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Edited by Susan LeVan-Green

Overall General Chair*: *Eve Haviarova, Purdue University, USA

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Evaluation of NHLA Graded Yellow-Poplar Lumber Regraded for Structural Use in CLT Panel Production

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Abstract

The current cross laminated timber (CLT) standard in North America (ANSI/APA PRG 320-2018) restricts the use of hardwoods. For producers within the Appalachian Region, with a large percentage of hardwoods, this restriction limits the use of locally supplied lumber for CLTs. An additional hinderance is that most hardwood lumber is graded in respect to appearance following National Hardwood Lumber Association (NHLA) grading rules. Lumber used in structural purposes, however, requires grading system that evaluate defects in relation to mechanical properties. For example, Liriodendron tulipifera (yellow-poplar) can be structurally graded following North Eastern Lumber Manufacturers Association (NELMA) grading rules. Further complicating the issue, the processing steps vary between lumber produced for NHLA versus structural grading. Therefore, the objective of this study was to evaluate differences in lumber grades and quantify the influence of additional machining steps on yellow-poplar lumber prepared for CLT panels. Eight packs of dry, rough-cut, 17/16" yellow-poplar lumber with NHLA grades of "2 and below" (NHLA Grade 2A, 2B, 3A, and 3B) were obtained. The lumber used was of random width, but within a range of 6 1/4 inches to 7 3/8 inches. The lumber was graded following both NHLA and NELMA grading rules before and after processing. The processing consisted of ripping to a final width of 6-inches and surfacing both faces to achieve a final thickness of 7/8-inch. Information on which defect kept the lumber from achieving a higher grade (i.e., limiting defect) was determined. Results indicated that lumber processing considerably influence the grade, as chi-square tests showed a statistically significant difference between the lumber grade (in both systems) prior to and after processing (NHLA, 268.61>12.59 X25% and NELMA, 140.97>7.81 X25%). In relation to NELMA grades, analyses of prior and post processing showed an increase of Select Structural and lumber that did not meet grade (i.e., below grade). The most common defects were knots (46%) followed by splits (29%), wane (7%), and shake (7%). Ripping to final width showed two main qualitative results. When the defect was in the edge areas, the defect was removed and boards achieved higher grades (e.g., Select Structural). However, when defects were located in central areas, the board overall surface area decreased and the defect area (as a percent) increased, thus decreasing the board grade. To truly quantify these results, further investigation is required with digital image comparisons for prior

to and after processing. In respect to NHLA vs NELMA grading, the results showed for processed lumber graded as "2 and below", 56% of the boards achieved a NELMA structural grade. The lumber met the following NELMA grades: 12% Select Structural; 7% No. 1; 19% No. 2; and 18% No. 3. The remaining 44% were below grade. In conclusion, a majority of yellow-poplar lumber sawn and graded for appearance possessed structural attributes required for use in the production of CLT panels. This finding suggests that there is potential value in re-grading/classifying traditionally processed hardwood lumber (in particular, yellow-poplar) for structural grades.

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