

Influence of Different Gluing Factors on the Bonding Performance of Glued Laminated Timber Made from European Beech

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Executive Summary

Various scientific investigations have been conducted to pave the way for European Beech as material for glued structural products. Beside the determination of strength properties of Beech timber, the interest was directed towards the assessment of the bonding performance under structural aspects using assessment methods according to European standards designed for glued softwood elements. Delamination tests are a proved and tested method to indicate the durability of the bond line. Different authors reported about delamination tests on Beech timber with and without red heartwood. In many cases, specimens showed insufficient results and did not pass the currently required limits concerning the maximum allowed delamination rate. Therefore, the suitability applying this test to hardwoods like European Beech, is discussed intensely.

The objective of this study was, to find out to what extend the delamination could be reduced by varying specific selected gluing factors. For that reason, specimens bonded with a Melamine-Urea-Formaldehyde have been investigated by varying lamella thickness, closed assembly time, pre-treatment of lamellas and use of a coupling agent. The assessment was carried out under consideration of following macroscopic wood features: growth ring angle and thickness as well as red heartwood amount on the gluing surface. The results showed sufficient delamination results for those elements, which were glued from lamellas with a thickness smaller than 30 mm. The most effective

variant leading to low delamination was of small sized, and edge-grain lamellas bonded by an extended closed assembly time. The use of a coupling agent showed also significant reduced delamination.

Keywords: European Beech, glueability, adhesive, delamination, bonding