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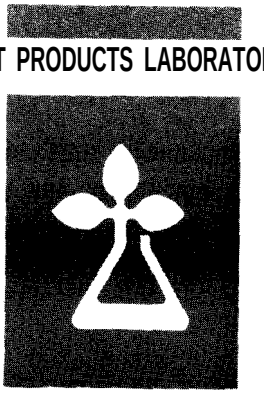

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VENEER CUTTING AND DRYING PROPERTIES OF PACIFIC MADRONE[1]

By

Forest Products Laboratory, Forest Service
U.S. Department of Agriculture

Pacific madrone (Arbutus menziesii Pursh) is a moderate-sized hardwood tree found in the Pacific coastal country from British Columbia to southern California. In California it also grows in the western Sierra Mountains below 4,000 feet elevation. The tree is also known as madrono and madrona. It is locally used for fuelwood, fence posts, charcoal, and to a minor extent for lumber and veneer. The latter uses are limited because of the tendency of the tree to grow with poor form except in dense stands. The tree attains a diameter of 2 to 4 feet (2)[2] and a height of about 80 feet on good sites (5). The wood is heavy, fine textured, and shows little distinction between early wood and late wood. The heartwood is generally reddish brown and the sapwood yellow white in color (1). The figure in the wood is due largely to pigment color differences in the heartwood.

The wood works easily with tools but it was noted in this study that it had a tendency to chip rather than splinter. It is intermediate in strength between hard and soft maple (4). The lumber is difficult to dry, with warp and collapse being major problems. Kiln-drying schedules have been published by the Forest Products Laboratory (6).

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[1] This Note was originally published in April 1959 under the same title as Forest Products Laboratory Rpt. No. 1766-14.

[2] Underlined numbers in parentheses refer to literature cited at the end of this paper.

Description of Logs Tested

Two 4-foot-long madrone bolts were received at the Forest Products Laboratory from Sonoma County, Calif., for rotary veneer cutting tests.[3] They were reported to be of average or better quality for madrone from that area. They were without exterior defects except for small end checks. These bolts were numbered 3 and 5.

Two logs were also received for slicing tests.[4] These were butt logs and were fairly round with the pith approximately in the geometric center. The logs were green when received at the Laboratory and in good condition except for heart checks, These logs were numbered 223 and 224. A more complete description of all test material is given in table 1.

Based on the test logs described in this report, the main defects to be avoided in the selection of veneer logs are knots, bark pockets, and heart checks.

The moisture content and specific gravity values (table 1) were determined from disks cut from the interior of the logs.

Preparation of Logs for Veneer Cutting

Eight flitches for quarter slicing and two flitches for flat slicing were sawn from the two larger logs Nos. 223 and 224. Each of the flitches was about 6 feet in length. The smaller logs, Nos. 3 and 5, and a bolt from log No. 224 were used for rotary cutting. The bolts were about 4 feet in length.

Bolts 3 and 5 were heated in water at 210°F. before being cut into veneer. Good quality veneer was produced, but heart checks in the bolts opened up excessively during heating. The 4-foot bolt from log No. 224 was heated at 160° F. The heart checks already present opened up only slightly with heating. Smooth tight veneer was produced from this bolt.

The flitches were heated at 180° F. Defects due to heating did not appear in the flitches or in the veneer. Good quality veneer was sliced from the flitches.

The approximate heating times required for conditioning 8-foot madrone bolts in water at 180° F. to insure a temperature of 148° F. at a core diameter of 6 inches are as follows:

[3] The logs were selected by the Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.

[4] The logs were furnished by the Simpson Logging Company in cooperation with the Pacific Southwest Forest and Range Experiment Station.

Log diameter (inches)	Heating time (hours)
12	8
24	36
36	98

The approximate heating times required for conditioning 8–foot flitches in water at 180° F. to insure a temperature of 160° F. at the flitch center are as follows:

Average end dimension of flitch (inches)	Heating time (hours)
6	4
12	15
18	40

Veneer Cutting

The lathe and slicer settings given in table 2 were satisfactory for producing veneer of good quality.

The veneer cut smoothly and was uniform in thickness. No defects other than shallow knife checks were produced in the veneer during rotary cutting or slicing. The uniform texture of the wood aided in the production of smooth veneer.

The rotary–cut veneer had many splits due to the heart checks in the bolts. Much veneer was lost at the clipper in cutting out areas of included bark in the outer 5 to 6 inches of diameter of the bolt cut from log No. 224. The wavy grain caused a minor amount of figure in the sliced veneer.

Short grain around knots caused localized roughness in the veneer. The knots themselves cut smoothly and easily.

Veneer Drying

The veneer was dried in a mechanical roller-conveyor type dryer. Drying schedules are shown in table 3.

The ends of the sheets of rotary-cut veneer wrinkled badly in drying. Much of this may have been due to the logs having become partially dried on the exposed ends before cutting.

Splits in the rotary-cut veneer tended to widen and lengthen during drying.

Tangential shrinkage was high during the drying of the veneer to a moisture content of 3 to 8 percent, averaging about 13.5 percent of the green dimensions. Radial shrinkage averaged about 6.5 percent of the green dimensions.

The drying results were similar at both temperatures used.

Veneer Yields

The good quality of the large logs, Nos. 223 and 224, resulted in the recovery of a high proportion of face-grade veneer. Most veneer degrade was caused by knots. Other causes of degrade were splits and bark pockets.

The smaller logs, Nos. 3 and 5, had many splits after heating, which reduced the recovery of face veneer.

Gluability

Five-ply panels were made with 1/28-inch madrone faces and backs and yellow-poplar (Liriodendron tulipifera L.) cores and crossbands. A phenolic film glue was used. Good plywood was made using a pressure of 150 pounds per square inch, a temperature of 320° F., and a pressing time of 10 minutes. The gluing of madrone with other adhesives is discussed in Forest Products Laboratory Report No. 2030 (3), which states that madrone does not present unusual gluing problems and good joints can be expected with any of the conventional woodworking glues with good control of gluing conditions.

Finishing

The panels needed little sanding because of the smoothness of the madrone face veneers. After sanding, the panels were finished with a clear lacquer to a uniform gloss.

Appearance and Uses of the Veneer

Madrone has good potentialities as a face veneer wood. Some of the veneer has exceptional color variation in the heartwood. The heartwood of freshly cut veneer may have a uniform light red color or it may vary in color from various shades of red and brown to gray-green. Veneer and plywood exposed to sunlight becomes a more uniform light brown. Plywood faced with rotary-cut veneer may have a widely varying color. Quarter-sliced faces are somewhat less striking due to the uniform grain on the radial surface. Panels faced with flat-sliced veneer are intermediate, showing an attractive grain and color pattern. Limited quantities of madrone veneer have been cut commercially for face veneers for plywood paneling and for veneered furniture.

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Table 1.--Description of test logs[1]

Log No.	Average diameter (inside bark at small end)	Length	Total number of rings at midlength	Number of rings per inch: Maximum	Number of rings per inch: Minimum	Average width of sapwood	Average eccentricity of pith	Average moisture content[2]: Sapwood	Average moisture content[2]: Heartwood	Average specific gravity[3]: Sapwood	Average specific gravity[3]: Heartwood
	Inch	Feet				Inch		Percent	Percent	Percent	Percent
3	16	4	.....	.....	.....	3/4	1/2	.....	.....	.....	.....
5	14-3/4	4	.....	.....	.....	1/2	2	.....	.....	.....	.....
223	31	12	192	18	13	1	0	142	124	0.43	0.49
224	27	12	145	16	9	1-1/2	2	167	124	.50	.52

[1]General description: Logs 3 and 5, no defects visible, heart checks on both ends; log 223, no defects visible under bark, burl at diameter of 18 inches, heart check; log 224, no defects visible under bark, heart check at butt end, ring shake at 4-inch diameter.

[2]Based on ovendry weight.

[3]Based on green volume and ovendry weight.

Table 2.--Suggested veneer slicer and lathe settings

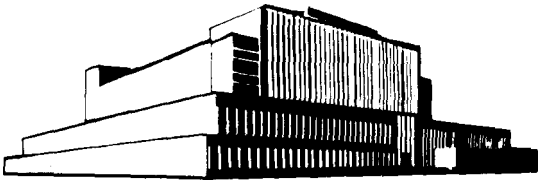
Method of cutting veneer	Veneer thickness	Knife angle	Knife bevel	Nosebar settings		Nosebar bevel
				Horizontal	Vertical	
	Inches	Degrees and minutes	Degrees	Inches	Inches	Degrees
Slicer	1/28 (0.035)	90-20	22	0.032	0.030	12
Lathe	1/28 (0.035)	90-30	21	.030	.012	15
Lathe	1/16 (0.0625)	90-05	21	.055	.016	15

Table 3.--Veneer drying schedules used and shrinkage values determined for madrone veneer

Veneer thickness	Veneer dryer temperature	Drying time[1]	Average shrinkage values[2]	
			Radial	Tangential
Inch	°F.	Minutes	Percent	Percent
1/28	250	8	6.2	13.2
1/28	320	4-1/2	6.7	14.0
1/16	250	16	.....	13.5

[1] After drying, the moisture content ranged from 3 to 8 percent, based on ovendry weight; the sapwood had 1 to 2 percent higher moisture content than the heartwood.

[2] Based on green dimensions.



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