

Lab Report : Testing of Wood

The goal of this lab is to help provide better understanding of the properties of wood. Four samples will be tested; two for compressive strength with the load parallel to the grains and two with the load perpendicular to the grains. This will enable the calculations of the modulus of elasticity and the maximum strength under compression for both loading parallel and perpendicular to the grain. The influence of grain direction and wood type, as well as failure mechanism can be identified.

1.0 Summary

- Briefly introduce the type of wood (i.e. Oak is a kind of hard wood, pine is a kind of soft wood), the type of tests and the number of specimens
- Table 1 summarizes the results obtained later from Table 4.

Table 1: Summary of Results

Wood Name	Wood Properties	Values
Oak	f_c (MPa)	
	E_c (GPa)	
	$f_{c\perp}$ (MPa)	
	$E_{c\perp}$ (MPa)	
Pine	f_c (MPa)	
	E_c (GPa)	
	$f_{c\perp}$ (MPa)	
	$E_{c\perp}$ (MPa)	

2.0 Test Set-up

- Describe the Following briefly.
1. Test machine and data collection method
 2. Test set-up of compressive tests (Parallel and Perpendicular to Grains) (Fig. 1)

3.0 Data Analysis

Table 2: Specimen Dimensions

Wood Name	Test Type	Specimen No.	thickness (mm)	Length L (mm)
Oak	Compression Parallel to Grain	Oak 1		
	Compression Perpendicular to Grain	Oak 2		
Pine	Compression Parallel to Grain	Pine 1		
	Compression Perpendicular to Grain	Pine 2		

Thickness refers to the width of the block.

- Describe what constitutes failure for wood under compressive testing. What is the nature of the failure.
- Mention briefly what differences can be seen between the properties of the hard and soft woods.

Table 3: Failure Loads

Wood Name	Test Type	Specimen No.	Failure Load (kN)
Oak	Compression Parallel to Grains	Oak 1	
	Compression Perpendicular to Grains	Oak 2	
Pine	Compression Parallel to Grains	Pine1	
	Compression Perpendicular to Grains	Pine 2	

Table 4: Wood Properties

Wood Name	Test Type	Specimen No.	Strength (MPa)	ϵ	E (GPa)
Oak	Compression Parallel to Grains	Oak 1			
	Compression Perpendicular to Grains	Oak 2			
Pine	Compression Parallel to Grains	Pine 1			
	Compression Perpendicular to Grains	Pine 2			

Strength is defined as:

$$f = \frac{P}{A} \quad (\text{Equation 1})$$

where P is the peak load and A is the cross sectional area of the block.

Strain is defined as:

$$\varepsilon_c = \frac{\Delta L}{L} \quad (\text{Equation 2})$$

where ΔL is the change in length of the specimen and L is the length. (Table 2)

The strain with load perpendicular to grains is defined as:

$$\varepsilon_{c\perp} = \frac{\Delta d}{d} \quad (\text{Equation 3})$$

where Δd is the change in diameter (width) of the specimen (Table 2) and d is the diameter (width) Table 2.

For modulus of Elasticity, refer to Lab #1, Equation #8

4.0 Plot Stress-Strain Curves

- Stress – Strain curves should be plotted in Figures 2-5, for each of the four specimens.
- Mention any significant discoveries.
- Make sure you normalize your data as you did in the concrete lab.

5.0 Description of Specimen Failure

- Include a Figure that shows the different ways wood can fail
- Mention how each of the specimens failed

6.0 Concluding Remarks

- Provide conclusions of the results and interpretation.