

Determination of Moisture Content of Wood using Ultrasonic Pulse Velocity

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Wood is one of the conventional materials still used in many engineering applications. As a natural material, it is subjected to dynamic property variations. One of the major reasons for the property variation of wood is the moisture absorption. The main aim of this research is to estimate the degree of decay in the compressive strength of selected wood types against the amount of moisture using ultrasound waves. Teak (*Tectonagrandis*), a hardwood and Pine (*Pinusthaeda*), a softwood are two types of wood which are commonly used in Sri Lankan wood industry. Samples of each wood type were kept for moisture absorption and the ultrasonic pulse velocities were measured in each sample. A 54 kHz normal probe was used. Through transmission technique was carried out in longitudinal and transverse directions. The corresponding compressive strength was also tested for each moisture level in the defined directions.

In the transverse direction, ultrasonic velocity and compressive strength showed relatively lower values than those in the longitudinal direction. The ultrasound velocity was found to drop with the increase in moisture content. The rate at which the velocity drops changed at a particular moisture content. It was noted that this moisture content is the Fiber saturation point (FSP) of the wood tested. This phenomenon is common for both the wood types in both the directions. The fiber saturation point of each sample was confirmed with DSC (Differential Scanning Calorimetric) analysis.

The established relationships can be used to estimate the compressive strength of wood nondestructively for a known moisture content.

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