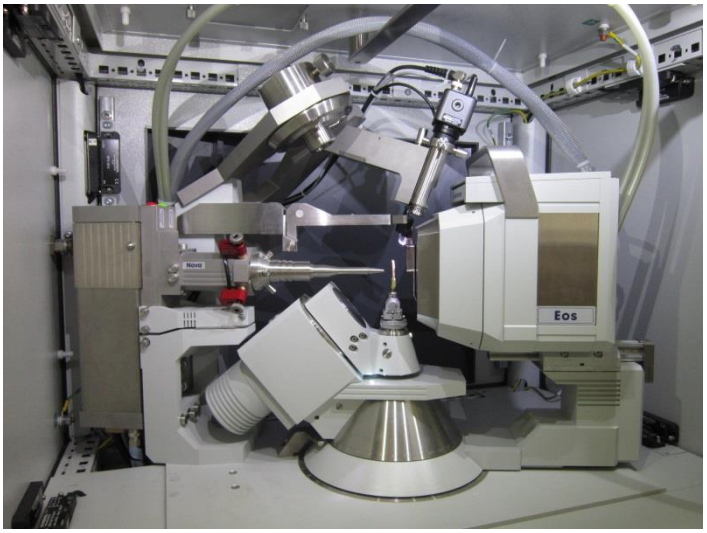
Report of measuring microfibril angle in INRA Champenoux Nancy



Report

March 2014

Financed by

Background

In order to meet the demand for forest products where the existence of the environment can still be maintained, in the future, wood will be taken from fast-growing types of trees grown in plant forests. The long term objective of this research work is to develop an innovative engineering technique to produce good quality of laminated veneer lumbers made of fast growing wood species for construction. Two laboratories (1 French - LaBoMaP Cluny and 1 Indonesian Forest Product Department of Bogor Agricultural University - IPB Bogor, Indonesia) propose to get over these technological obstacles altogether by the mean of a cooperative program performed with PhD students of the two countries. These countries meet the same concern regarding fast growing woods valorization but with quite different species involved.

Research work organized into 4 tasks through a collaborative research between IPB Indonesia and LaBoMaP Cluny. Task 1 : optimization of peeling parameter for douglas-fir, poplar, sengon and jabon; and Task 2 : determination of juvenile / mature transition age for the 4 species. Task 3 : impact of juvenile wood on LVL mechanical properties; and Task 4 : impact of lathe checks on LVL mechanical properties.

And for completing task 2, we need to measure microfibril angle (MFA) as one of the distinguished parameter to determine demarcation point between juvenile and mature wood. According to literature, xray diffractometer is a reliable instrument to measure MFA so that we decided to go to INRA Champenoux Nancy to measure MFA of poplar, douglas, sengon and jabon.

Journey report in INRA Champenaux Nancy

This short term scientific mission starts on Monday, March 17, 2014. We took wood samples in the form of discs (sengon, jabon and douglas fir) and veneers (poplar). Mr. Julien Ruelle, PhD, expert in wood anatomy characterization in Laboratory of wood quality, INRA, (figure 1c), spend time to discuss and to finalize the experimental protocol performed.

The total number of samples of sengon was about 51 samples, while jabon was about 61 samples. For poplar was 150 and douglas 156 samples. I measured all of the samples from 18-28 March, 2014.

Before measuring MFA by xray diffractometer, we needed to cut the samples into little pieces, for veneer was approximately 2cm (length) x 1 cm (width) x 0.3 cm (thickness). And for douglas, we needed to separate the samples between earlywood and latewood, so that the dimension of each sample was 3cm (length) x 1.5cm (width) x 0.5 (thickness). While for sengon and jabon, I cut every 1cm from pith to bark (since for sengon and jabon, there is no growth ring).

After samples were ready, we put the sample on the device that was for sample placement by nail or wax (like figure 1a), and then we had to adjust camera position before measuring

(figure 1b). The results of the measurements were computed to estimate the MFA. MFA of douglas fir was presented in figure 2.

The results will be discussed regarding the mechanical performances of the LVL made with the same woods. A scientific paper will be written to communicate the results of this study.

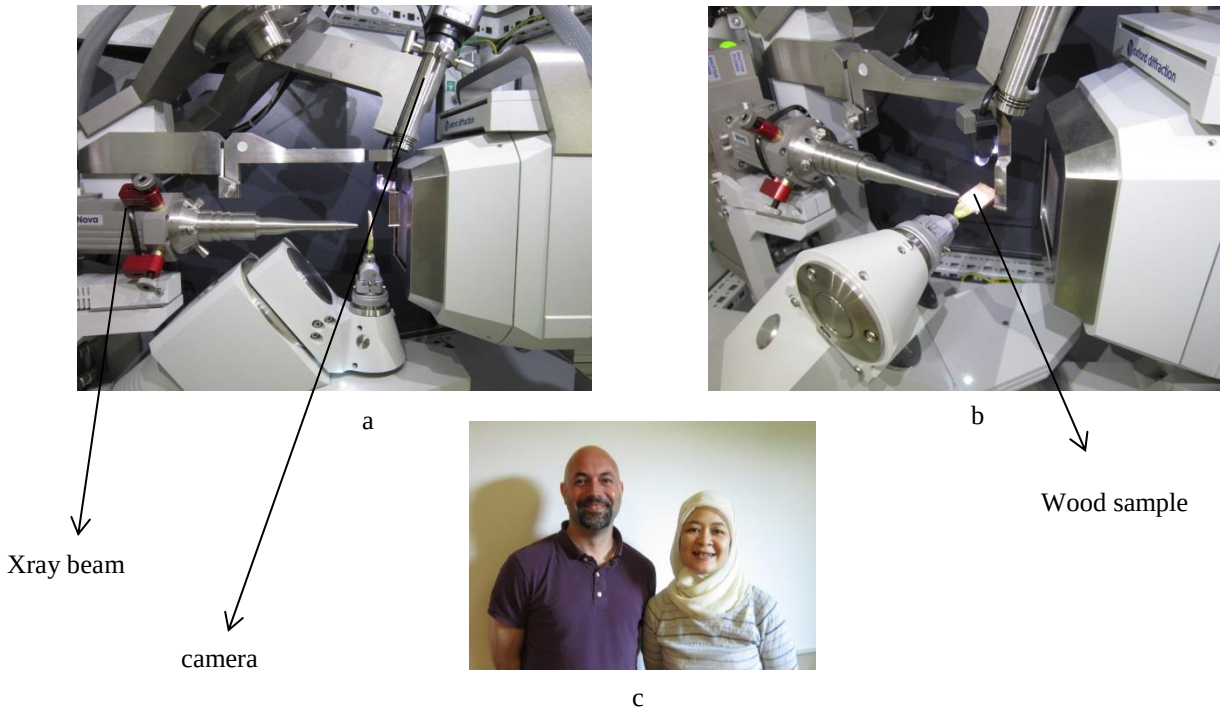


Figure 1. Placement of wood sample in Xray Diffractometre (a); Arrangement of camera postion before measuring MFA (b); and me with Mr. Julien Ruelle, PhD (c)

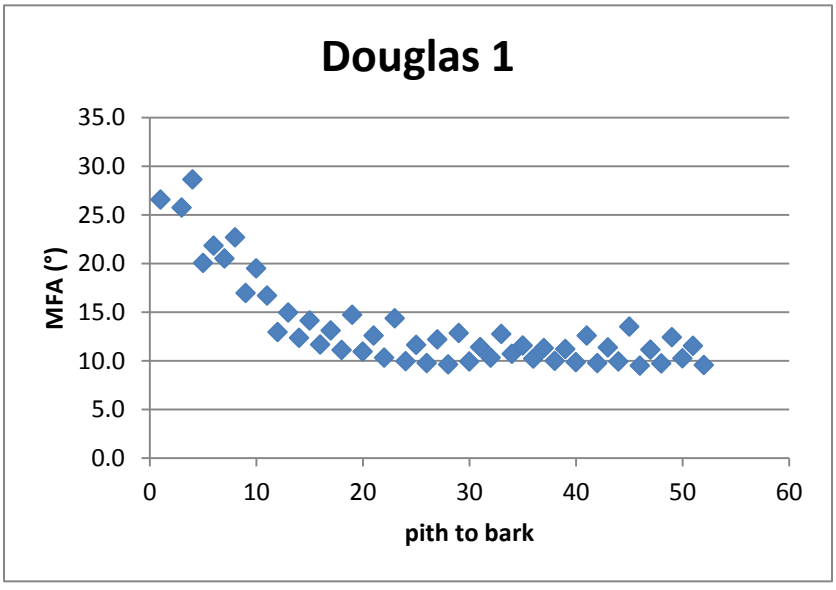


Figure 2. MFA of douglas fir