

## From eucalyptus to elastic gridshells

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### Abstract

Elastic timber gridshells are built by bending small cross-section, long and good quality timber laths on site to the desired shape. This procedure enables double curvature structures of great aesthetic appearance and high structural efficiency. Despite their interest, few structures of this type have been built since the first realizations due to important scientific and technical barriers, such as the complexity of design methods to determine the final geometry, the few studies regarding the stress relaxation in curved timber laths, and the lack of research on numerical models verified by full-scale tests.

*Eucalyptus globulus* is a hardwood species with high mechanical performance and good natural durability, but it is usually not intended for building structures. The main use is as raw-material for the wood pulp industry. In this paper, research carried out to reduce the aforementioned barriers using eucalyptus wood for application in gridshells is described. Studies on the mechanical characterization of the material, the short and long-term active bending behaviour, and the full-scale test and numerical model of a gridshell prototype are presented. The parametric algorithms for the design of a recently built 24m long gridshell as well as the most relevant structural aspects are also shown, which demonstrates the great potential of eucalyptus for gridshells.

