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Production feasibility and performance of carbon fibre reinforced glulam beams manufactured with polyurethane adhesive

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Abstract

Wood is a structural material traditional and modern at the same time. It can be used as solid timber or combined with adhesives to form engineered wood products with enhanced mechanical properties, opening several opportunities for the development of the wood building sector in the construction industry. Here, the feasibility of producing glulam beams reinforced with carbon fabric applied using mono-component polyurethane glue was analysed. The same adhesive was utilized during beam manufacturing; thus, carbon-reinforced elements were produced with a unique assembling procedure. Unreinforced glulam beams were compared with strengthened elements; the factors analysed were the thickness of the carbon fabric and the adhesive type used at the fabric-timber interface, comparing the polyurethane adhesive with an epoxy resin. Both bending tests and numerical modelling have been performed in the study. Tests showed that the general performance of the strengthened elements with