

# Dowel Laminated Timber Investigation

Reiley Akkari

Bryan Garcia

Sophia Looney

# Presentation Outline

- Introduction
- Objectives
- Experiment
- Project Organization

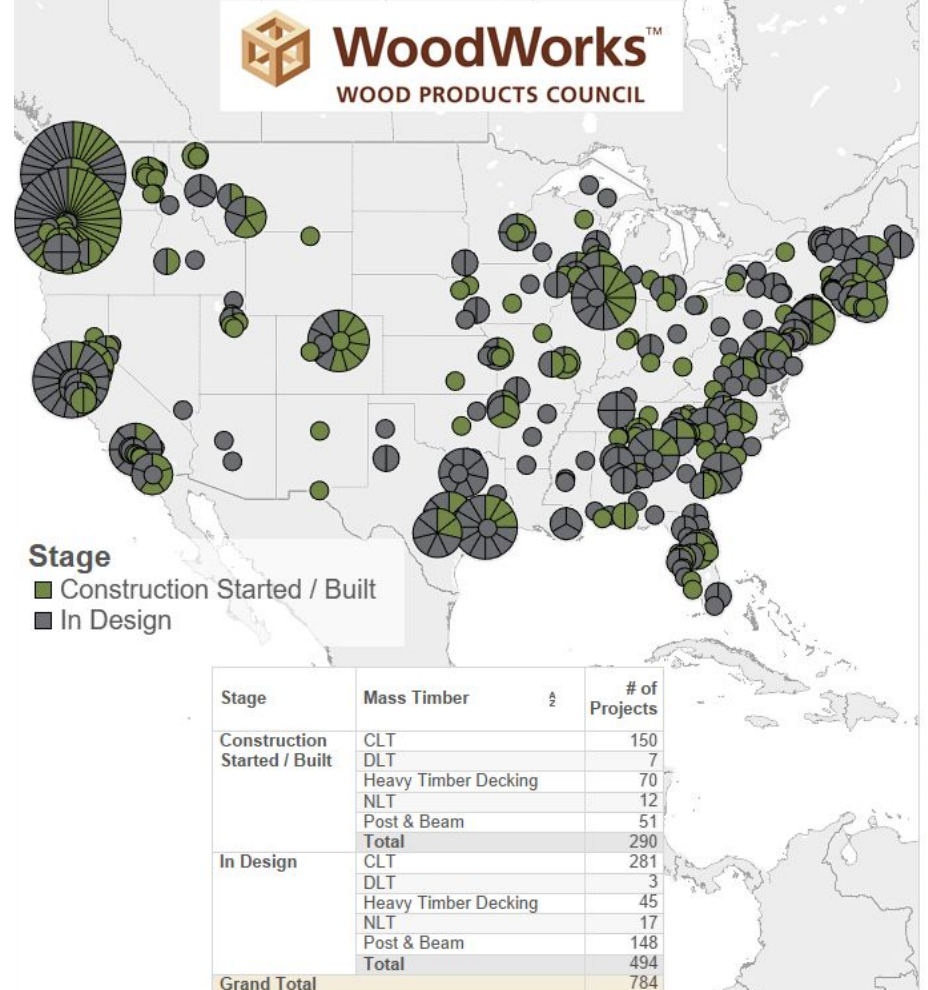


# Introduction

- 7 buildings built
- 3 buildings in design



(WoodTECH.events)



(WoodWorks.org)

# Objective #1

- Investigating DLT application in developing countries
  - Labor cost < equipment cost
  - Micro economy
  - No bonding chemicals
- Experience constructing a DLT panel





# Objective #2

- Testing and analyzing our DLT panels
  - Riehle universal testing machine
  - Theoretical vs actual strength values



# Objective #3

- Maintaining a high level of professionalism
  - Weekly meetings
  - Respectfully contacting professionals



StructureCraft



# DLT Fabrication & Testing



# DLT Fabrication

## Equipment / Materials:

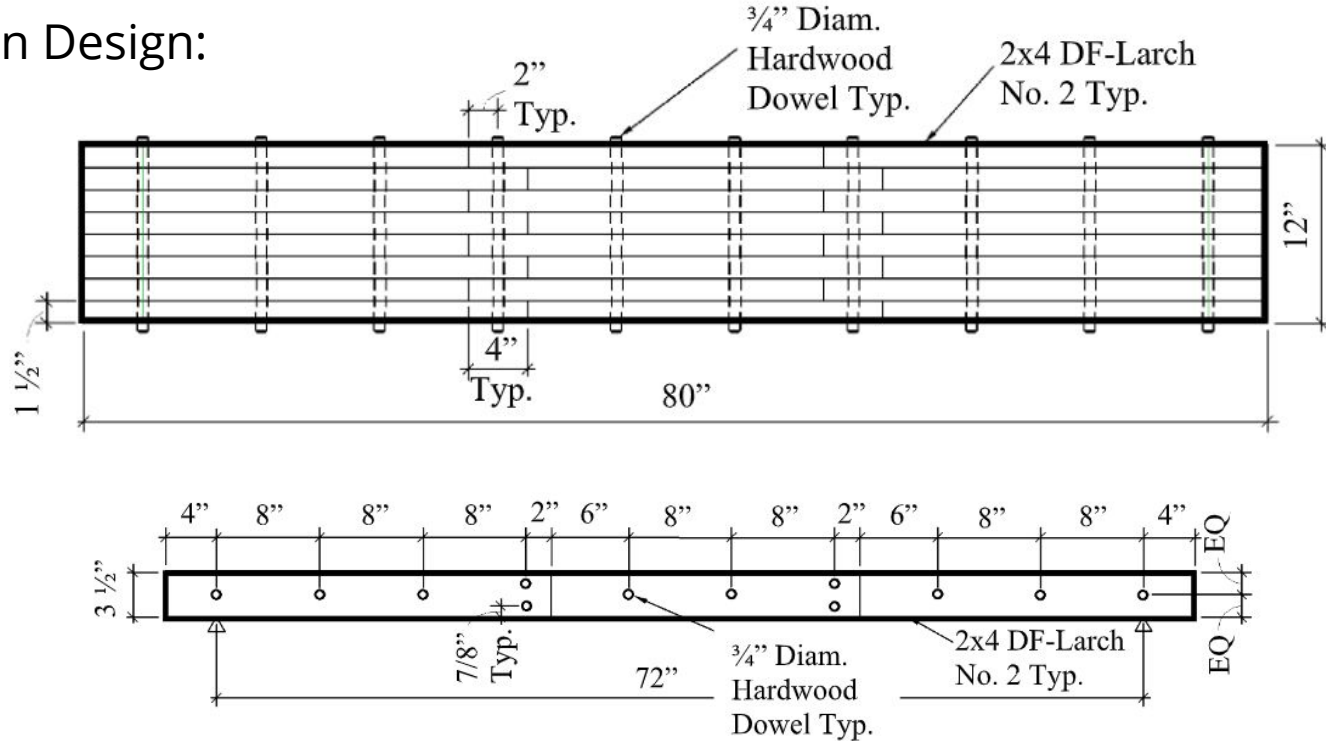
- Handheld tools
  - Drills
  - Handmade jigs
  - Clamps
- Douglas Fir Larch No. 2
- Hardwood Dowels (Red Oak)





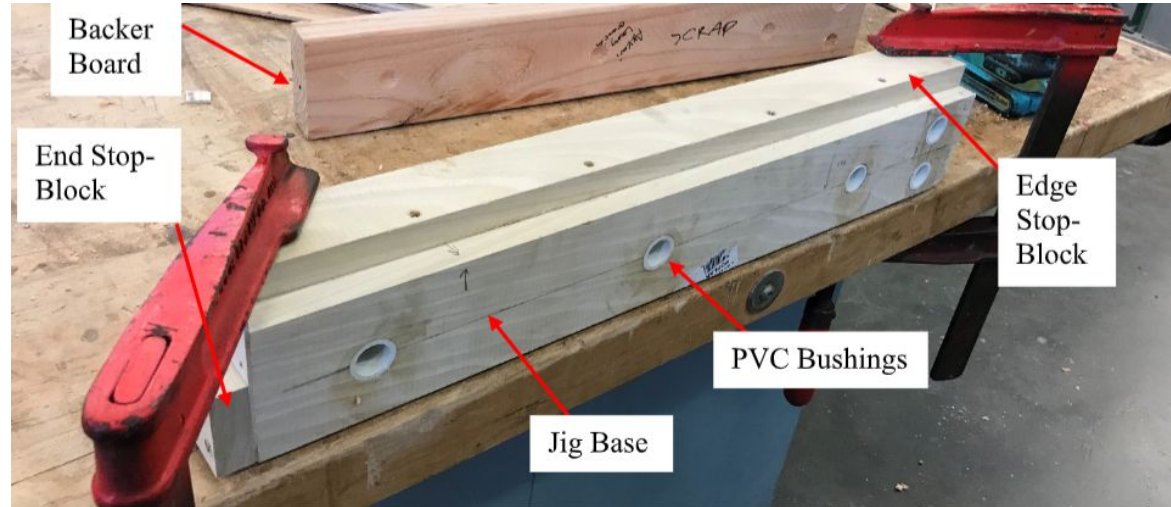
# DLT Fabrication

## DLT Specimen Design:



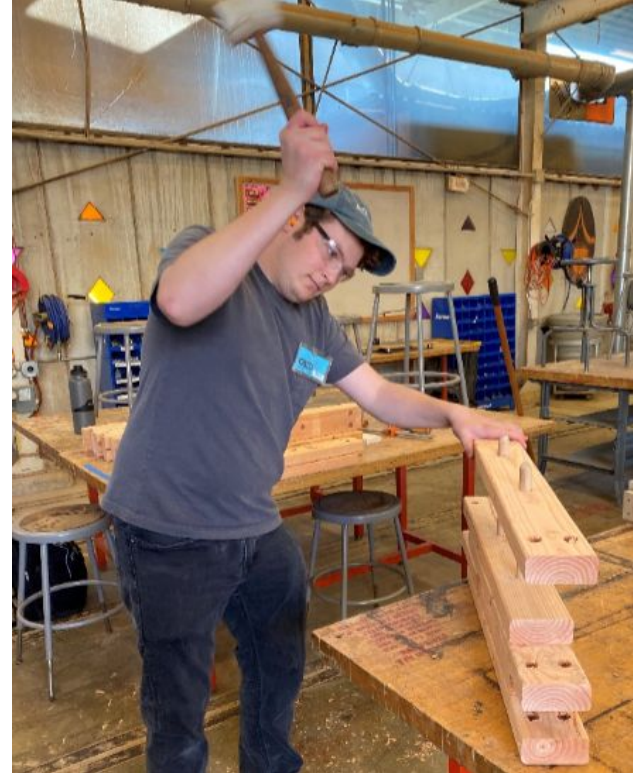
# DLT Fabrication

- Jig Design and Fabrication:
  - Positive Stops for repeatability
  - Durability over long term use



# DLT Fabrication

DLT Specimen Fabrication:





# DLT Fabrication

DLT Specimen Fabrication:





# Test Set-Up

Baseline Tests:



Baseline 1: Single 2x4

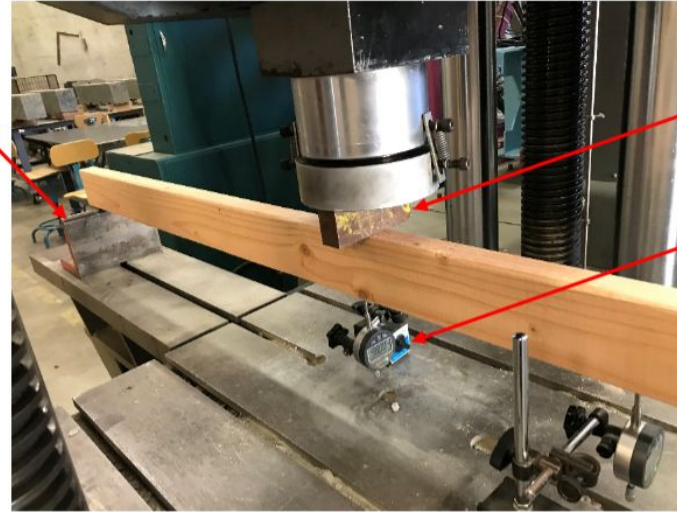


Baseline 2: Dowelled Butt Joint Connection

# Test Set-Up

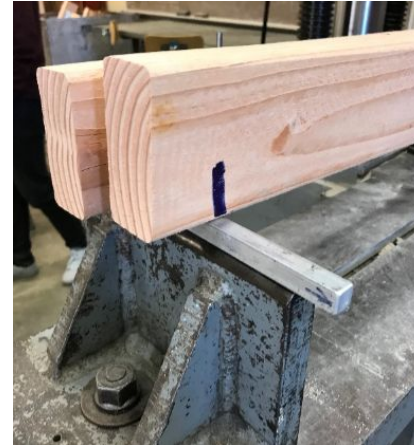
- Load Testing:
  - Riehle Universal Testing Machine
  - 3 Point Test
  - Dial Indicators
  - Shims

Typ. Support



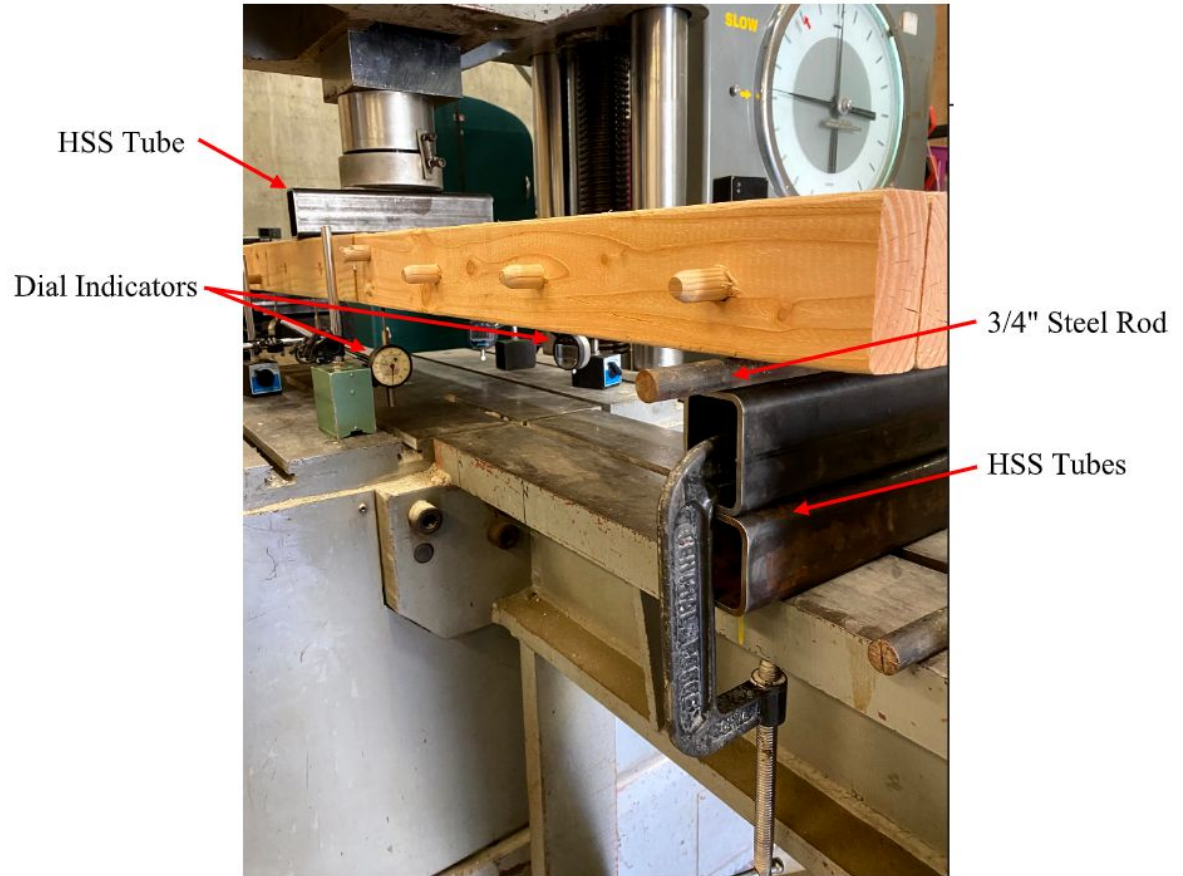
1\" Steel Bar

Dial Indicator



# Test Set-Up

Load Testing:



# Experimental Results





# Experimental Results





# Communication & Travel



# Communication

- Weekly Meetings

- Professional Practice
- Meeting notes

- Transition to Zoom

- Meetings
- Report

Meeting Notes: March 10, 2020

Meeting Notes: March 10, 2020

## SENIOR PROJECT MEETING NOTES

DATE: March 10, 2020

TIME: 12:00PM – 1:00 PM

LOCATION: Room 21-108B

PROJECT NAME: Dowel Laminated Timber Senior Project

### ATTENDEES:

NAME	POSITION	EMAIL
Dr. Craig Baltimore (CB)	Advisor	cbaltimo@calpoly.edu
Reiley Akkari (RA)	Student	rakkari@calpoly.edu
Bryan Garcia (BG)	Student	bugarcia@calpoly.edu
Sophia Looney (SL)	Student	slooney@calpoly.edu

### MEETING NOTES - DELIVERABLES:

- Test Set-Up
  - Should write out feet and inches in reports
  - Simply supported tests are known as Three-Point Tests in the industry
    - This loading configuration gives higher moments and deflections

### DELIVERABLES

ITEM NO.	NOTE	RP	DUE
1.0	Complete Simpson Scholarship	SL	3/17
2.0	Complete Test Set-Up for report	RA	3/17
3.0	Begin Working on Background Research of Report	BG	3/17

- 1.0) Finalize edits on pamphlet for Simpson scholarship application and apply to other scholarships that may come up.
- 2.0) Submit a finished version of the Test Set-Up for the report and send to CB for review to be discussed at next meeting.
- 3.0) Begin formalizing background research we conducted for the report. Ask teammates for review assistance along the way.

Please notify of any revisions, clarifications, or additions within 48 hours of receipt.



# Communication, cont.

- Fundraising
  - American Wood Council
  - Simpson Strong-Tie
  - Senior Project Scholarships
- Travel Plans
  - Organize Trip
  - Comm with Paolo



American Wood  
Council



# StructureCraft



RE: Cal Poly Senior Project - We would love your support!



Kam-Biron, Michelle <[REDACTED]>

Tuesday, January 21, 2020 at 9:21 AM

To: Sophia Demetra Looney

**From:** Sophia Demetra Looney <[slooney@calpoly.edu](mailto:slooney@calpoly.edu)>  
**Sent:** Monday, January 20, 2020 12:59 PM  
**To:** Kam-Biron, Michelle <[REDACTED]>  
**Subject:** Cal Poly Senior Project - We would love your support!

Hello Ms. Kam-Biron,

I hope this note finds you well.

My name is Sophia Looney and I am currently a fourth year student at Cal Poly SLO studying Architectural Engineering. I received your contact information from my senior project Advisor, Dr. Craig Baltimore. He spoke to us about your work at WoodWorks and how you could possibly be a wonderful resource to us. We understand that you have a breadth of knowledge of mass timber, ranging from fire-resistance design for wood construction to expertise on codes associated with timber construction. Being inspired by people like yourself, my fellow group mates and I decided to deepen our knowledge of mass timber through our senior project. Our senior project focuses on Dowel-Laminated Timber; we wanted to explore more about this fairly new mass timber product. We are planning to build our own sample of DLT and how ours can compare to industry standard. Specifically, we are making our own DLT using tools that we could presumably find in a developing nation, and how it compares to industry-fabrication and industry standards. In order to test the quality of our sample in comparison to industry manufactured produce, we will be using water to test the water retention of DLT, and the absorption patterns and volume of the water for each sample.

On behalf of our senior project group, I would love to ask for your support for our endeavors. We would be incredibly appreciative of any knowledge or monetary donation on behalf of WoodWorks. Your support will help us accomplish our goal and allow us to complete our senior project successfully and in a timely manner. We are grateful of your consideration and hope you find our project to be of interest. Dr. Baltimore shared with us that you attend Cal Poly as an ARCE, and our group is very impressed by your accomplishments especially with WoodWorks; it is transparent that your Cal Poly education was a catalyst in your success. Therefore, each of us understand greatly the extraordinary education we are receiving at Cal Poly, and want to further take advantage of all opportunities to grow our knowledge through our senior project with the support from you and Woodworks.

Thank you in advance for your consideration; we appreciate the time taken to acknowledge our endeavors.

I look forward to speaking with you soon.

RE: Potential Student Visit to StructureCraft



Paolo Balce <[REDACTED]>

Friday, January 24, 2020 at 12:33 PM

To: Sophia Demetra Looney

Cc: Bryan Ulises Garcia; Reiley A. Akkari

Hi Sophia,

Thanks for contacting us. My name is Paolo and I'm an estimator for the business development team at StructureCraft. I'll be your main contact from here.

Good to hear there's interest in DLT. I'd be happy to give you all a tour of our facility and answer any questions you may have regarding DLT or our company in general. When do you plan to travel up here?

Best regards,

**Paolo Balce**  
Business Development Estimator  
[REDACTED]

**StructureCraft Builders Inc.**  
D 778 820 0240  
[www.structurecraft.com](http://www.structurecraft.com)

**From:** Sophia Demetra Looney <[slooney@calpoly.edu](mailto:slooney@calpoly.edu)>  
**Sent:** January 22, 2020 10:43 PM  
**To:** Gerald Epp Jr. <[REDACTED]>  
**Cc:** Bryan Ulises Garcia <[bugarcia@calpoly.edu](mailto:bugarcia@calpoly.edu)>; Reiley A. Akkari <[rakkari@calpoly.edu](mailto:rakkari@calpoly.edu)>  
**Subject:** Potential Student Visit to StructureCraft

Hello Gerald,

My name is Sophia Looney and I am a senior at California Polytechnic State University in San Luis Obispo, California. We are majoring in Architectural (Structural) Engineering, and at our university, we have the opportunity to explore and research any topic

# Email Examples to Ms. Michelle Kam-Biron, Mr. Paolo Balce

# DLT

ARCE SENIOR PROJECT  
WINTER 2020

The group includes Reiley Akkari, Sophia Looney and Bryan Garcia. Our faculty advisor is Craig Baltimore, PhD, SE.

The purpose for our project is to explore DLT and its advantages and disadvantages as a new building material. We chose to focus on how DLT can be used as an option in developing nations, as toxins in glue-laminated timber can be harmful to the environment if not treated properly.



## OUR EXPERIMENT

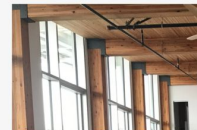
In addition, we traveled to the Pacific Northwest to visit the closest manufacturer of DLT, StructureCraft. The purpose of our travel was to learn more about DLT and how it is manufactured with industry practices and machinery.



DLT panel in construction



Reiley assmbling DLT panel



### Example of Simpson StrongTie Connection



### Single dowel connection

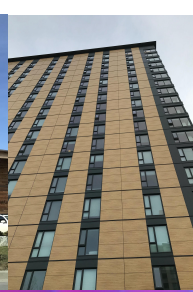
If you would like to support  
our project, please contact  
Sophia Looney at  
[slooney@calpoly.edu](mailto:slooney@calpoly.edu)

# Travel to Pacific Northwest

- StructureCraft
  - Tour of Facilities
  - Time with Paolo
- Brock Commons Tallwood Student Residence
  - Vancouver, BC
- Bullitt Center
  - Seattle, WA









# Conclusion

- Global considerations
- Placement of joints
- Experience with professionalism







Thank You!

