

SIMULATION OF MECHANICAL BEHAVIOR OF SANDWICH PANELS WITH DENDROLIGHT® CELLULAR WOOD MATERIAL CORE

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In order to introduce a new type of sandwich panels with DendroLight® core a special attention must be paid for development of design practice capable in detailed representation of mechanical behaviour for cellular wood structure. A validation between detailed cellular core finite element analysis and experimental tests in bending and compression should lead to evaluation of design procedure for engineering design praxis [1]. Moreover computational time consumption makes it impractical to rely on the FE analysis exclusively, thus requiring a simple however reliable design tools and guidelines. The aim of this research is to create finite element model of sandwich panel with DendroLight® core, to match the mechanical behaviour of experimental bending and compression tests. Commercially available ANSYS FE code with parametrical inputs and shell elements has been selected for particular task. Transverse isotropic wood mechanical properties were assigned for a cellular wood frame and corresponding properties for plywood or MDF (medium density fibreboard) cover skins.

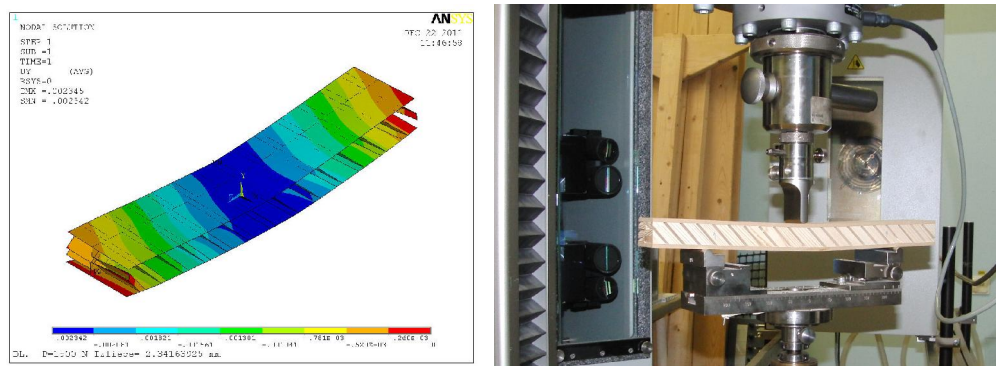


Fig. 1. Sandwich panel model and experimental 3-point bending test set up.

Special attention has been devoted to experimental testing of DendroLight® core structure and sandwich application. Bending and compression tests were performed on ZWICK Z100 testing machine. Bending set-up has been used to test sandwich beams with dimensions of 30x50x300 mm (Fig. 1). Compression tests were performed on specimens with dimensions 40x200x200 – according to EN789 standard [2]. For recording the strain distribution during the tests, the strain gauges alongside the non-contact optical measuring system ARAMIS has been used. Obtained accuracy of computer simulation model do not exceed 20 % scatter comparing with experimental results within the elastic zone. Taking into account original scatter of wood mechanical properties it may be concluded as good basis for scaling up and delivering the design guidelines for the sandwich panel application with DendroLight® core.

1. Zenkert, D. *The Handbook of Sandwich Construction*. London, EMAS Publishing, 1997.
2. EN 789:2004. *Timber structures. Test methods. Determination of mechanical properties of wood based panels*. European Committee for Standardization (CEN), Brussels