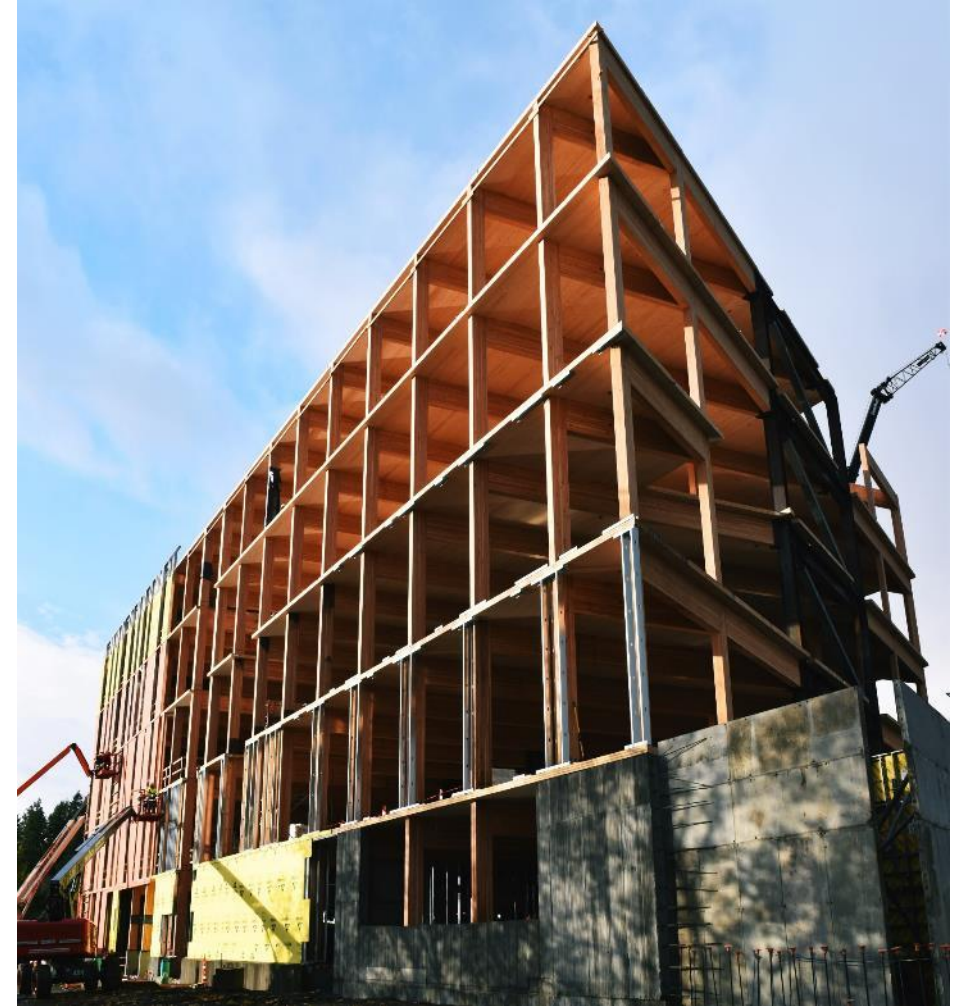


## Self-Drilling Dowel

Wednesday February 20 @10:00 PST | 1:00PM EST

# Self-Drilling Dowel Webinar



# Self-Drilling Dowel Webinar



# Self-Drilling Dowel Webinar

## Your Host

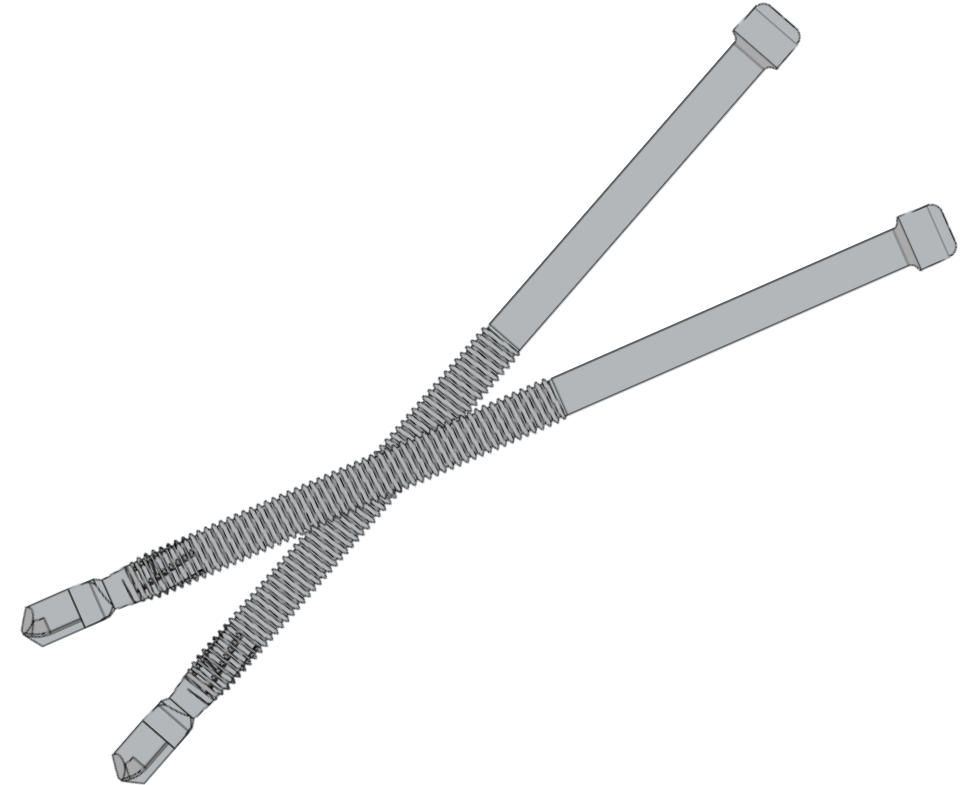
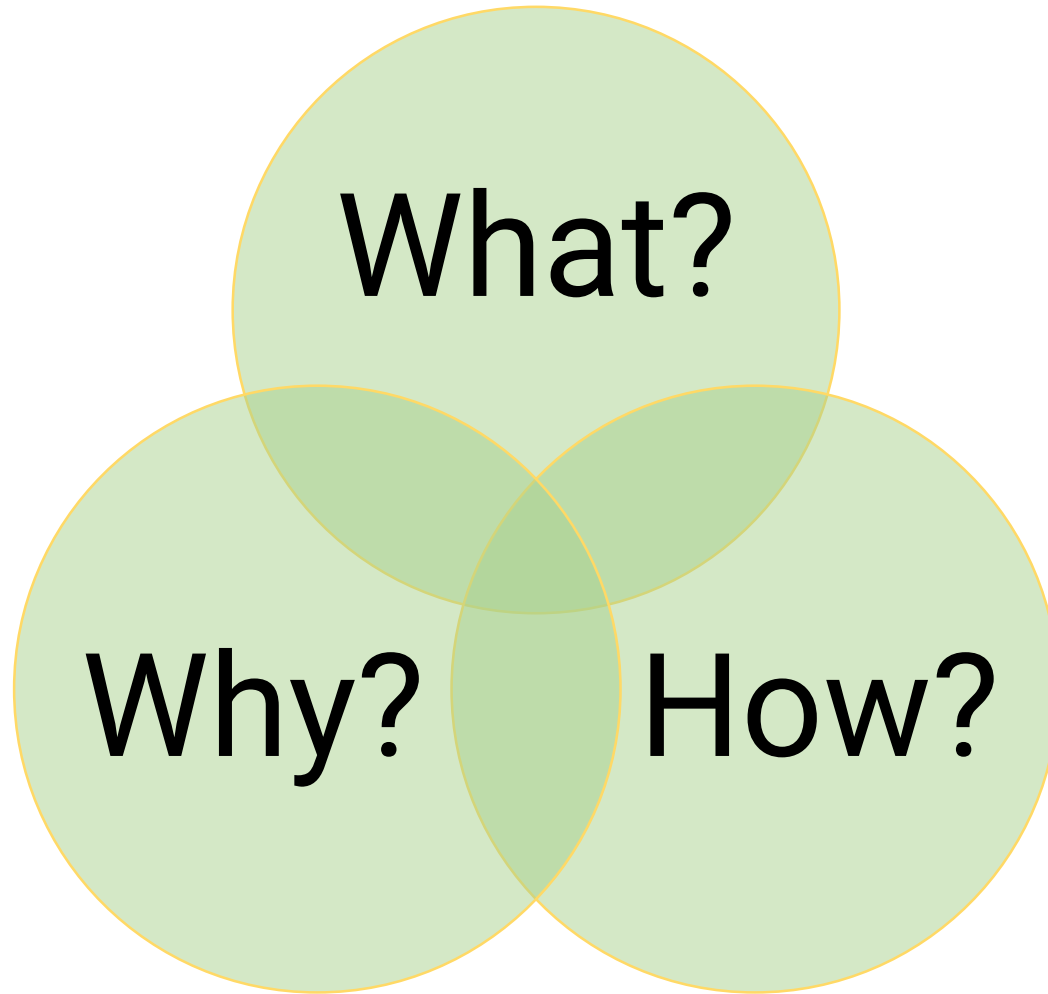
- Dominique Robitaille, EIT

## MyTiCon

- Specialized Mass Timber Connection System Supplier

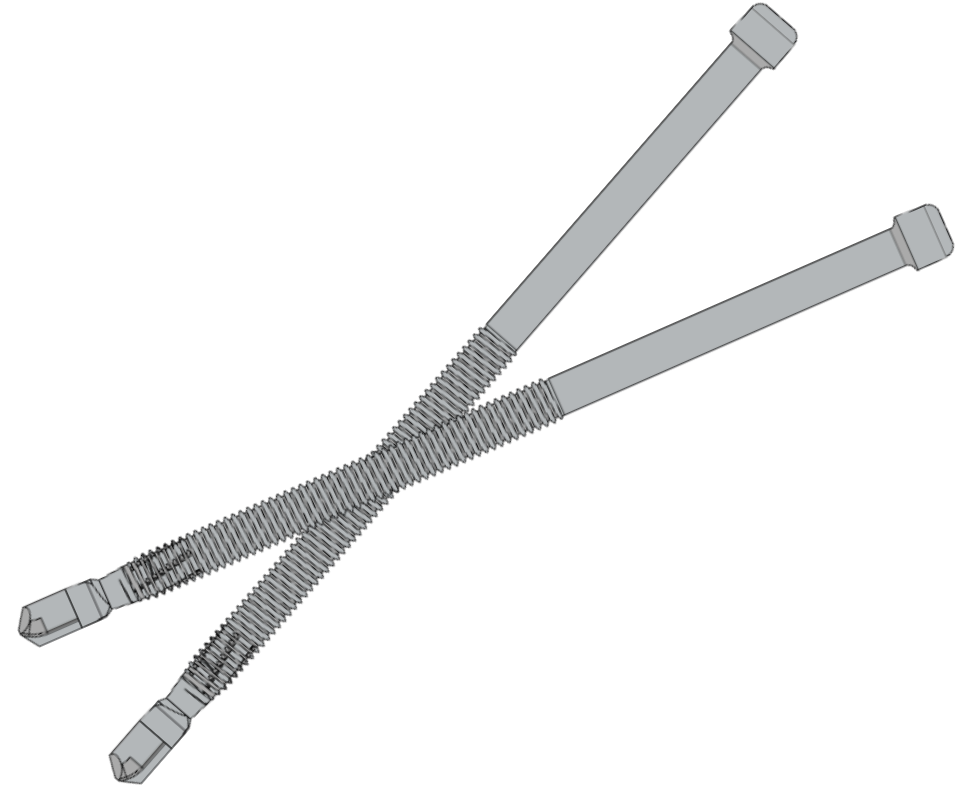


# Self-Drilling Dowel Webinar



# Self-Drilling Dowel Webinar

- What? - Product Presentation
  - SDD Self-Drilling Dowel
  - Self-Drilling Tip
  - Continuous Thread
  - Concealable Head
  - Hardened Steel



# Product Presentation

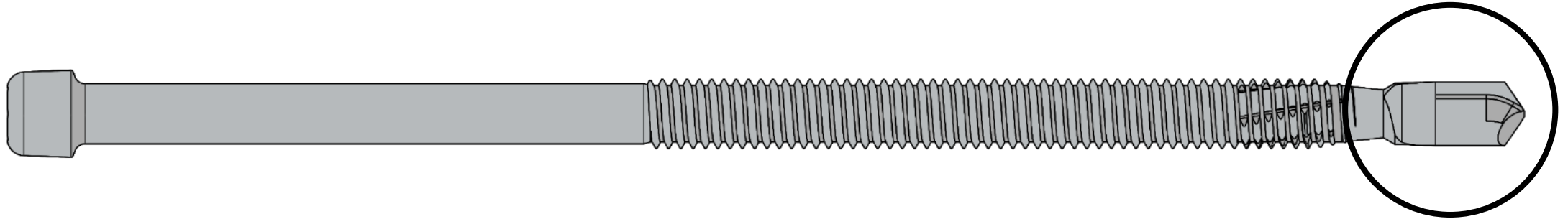
---

- SDD Self-Drilling Dowel
- Fastener for Internal Knife Plate Connection



# Product Presentation

---

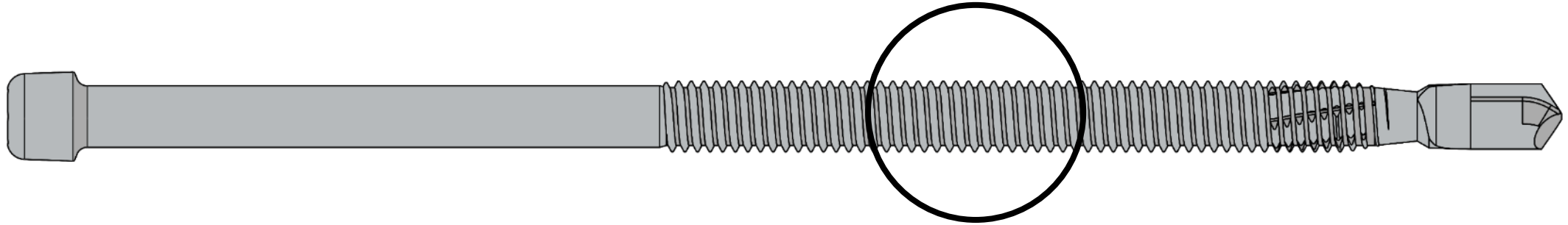


## Self-Drilling Tip

- Enables fast and simple installation
- Eliminates the need for pre-drilling in:
  - Wood
  - Aluminum
  - Thin steel plate ( $< 1/8''$ )

# Product Presentation

---

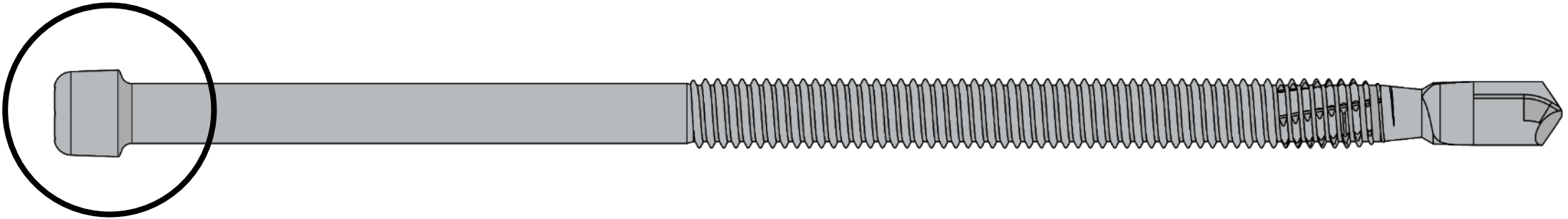


## Continuous Thread

- Helps avoid slippage of the dowel
- Helps drive the dowel in
- Can be installed with cordless drills
- Low installation torque

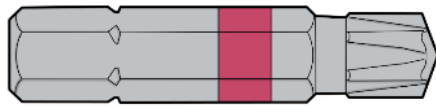
# Product Presentation

---



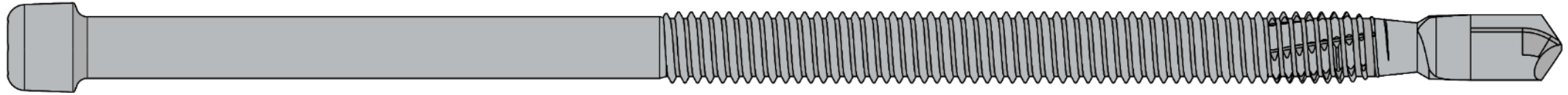
## Concealable Head

- Design to be used with AW 40 bits



# Product Presentation

---



## Hardened Steel

- Resulting in higher yield point
- But still ductile

## Yield Strength of Fastener in Bending:

- SDD                      126,000 psi
- Competitor            57,000 psi

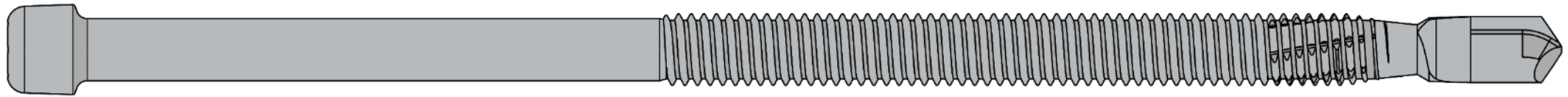
## What is the SDD?

---

### Dowels for Internal Knife Plates

Featuring:

- Self-Drilling Tip
- Continuous Thread
- Concealable Head
- Hardened Steel



# Self-Drilling Dowel Webinar

- Why?
  - Simple Installation of Concealed Connection
  - Adaptable
  - Tested Fastener



# Simple Installation

---

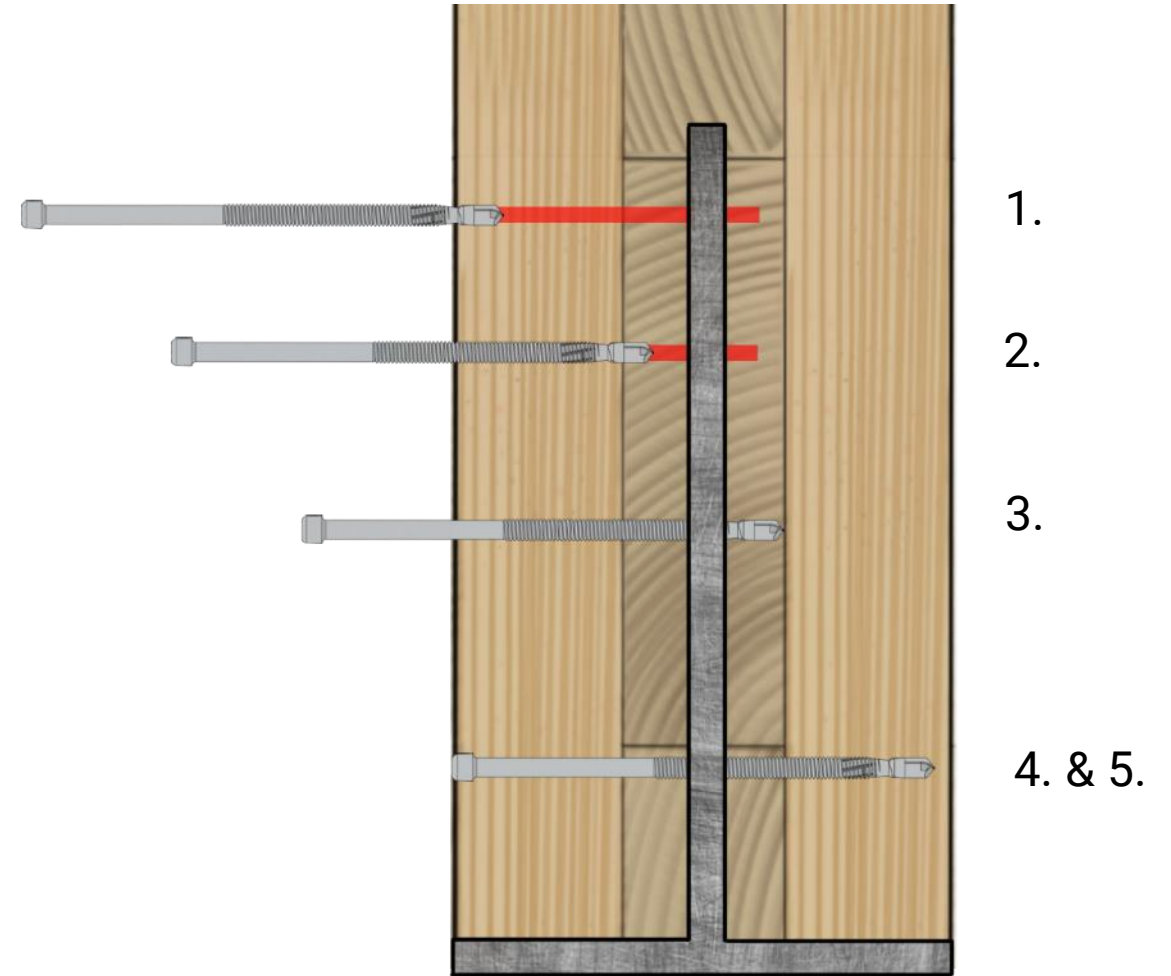




# Simple Installation

---

1. Drill tip eases the entry
2. Threads help forward movement
3. Threads grip into the steel
4. Drill tip finishes the drilling
5. Thread maintains dowel in place



# Simple Installation

---

## Large Dowel v.s. Smaller Dowel

### Smaller Dowel :

- Simple to install
- Shrinkage and swelling
- Stress distribution
- Better load dissipation



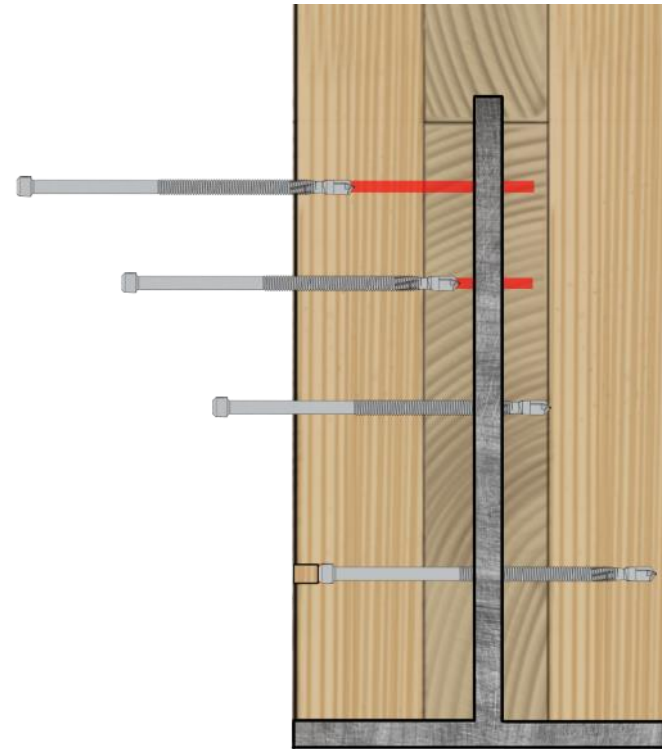
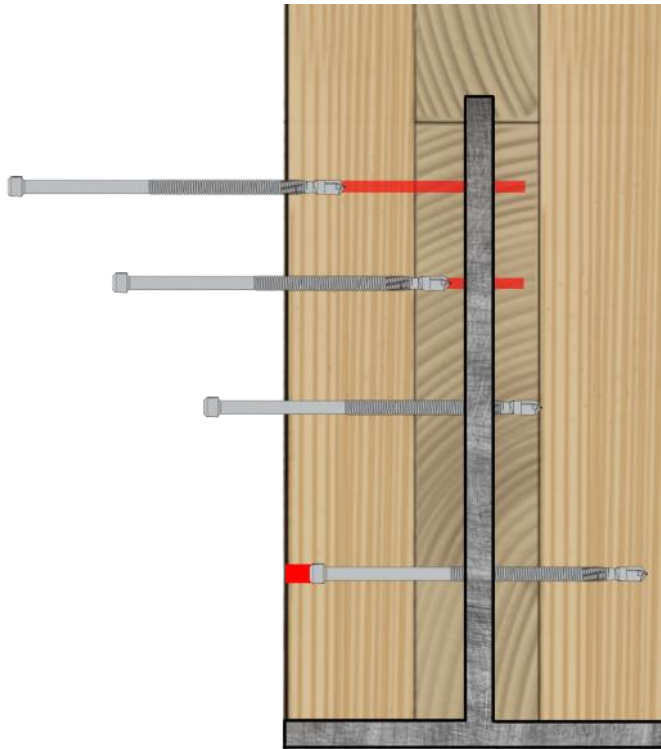
Regular Steel Dowel

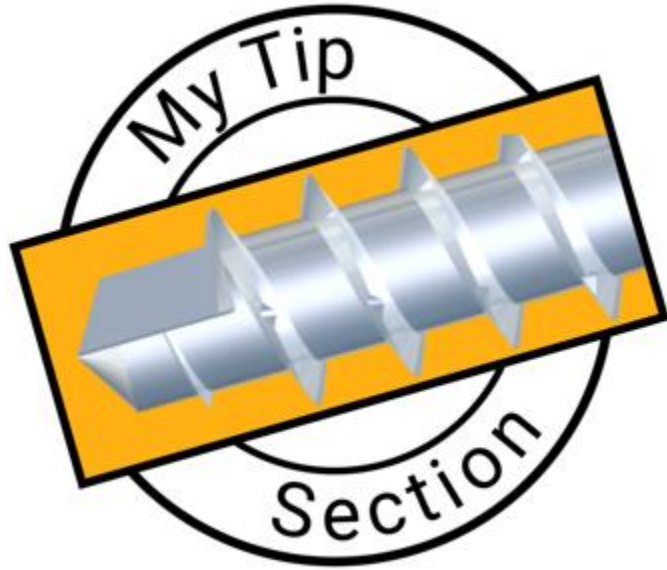


# Simple Installation

---

## Concealed Connection for Fire Rating





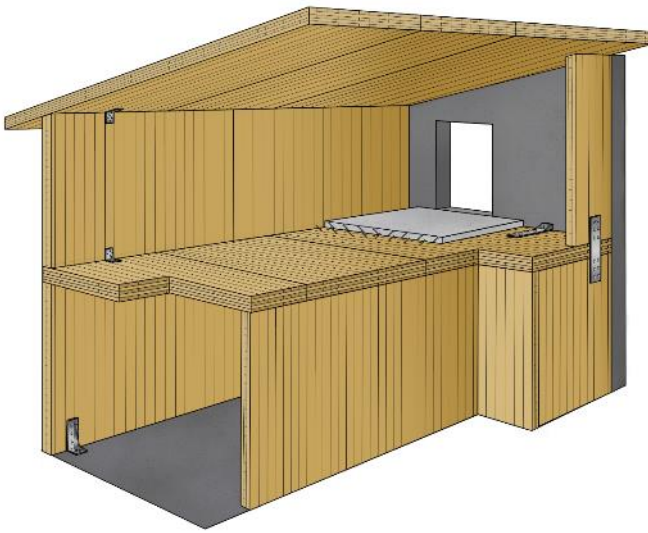
## Pre-Drilling on Site or Not?

- Pilot holes

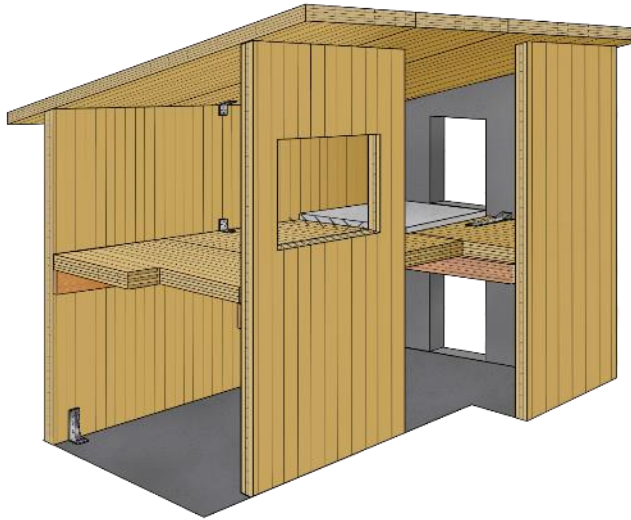
# Concealed Connection

---

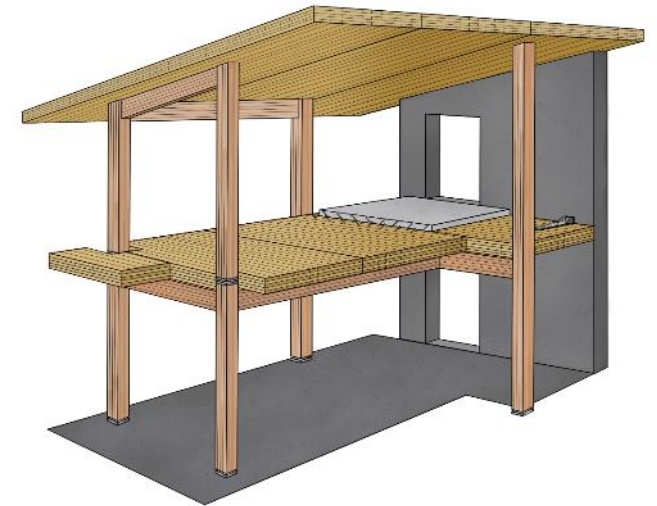
- Visually Appealing
- Concealed Connections



Platform Framing



Balloon Framing



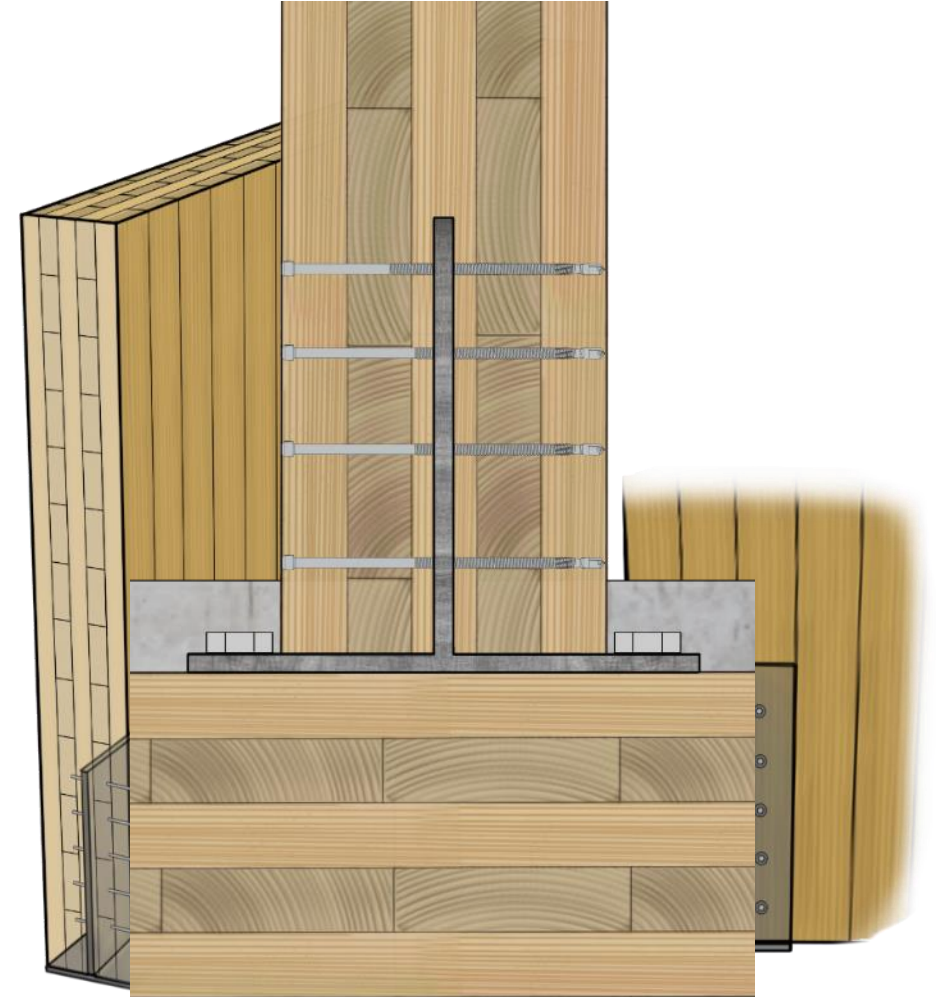
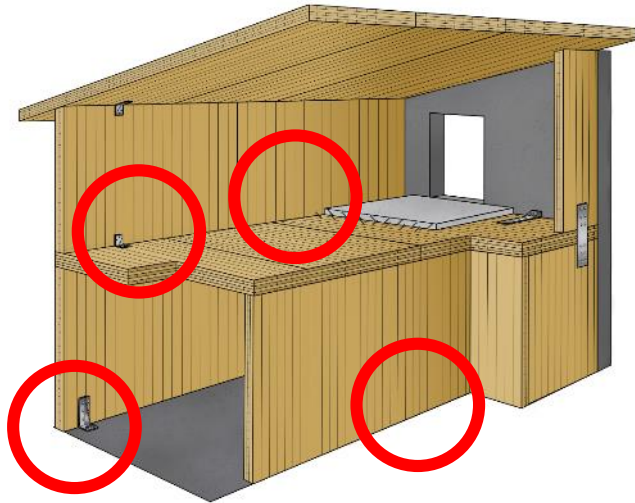
Post and Beam Framing

# Versatile Connector

---

## Panel Base

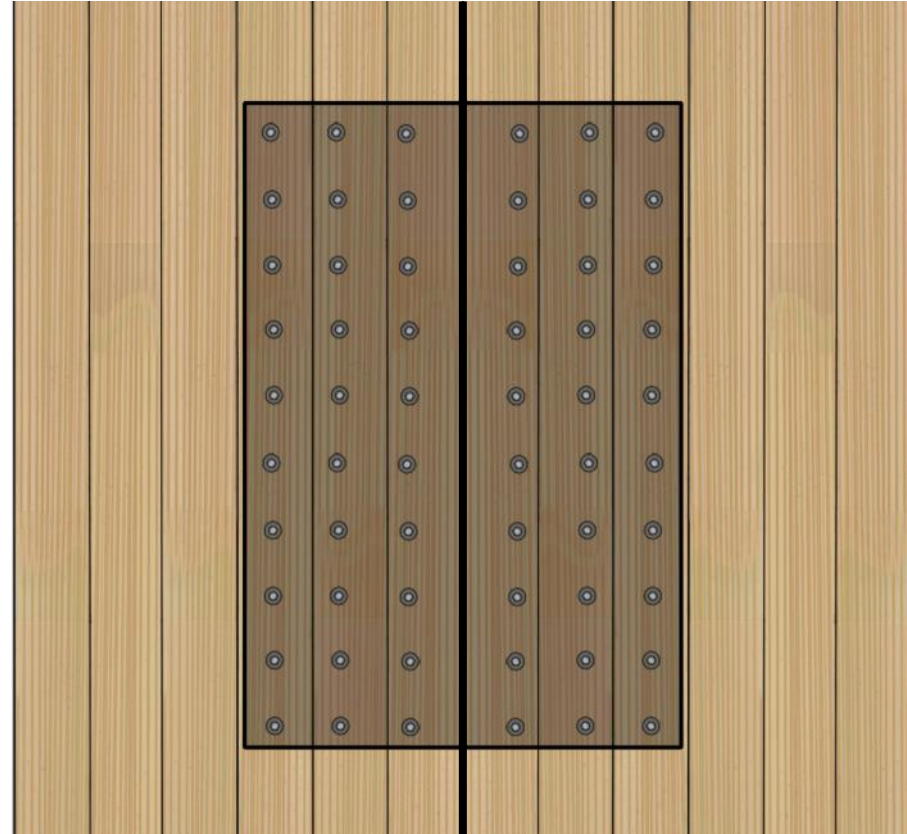
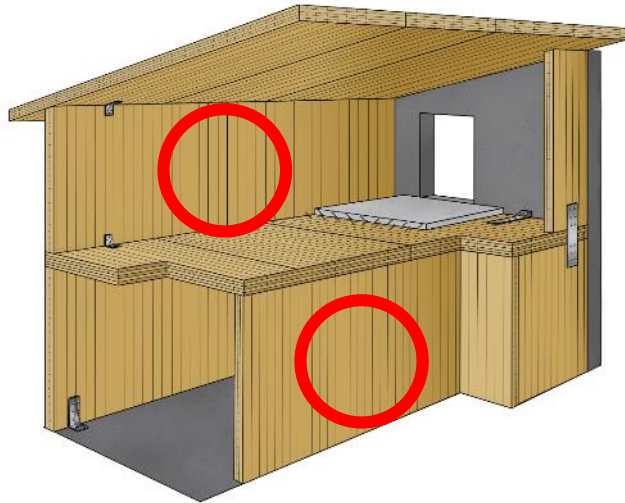
- CLT Hold Down
- CLT Base Shear Connection



# Versatile Connector

---

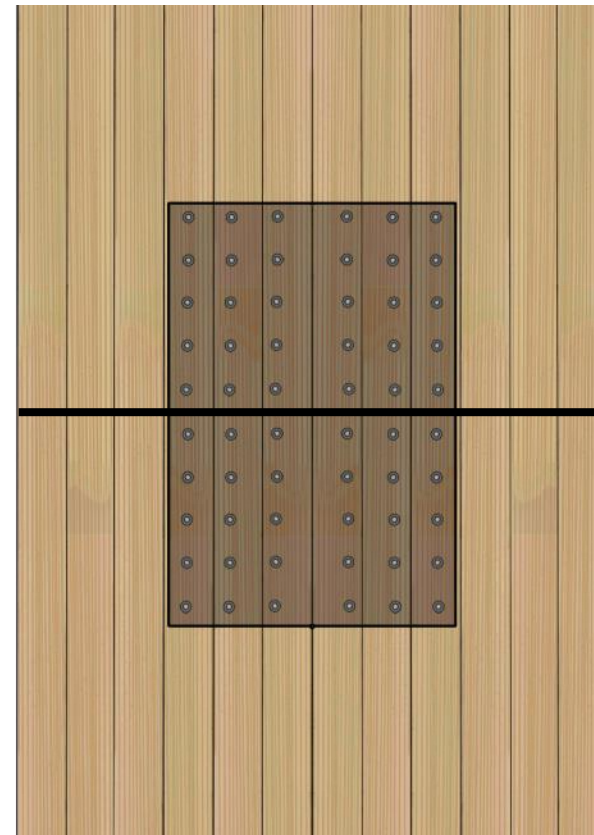
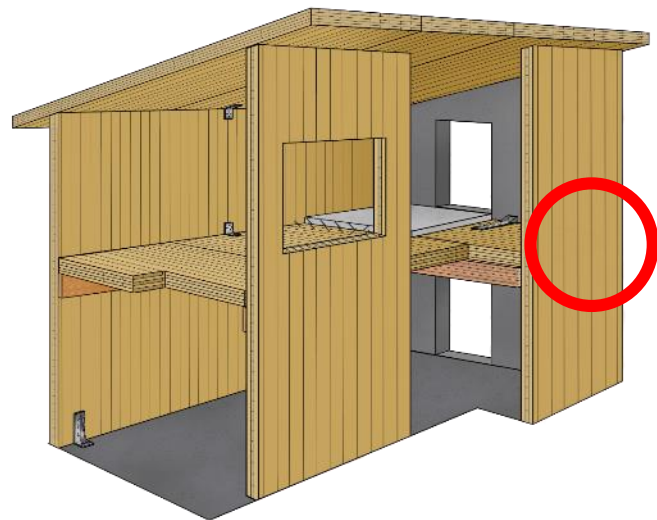
## CLT Internal Splice Plate Connection



# Versatile Connector

---

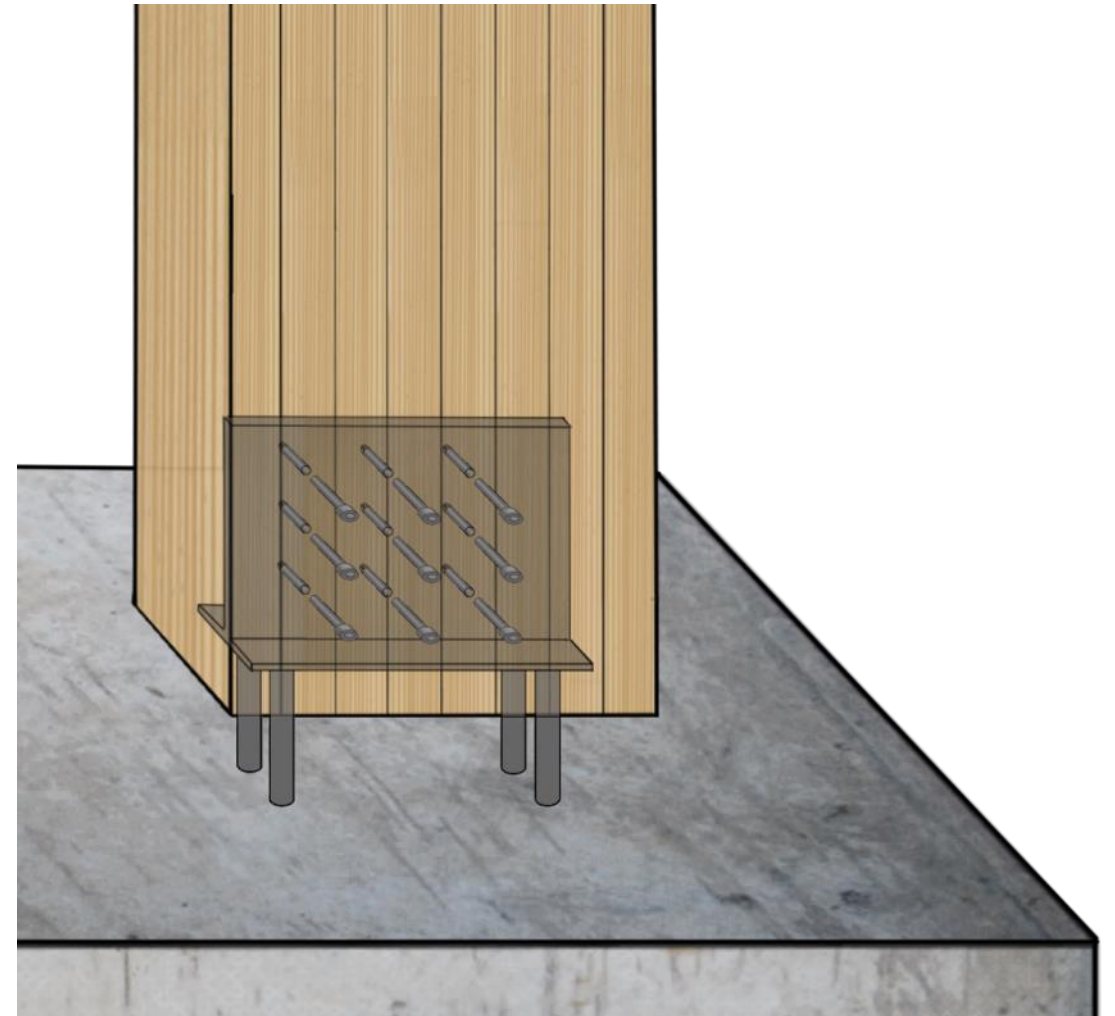
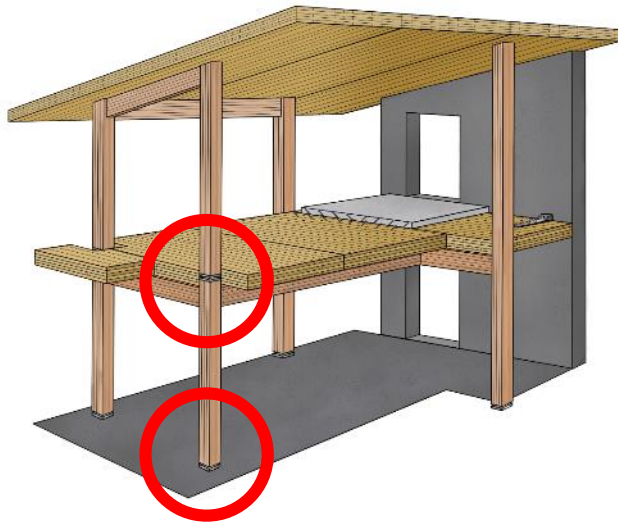
## Internal Tension Straps



# Versatile Connector

---

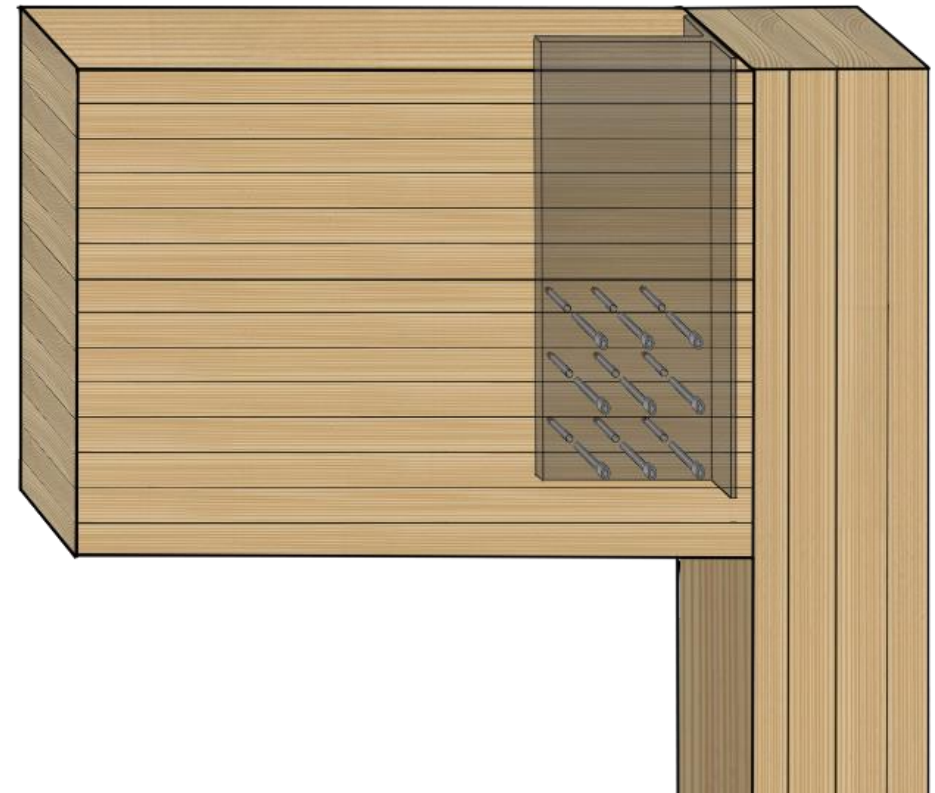
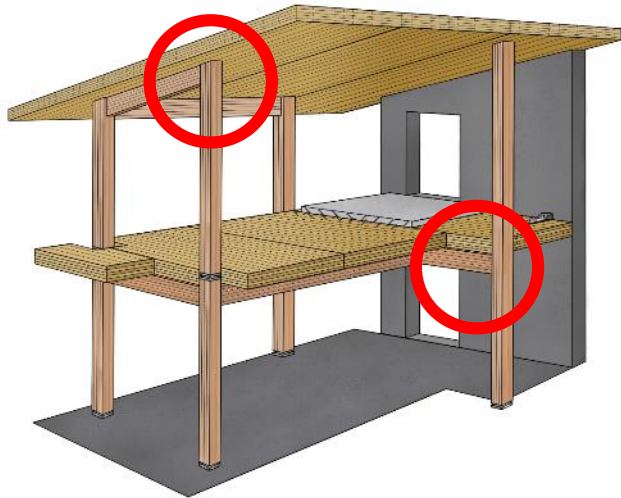
## Column Base Connection



# Versatile Connector

---

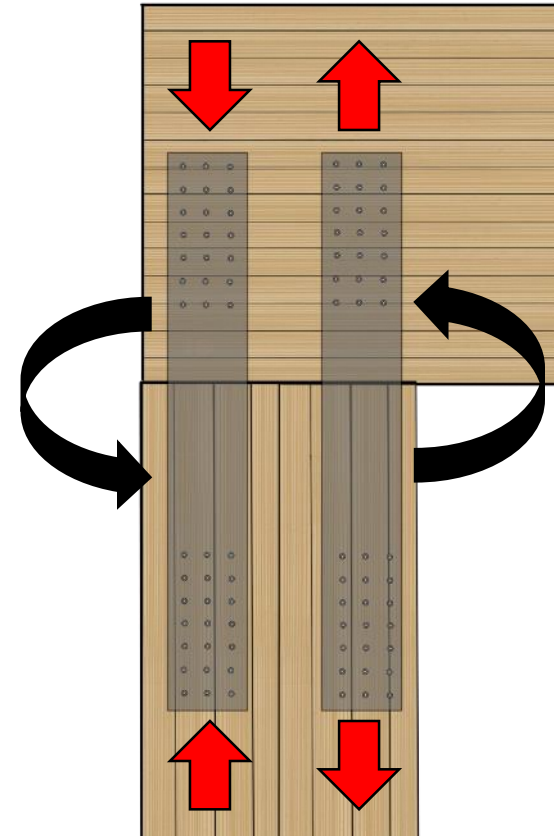
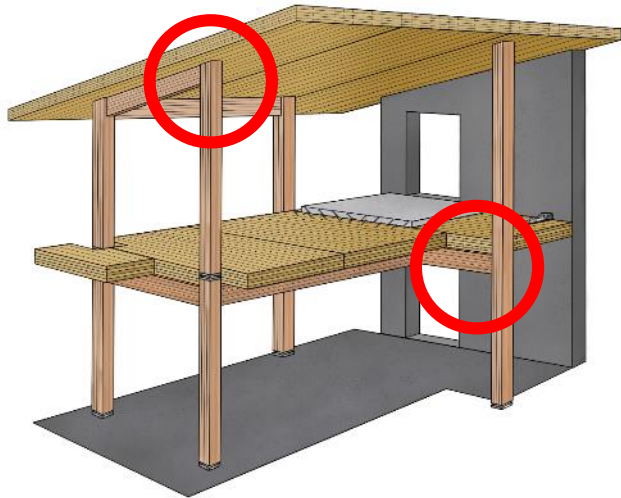
## Knife Plate Hanger



# Versatile Connector

---

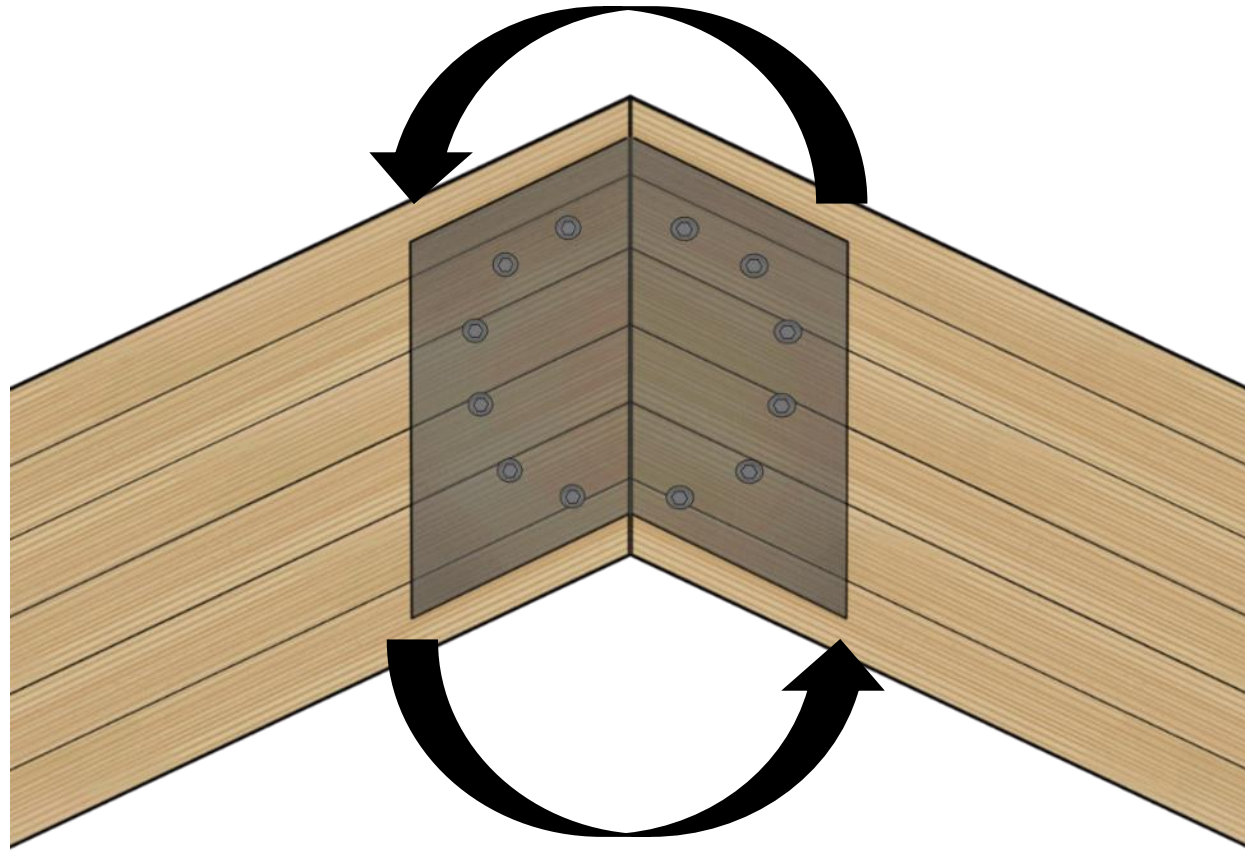
## Moment Connection



# Versatile Connector

---

## Moment Connection



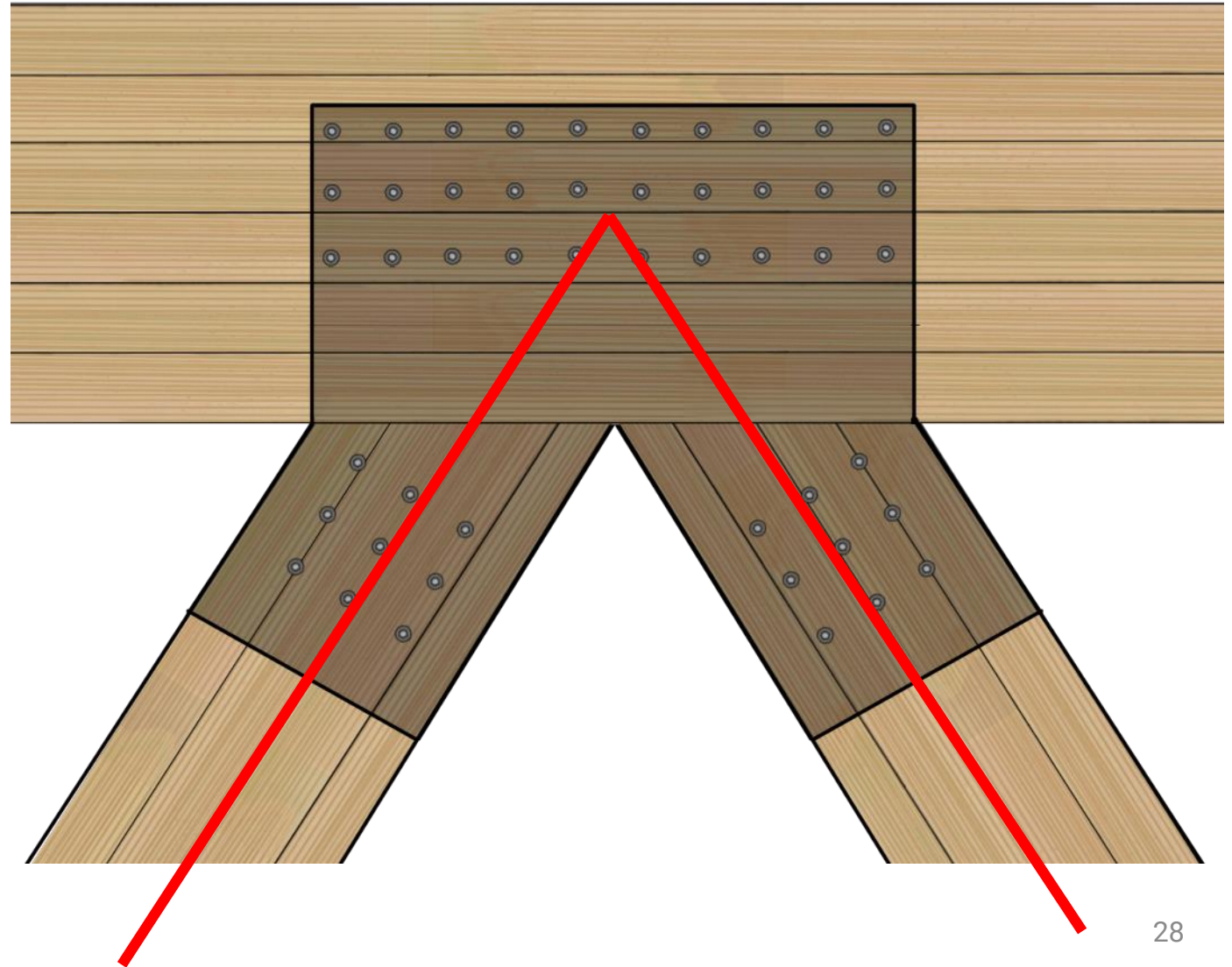
# Versatile Connector

---

## Brace Connection



U-Mass Amherst



# Tested Values

---

Tested using CLT  
Tested in America

- Montana State University



# Tested Values

---

## Fire Rating

- Same concept as for our beam hanger connections.
- Protected by a wood cover.

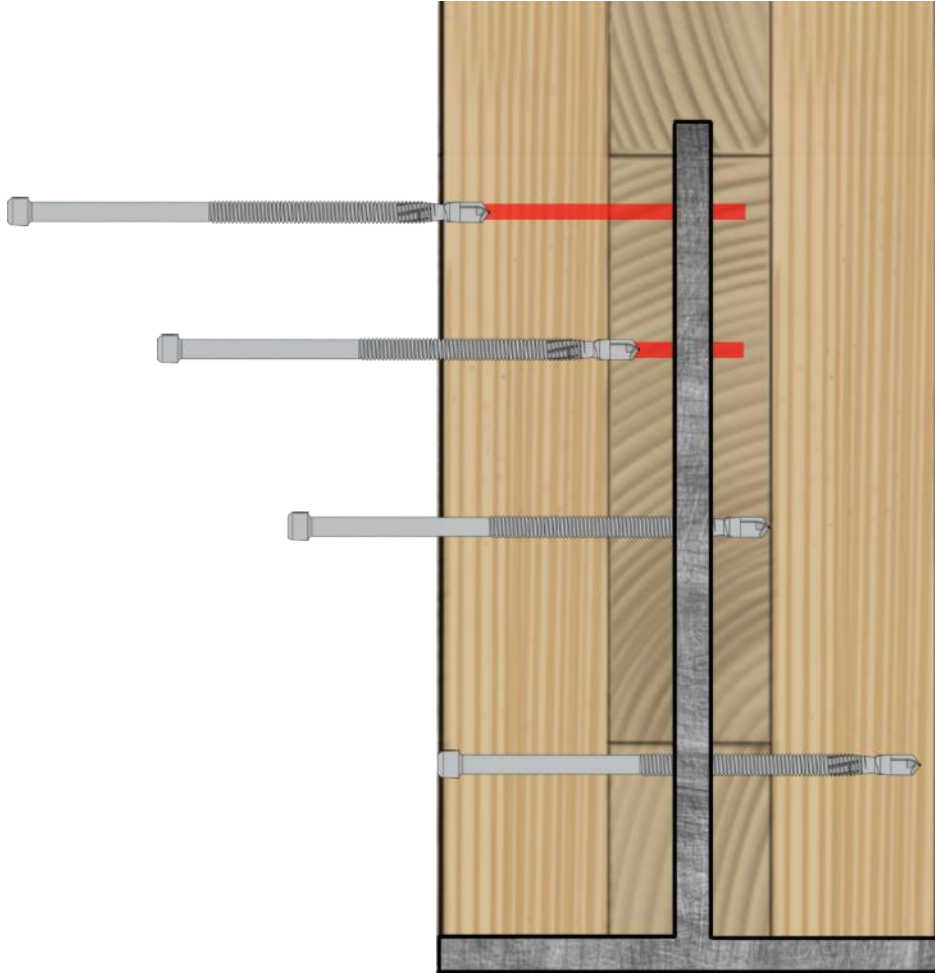


# Why Use the SDD?

---

They are:

- Adaptable
- Simple to Install
- Hold in Place
- Tested



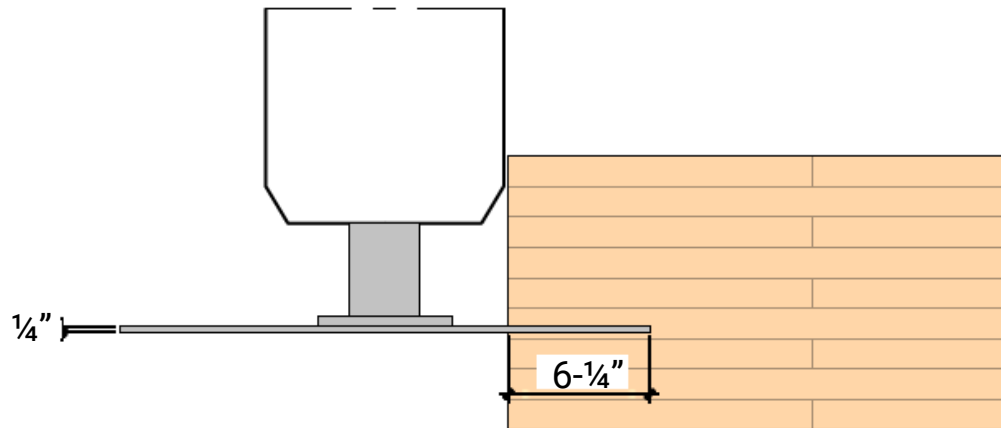
# Self-Drilling Dowel Webinar

- How? – Designing
  - Important Details
  - The Design Guide
  - Geometry Requirements
  - Bending Yield Strength

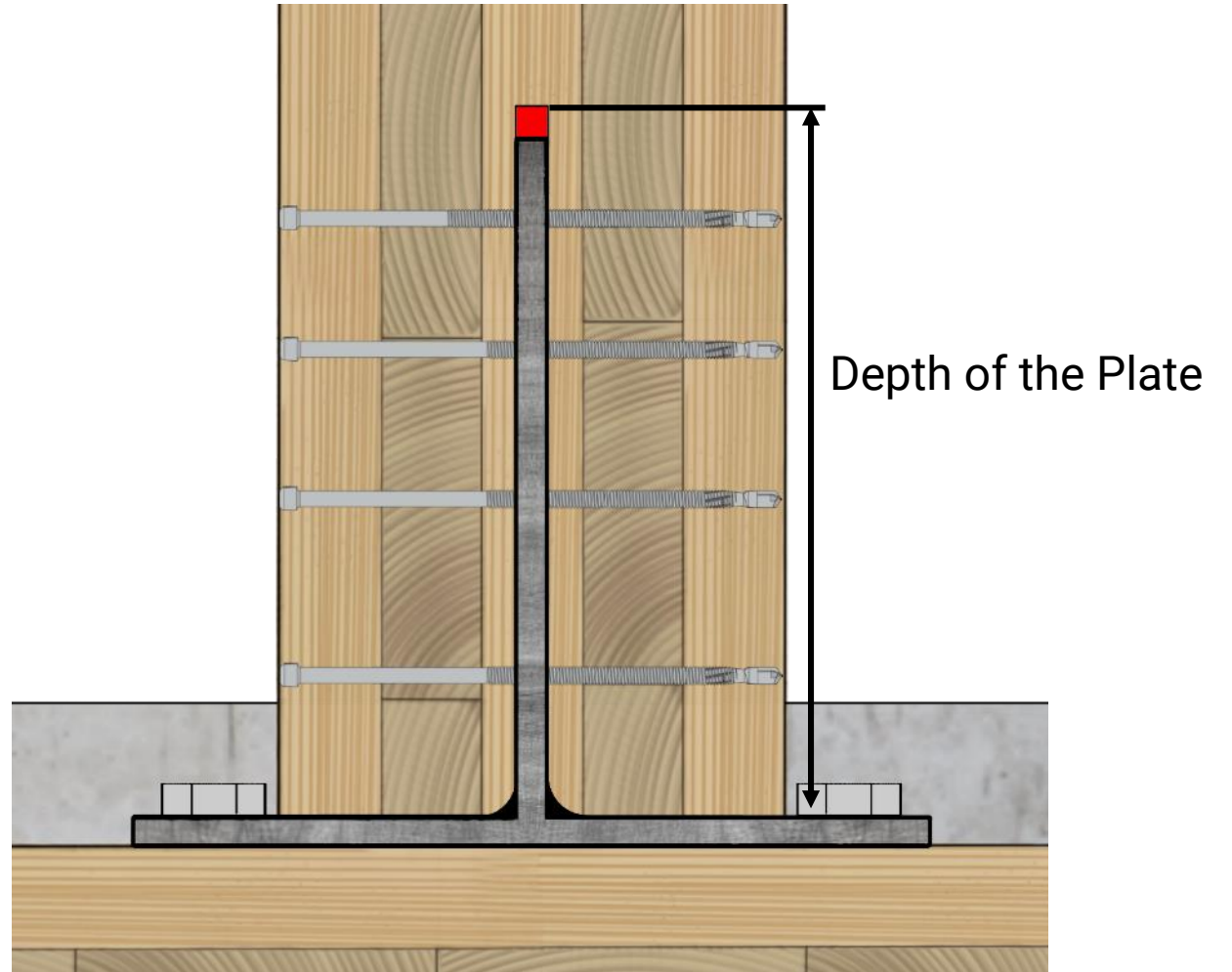


# Important Details

## 1. Depth of plate



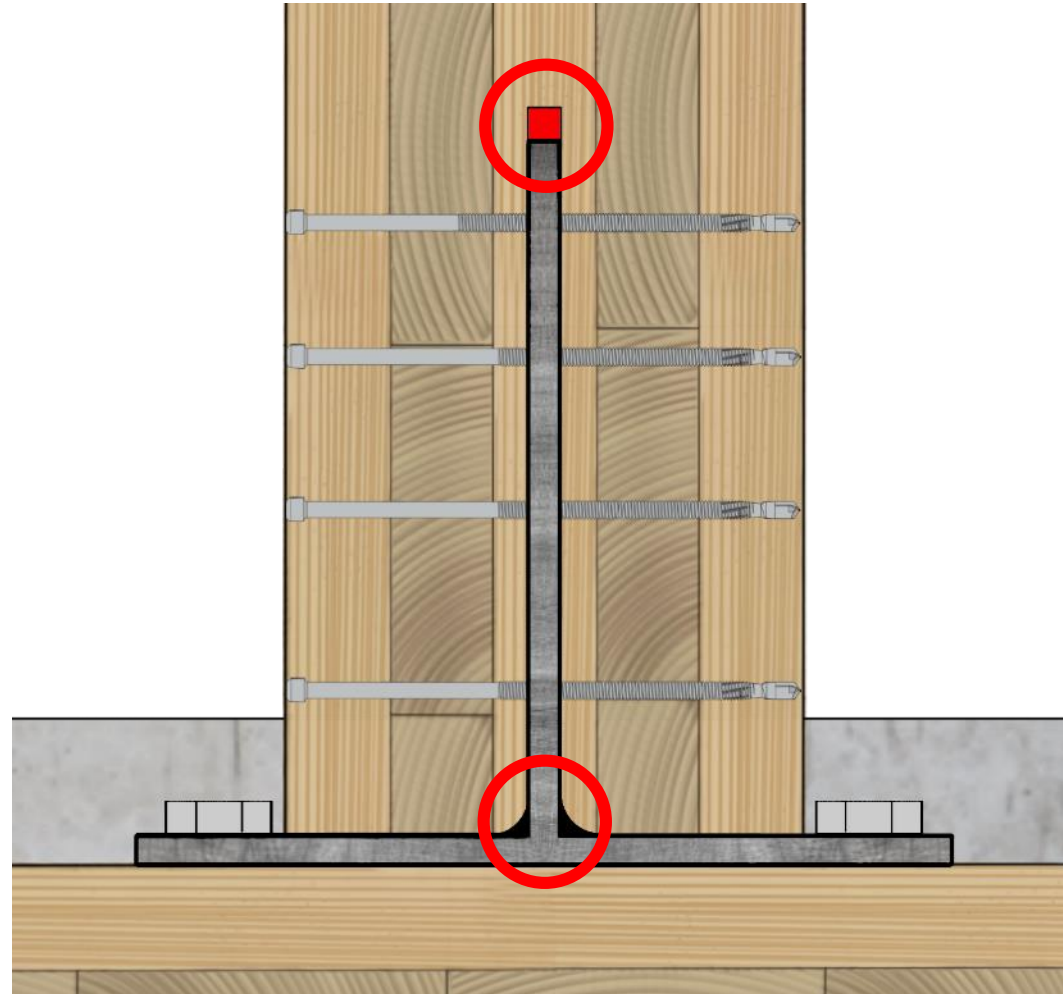
$\frac{1}{4}"$  x  $23\frac{5}{8}"$  blade

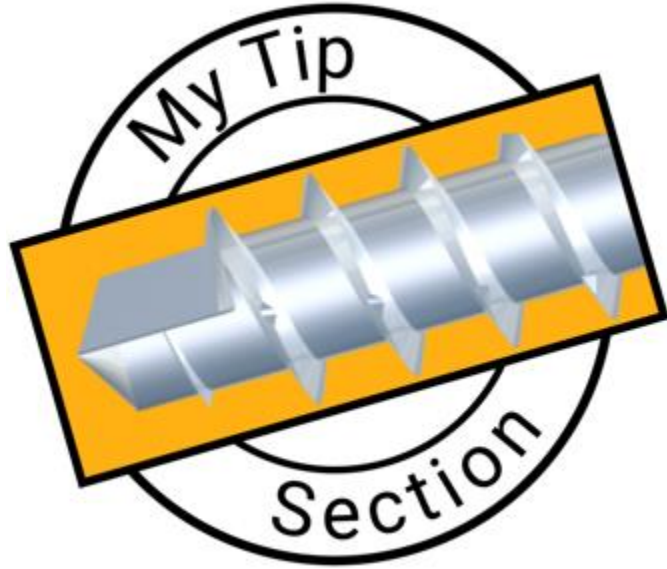


# Important Details

---

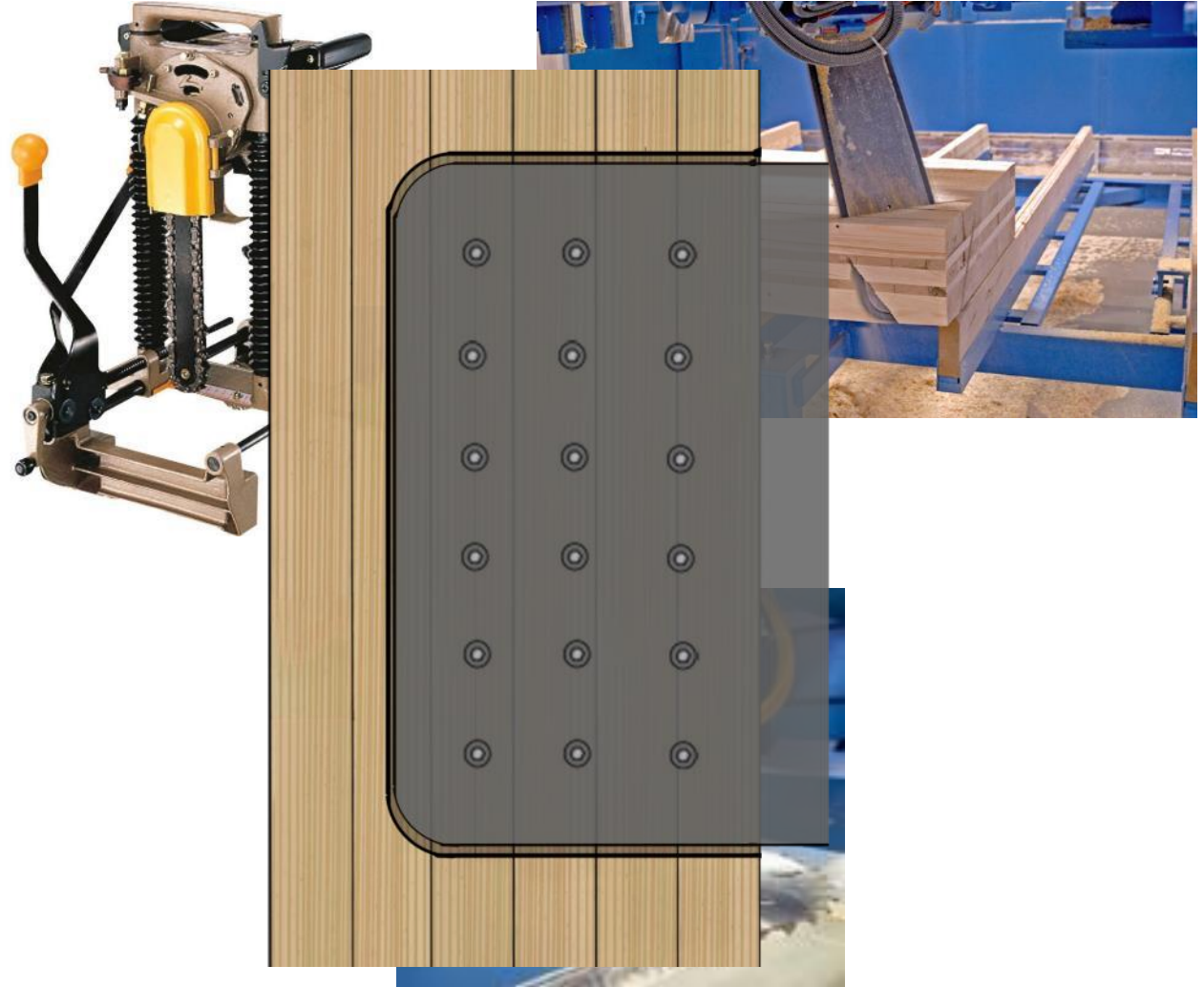
1. Depth of plate
2. Extra space
3. Rounded or welded corners
4. Bevel the corners





Saw blades are round

- Rounded corners
- Over design the slot



# Self-Drilling Dowel Design Guide

- Design Tables
- Connection Capacities
- Geometry Requirements
- Bending Yield Strength

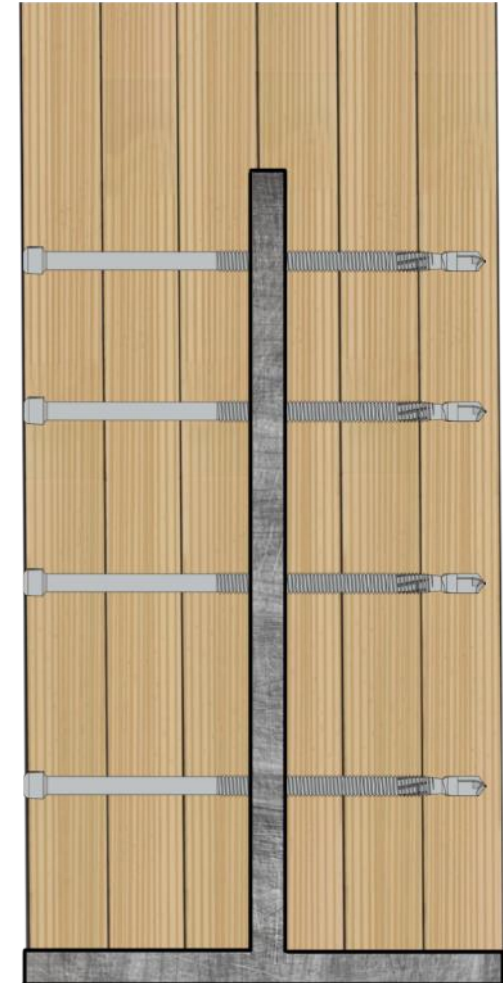
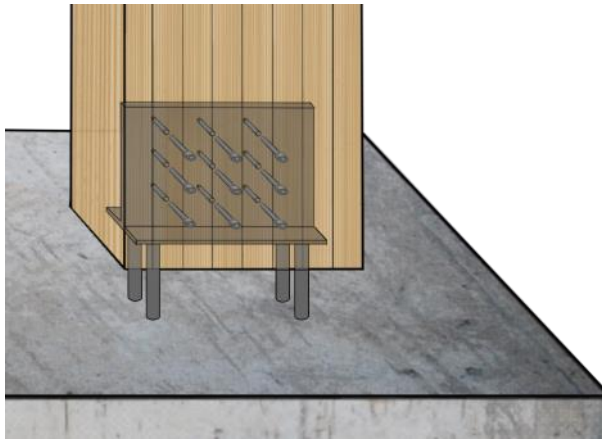


# Example - Column Base Connection

---

## Simple column base connection

- Using a knife plate
- And SDD Self-Drilling Dowels

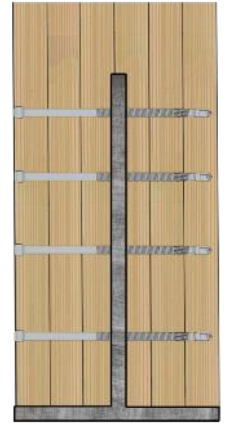


# Example - Column Base Connection

---

## Step 1: Steel Plate Selection

- Single Steel Plate
- Double Steel Plate



# Example - Column Base Connection

---

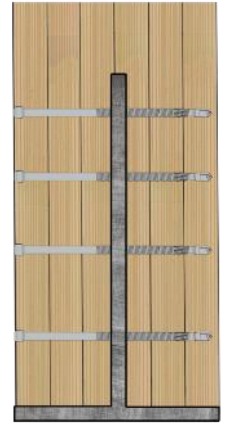
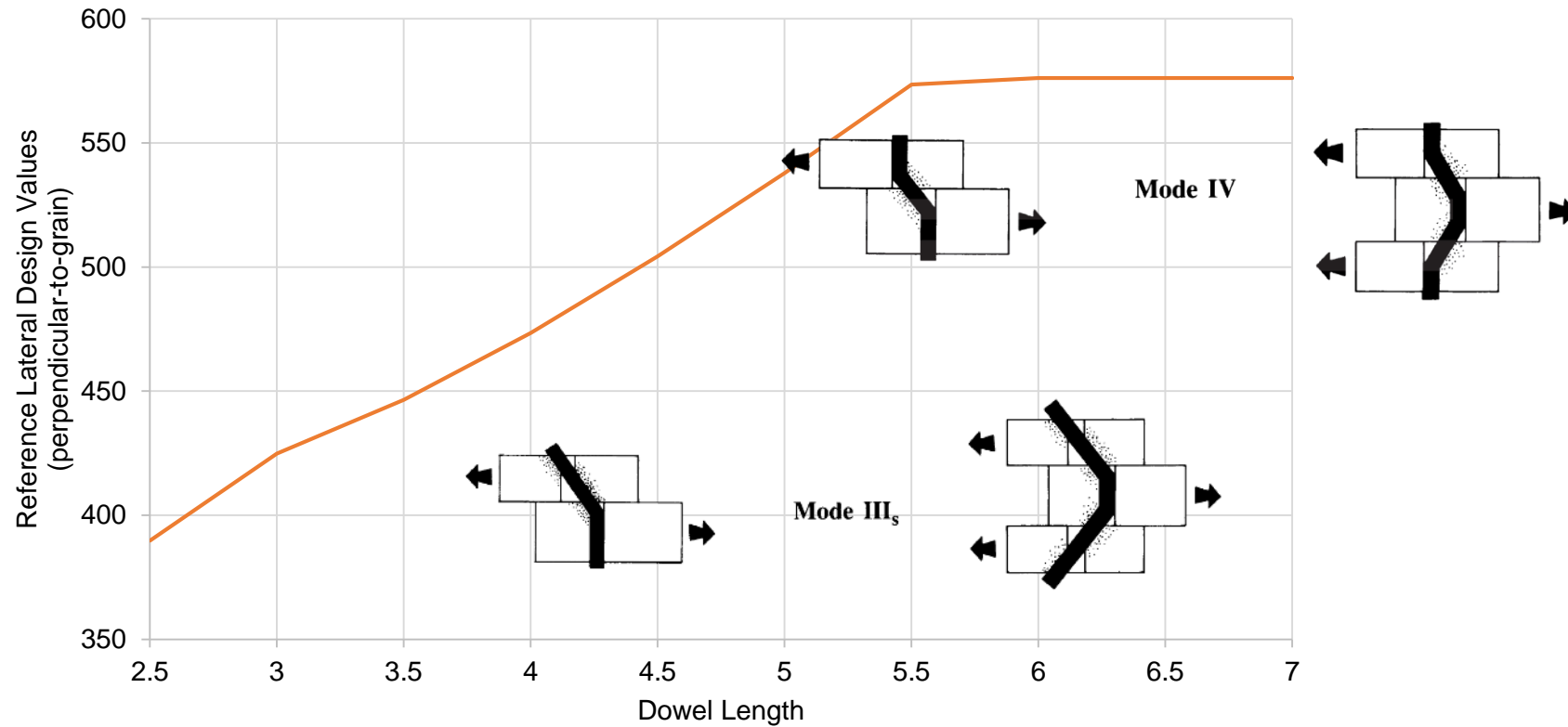
## Step 2: SDD Selection

- Dowel length
- 9 Different length
- From 2-7/8"
- To 9-1/8"



# Example - Column Base Connection

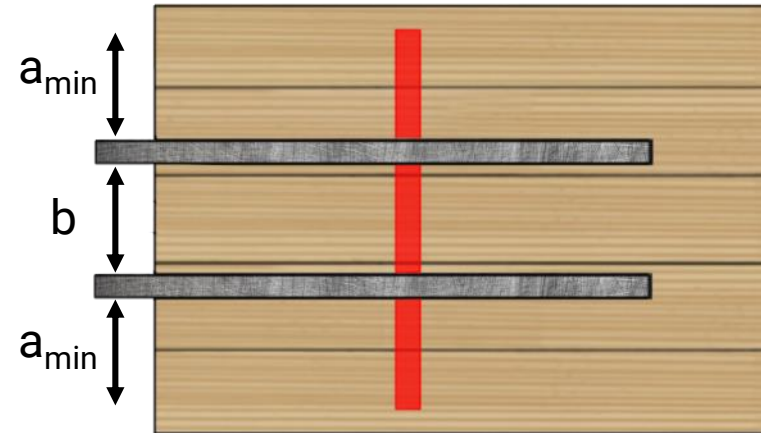
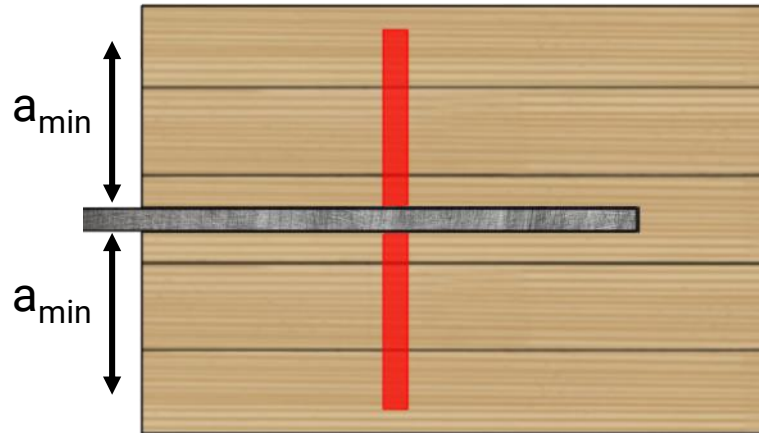
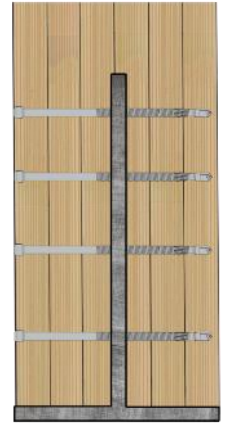
## Step 2: SDD Selection

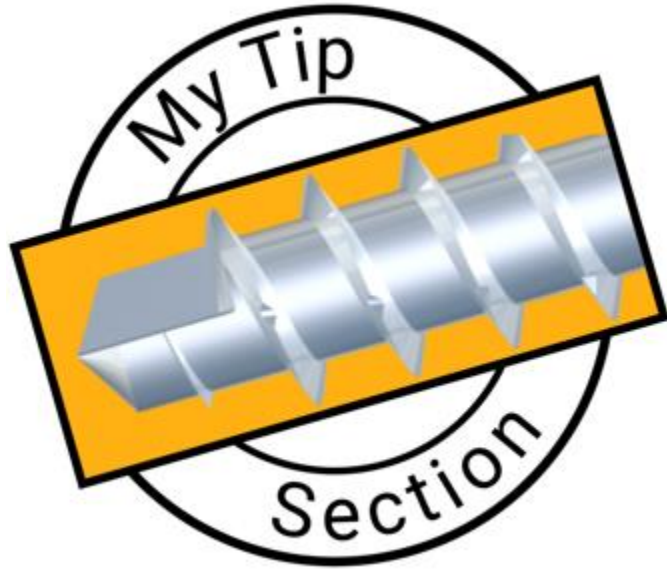


# Example - Column Base Connection

## Step 3: Evaluating Design Value

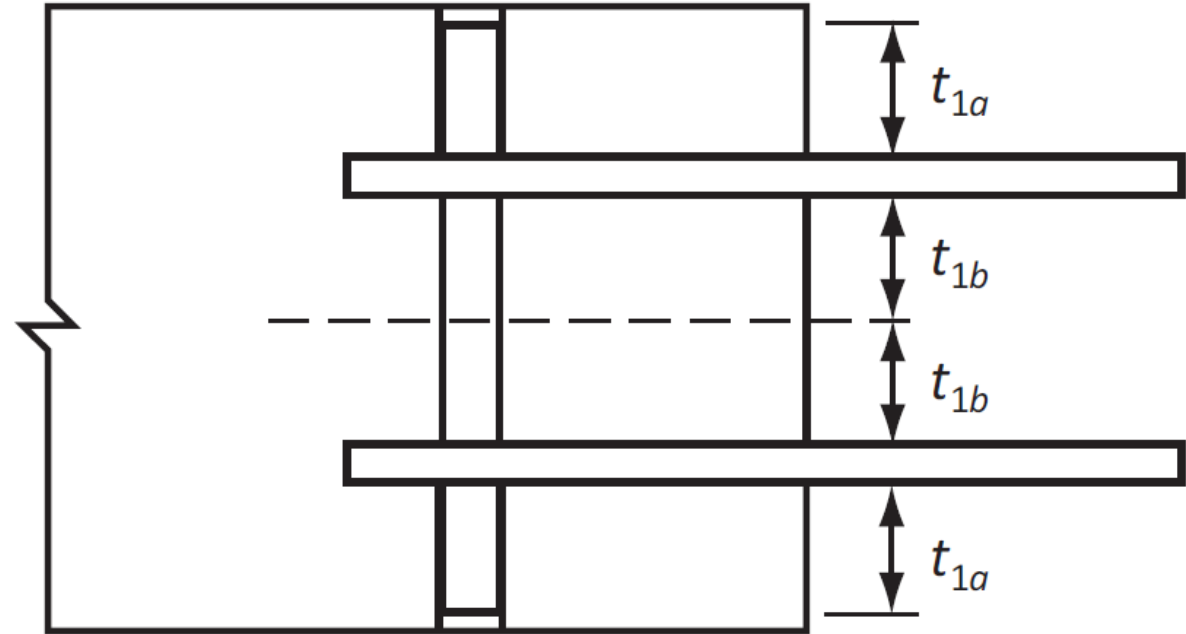
- Minimum wood embedment





## Double Knife Plate Optimal Spacing:

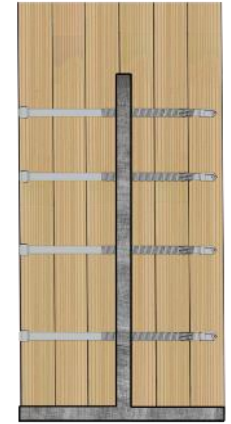
- $t_{1a} = t_{1b}$



$$t = \text{minimum } (t_{1a}, t_{1b})$$

From CSA O-86

# Example - Column Base Connection



## Step 3: Evaluating Design Value

Table 2.1, Reference Lateral Design Values for a Single Knife Plate

Specific Gravity G	D in. [mm]	Fastener L		Steel Plate Thickness Range		Minimum Wood Embedment		Reference Lateral Design Values		
		in.	[mm]	in.	[mm]	in.	[mm]	$Z_{  }$ lbs.	$Z_{  ,CLT}^5$ lbs.	$Z_{\perp}$ lbs.
0.42	1/4 [6.9]	2-7/8	[73]	3/16 to 5/16	[4.76] to [7.94]	1-1/4	[31.7]	644	579	420
		3-5/8	[93]			1-5/8	[41.7]	719	647	455
		5-1/4	[133]			2-3/8	[61.7]	844	760	554
		6	[153]			2-7/8	[71.7]	844	760	576



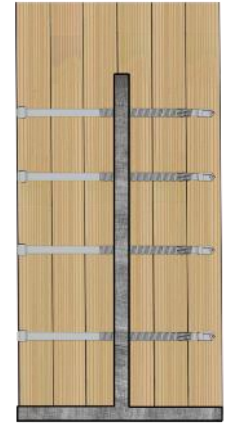
Table 2.1, Lateral Yielding Resistance for a Single Knife Plate

Relative Density G	D in. [mm]	Fastener L		Steel Plate Thickness Range		Minimum Wood Embedment		Lateral Yielding Resistance		
		in.	[mm]	in.	[mm]	in.	[mm]	$N_{  }$ N	$N_{  ,CLT}^5$ N	$N_{\perp}$ N
0.42	1/4 [6.9]	2-7/8	[73]	3/16 to 5/16	[4.76] to [7.94]	1-1/4	[31.7]	5428	5084	3089
		3-5/8	[93]			1-5/8	[41.7]	5859	5472	3489
		5-1/4	[133]			2-3/8	[61.7]	6723	6249	3868
		6	[153]			2-7/8	[71.7]	7154	6638	4058



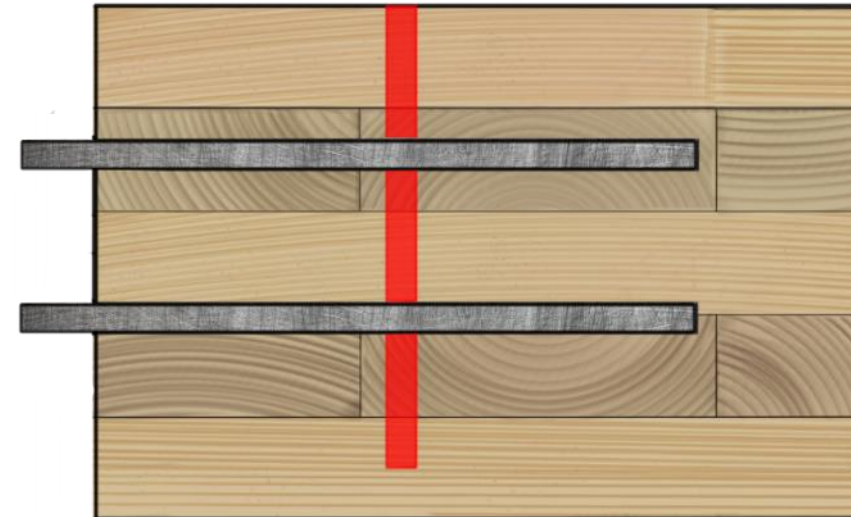
# Example - Column Base Connection

## Step 3: Evaluating Design Value



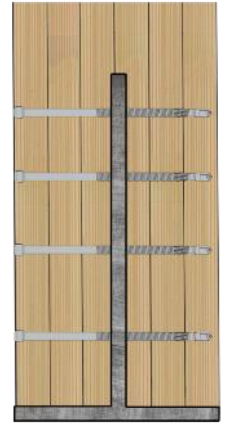
Reference Lateral  
Design Values

$Z_{  }$	$Z_{  ,CLT}^5$	$Z_{\perp}$
lbs.	lbs.	lbs.
644	579	420
719	647	455
844	760	554
844	760	576



## Example - Column Base Connection

---



### Step 4: Adjusting the design value

- $C'$  &  $K'$ : Adjustment factor
- $n_F$  : Effective number of fastener

$$\text{US: } Z' = Z * n_F * C'$$

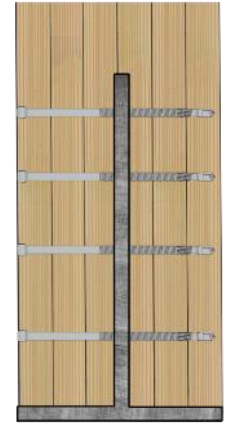


$$\text{CAN: } N_r = N * n_F * K'$$



## Example - Column Base Connection

---



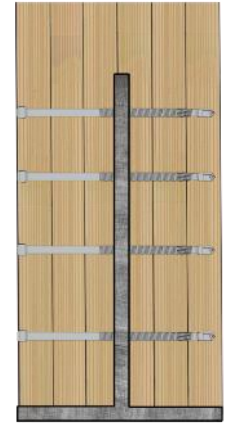
### Step 4: Adjusting the design value

- Effective number of fastener

$n_F$       Number of effective fasteners in a connection:  $n_F = 0.9 \cdot n$

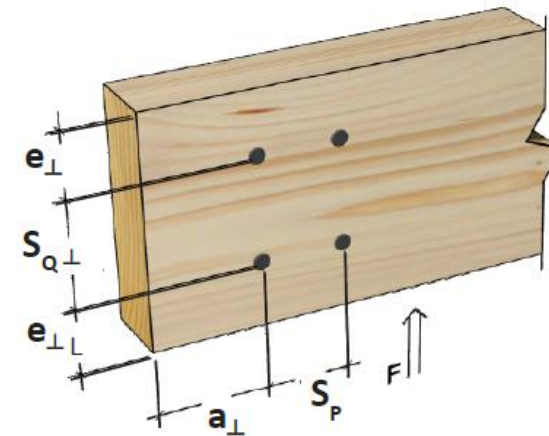
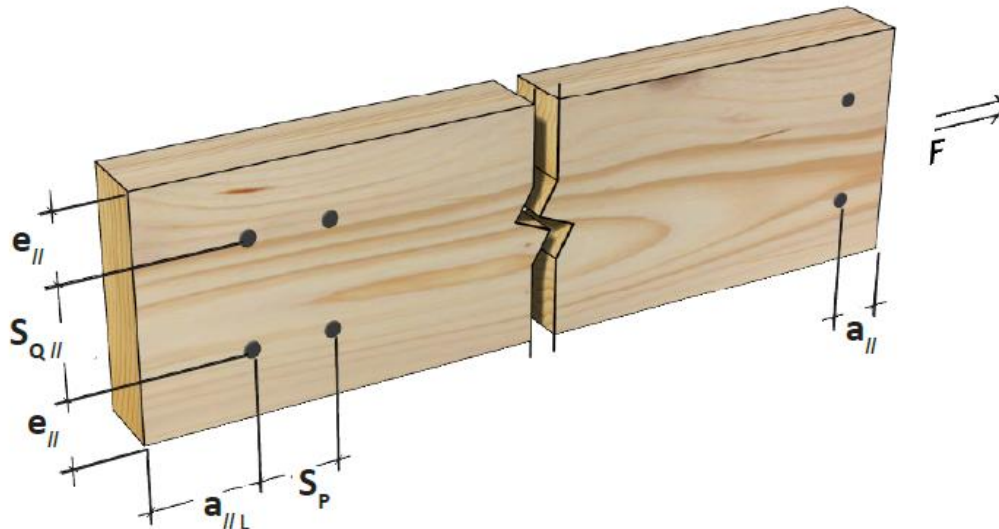
$n$       Number of fasteners acting together in a connection.

# Example - Column Base Connection



## Step 5: Geometry Requirements

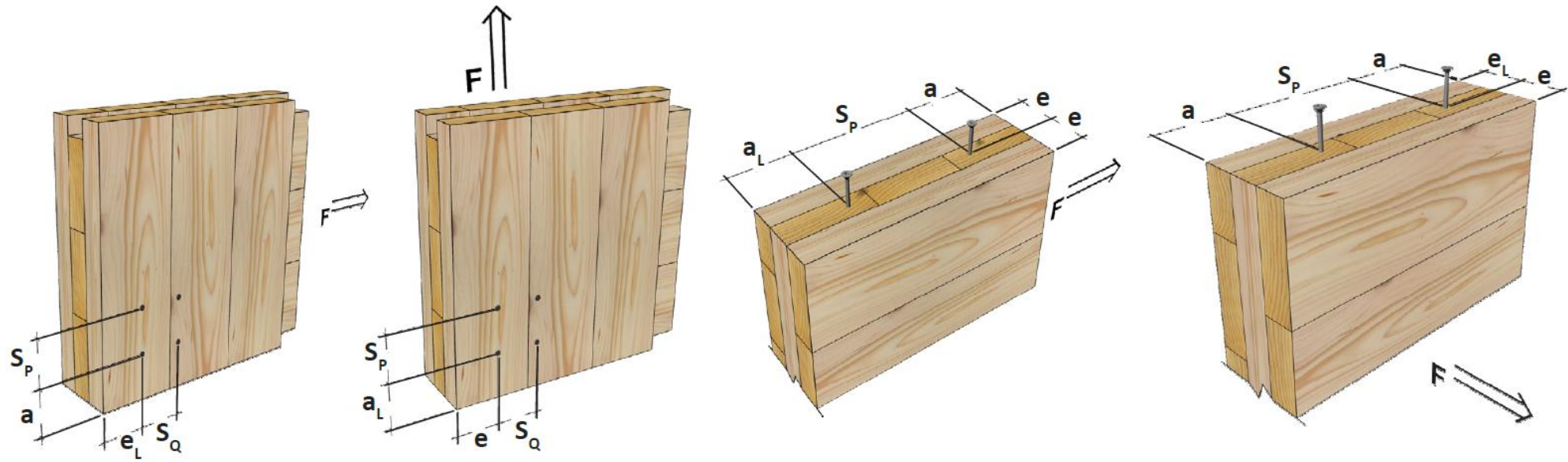
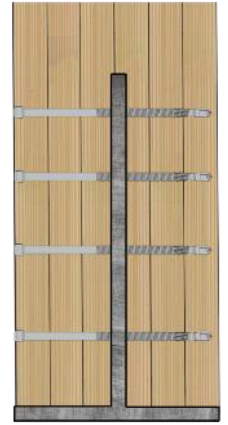
- Glulam or CLT



# Example - Column Base Connection

## Step 5: Geometry Requirements

- Glulam or CLT



# Bending Yield Strength

---

## For unique Connections

**Table 1.2, Allowable Fastener Strength**

Diameter	Allowable Shear Strength	Specified Bending Yield Strength, $F_y$
in.	lbs.	psi
1/4"	1,725	126,200

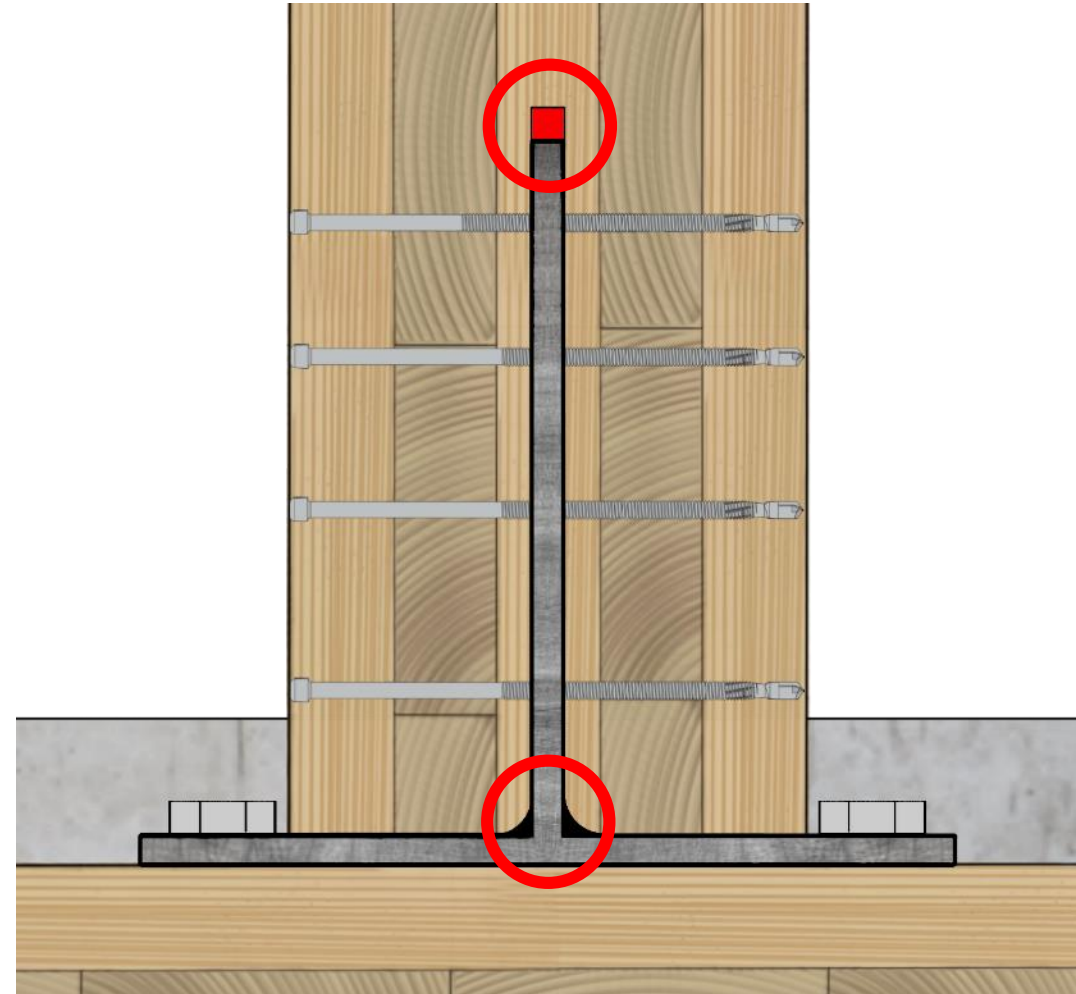


**Table 1.2, Strength of Fastener**

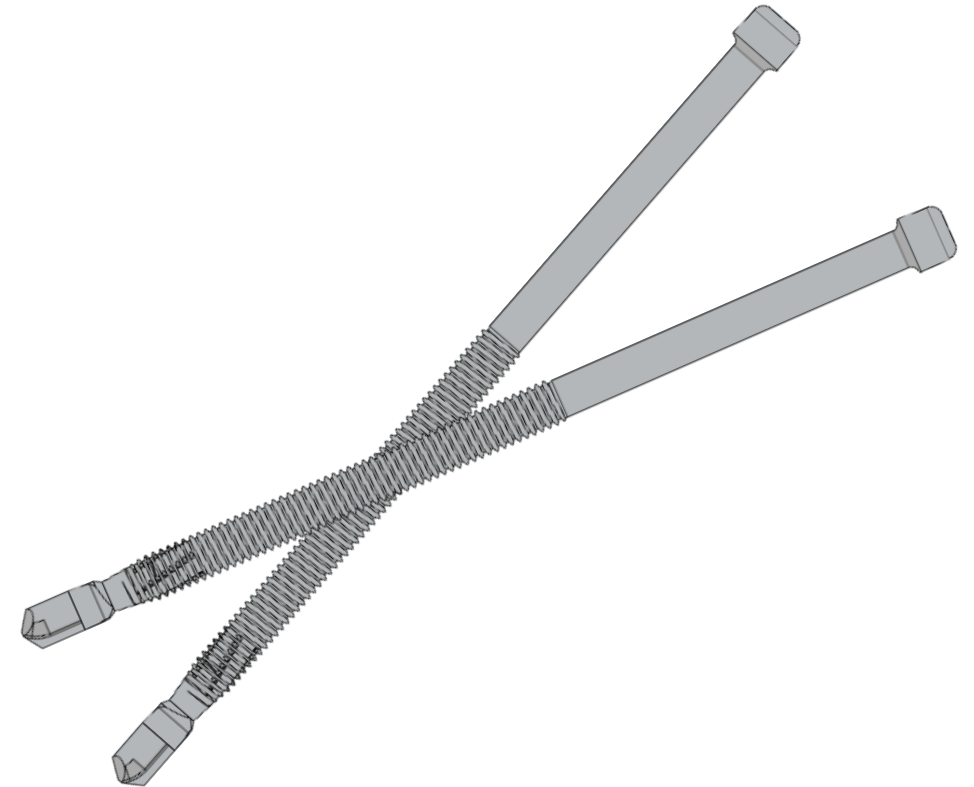
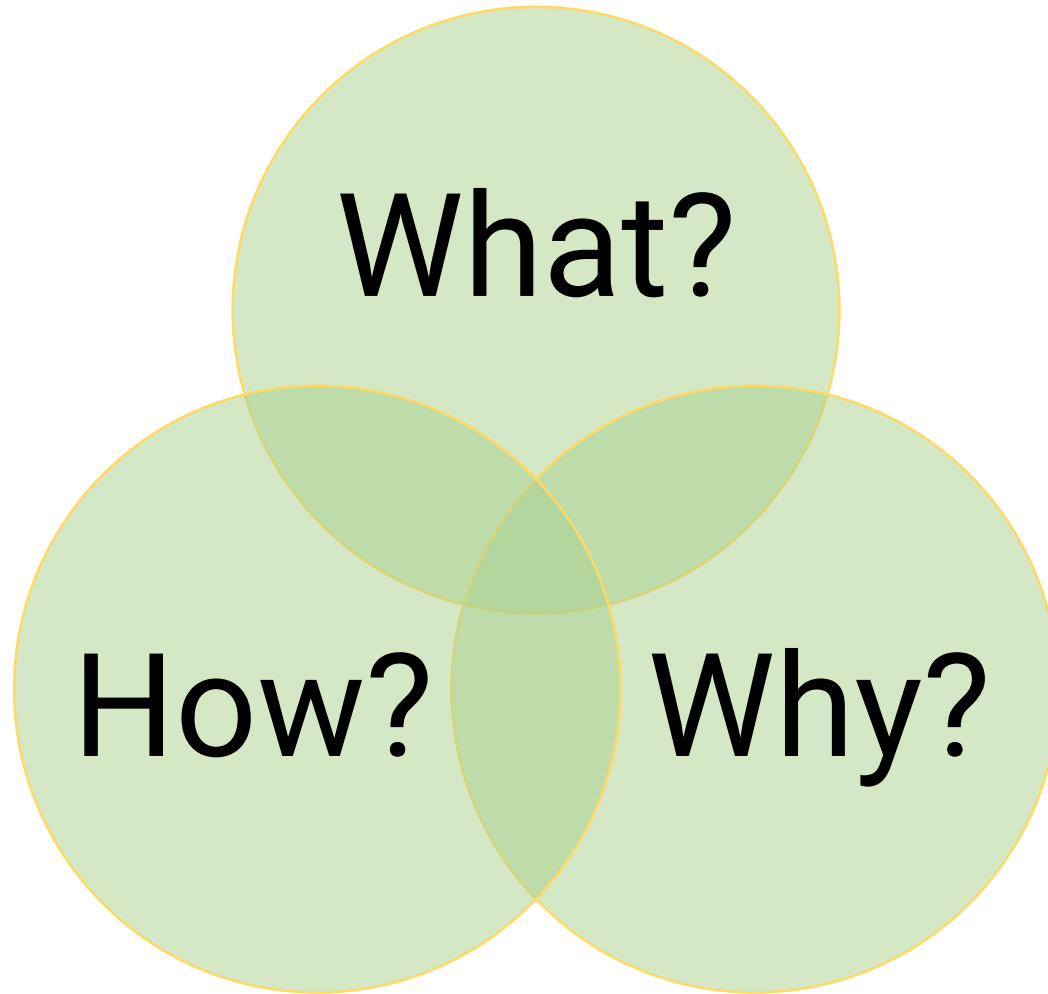
Diameter	Factored Dowel Shear Strength	Yield Strength of Fastener in Bending, $f_y$
in. [mm]	kN	MPa
1/4" [6.9]	17.6	870



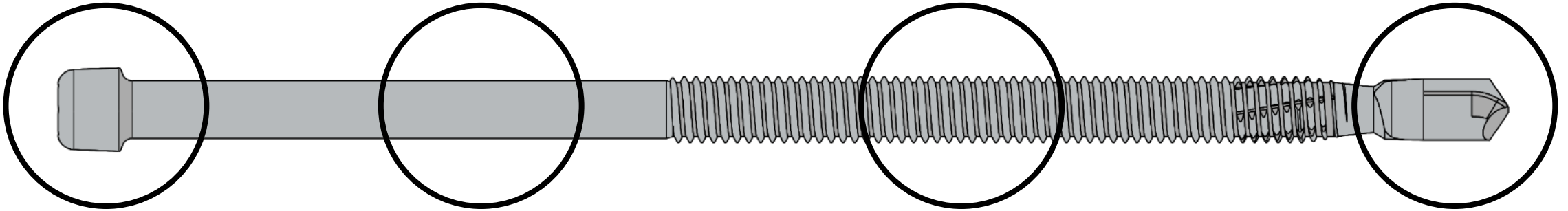
# How to Design with the SDD?



# Self-Drilling Dowel Webinar



# Self-Drilling Dowel Webinar



## What?

- Drilling Tip
- Continuous Thread
- Concealable Head
- Hardened Steel

# Self-Drilling Dowel Webinar

## Why?

- Adaptable
- Simplified Installation
- Hold in Place
- Tested



# Self-Drilling Dowel Webinar

How?

- With the Self-Drilling Dowel Design Guide



# Thank You for Attending

For more information [Support@MyTiCon.com](mailto:Support@MyTiCon.com)