

Trying to dry using High-Frequency Electric Current

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Among the many interesting topics in the field of Wood Science and Technology is a fascinating story about research and development on drying wood products with high-frequency electric current. Historically, it can be traced back over decades. Heat transfer to and evaporation of moisture from wood may be accomplished with high frequency current depending on its dielectric properties. Because wood is generally heterogeneous, these properties vary not only with the frequency of the current and the field orientation, but also with the moisture content, temperature, and density of wood.

Research on this technology has covered many products from paper and veneer to lumber and heavy timbers. Much emphasis, however, has been placed on wood species and/or products with larger dimensions that are difficult or impossible to dry when using conventional drying methods. The advantages were found to be rapid and fairly uniform heat transfer often to solidly stacked timbers, very high drying rates, and avoidance of significant case-hardening and oxidative discoloration of the wood.

During the last two decades, the development focused mainly on drying lumber in vacuum kilns using dielectric heating, often termed high-frequency/vacuum drying. It has been justified economically on the basis of increased throughput and higher quality. Existing industrial installations provide a positive picture for higher value products. The economics should improve with advances in available equipment, better basic understanding and more practical experience with operating industrial units. The combination of high-frequency/vacuum drying with other systems, such as moisture leveling after primary drying or pre-heating prior to the high-frequency/vacuum step, hold promise for further technical improvement.