

Potential Advantages of Curve Sawing Non-Straight Hardwood Logs

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Curve sawing is not new to the softwood industry. Softwood sawmill managers think about how fast they can push logs through their sawmill to maximize the yield of 1x and 2x lumber. Curve sawing helps mills maximize yield when sawing non-straight logs.

Hardwood sawmill managers don't want to push logs through their sawmills, because they want to maximize lumber value and not volume yield. Value maximization requires decisions at the headrig, resaws, edgers, and trimmers. Poor decisions equal losses in revenue. We will discuss a way to do both on non-straight logs.

USDA Forest Service and Virginia Tech scientists have been investigating potential benefits of processing non-straight hardwood logs and smaller diameter roundwood through curve sawing systems similar to those used by softwood mills, also known as "sweep sawing." The lumber and cants are sawn parallel to the sweep or pith of the logs.

Advantages of curve sawing are increased lumber recovery and sawing accuracy for small-diameter logs. See "Curve sawing performance evaluation" by S. J. Wang, B. D. Munro and D. R. Giles in *Forest Products Journal* 42(1): 15-20.

Resulting lumber should also be longer and have straighter grain as you are sawing along the grain and not across the grain. This can help reduce warp. Plus, hardwood customers would prefer a straighter grained product.

In "Drying Hardwood Lumber," Technical Report FPL-GTR-118 for the USDA Forest Service by J. Denig, E.M. Wengert and W.T. Simpson, curve sawn lumber is less likely to develop bow and twist than lumber sawn at various angle to the bark.



Clockwise from top: Some curve sawing results; cant going into curve saw; product coming out.

Investigations into curve sawing for hardwoods included:

- A study of curve and straight sawing low-grade hardwood logs
- A look at drying curve sawn hardwood lumber
- A study to determine the percentages of logs in sawmill log yards that should be curve sawn instead of straight sawn
- A further look at drying curve sawn lumber and rough mill processing yields when processing the lumber to parts.

In "Effect of curve sawing small diameter hardwood sawlogs on pallet part yields" by P. C. Hamner, M.S. White and P. Araman, to be published in the *Forest Products Journal*, we compared the performance of curve and straight sawing of small diameter low-grade hardwood logs with three levels of sweep.

These were long pulp quality curved logs. We used a gang frame saw for the curve sawing of the hardwood logs at a softwood sawmill. The logs went through a circle scrag headrig prior to the gang frame saw. Some extreme sweep logs did not process through the scrag. The frame saw is slow, but it allows an operator to cut the log following most of the sweep. We had some logs with double sweep. This test was very encouraging.

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We also conducted drying tests on these materials. The main objective was to determine the effect of curve and straight sawing, and varying amount of log sweep in small diameter low-grade hardwood on resulting bow and crook in the manufactured lumber after drying.

Promising lumber drying results are reported in “Effects of Sawing Pattern and Sweep on Warp of Oak, Sweetgum and Yellow-Poplar Lumber from Low-grade Logs” by Deomano, Edgar and Araman in *Forest Products Journal*. The lumber flattened in the stacks and stayed flat through the kiln drying.

We then visited sawmills to measure the straightness of logs at hardwood sawmills. In our 2003 study, out of almost 2000 logs measured, more than one-third had excessive yield reducing sweep. The results are summarized in Table 1. A complete article will be published in the *Forest Products Journal* by Peter Hamner, Mark White and Phil Araman.

The log survey results suggest logs with excessive sweep should be cut on a side set of equipment with a scrag headrig followed by a curve saw. Several equipment options are available. Another option is to replace a current gang edger with a curve sawing edger.

Our next study will be done on normal sawmill logs at a traditional hardwood sawmill. We will determine the recovery of curve versus straight sawn lumber and cants from sawmill logs with excessive sweep. We will determine log yield, lengths of lumber produced, and handling problems.

We will also analyze the drying of curve sawn and straight sawn lumber from excessive sweep logs and determine the yield differences when the lumber is converted to flooring or dimension stock. We hope to complete this research and report on it later this year.

Curve sawing should work in hardwood mills. We are trying to provide the information to help you make an informed decision to curve saw or not to curve saw.

Look at the potential from our earlier studies. Even half of this recovery would make it very enticing!

2/3 - considered straight

Sweep Deduction Category	# of logs	% of logs	Log Length (ft.)	Log Diameter (in.)	Sweep (in.) (12 ft. basis)	Sweep Deduction (%)
0% to 5%	1166	68.8%	12.5	14.8	0.7	0.5%
5% to 10%	216	12.8%	11.6	15.2	3.0	7.0%
10% to 15%	147	8.7%	11.6	14.5	3.9	12.3%
15% to 30%	136	8.0%	11.3	14.2	5.5	20.5%
> 30%	29	1.7%	12.0	12.9	7.4	38.9%
Total	1694	100.0%	12.2	14.7	1.7	4.6%

Avg. = 13%

Table 1: Sweep summary of study at eastern hardwood sawmills. Nearly one-third of lumber showed excessive sweep.

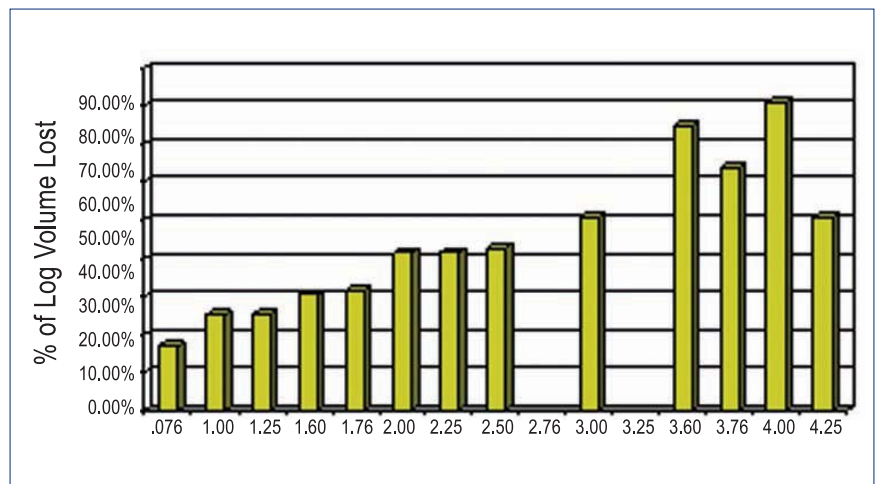


Table 2: Average percentage of volume lost by straight sawing versus sweep in inches (our estimate).

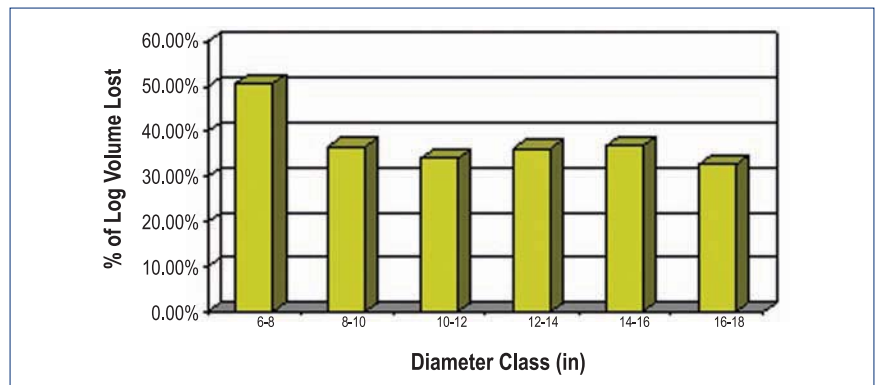


Table 3: Average percentage of volume lost by straight sawing versus diameter.