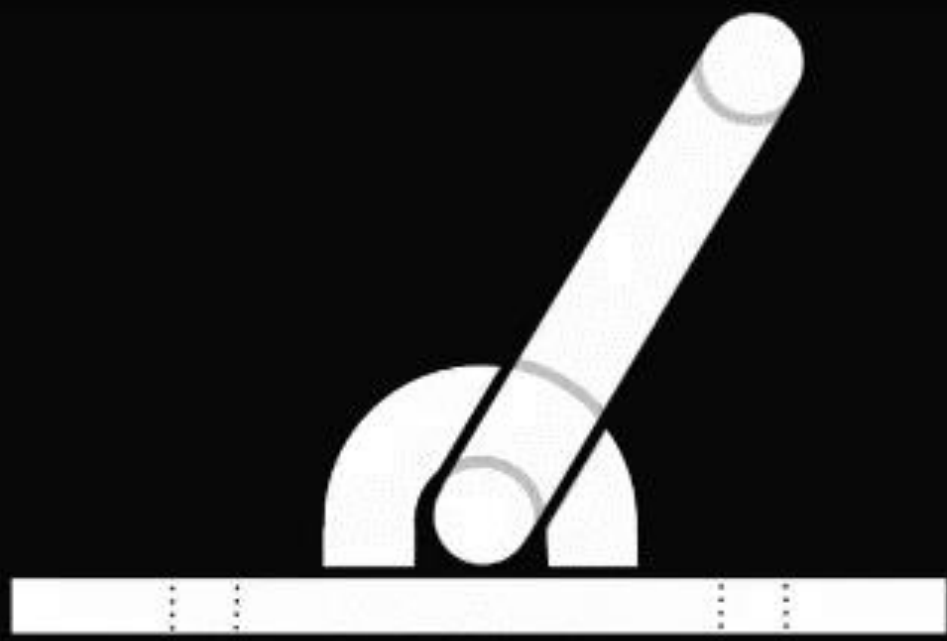
Provided by: Structurelam Mass Timber Corporation

# Screw Hoist System

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# Yoke Anchor System

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- Different sizes and lifting capacities



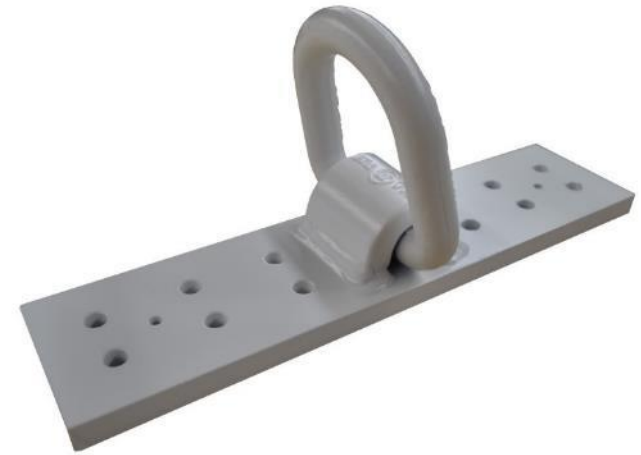
Mini Yoke



Yoke 1T



Yoke 5T



Yoke XL

# ASSY Self Tapping Screws

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ASSY VG CSK



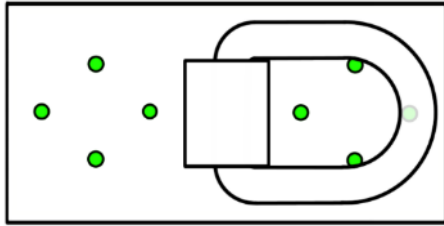
ASSY Kombi



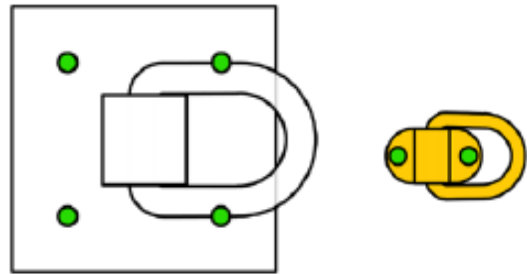
ASSY Ecofast

# Step 3: Anchor System Selection

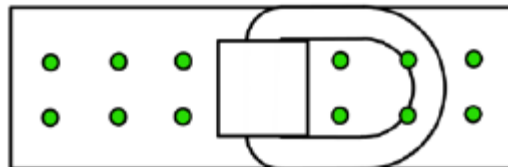
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Ø 1/4 " [6 mm]



Ø 1/2 " [12 mm]



Ø 3/8 " [10 mm]



# Lifting Elements

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Structural Insulated  
Panels (SIP)



# Lifting Elements

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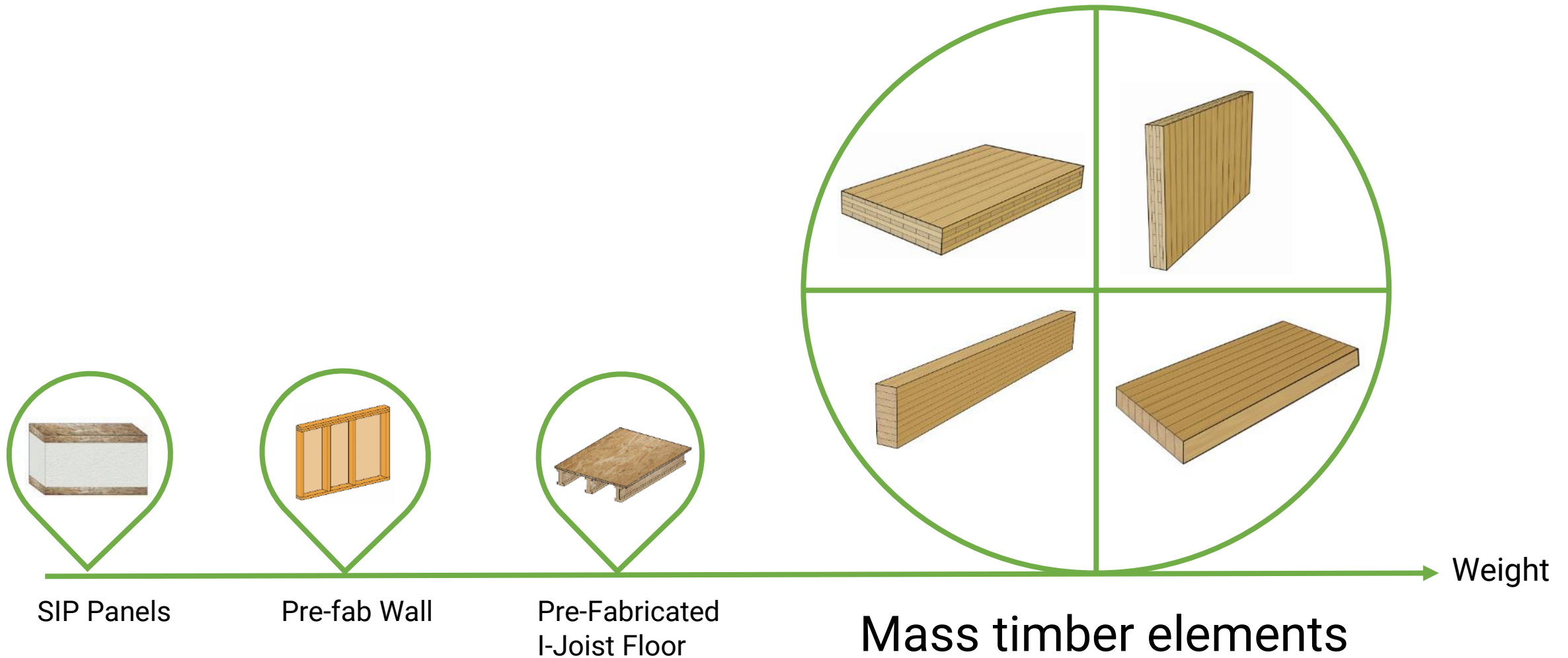


# Lifting Elements

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# Lifting Elements





## What?

Simple lifting solution for various mass timber elements

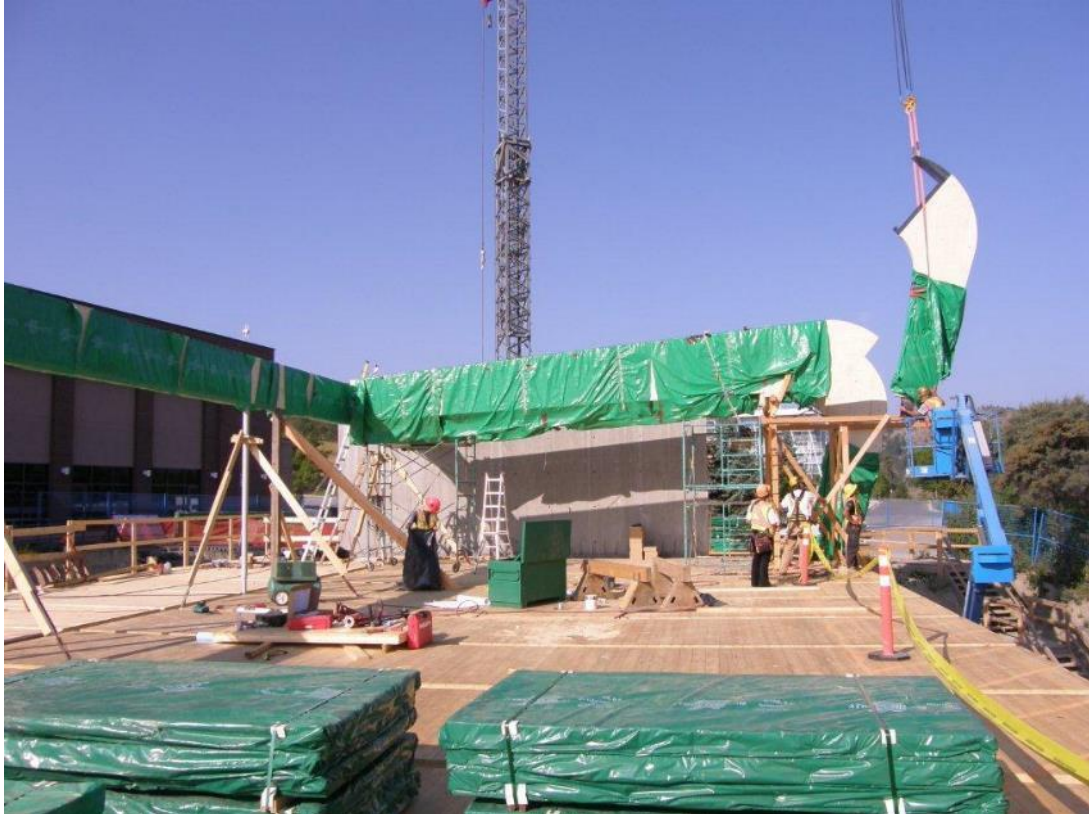
Why?

# Safe Solution

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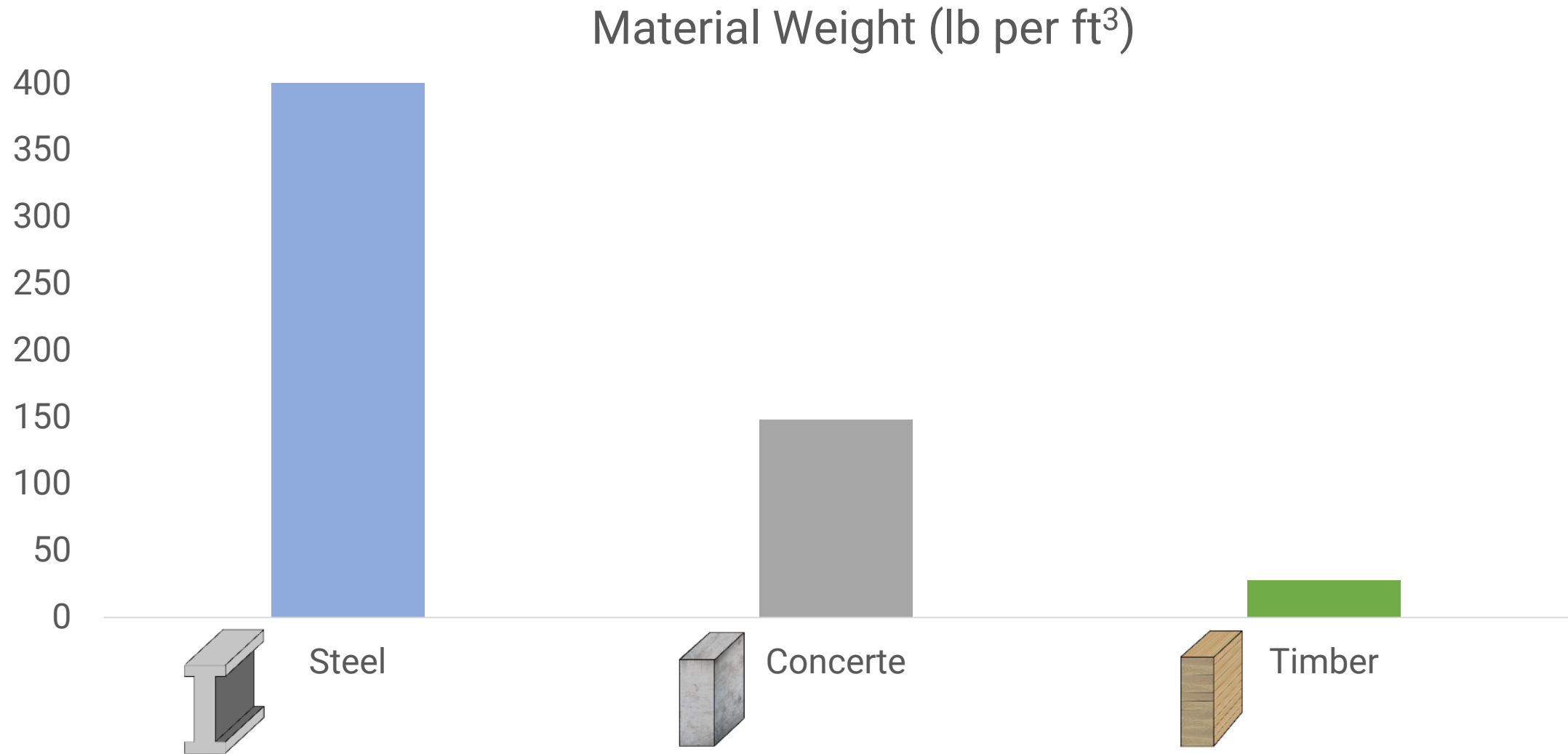
Reference: Alex Schreyer



Reference: Nicola Log Works

# Safe Solution

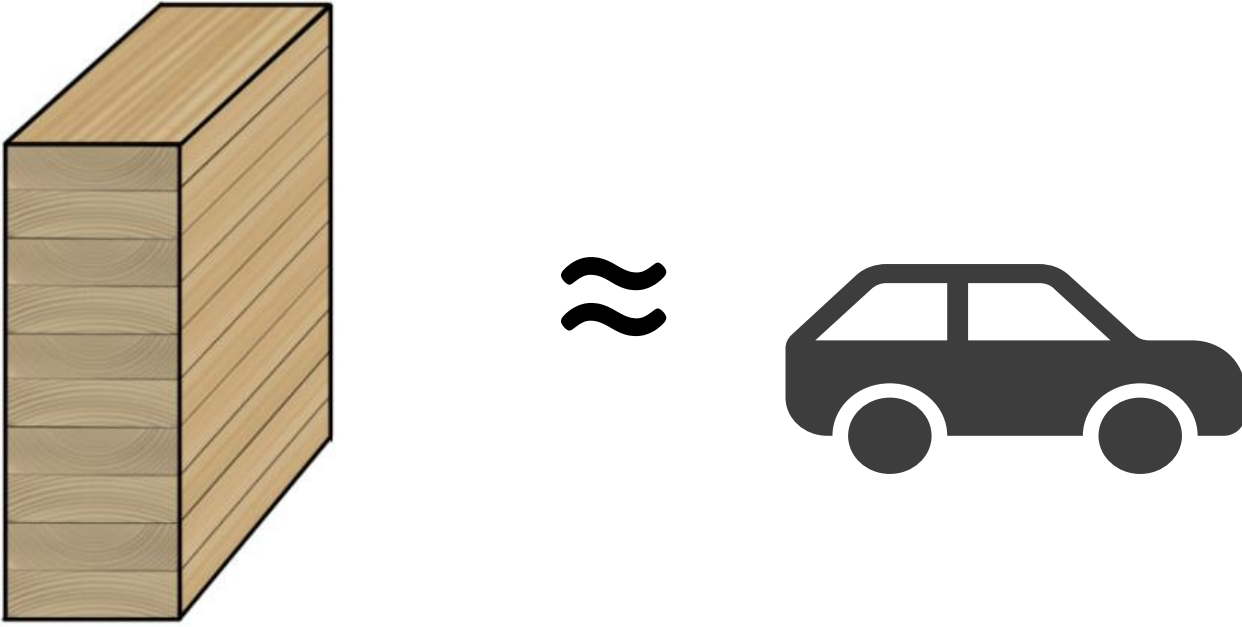
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# Safe Solution

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# Safe Solution

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# Safe Solution

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- Heavy duty system
- Simplicity of installation
- Reduced installation error





# Tested Solution

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- Full scale testing
- Testing done up to ultimate failure of system



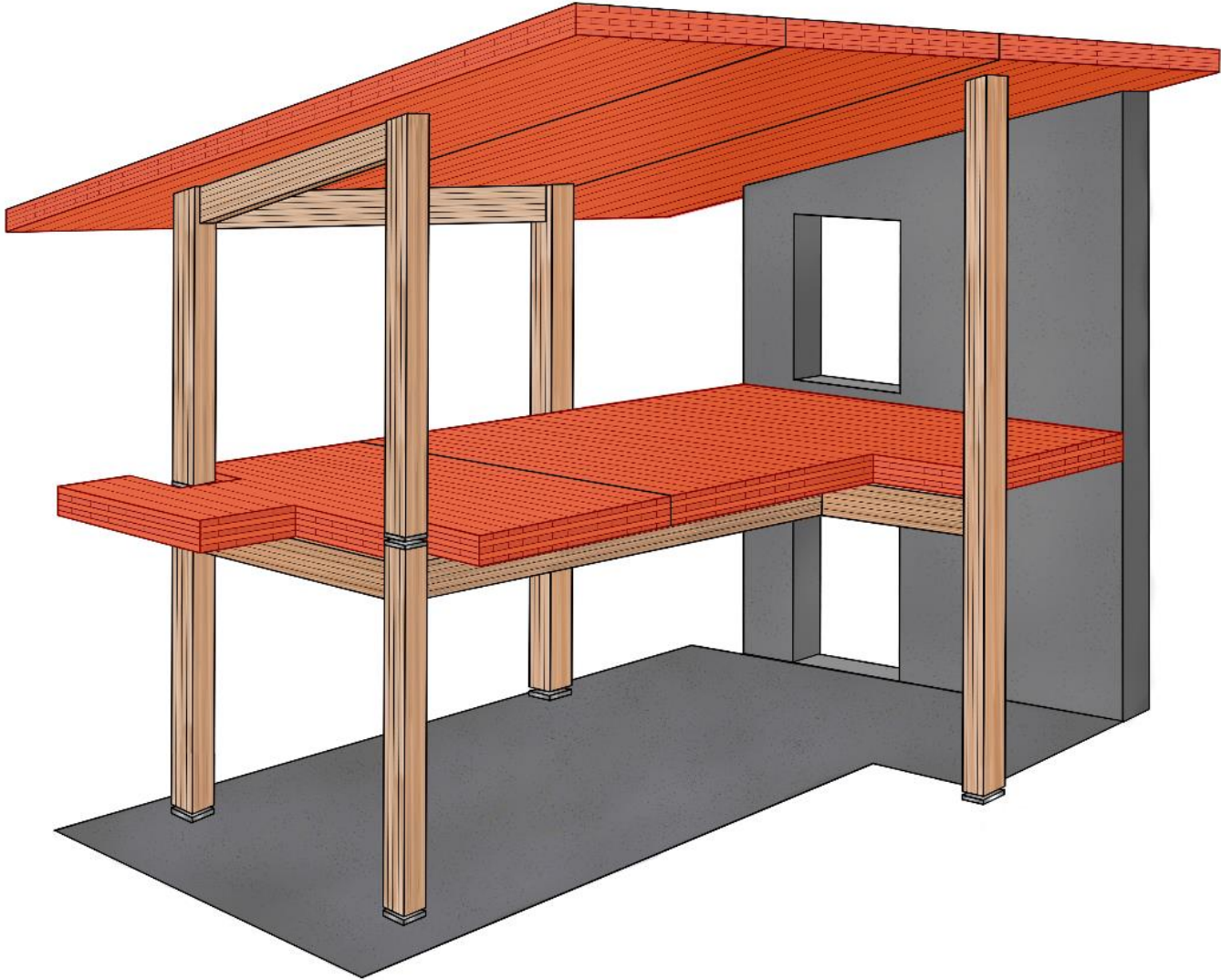
Provided by: Brigham Young University



Provided by: University of Alberta

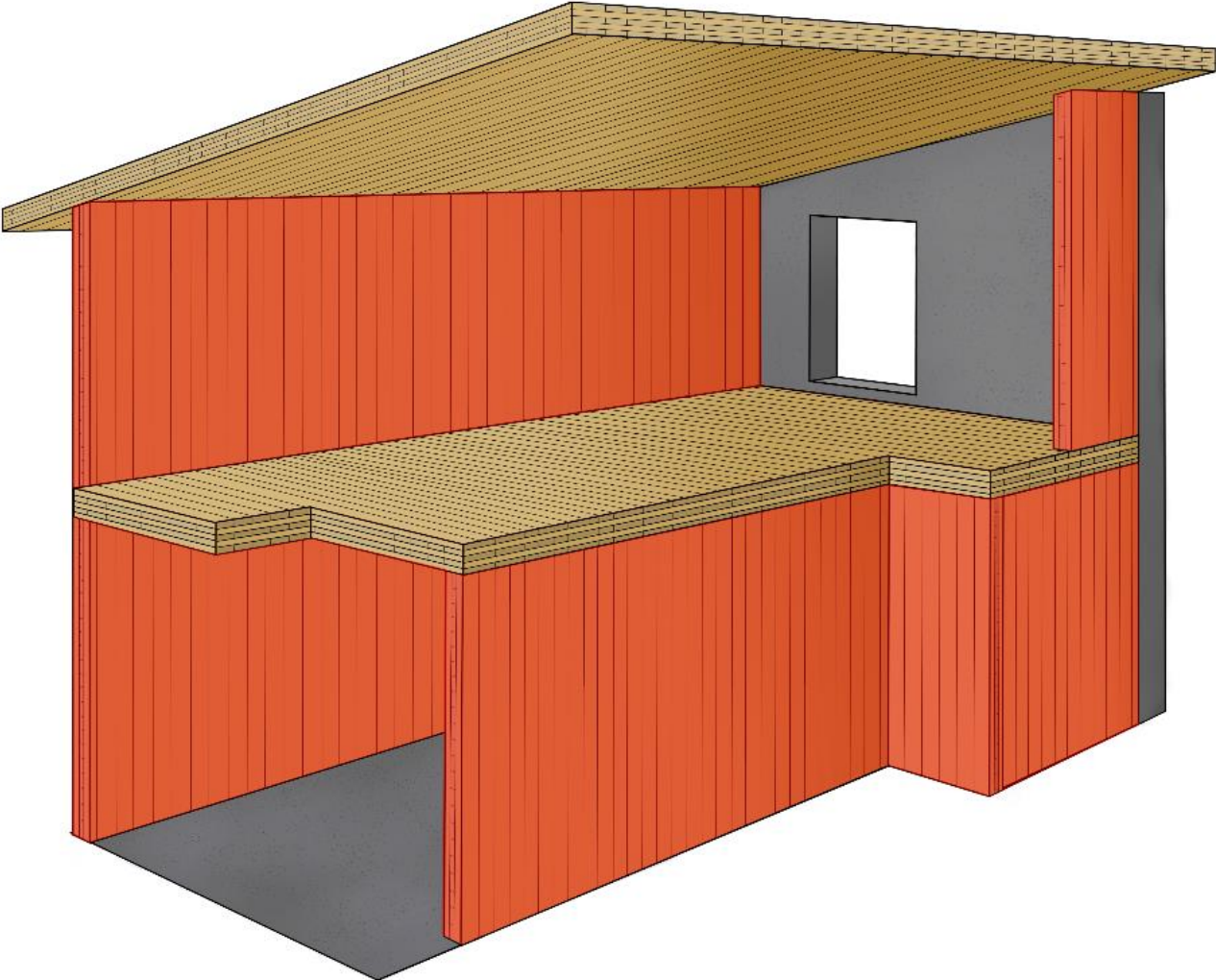
# Versatility

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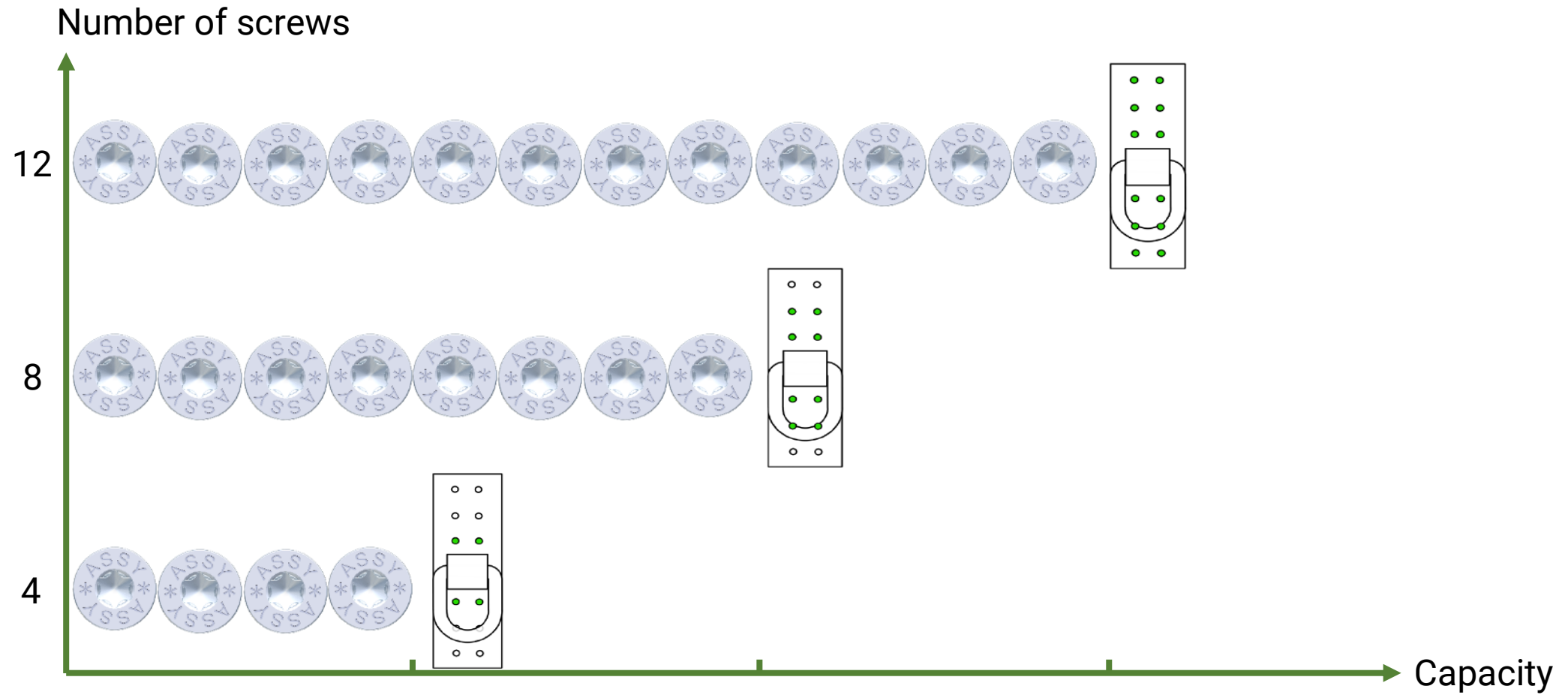


# Versatility

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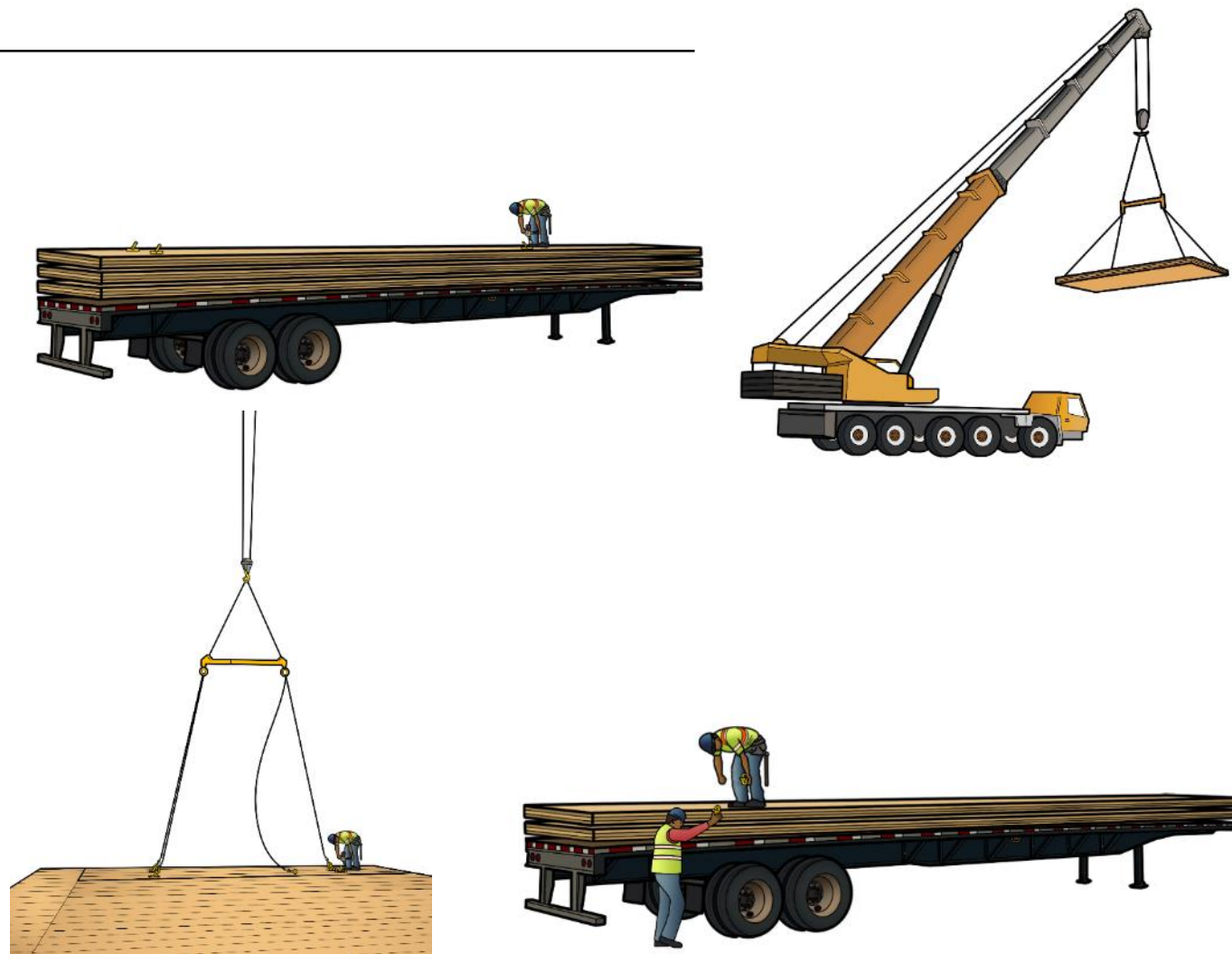
# Versatility



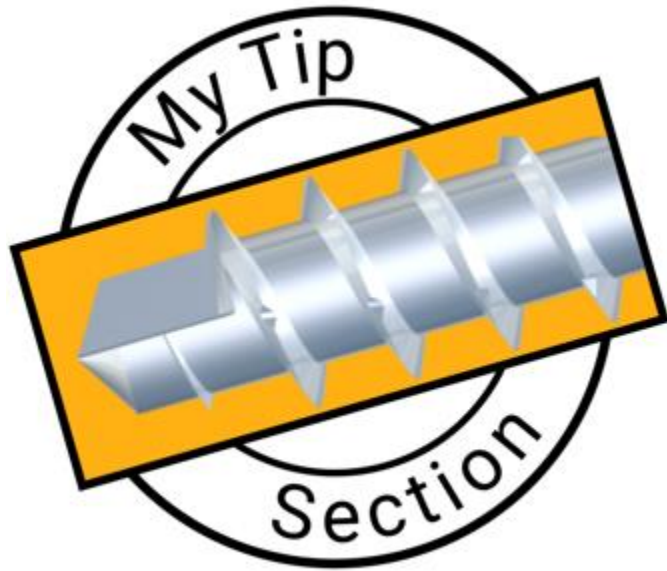
# Workflow Simplicity

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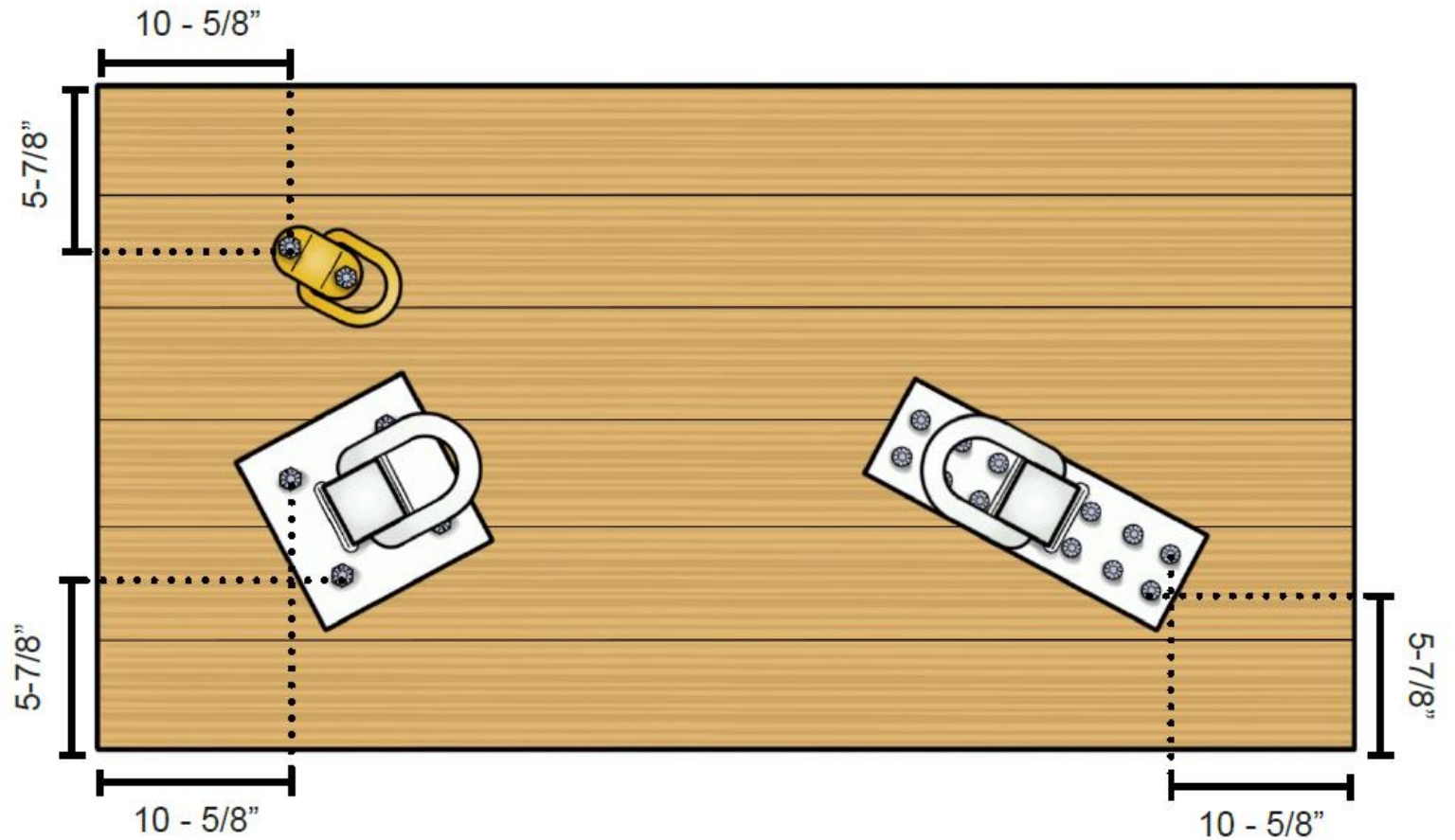
- Easy installation
- Fast installation
- Yoke anchors can be used multiple times



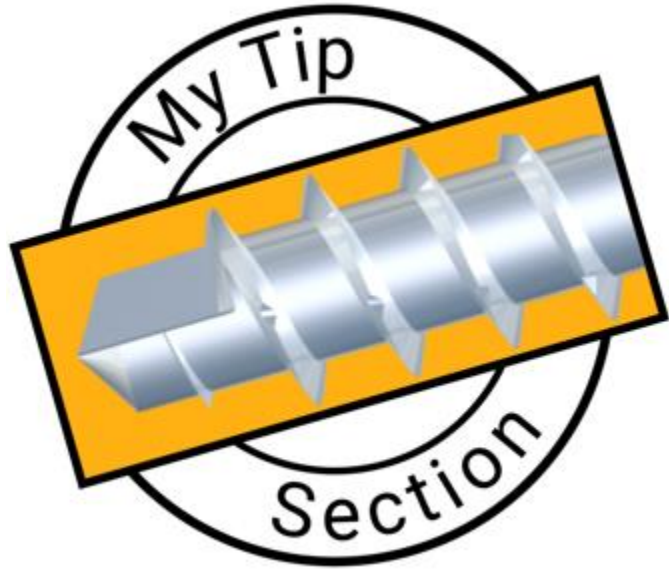




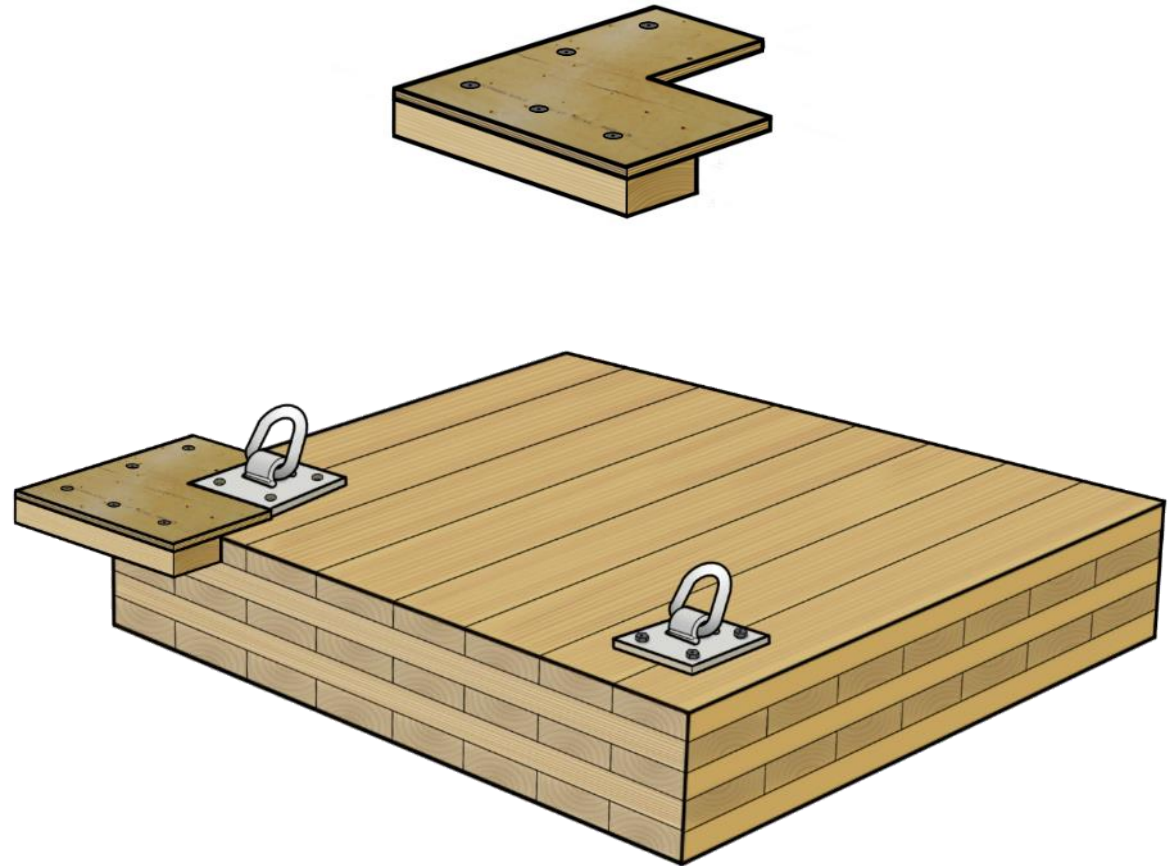
- Always respect the edge distances







- Simple jig for repetitive lifts

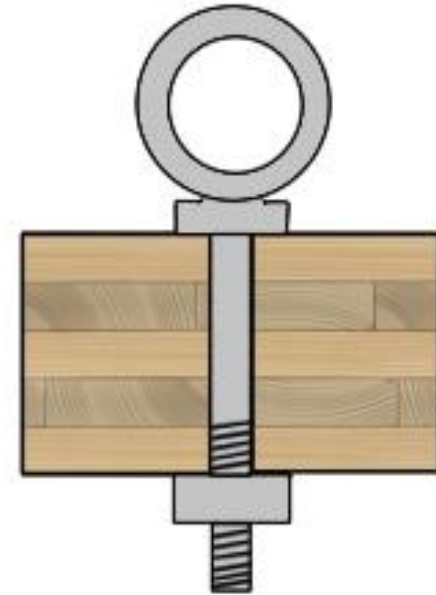


# Contact Lifting System

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Reference: Canadian Pride Log Builders



# Integrated Lifting System

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Reference: FP Innovation's CLT handbook chapter 12



# Cost-Effective

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- Preparation time
- Pre-drilling
- Maintenance

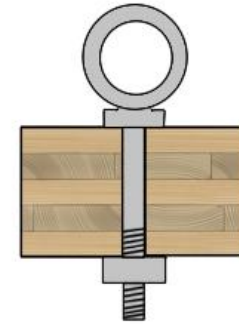
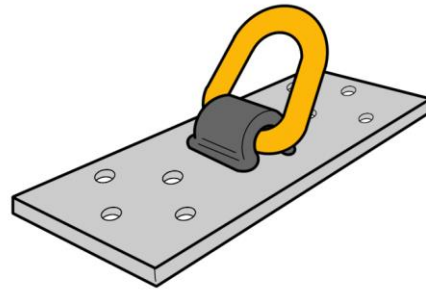


Provided by: Structurelam Mass Timber Corporation

# Cost-Effective

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■ Hardware Cost



Similar cost here



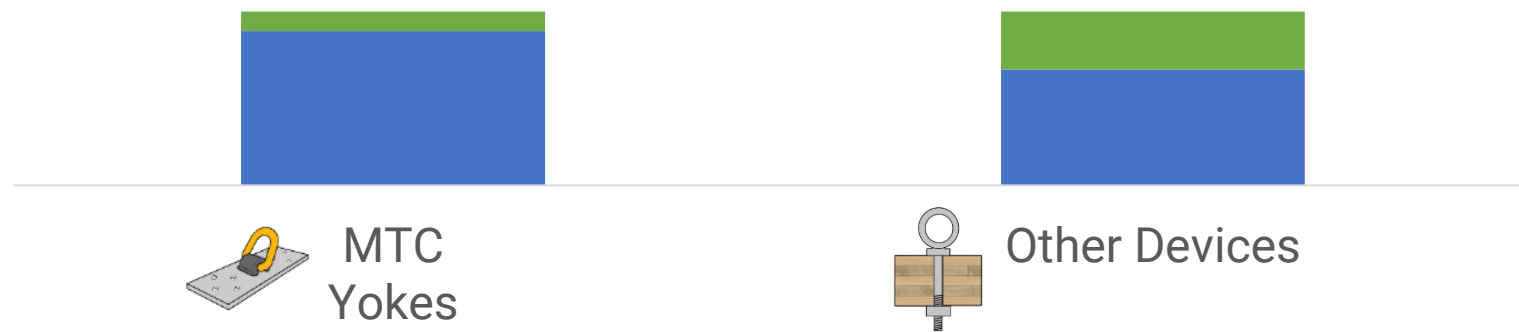
MTC  
Yokes

Other Devices

# Cost-Effective

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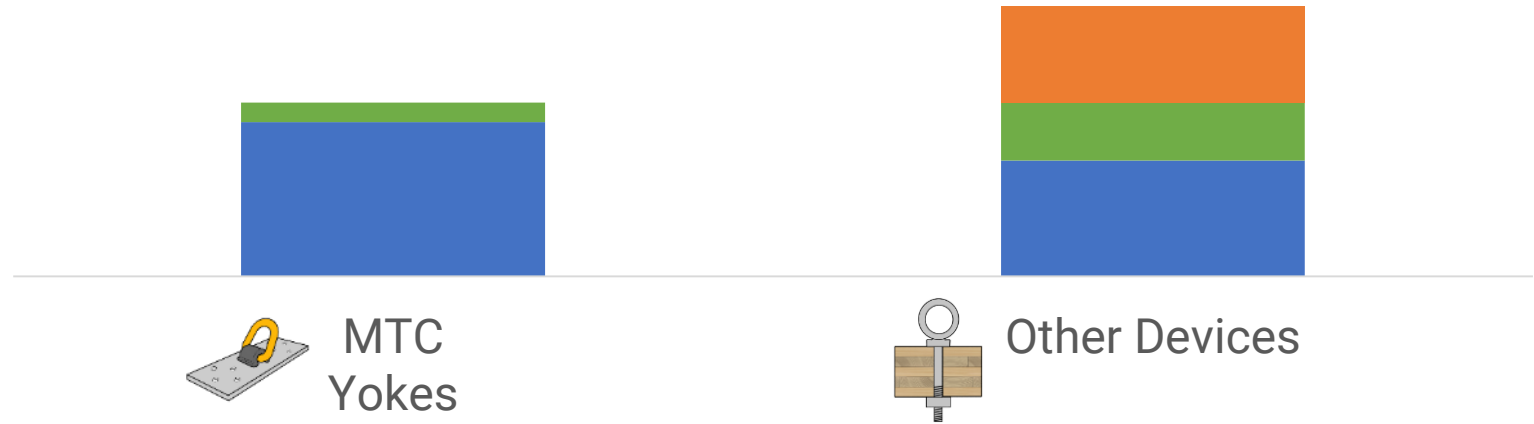
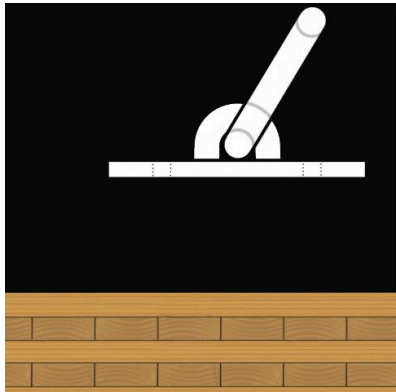
- Preparation
- Hardware Cost



# Cost-Effective

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- Pre-drilling Time
- Preparation
- Hardware Cost

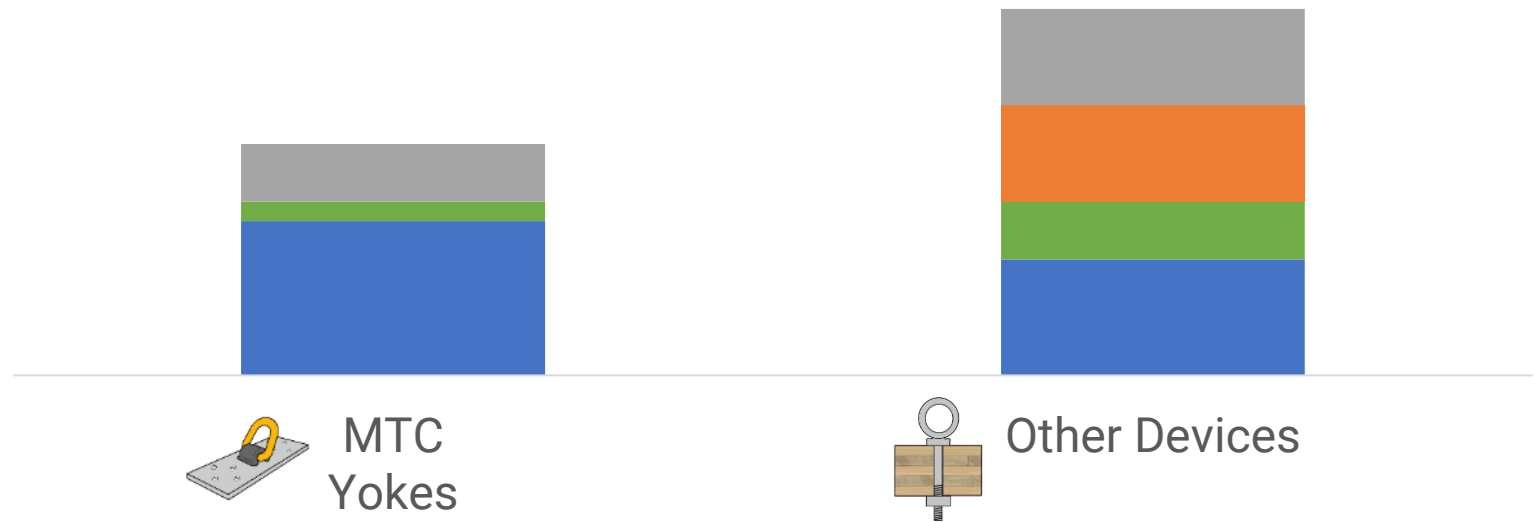
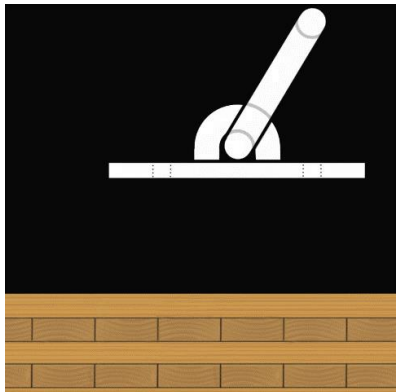




# Cost-Effective

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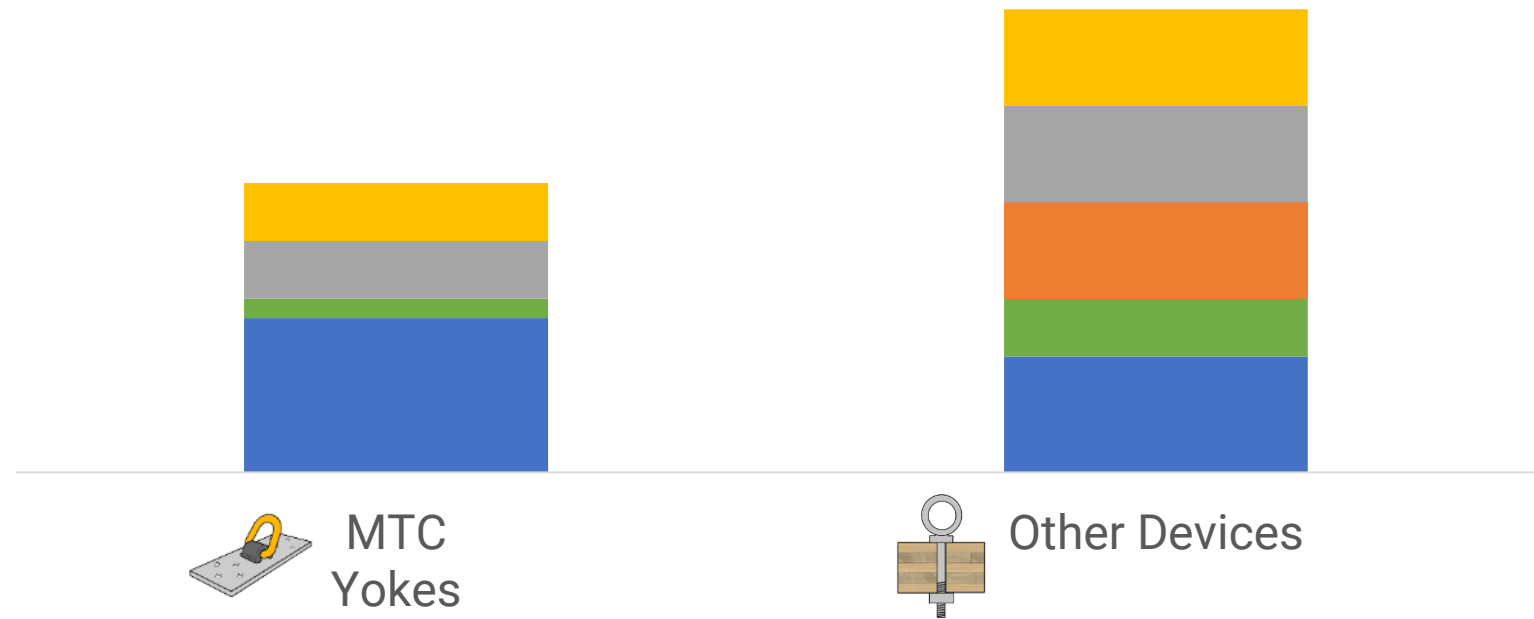
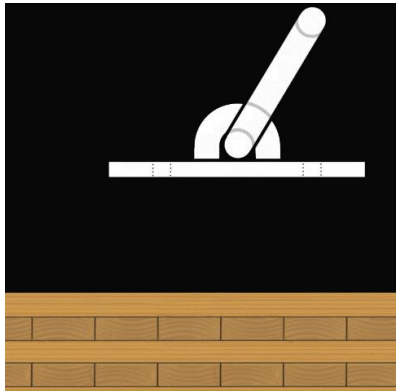
- Installation Time
- Pre-drilling Time
- Preparation
- Hardware Cost



# Cost-Effective

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- Removing Hardware
- Installation Time
- Pre-drilling Time
- Preparation
- Hardware Cost

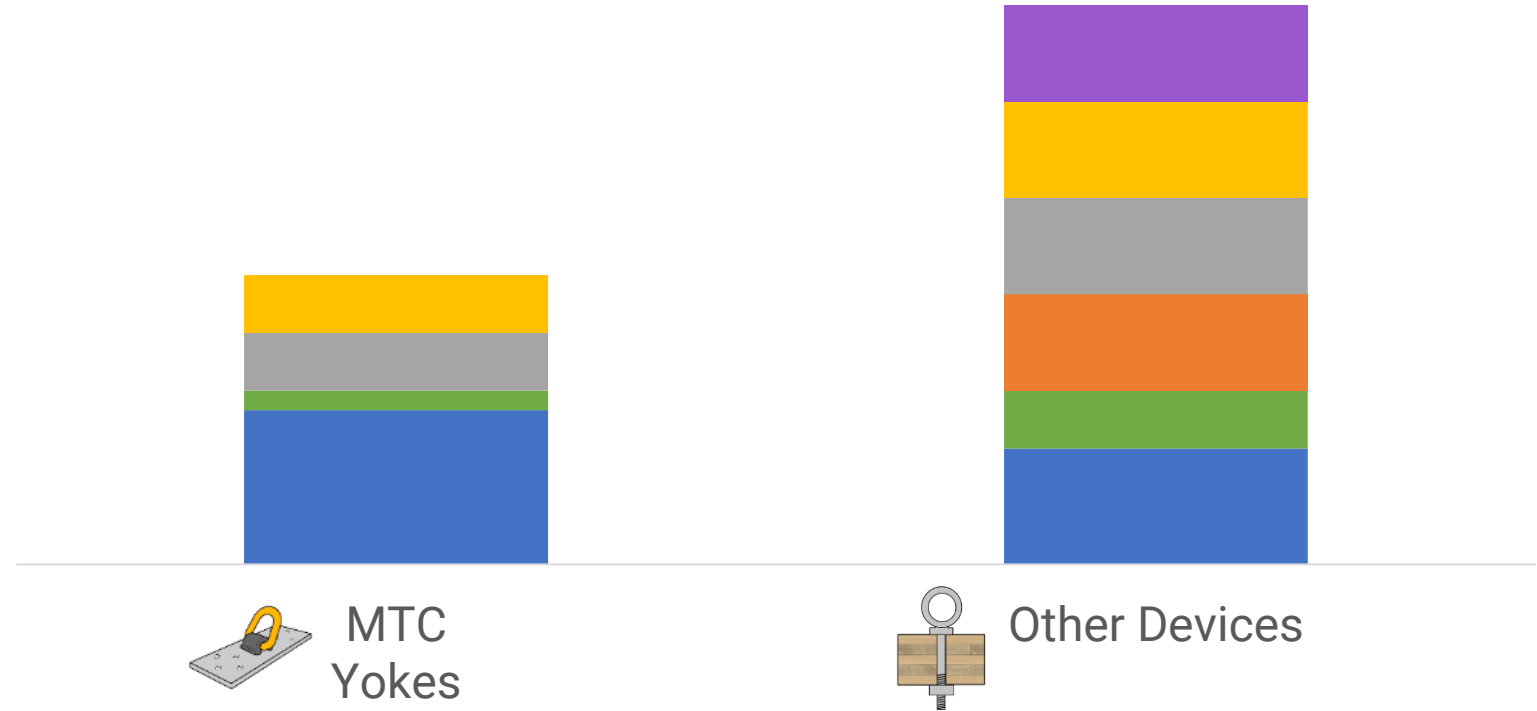


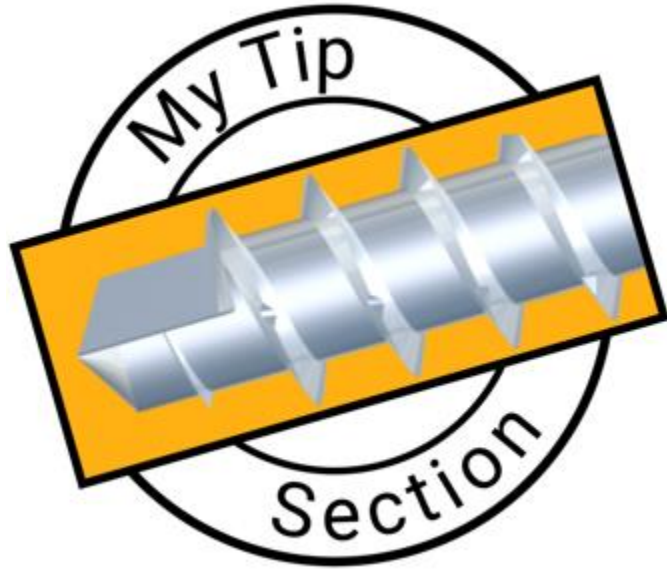
# Cost-Effective

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## Total Cost of Lifting

- Plugging Holes
- Removing Hardware
- Installation Time
- Pre-drilling Time
- Preparation
- Hardware Cost





- Complex beam angles
- Easy installation when elements are stacked side by side



Provided by: Structurelam Mass Timber Corporation

## Why?



Safe

Versatile

Tested

Cost-Effective

# How?

# Rigging Design Guide

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Step 1:

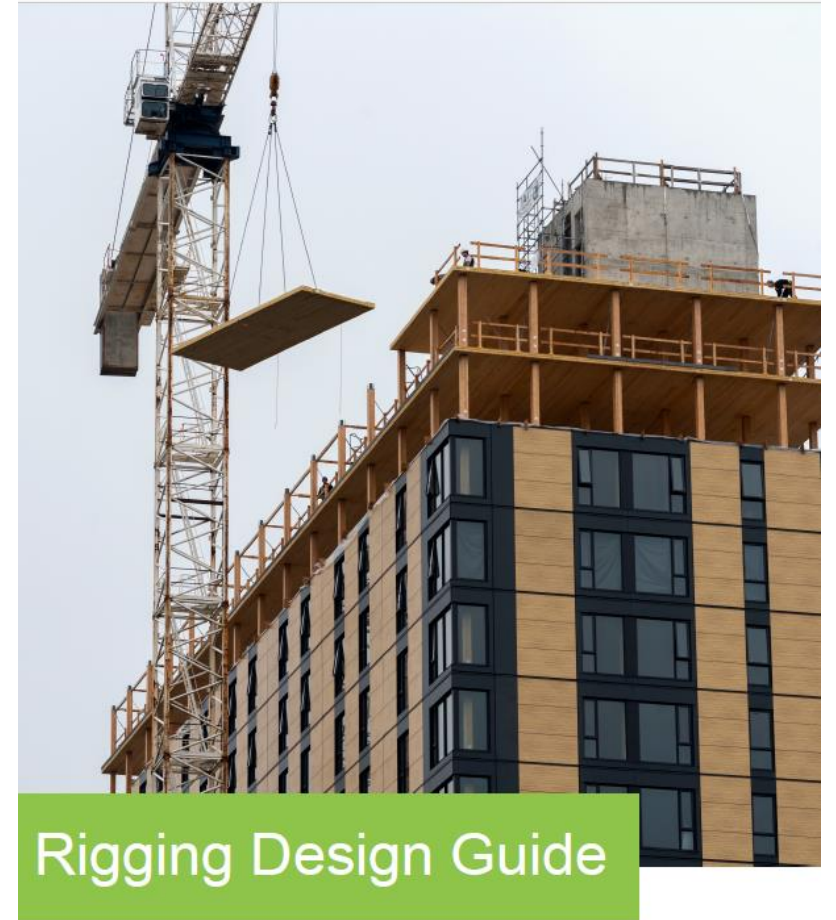
Determine type of rigging and relative density

Step 2:

Determining factored total Load

Step 3:

Anchor system selection



MyTiCon Timber Connectors

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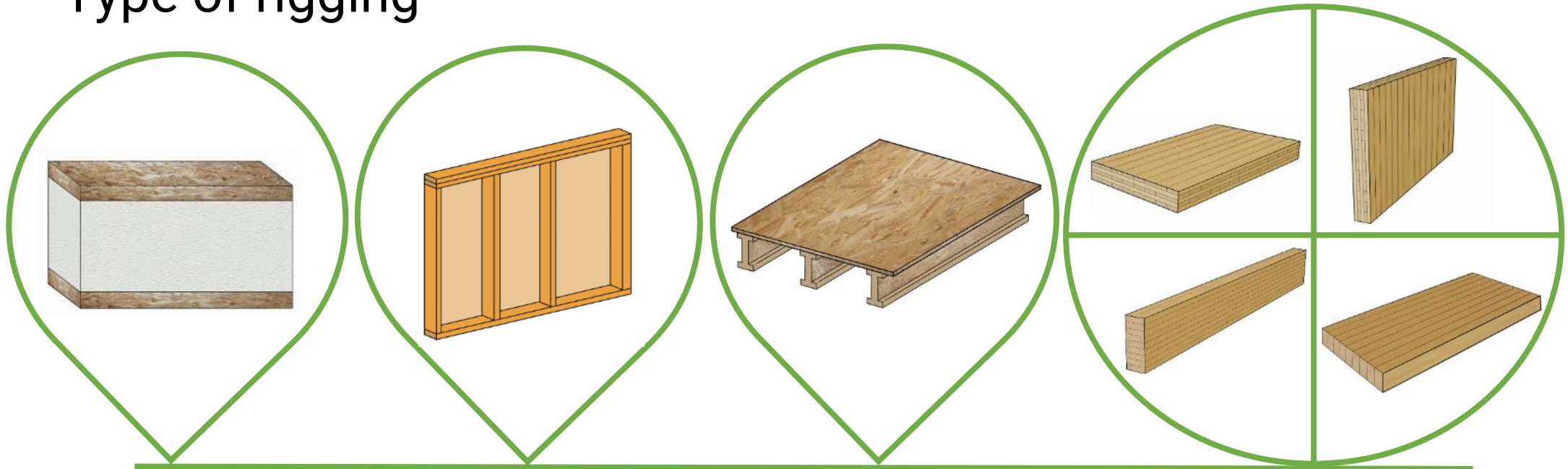




# Step 1: Type of Rigging

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- Assigned relative densities (G)
  - Douglas Fir
  - S-P-F
- Type of rigging



# Rigging Design Guide

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Step 1:

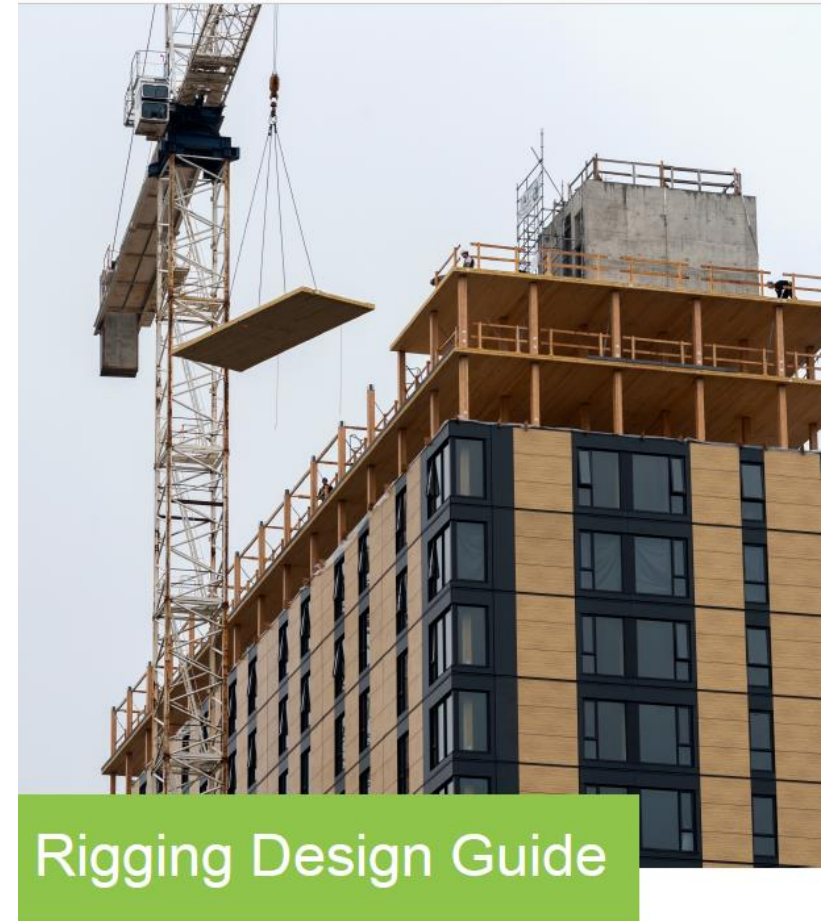
Determine type of rigging and relative density

Step 2:

Determining factored total Load

Step 3:

Anchor system selection



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## Step 2: Factored Total Load

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$$P = p * K_v * K_{OS}$$

# Step 2: Factored Total Load

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$K_V$  : Dynamic acceleration factor



$K_V = 1.1$  to  $1.3$



$K_V = 1.3$  to  $1.4$

# Step 2: Factored Total Load

---



$K_{OS}$  : Optional safety factor

Rigging mat rigging

$$K_{OS} = 1$$

Open space rigging

$$K_{OS} = 1.2$$

Tight space rigging

$$K_{OS} = 1.3$$



# Rigging Design Guide

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Step 1:

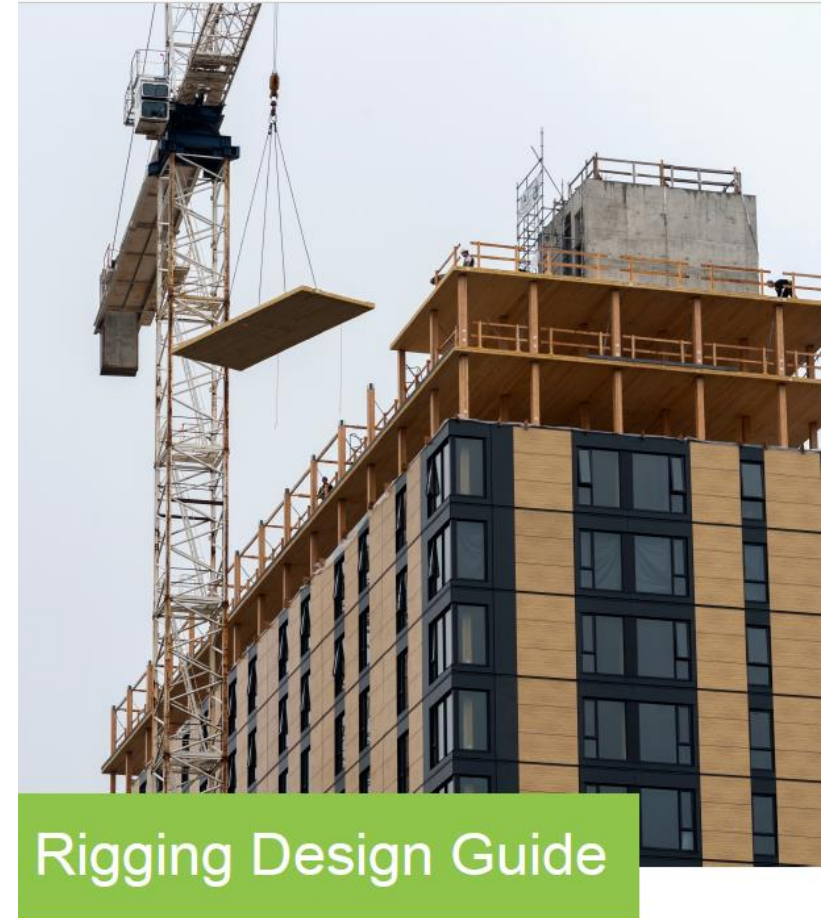
Determine type of rigging and relative density

Step 2:

Determining factored total Load

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# Step 3: Rigging Capacity Per Anchor

## Floor/Roof CLT Panel Rigging

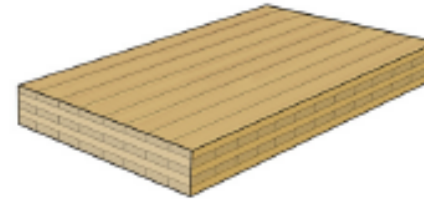



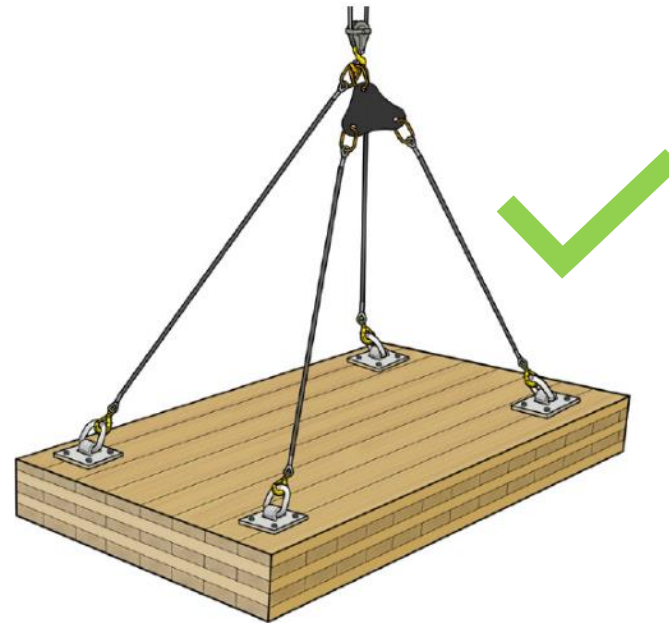
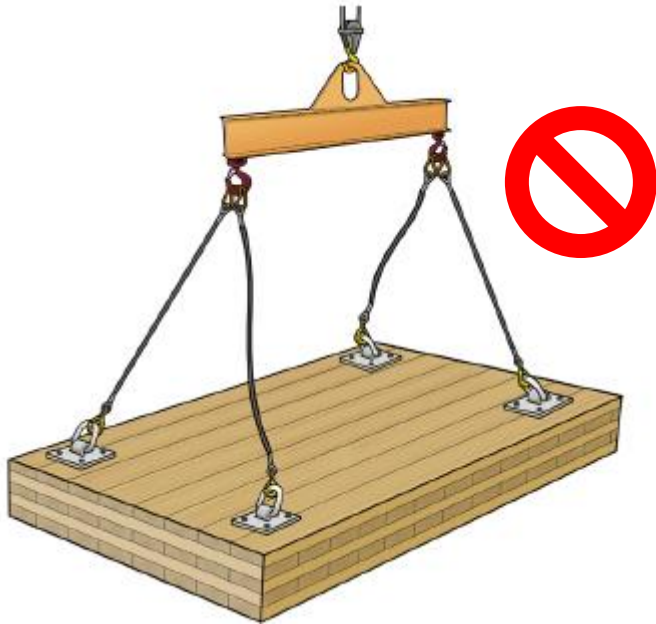
Table 5, Reference Rigging Capacity for Flat CLT Panel Rigging using Yoke 1T (Z)

Rigging Device	Specific Gravity	Min Panel Thickness		Fastener Designation	Reference Rigging Capacity (Z)	
	G	in.	[mm]	in.	lbs.	
Yoke 1T 	0.42	3-1/8"	[78]	Kombi 1/2" x 3-1/8"	1,150	
		4"	[100]		1/2" x 4"	1,150
		4-3/4"	[120]		1/2" x 4-3/4"	1,350
		6-1/4"	[160]		1/2" x 6-1/4"	1,500
	0.49	3-1/8"	[78]	Kombi 1/2" x 3-1/8"	1,400	
		4"	[100]		1/2" x 4"	1,400
		4-3/4"	[120]		1/2" x 4-3/4"	1,450
		6-1/4"	[160]		1/2" x 6-1/4"	1,500

# Load Spreader

---

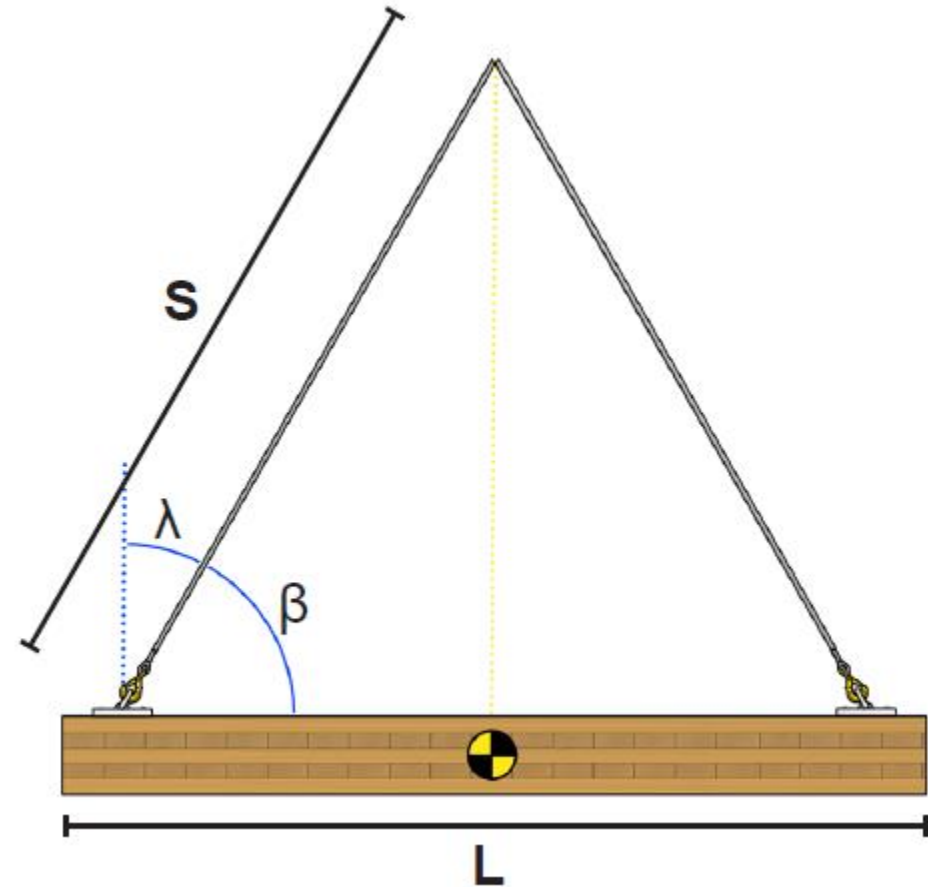
- Avoid slack in slings
- Avoid uneven load sharing



# Sling Angle

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- Sling angle ( $\beta$ )  $\geq 60^\circ$
- If sling length  $>$  panel length



# Examples



Provided by: Oregon Forest Resource Institute



Provided by: Structurelam Mass Timber Corporation



# Example – Floor/Roof

---

CLT panel dimension                      10' x 40'

---

Panel density                                      0.42 (SPF)

---

Number of plies                                      5-ply



Provided by: Oregon Forest Resource Institute

# Example – Floor/Roof

---

Open space rigging  $K_{OS} = 1.2$

---

Mobile crane  $K_V = 1.4$

---

Sling angle  $\geq 60^\circ$   $R_{AR} = 1.0$

---

Using load spreader  $R_{LS} = 1.0$

---

Standard term loading  $R_D = 1.0$



Provided by: Oregon Forest Resource Institute

# Example-Floor/Roof

---

Determine factored total load:



$$P = p * K_V * K_{OS}$$

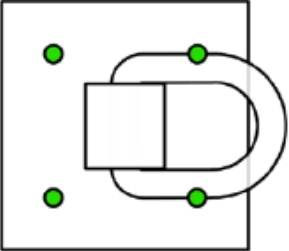
$$P = (6279 \text{ lb}) * (1.4) * (1.2)$$

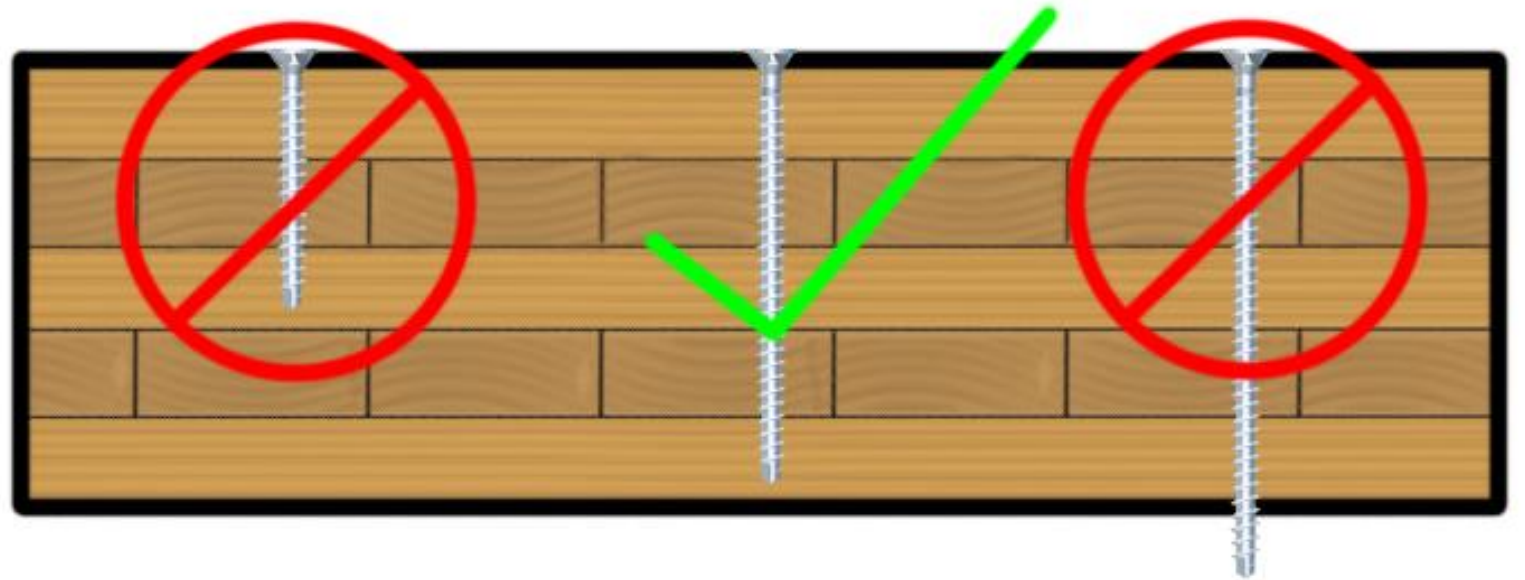
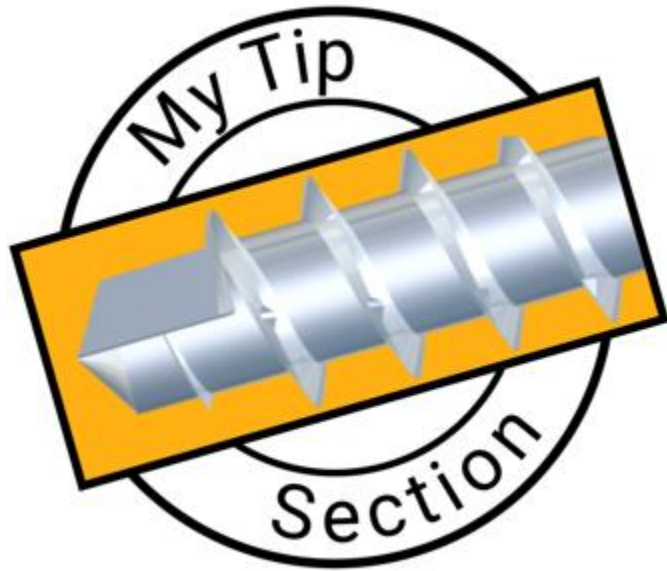
$$\mathbf{P = 10,500 \text{ lb}}$$

$$\frac{10,500}{4} = \mathbf{2600 \text{ lb}}$$

# Example-Floor/Roof



Rigging Device	Specific Gravity	Min Panel Thickness		Fastener Designation	Reference Rigging Capacity (Z)	
	G	in.	[mm]	in.	lbs.	
Yoke 5T  	0.42	3-1/8"	[78]	Kombi	1/2" x 3-1/8"	2,000
		4"	[100]		1/2" x 4"	2,000
		4-3/4"	[120]		1/2" x 4-3/4"	2,800
		6-1/4"	[160]		1/2" x 6-1/4"	5,000
	0.49	3-1/8"	[78]	Kombi	1/2" x 3-1/8"	2,200
		4"	[100]		1/2" x 4"	2,200
		4-3/4"	[120]		1/2" x 4-3/4"	3,100
		6-1/4"	[160]		1/2" x 6-1/4"	5,500

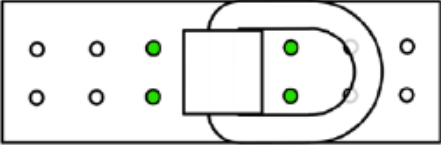


Choosing the right fastener  
embedment length is important



# Example-Floor/Roof



Rigging Device	Specific Gravity	Min Panel Thickness		Fastener Designation		Reference Rigging Capacity (Z)
	G	in.	[mm]	in.		lbs.
Yoke XL ; 4 screws 	0.42	3-1/8"	[78]	Ecofast	3/8" x 3-1/8"	1,600
		4"	[100]	VG CSK	3/8" x 4"	2,500
		6-1/4"	[160]		3/8" x 6-1/4"	4,500
	0.49	3-1/8"	[78]	Ecofast	3/8" x 3-1/8"	1,800
		4"	[100]	VG CSK	3/8" x 4"	2,800
		6-1/4"	[160]		3/8" x 6-1/4"	5,000

# Example - Summary

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- Panel size: 10' x 40'
- Factored load: 10,500 lb



# Examples



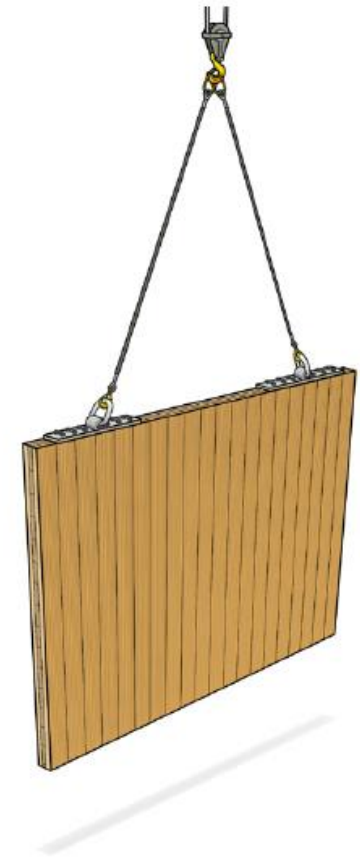
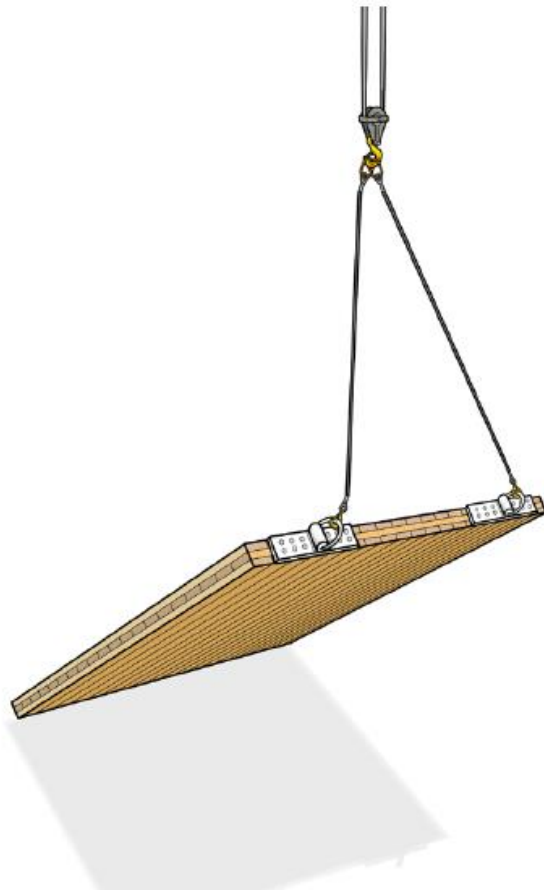
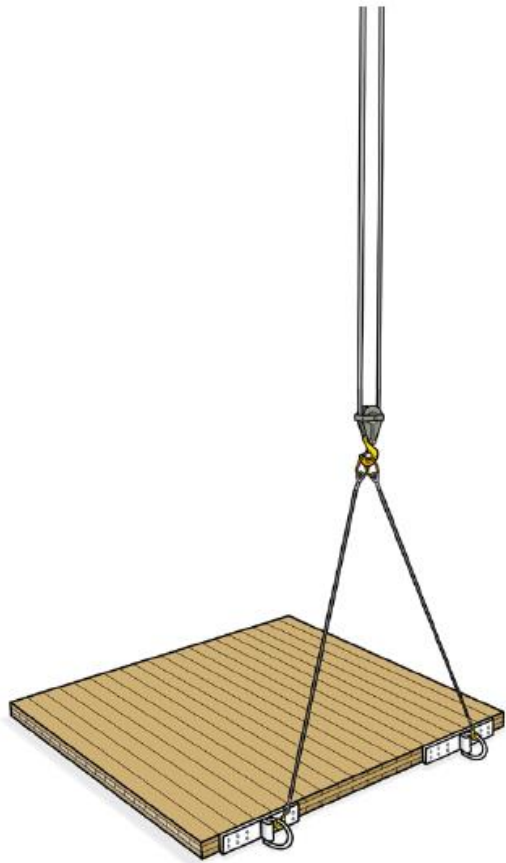
Provided by: Oregon Forest Resource Institute



Provided by: Structurelam Mass Timber Corporation

# Example-Wall

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# Example-Wall

---



Provided by: Dr. John Judd



# Example-Wall

---

CLT panel dimension                      8' x 18'

---

Panel density                                      0.42 (SPF)

---

Number of plies                                      5-ply



Provided by: Structurelam Mass Timber Corporation

# Example – Floor/Roof

Open space rigging  $K_{OS} = 1.2$

---

Mobile crane  $K_V = 1.4$

---

Sling angle  $\geq 60^\circ$   $R_{AR} = 1.0$

---

Using load spreader  $R_{LS} = 1.0$

---

Standard term loading  $R_D = 1.0$



Provided by: Structurelam Mass Timber Corporation

# Example-Wall

---

Determine factored total load:



$$P = p * K_V * K_{OS}$$

$$P = (2000 \text{ lb}) * (1.4) * (1.2)$$

$$P = 3360 \text{ lb}$$

## Example-Wall

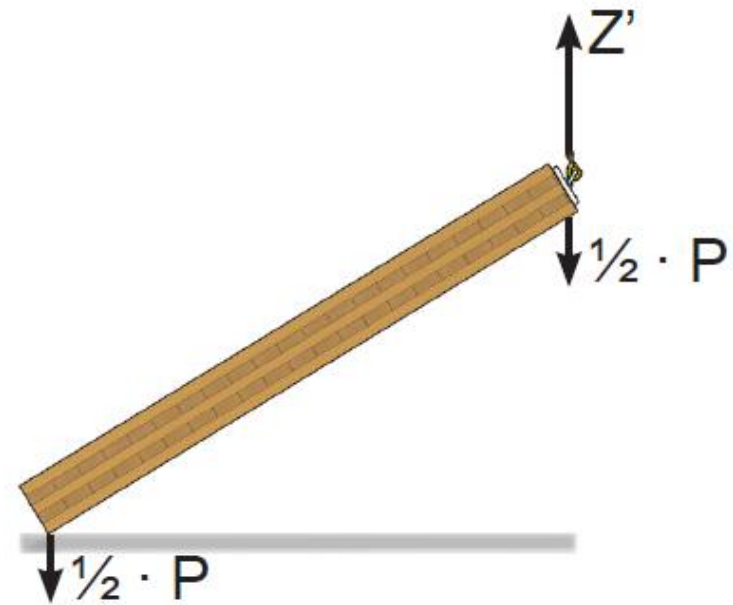
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Total Capacity required:

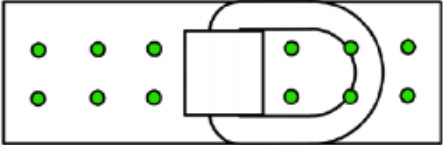
$$\frac{3360}{2} = 1680 \text{ lb}$$

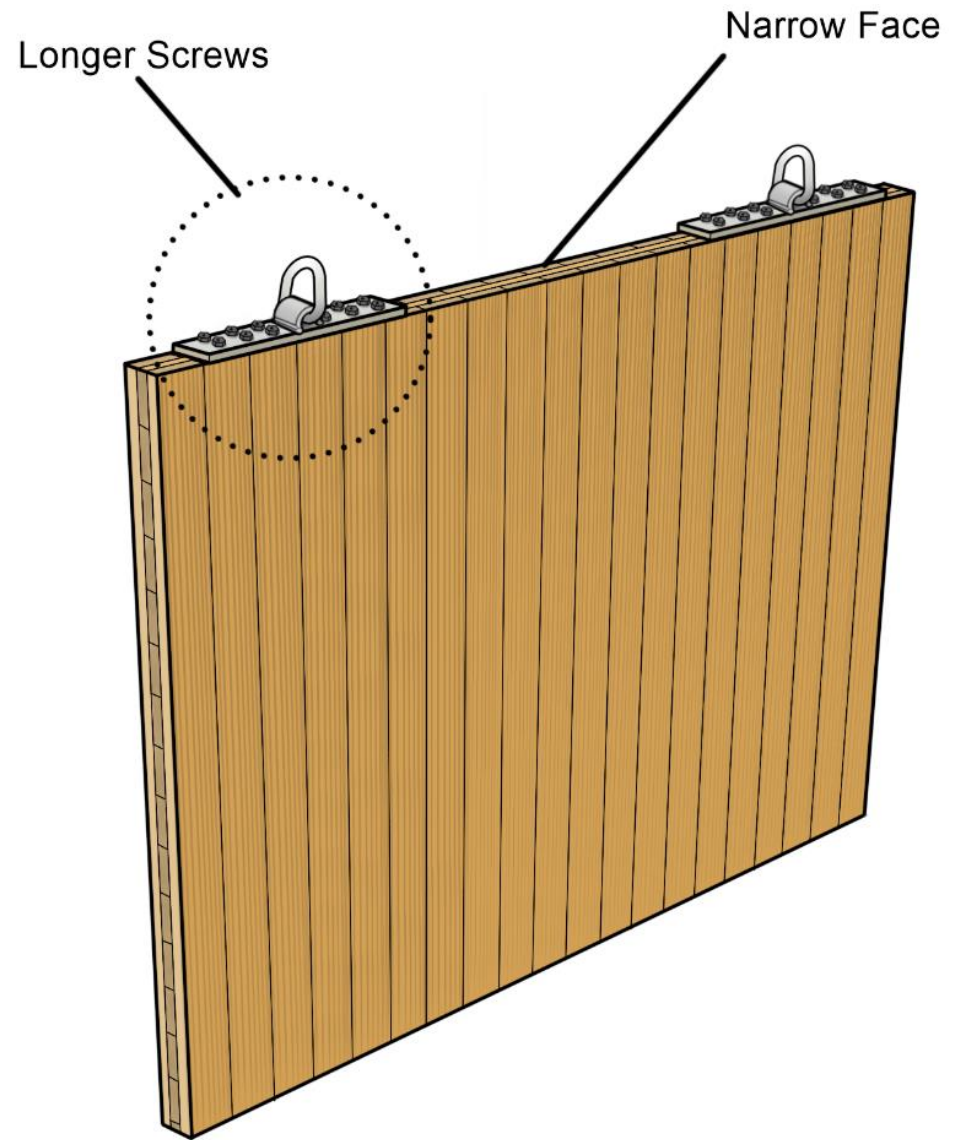
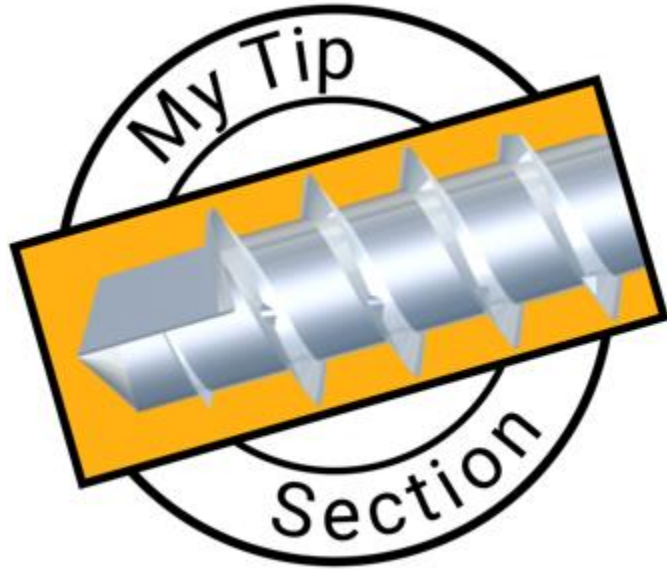
For one connector:

$$\frac{1680}{2} = 840 \text{ lb}$$



# Example-Wall

Rigging Device	Specific Gravity	Min Panel Thickness		Fastener Designation		Reference Rigging Capacity (Z)
	G	in.	[mm]	in.		lbs.
Yoke XL ; 12 screws 	0.42	3-1/2"	[87]	VG CSK	3/8" x 6-1/4"	<b>1,000</b>
	0.49	3-1/2"	[87]	VG CSL	3/8" x 6-1/4"	<b>1,100</b>



- Longer screws in the narrow face
- For wall panels

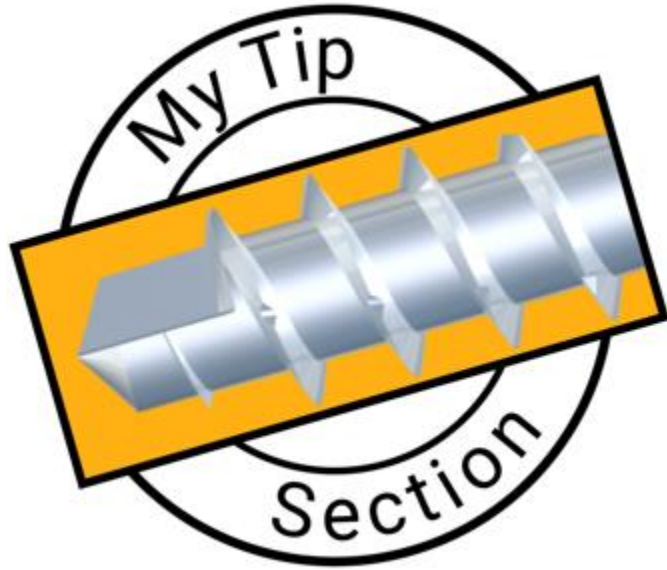


# Example - Summary

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- Panel size: 8' x 18'
- Factored load: 3400 lb

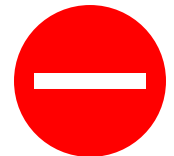




1. Lifting plans must be approved by a licensed design professional



**The fasteners used for panel rigging should only be used once!**



# Objectives of the Webinar

- **What?**  
Simple lifting Solution
- **Why?**  
Safe and tested Solution
- **How?**  
Design Guide

# What is the Yoke Anchoring System

- Unique MyTiCon anchoring system
- Simple to use



# Why the Yoke Anchoring System?

- Safe and heavy duty
- Versatile
- Tested
- Cost-effective



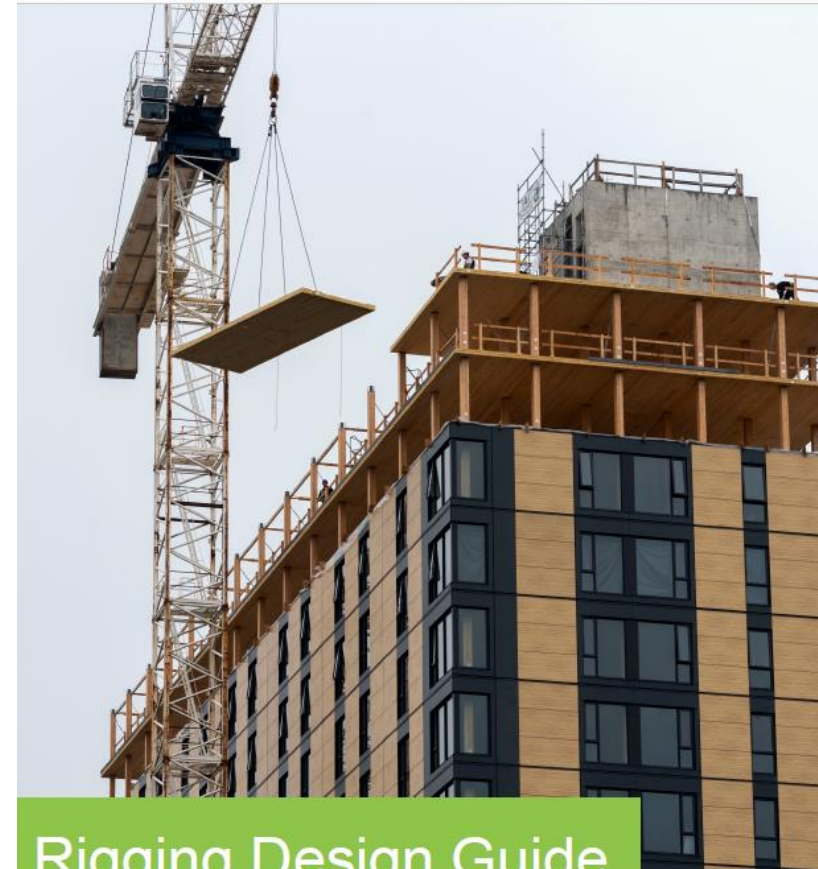


# How to use the Yoke Anchoring System?

## The Design Guide Provides

- Step-by-step
- Detailed
- Adaptable

## Instructions



Rigging Design Guide



MyTiCon Timber Connectors

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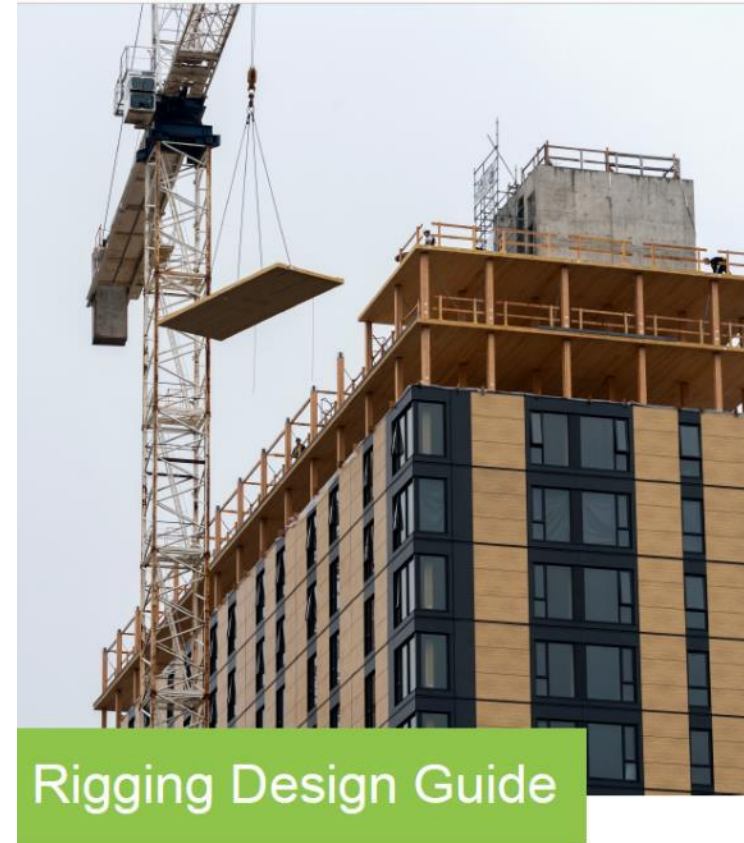
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# Questions?

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- [www.myticon.com](http://www.myticon.com)
- Technical Support
- [support@myticon.com](mailto:support@myticon.com)



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# Heavy and Mass Timber Handbook

