Περίληψη Διπλωματικής Διατριβής Μεταπτυχιακού Διπλώματος με θέμα :

Compression bending test mechanism for plywood-fiberglass composites. Encoding complex 3d form into flat 2d strips, through fiber orientation and layers count distribution

A compression bending test mechanism has been developed to measure and document the bending properties of plywood-fiberglass composite slender beams, employing Tracker, a digital video analysis and modelling tool and Grasshopper, a graphical algorithm editor for Rhino 3d. Fiberglass is distributed along planar plywood strips, in one or more layers, in four warp-weft fiber directions of 0, 30, 45 and 60 degrees. The deflections, forces and geometry of the bending tests are analyzed and classified per case, in order to derive the bending modulus, the proportional limit and the minimum bending radius of various plywood-fiberglass layout schemes. The results are embedded into K2Engineering, a structurally calibrated extension of Kangaroo2 grasshopper plugin, which is a 3DOF Dynamic Relaxation interactive simulation engine. K2engineering offers direct input and output of structural data that define the resulting shape and can be used to evaluate its structural performance respectively. This enables a unified, multiscalar materially informed form finding process, where the final geometry is approximated according to the local material specifications at a macro, meso and micro scale. General dimensions, i.e. width length and thickness, the number of fiberglass layers and the orientation of wood grain and glass fibers respectively, along with the resin formulation and the chosen boundary conditions can output a variable stiffness strip, that when bent, converges into a non-symmetrical shape of variable curvature without the need of a secondary support system.