

Potential Dimension Yields From Direct Processing

The conversion of logs into dimension parts has conventionally taken two steps: First, logs are sawn into lumber and the lumber is marketed according to standard National Hardwood Lumber Association grades; then the lumber is dried and processed into dimension parts in a dimension mill or a rough mill associated with a furniture or cabinet plant.

As the price of timber increases and environmental legislation limits harvestable log volumes, however, the process of converting logs directly into dimension parts needs further exploration. Direct processing converts

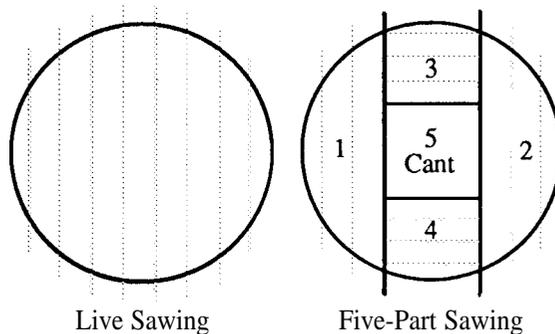


Figure 1. Live versus five-part sawing.

logs directly into rough green dimension parts without the intermediate steps of lumber manufacturing, grading, trading, shipping and drying. A major attraction of direct processing is that it can produce high-value dimension products from lower-grade logs.

Researchers Wenje Lin, D. Earl Kline and Philip A. Araman recently published results of a study they undertook to determine the potential cutting yield and value recovery of dimension products attainable directly from hardwood logs. In particular, they estimated recovery from Grade 2 and 3 red oak logs, and the effects of various processing configurations and cutting bills on yield and value.

The study compared two patterns for sawing logs into flitches (live and five-part sawing (Fig. 1)); two commonly used sequences for cutting flitches into rough dimension parts (rip-fret and crosscut-first); and three cutting bill requirements (short pieces, long pieces, and mixed). The ranges of results given here represent the best and the worst cases attainable with the different possible combinations of variables.

High-Grade Logs Yield More Volume...

The average scaling yield (the ratio of board foot volume of rough green dimension parts to the scaled board footage of the logs (International 1/4-inch)) ranged from 57.8 to 78.5 percent for Grade 2 red oak logs and from 52.3 to 76.6 percent for Grade 3 logs. Overall, 7 percent more dimension yield can be realized from Grade 2 logs than Grade 3 logs.

High-Grade Logs Yield More Value...

In terms of board feet (BF) of input, Grade 2 logs produce \$1.34 to \$1.65 in dimension part value for every board foot of log input, while Grade 3 logs produce \$1.06 to \$1.37 in product value for every BF of log input.

But, Low-Grade Logs Give Best Return

On the basis of log value, however, the tables are turned. For every \$1.00 in value of Grade 2 logs used for raw materials, from \$3.62 to \$4.45 worth of dimension parts can be produced. Every \$1.00 spent on Grade 3 logs, on the other hand, will yield from \$8.82 to \$11.39 worth of dimension parts. So, although Grade 2 logs average 24 percent greater value recovery than Grade 3 logs on a log volume basis, Grade 2 logs average 60 percent *less* value recovery than Grade 3 logs on a log value basis.

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Direct Processing

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Effect of Processing Configuration

The two sawing patterns (live and five-part) and two cutting sequences (rip-first and crosscut-first) produced four possible processing configurations. For both Grade 2 and 3 red oak logs, on both the bases of per BF log input and per dollar log input, the combination of live sawing and rip-first achieved the highest value recovery. Although the live sawing and crosscut-first combination actually produced higher volume, ripping first produced longer (more valuable) cuttings, thereby offsetting the lower volume yield.

Effect of Cutting Bill

In general, the longer the required cuttings, the lower the cutting yield. In this study, cutting bills with longer cuttings resulted in up to 20 percent less part yield than those which allowed mixed cutting lengths (this was especially true with Grade 3 logs).

Based on raw material costs and return on raw material investment, direct processing appears more profitable for processing Grade 3 logs than Grade 2 logs. Grade 3 logs can yield over \$11.00 in dimension parts for every dollar in raw material costs. The combination of live sawing and rip-first cutting can provide the highest value recovery among the sequences tested. Combining longer and shorter cuttings in a production run will help maximize the value from given logs, especially Grade 3 logs. (Source *Forest Products Journal*, September 1994.)

Copies of the journal article are available from NHLA. 

