

MICROWAVE PRECONDITIONING TO ACCELERATE SOLAR DRYING OF TIMBER

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Wood drying is essential for preparation of this natural resource for practical applications. Solar drying can reduce drying costs and energy consumption. There are many potential models to describe the drying process. However, most models confirm that the tortuosity of the moisture transport path is an important control parameter during the diffusion-controlled drying process. Microwave heating equations, which have been presented elsewhere (Brodie, 2003; 2004), suggested that microwave induced thermal runaway rapidly generates steam in moist wood. The resulting internal pressure selectively ruptures the wood structure creating radial pathways through which moisture may readily move, as described by Torgovnikov and Vinden (2003).

Subsequent experimentation in a solar kiln, specifically designed and evaluated for this project, resulted in a 17% reduction in drying time for microwave treated *Populus alba* samples, compared with untreated samples dried in the solar kiln at the same time. A second experiment in the solar kiln reduced drying time for microwave treated *Eucalyptus regnans* samples by 33 % compared with untreated samples dried in the solar kiln at the same time. These reductions in drying time are attributable to a combination of wood modification and an initial moisture loss due to microwave treatment.

REFERENCES

- Brodie G., 2003, Microwave heating in slabs, cylinders and spheres of agar gel, In *9th International Conference on Microwave and High Frequency Heating*, Ed. Binner J., Loughborough University Press, pp. 253-256
- Brodie, G. 2004. Microwave modification of wood properties, In: *The Encyclopedia of Agricultural, Food and Biological Engineering*, Ed. Heldman, D. R., New York: Marcel Dekker
- Torgovnikov, G. and Vinden, P., 2003, Innovative microwave technology for the timber industry, *Microwave and Radio Frequency Applications*, Eds. Folz, D. C., Booske, J. H., Clark, D. E. and Gerling, J. F., The American Ceramics Society: Ohio, pp. 349-35