

FURNITURE CUTTINGS MADE FROM LOGGING RESIDUE: THE THREE-SIDED CANT SYSTEM



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**FOREST SERVICE RESEARCH PAPER NE-417
1978
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
NORTHEASTERN FOREST EXPERIMENT STATION
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MANUSCRIPT RECEIVED FOR PUBLICATION 12 APRIL 1978

Abstract

A new method to make furniture cuttings from the best of logging residues was tested. Bolts 4 through 8 feet long were sawed to three-sided cants. The cants were then resawed to boards and dried. The dried boards were gang ripped and defects removed to obtain clear-one-face cuttings of random width and length. The 6-, 7-, and 8-foot long bolts gave good yields by this system, while the 4- and 5-foot bolts did not.

INTRODUCTION

THERE IS SOME GOOD, small timber left behind as residue after a timber sale. Can this small-diameter residue be quickly and cheaply converted into furniture cuttings? In theory the answer is yes—provided the residue is first converted into cants. In a study to evaluate this process, we found considerable merit to the cant concept provided that three problems could be solved:

1. How to separate the good residue from that of poor quality.
2. How to saw cants to boards quickly and cheaply.
3. How to convert the boards to cuttings cheaply while maintaining a good yield.

To solve these problems, we developed the “three-sided cant system” for making furniture cuttings. We tested the system with oak logging residue from a commercial timber sale on the Monongahela National Forest near Richwood, West Virginia.

PROBLEM 1: HOW TO SEPARATE THE GOOD RESIDUE

Most logging residue is not good enough for furniture use, so the first step is to separate the pulpwood from the better quality residue. We bucked bolts of 4, 5, 6, 7, and 8 feet in length with a 2-inch trim allowance. By bucking out big knots and defects and by reducing sweep, we improved the bolt quality. We also made 4-foot pulpwood bolts which can be of very low quality. When we were not sure of the quality of the residue, we made pulpwood bolts.

The second selection is made at the sawmill. Any bolt that does not have one or more clear faces is sawed to pallet cants (4 by 4, 4 by 6, or 6 by 6 inches). This selection is made quickly and does not interfere with sawmill production.

The bolts to be sawed to three-sided cants are put onto the sawmill carriage with the best face toward the saw. A light slabbing cut is made to expose a face 3 inches wide. Now the final selection is made. If the exposed face is poor, the bolt is sawed to pallet cants. If the face is good, the bolt is sawed as shown in Figure 1.

Figure 1. Sawing three-sided cants.

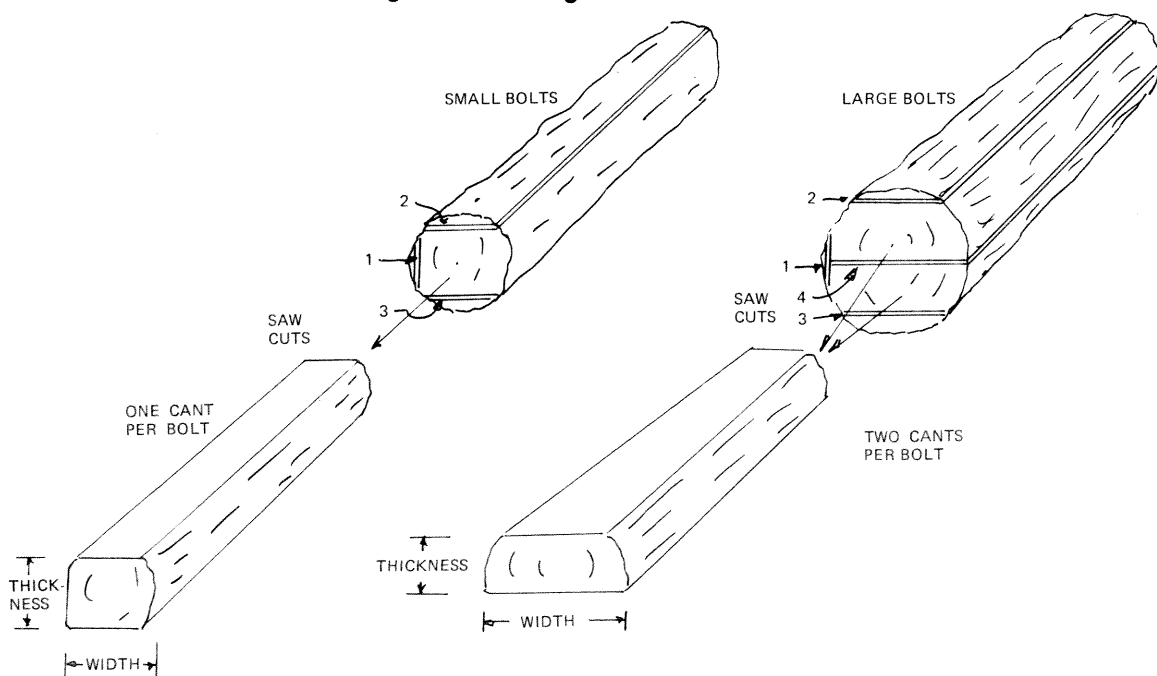


Table 1.—Scale and average size of 3-sided cants from oak bolts, by length and number of bolts

Bolt length (ft)	Number of bolts	Cant scale (fbm)		Cant size (inches)	
		Total	Mean	Height	Width
4	62	604	9.7	5.1	6.2
5	11	156	14.2	5.4	6.2
6	19	373	19.6	5.6	6.6
7	10	232	23.2	5.8	6.8
8	12	385	32.1	5.6	8.1
Total	114	1,750			

There were 114 oak bolts selected by this process and sawed to three-sided cants. The bolts were of small diameter and only three bolts were large enough to yield two cants per bolt. The data are shown in Table 1.

As a usual practice, pallet cants are sold to pallet makers and three-sided cants to furniture makers. If the sawmiller sells the three-sided cants for no more than the pallet cant price per board foot, he will do well because more footage is obtained by less sawing.

PROBLEM 2: HOW TO SAW CANTS TO BOARDS QUICKLY AND CHEAPLY

The second problem is solved by making boards using a circular gang resaw. Circular resaws are made in a variety of styles and sizes. There are resaws with two arbors to saw thick cants to boards in one pass or with one arbor to saw thin cants to boards in one pass. There are one- and two-arbor resaws that saw a few boards from a cant at one time. The cant is repeatedly sent through the resaw to complete the sawing. Approximatey 15 hp per saw is required for resawing hardwoods. Among the possible choices, a three-saw, single-arbor cant resaw best met our requirements for resaw cost, horsepower, and production capacity.

We used a Gross Kerfsaver single-arbor circular gang resaw¹ in this study. Three 18-inch diameter

sawblades (3/16-inch kerf) are mounted on the arbor with spacers to give 1 1/32-inch thick boards. The first board is sawed (from the first cut face) between the fence and the first saw, the second board is sawed between the first and second saw, and the third board is sawed between the second and third saw. The machine is open on the left side so that wide cants can be sawed in multiple passes. All boards are sawed parallel to the first cut face (Fig. 1). The top rolls are adjusted in height to accommodate cants from 3 3/4 through 6 inches thick.

This type of resaw gives smooth and accurate sawing with a minimal kerf. The within-board variation of thickness did not exceed .005 (3/64) inch. The between-board variation in average thickness did not exceed .085 (5/64) inch. The first board from a cant had the greatest within-board variation because the first face had been sawed at the sawmill. The greatest cause of between-board variation occurred when the cant face had not been held firmly against the fence.

No board grading was done after resawing. Only those narrow, waney-edged boards that would not give a 1 1/2-inch wide by 12-inch long cutting were rejected; 1,335 board feet of boards were sawed from 1,750 board feet of cants. This is a satisfactory yield of 76 percent.

Excellent drying quality was obtained by starting the air drying immediately after the boards were sawed. The boards were stacked using 1/2-inch thick stickers on 2-foot centers. The 4-foot high by 4-foot wide stacks were tightly banded with polypropylene strapping that kept the packages tight during drying and forklift handling.

The 63 percent initial moisture content dropped to 21 percent during 18 days in the forced air dryer at the Forestry Sciences Laboratory (Cuppett and

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Craft 1975). The temperature was maintained at 70°F minimum without schedule changes. An 8-day mild schedule in a regular dry kiln was then used to bring the oak to a 6 percent final moisture content. A higher temperature 5-day schedule would have been adequate.

PROBLEM 3: HOW TO CONVERT THE BOARDS TO CUTTINGS CHEAPLY WHILE MAINTAINING A GOOD YIELD

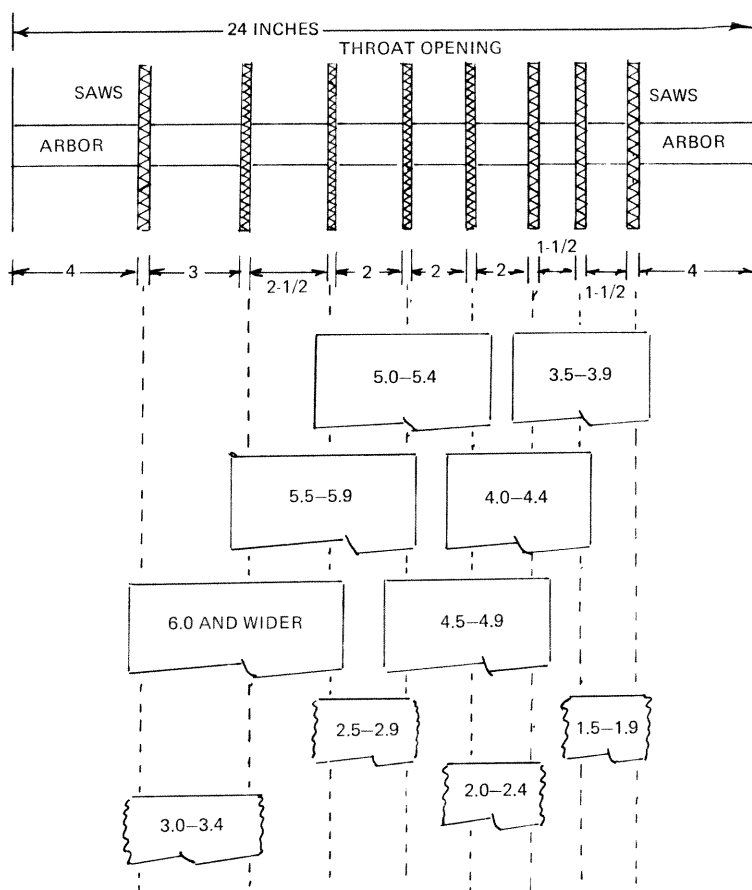
Boards made from cants cannot be processed economically in a conventional rough mill—they are too narrow and short. So we designed a “gang-rip first” rough mill that can be used with automated, commercially available equipment.

This new rough mill can reduce the short boards to cuttings at less expense than standard lumber sent through a conventional rough mill. And the yield of parts from short boards remains high.

The kiln-dried boards were first planed on both faces to 7/8-inch thickness. An abrasive planer with 24-grit paper did the job very well. As a result of the smooth, accurate sawing of cants to boards and the good drying, a 5/32-inch allowance for shrinkage and planing was adequate.

The planed boards are then fed into a glue-joint gang rip saw with a 24-inch throat opening. Eight saws, each having a 1/8-inch kerf, are spaced on the rip saw arbor as shown in Figure 2. The boards are ripped to strips according to board width. Strip widths are 1.5, 2.0, 2.5, and 3.0 inches. The 10 possibilities used are shown in Figure 2. Boards 1.5 to 3.4 inches wide are ripped to one strip;

Figure 2. Gang ripping kiln dried boards. The boards are ripped to strips according to board width (in inches).



boards 3.5 inches and wider are ripped to two strips. All edgings (regardless of width) are discarded.

Any defect to be removed from the strip is marked on each side, and a mark-sensing chapsaw removes the defects. The quality of cutting required is clear-one-face or better. In some cases, defects are found on the edges of strips. These strips are salvaged by ripping them on a single-blade, glue-joint rip saw. All cuttings are made random width and length with a 1- by 12-inch minimum.

The yields of cuttings ranged from 47 to 66 percent (Table 2). The board surface area, before

Table 2.—Percentage of cuttings from kiln-dried boards after gang ripping or salvage rip-sawing, by board length

Board length (ft)	Gang ripping/defecting	Salvage	Total
4	23.9	22.9	46.8
5	14.6	43.6	58.2
6	23.6	33.9	57.5
7	44.1	22.7	66.8
8	45.9	19.7	65.6

gang ripping, was divided into the surface area of the cuttings to find yield percentages. The 4-foot boards gave a lower yield than the longer boards. While the 5-foot boards gave an acceptable yield, little was obtained from automated gang ripping and removing defects—a considerable amount of salvage rip sawing had to be done manually. The 6-foot boards required less salvage rip sawing. The 7- and 8-foot boards were of the quality we were seeking—little salvage rip sawing had to be done to obtain a good yield.

If the gang-rip rough mill is to solve the problem of how to get cuttings cheaply while maintaining a good yield, the yield should be over 50 percent, and most of the cuttings should be obtained by automatic gang ripping and crosscutting. Also, it is very desirable to have a good proportion of long cuttings.

Table 3.—Percentage of total yield of long and short cuttings, by board length

Board length (ft)	Long cuttings ^a	Short cuttings ^b
4	10	90
5	40	60
6	36	64
7	32	68
8	39	61

^a40 inches and longer.

^bLess than 40 inches long.

The 4-foot boards had slightly less than 50 percent yield and half of that yield was made automatically, but only 10 percent of the cuttings were long (Table 3). The 5-foot boards had a satisfactory yield of 58.2 percent, and 40 percent of the cuttings were long—but very little of the yield was made automatically. The 6-, 7-, and 8-foot boards had good yields with one-third in long cuttings, and most of that yield was made automatically. So we can say that the gang-rip rough mill was satisfactory for 6-, 7-, and 8-foot boards but not for the 4- and 5-foot boards.

CONCLUSIONS

Logging residue is plentiful and cheap but of low quality. By making 6-, 7-, and 8-foot bolts, the poorest residue is not used. The best bolts are sawed to three-sided cants and the poorer bolts to pallet cants. The three-sided cants are sawed to boards, the boards are dried, and are then made to clear-one-face or better cuttings in an automated rough mill. Board yields are approximately 60 percent with more than one-third of the cuttings 40 inches or longer.

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☆ U.S. GOVERNMENT PRINTING OFFICE: 1978—703-112:50

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