



## Evaluation of green veneer moisture content distribution and industrial moisture content sensors

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Author: Wang, Brad J.  
Dai, Chunping  
Xu, H.  
Groves, C. Kevin

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Abstract:

It is important to improve drying productivity since this process is the bottleneck in plywood production. To address this issue, we evaluated the veneer moisture content (MC) distribution and the accuracy of radio frequency (RF) sensors both in the laboratory and in mill trials in this study.

We analyzed the distribution of green veneer moisture content (MC) and density from sapwood to heartwood for lodgepole pine logs via veneer peeling in the Forintek's composites pilot plant. The results show that the MC distribution appears to be a dual-peak pattern both for heartwood and for sapwood. The position of the first peak is more consistent whereas the second peak varies more among logs. This information is useful for determining the proper number of green veneer sorts and the optimum cut-off MC level for each sort.

Readings of the radio frequency (RF) sensor are affected by veneer species, veneer density, veneer thickness, temperature, green veneer MC, grain angle, and distance between the sensor source and veneer surface. Of these variables, veneer density, veneer species and the distance are found to be the three main factors affecting the readings of the sensor. Based on the measurement results from different species, we conclude that the RF sensor is only suitable for measuring green veneer MC below 80%.

The correlation between readings of the sensor and green veneer MC varies from species to species. In general, this correlation could be improved using an exponential or a power equation. The readings of mill sensor are more inconsistent than those of the lab sensor for the heart sort veneer. The lab sensor underestimates MC for the heart sort veneer and overestimates MC for the sap sort veneer. However, the mill sensor overestimates in both positive and negative ways for each sort. To improve the accuracy of the readings, the sensor needs to be calibrated based on the species and veneer thickness, and the distance between the sensor source and veneer surface has to be kept as small as possible. However, this is not practical for the spruce, pine and subalpine fir (SPF) group since these species are not separated on a commercial basis.

We conducted three mill visits to: 1) measure the distribution of green veneer MC for different veneer sorts, and 2) assess the accuracy of current green veneer sorting. The results demonstrate that the accuracy of moisture sorting differs among mills and species, and the species mix like SPF generates larger MC variation within each sort. In general, the heart veneer sort is well done, but there is a significant overlapping between light-sap and sap veneer sorts. This indicates that the current industrial RF sensors cannot ideally sort higher MC veneer. The results also show that there is potential for more accurate green veneer sorting which would result in a 5% increase in drying productivity. This improvement would generate more than \$1 million in annual savings per mill.

Veneers - Moisture content

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