

Computational Modeling of Perpendicular to Grain Stress in a Non-Standard Glulam Beam

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Abstract : This paper focuses on the analysis of tensile stresses perpendicular to the grain in simply supported beams with different geometry made of glued laminated timber. Two types of beams are considered: standard double-tapered beams described in Eurocode 5 and non-standard glulam beams with a flattened apex. The beams are analyzed using two methodology approaches: a code design verification method and a finite element method (FEM) in terms of the linear theory of elasticity with plane stress assumption. The performed analyses proved that both methodologies lead to consistent results in case of standard glulam beams and therefore, the FEM can be used in case of non-standard structures, which are not included in Eurocode 5. Moreover, the FE analysis of the glulam beam with a flattened apex showed that it can be treated as a structure with two apex zones.

Keywords : double-tapered beams, finite element analysis, glued laminated timber, perpendicular to grain stress

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