



Delamination Detection in a 90-Year-Old Glulam Block with Scanning Dry Point-Contact Ultrasound

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Summary:

Glued laminated timber (glulam) is known in timber constructions since more than 100 years. Glulam members can delaminate due to aging and excessive changes of temperature and humidity. This results in significantly reduced load bearing capability of the affected structural members. This contribution focuses on the ultrasonic point-contact inspection of gluing plane delamination as a nondestructive method. Ultrasonic measurements on a section of a 90-year old roofing glulam member are presented. The results are compared with manual detection and evaluation of delamination with a feeler gauge, with X-ray computed tomography analyses, and with numerical simulations. Appropriate data evaluation of the mechanized ultrasonic results allows the determination of material separation that are deeper than 20 mm in the signature of the surface wave and large-scale delamination (> 80% of the complete bonding width) in the back-wall echo. Numerical simulations based on the finite-difference time-domain method shed light into the details of the wave propagation and support the experimental findings.

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Resource Link

<http://doc.rero.ch/record/295320/files/hf-2012-0202.pdf>