

Student Reports

Objectives

These reports are intended to give students an opportunity to explore some aspect of wood structures in more detail than is possible in the context of the lecture series. They are intentionally arranged to give sufficient latitude for the student to choose topics or areas of wood technology which will be of more particular interest to themselves. Through the class presentations, the other students are also given an opportunity to gain insight into different topics of interest in wood structures.

Options

Three options are suggested as types of studies that would be appropriate for the reports. These three are:

1. Case studies
2. Physical testing
3. Computer analysis

Other options are possible with approval from the instructor. Each group should gain approval from the instructor for a particular topic to avoid duplication.

Requirements

The studies may be performed in groups of 1 to 4. The expected product of the studies will depend on the size of the group.

1. One member class presentation
2. Two members presentation + (model or poster)
3. Three or four members presentation + model + poster

Presentation visuals (e.g. Powerpoint or model) are due with presentation. Posters are due at the end of the term.

Student Evaluation

Each student will also be required to fill out an evaluation for each presentation attended. Criteria for the evaluation will be:

1. Quality of work
2. Quality of presentation
3. Quality of additional visuals (e.g. models)
4. Relevance to topic (with regards to course)
5. Value to the class

General holistic rubric for an oral presentation

5 – Excellent

The student clearly describes the question studied and provides strong reasons for its importance. Specific information is given to support the conclusions that are drawn and described. The delivery is engaging. There is strong evidence of preparation, organization, and enthusiasm for the topic. The visual aid is used to make the presentation more effective. Questions from the audience are clearly answered with specific and appropriate information.

4 – Very Good

The student describes the question studied and provides reasons for its importance. An adequate amount of information is given to support the conclusions that are drawn and described. There is evidence of preparation, organization and enthusiasm for the topic. The visual aid is mentioned and used. Questions from the audience are answered clearly.

3 – Good

The student describes the question studied and conclusions are stated, but supporting information is not as strong as a 4 or 5. There is some indication of preparation and organization. The visual aid is mentioned. Questions from the audience are answered.

2 – Limited

The student states the question studied but fails to describe it fully. No conclusions are given to answer the question. The delivery and sentence structure are understandable, but with some errors. Evidence of preparation and organization is lacking. The visual aid may or may not be mentioned. Questions from the audience are answered with only the most basic response.

1 – Poor

The student makes a presentation without stating the question or its importance. The topic is unclear and no adequate conclusions are stated. The delivery is difficult to follow. There is no indication of preparation or organization. Questions from the audience receive only the most basic or no response.

0 No oral presentation is attempted.

Case Study

Option 1

Description

This option allows a detailed inspection of either an existing wood structure, material system or architect/engineer. Structure is to be studied on the level of complete systems as well as individual details. Subjects are to be chosen for their interest in terms of both structure and aesthetic, but with relevance to wood material.

Goals

- To become familiar with different wood structural systems
- To explore significant examples of wood applied in architecture
- To document the exploration and present it to the class

Procedure

- Form a group of 2 to 4 members
- Choose a subject for the case study. Suggestions are attached.
- Get your choice approved (to avoid duplicates)
- Research the subject.
- Prepare a short 10 to 15 minute presentation, which explains the structural significance of the subject. This would most likely be a short power-point presentation.
- The presentation can also include a physical model that illustrates either the system or some detail.
- Prepare a poster that summarizes the presentation – ca. three 11x17 sheets.

Both presentation and poster should have well illustrated graphic studies of form and structure that explain the architectural and structural concepts, and tectonic features of the building or project.

Graphic studies should include a general understanding of the layout of the building, computer modeling, physical models, and other diagrams that explain the structure.

The model can depict an important detail, structural concept, or entire system.

Considerations might include: structural system, construction details, finishes, transportation, erection, connections, weather proofing, location, economy, etc. and how these factors affect the choice of wood as a material and the structural system used.

Case Study Suggestions List

Materials

LVL application
Living structures
CLT (KLH)
Concrete Composite

SIP
Bamboo
Rustic Logs

Glulam
Plywood
Fiber Composite

Systems

Half-Timber Frame
Lever beams
Light frame
Grid Shells
Box-beams

Post-Frame
Timber Bridges
Stress Skin
Geodesic
Reciprocal Structure

Tensegrity
Truss work
Tree (branching) structure
Lamella
CLT

Architects/Engineers

Frei Otto
Ernst Giselbrecht
Blue sky architecture
Fielden Clegg Architects
Klaus Linkwitz
Thompson and Rose
Shimizu Arch. & Eng.
Simon Velez

Alvar Aalto
Fielden Clegg
Claus Mattheck
Jahan Nyren
Patkau Architects
Nikken Sekkei
Kajima Design (Izumo)
Andrea Frangi

Shigeru Ban
Hotson Bakker
E. Fay Jones
Jourda and Parraudin
Renzo Piano Building Workshop
Takao Doi (Silk Road Expo '88)
Green & Green
Peter Zumthor

Projects

SunnyHills, Japan
Kizhi Pogost Church
Horyu Temple, Japan
ATLAS-I, New Mexico

Tamedia Office Building
Tillamook Air Museum
Metropol Parasol, Seville
Solemar Bad Dürrhein

Superior Dome in Marquette
Community Church of Knarvik
Wood Innovation Center, Canada
Great Eastern Temple, Japan

Grid Shells:

Savill Gardens

Weald & Downland

Mannheim Multihall

High Rise Wood Systems:

Forté, Australia

Murray Grove, London

Treet, Norway

STAAD-Pro Analysis

Option 2

Description

This option involves the analysis of a more complex wood structural system. Systems which are beyond the scope of hand analysis can be better understood through computer analysis coupled with graphic post-processing that makes force flow and deflection modes more visible.

Goals

- To become familiar with different wood structural systems
- To gain further expertise in FEA
- To better understand the behavior of wood structural system
- To document the exploration and present it to the class

Procedure

- Form a group of 2 to 4 members
- Choose a subject for the analysis study. Suggestions are attached.
- Get your choice approved (to avoid duplicates)
- Model the system in STAAD under various loads.
- Prepare a short 10 to 15 minute presentation, which explains the structural significance of the subject. This would most likely be a short power-point presentation.
- The presentation could also include a physical model that illustrates either the system or some detail.
- Prepare a poster that summarizes the presentation. One sheet or two sheets max.

Both presentation and poster should have well illustrated graphic studies of form and structure that explain the structural concepts and analysis details.

Graphic studies should include still and animated images from the post-processing results. The model should illustrate the system or detail being analyzed.

Example Topics

half-timber frame	post-frame	Glulam frame
pole-frame (space truss)	bridges	panel structure
grid shells	lamella	tree (branching) structure
box-beams	strut & cable	lever beam
folded plate	surface shell	other CLT

Physical Testing

Option 3

Description

This option involves the physical testing of some smaller component or detail. Full size elements or details are developed and tested for stiffness and strength.

Goals

- To become familiar with the behavior of wood elements under load
- To gain expertise in physical testing
- To better understand the behavior of wood structural system
- To document the exploration and present it to the class

Procedure

- Form a group of 2 to 4 members
- Choose a subject for the test. Suggestions are attached.
- Get your choice approved (to avoid duplicates)
- Construct or procure a test sample of the element you wish to test.
- Develop a test plan, and test the piece.
- Record load and strain data. Make a video of the test.
- Prepare a short 10 to 15 minute presentation, which explains the structural significance of the subject. This would most likely be a short power-point presentation.
- The presentation should also include the physical piece that was tested.
- Prepare a poster that summarizes the presentation. Use between 1 - 3 11x17 sheets.

Both presentation and poster should have well illustrated graphic studies of test that explain the structural concepts and results. Graphic studies should include still and video (in presentation) images from the test.

Example Topics

Material

Glulam
SIP

LVL
Stress Skin

species tests in Fc, Ft, E
I-Joists

Details

gang nail
split ring shear
flexure joint

mortise and tendon
bolt bearing
shear panel

nailing
tension joints

System (model form or partial elements)

truss
box beam

shell
composite

plates
nail laminated plates or columns