

FOEN-6230

Lab # 1 Deriving Lumber Properties for Design Purposes

September 20, 2002

Objective:

The objective of today's lab exercise will be to develop an understanding of the process involved in determining lumber properties suitable for design. We will also be able to observe the variability in the strength properties of lumber and the phenomena known as creep.

Summary:

We are going to determine the modulus of rupture (MOR) of several 2x4's and some LVL pieces. One group of 2x4's is made from Spruce lumber and another is southern pine. Each of the 2x4's and LVL pieces have been selected "randomly" from a local supplier. The lumber and LVL are from different grades. We will use a small testing machine to conduct a static bending test on each lumber specimen. During each bending test, we will collect force data and at the end of the test (i.e., when the piece fails), we will record the force at failure. Moisture content and dimensions for each lumber specimen will also be measured. After all data are collected, you will be able to calculate the MOR of each piece of lumber. Eventually these data can then be compared to the design MOR values listed in the NDS for lumber of this grade. It will be interesting to see how the data that we collect agree with the design values published in NDS.

Procedure:

1. Mark each piece of lumber with an identification number (1 through 5).
2. Measure and record the actual width and thickness of each specimen.
3. Measure and record the weight of each specimen.
4. Measure and record the moisture content of each specimen
5. Perform the bending test on each specimen.
 - a. Load each board on the supports.
 - b. Position the cylinder so that it is applying a small force on the board.
 - c. Move the cylinder on the testing machine downward until the board breaks and record the peak force.

Lab Results:

I would like for you to turn in a report for our lab exercise. The report should include a cover page, the objectives of the lab exercise, a brief summary of the exercise, a listing of the procedures, a results and discussion section, and a conclusion section. You should list any references that you used. You are encouraged to type your report. I suggest using a spreadsheet to perform the required calculations and graphs.

The following are required:

1. Include appropriate sketches of the testing apparatus in the procedures section.
2. List the data for each specimen (ID number, dimensions, weight, moisture content, force and deflection data).
3. Along with the data required above, calculate the section modulus, modulus of rupture and density of each board.
4. Plot a scattergram of MOR versus specific gravity for all of the boards.
5. Calculate the mean, standard deviation, coefficient of variation, and estimated fifth percentile of MOR, and SG.
6. Explain any discrepancies between the actual and nominal dimensions of the lumber.
7. Discuss the relationship (if any) between specific gravity and MOR.
8. Discuss any deficiencies in our testing procedures.