

Use of Adjacent Knot Data in Predicting Bending Strength of Dimension Lumber by X-Ray¹

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ABSTRACT

In a previous study, the knot depth ratio (KDR) evaluation method was proposed to quantify the area of knots in a cross-section. That study reported that bending strength can be predicted by KDR analysis. However, the KDR model did not take into consideration the additional strength reduction caused by adjacent knots. It was found that the prediction of lumber strength was improved when adjacent knots were taken into consideration. Analysis using the KDRA (KDR adding knots) model revealed that the optimum cross-sectional interval, an input variable, is directly affected by knot size parallel to lumber length (KSPLL). KSPLL depends on the sawing method and log characteristics, and for species containing large knots, the cross-sectional interval is likely to be extremely wide. This can cause several adjacent small knots to be excluded from the analysis, requiring modification of the KDRA model algorithm. This modification resulted in improvement in the precision of the strength prediction, although the input variable of the cross-sectional interval was not used. The R² values obtained using this method were 0.60 and 0.56 for Japanese larch and red pine, respectively.

Keywords : *Knot depth ratio, X-ray, Knot cluster, Bending strength, Grading*

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