

# The Effect of Hygroscopic Design Parameters on the Programmability of Laminated Wood Composites for Adaptive Façades

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**Abstract.** Typical adaptive façades respond to external conditions to enhance indoor spaces based on complex mechanical actuators and programmable functions. Hygroscopic embedded properties of wood, as low-cost low-tech programmable material, have been utilized to induce passive motion mechanisms. Wood as anisotropic material allows for different passive programmable motion configurations that relies on several hygroscopic design parameters. This paper explores the effect of these parameters on programmability of laminated wood composites through physical experiments in controlled humidity environment. The paper studies variety of laminated configurations involving different grain orientations, and their effect on maximum angle of deflection and its durability. Angle of deflection is measured using image analysis software that is used for continuous tracking of deflection in relation to time. Durability is studied as the number of complete programmable cycles that wood could withstand before reaching point of failure. Results revealed that samples with highest deflection angle have least programmability durability.

**Keywords:** Wood, hygroscopic design, lamination, deflection, durability, adaptive façades.