

**MOISTURE GRADIENT MEASUREMENT DURING
KILN DRYING OF RED OAK**

by

Hong-mei Gu

Audrey G. Zink, Chair

Wood Science and Forest Products

(ABSTRACT)

The key to improving drying quality and reducing drying time and energy consumption lies in understanding and controlling moisture movement during drying. As wood dries, strains and stresses develop as a result of restraints imposed by moisture gradients and differential shrinkage in wood. So accurately measuring the moisture gradient in wood during drying will be helpful to improving drying quality.

In this project, moisture gradients in red oak will be measured through four different techniques----bandsaw slicing, Forstner bit layering, flaking and razor blade slicing. The first two techniques are found in the literature. The last two are developed in this study. The results obtained with these four techniques were compared, and it was found that the newly developed techniques could get moisture gradients that were closer to the true value.

The thickness of the slice was assumed to affect measuring the moisture gradient because of the environmental influences. So a thickness series was tested with the two new technique----flaking and razor blade slicing. The results showed that there was no slice or flake thickness effect on the moisture gradients. And an optimum slice and flake thickness was determined for the wood industries and research studies.

Finally, the directional effect on transverse moisture movement during kiln drying was examined through measuring moisture gradients in the tangential and radial directions of wood. The results showed that moisture moved slightly faster in the radial direction than in the tangential direction during kiln drying and the moisture gradients in the tangential direction were slightly steeper than those in the radial direction.

Acknowledgment

I would like to start my acknowledgment to Dr. Audrey G. Zink, Professor Robert L. Youngs and Professor Fred M. Lamb. My sincere thanks are to Dr. Zink, who contributed her time to the completion of this study and gave me constant encouragement, support and assistance throughout the whole project; to Professor Youngs, who gave me an insightful suggestion and much guidance for this research direction; to Professor Lamb, who made valuable comments about the experiments conduction.

I would like to thank Carlile H. Price for the technical assistance during the whole testing procedure, and appreciate for Kenneth L. Albert with helping the log sawing.

Also thanks are due to Professor Richard G. Oderwald for some of the statistical analysis guidance.

Finally, I will thank USDA NRI CSRS project providing the financial support for the completion of this project.

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