

Determination of Moisture Content of Hard Maple Lumber using Microwave Drying

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The standard method of determining the moisture content of lumber is to oven dry the sample in a convection oven according to the American Society for Testing and Materials (ASTM) standard D4442. It takes several hours for the lumber to reach an oven dry state. Microwave heating is being explored as an alternative method. There is no standard microwave heating procedure available for lumber. A microwave drying procedure is proposed for hard maple lumber. The procedure was also tested to analyze cross-species suitability using spruce and white oak.

The proposed procedure is not dependant on initial moisture content and was found effective for a range of moisture contents from dry (6 percent) to green (above 30 percent). The procedure was developed using different microwave power levels. The comparable oven dry weights of the maple samples were obtained approximately 25 times faster by the microwave method than by the standard convection oven method. Analysis of the accuracy of the results shows the moisture content values consistently in the range of ± 1 percent and often the error was much less. For spruce, the test results were obtained quickly and the final moisture contents were determined within the $\pm 1\%$ range. However, the procedure was not found to be effective for white oak and further testing is recommended.

The procedure for hard maple lumber and spruce is straightforward and easy to follow, can be completed in less than one half of an hour and requires no sophisticated lab equipment. This procedure for determining moisture content could be easily adopted for individual use at this time and with some further testing, depending on the accuracy required, could also be put to use for industrial purposes. Should this procedure be accepted, it will provide a base to develop a standard microwave heating and drying method for lumber.