FOREST PRODUCTS LABORATORY † FOREST SERVICE
U. S. DEPARTMENT OF AGRICULTURE

VENEER CUTTING AND DRYING PROPERTIES

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TAMARACK

Tamarack or eastern larch (Larix laricina) (Du Roi) K. Koch (8)[1] is a small to moderate size softwood tree growing in the northeastern United States as far south as West Virginia, the Lake States, Alaska, and much of Canada (1). The tree attains a diameter of 1 to 2 feet (6) and a height of 50 to 70 feet above the ground. The trunk is usually straight, round and slightly tapering (6).

The wood is fairly heavy, coarse grained, slivery, often spiral grained, and shows strong contrast between springwood and summerwood (1). The heartwood is yellowish-brown to russet-brown and the sapwood is whitish and is narrow in width (6).

Tamarack has moderate strength, stiffness, hardness, and shock resistance. The heartwood has fair decay resistance and is difficult to treat with preservative (11). The wood is reported to be comparatively difficult to ignite (13). The wood shrinks moderately, but warps and checks little in drying (1). Kiln-drying schedules have been published by the Forest Products Laboratory (7).

The chief uses of the wood are for pulpwood, lumber for framing, boxes, crates, railroad ties, telephone poles, fence posts, and fuel (6).

Description of Logs Tested

Five 8-foot-long tamarack logs were received at the Forest Products Laboratory from Aroostook County, Maine,[2] for veneer cutting tests. They were of moderately good quality with knots being the most common exterior defects. The logs were cut from three trees and were numbered 240, 241, and 242.

Based on the logs used in this study, the main defects to be avoided in the selection of tamarack veneer logs are knots, end checks, and compression wood (6).

A more complete description of the logs is given in table 1.

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

[2] The logs were obtained by the Northeastern Forest Experiment Station and Joseph M. Lupsha, Utilization Forester, State of Maine Forest Service, in cooperation with the International Paper Company and the Maine Public Service Company.

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Preparation of Bolts and Flitches for Veneer Cutting

Two logs, Nos. 240 and 241-2, were sawed into bolts about 4 feet long for rotary cutting. Three logs, Nos. 241-1, 242-1, and 242-2, were sawed into flitches for flat slicing. Two flitches were cut from log No. 241-1, but only one from each of the other logs because of their small size.

The bolts for rotary cutting were heated in water at 160° F. before being cut into veneer. Experience in heating veneer bolts has shown that softwood species similar to tamarack in specific gravity, annual ring structure, and size may be heated at 160° F. without severe end checking. Small heart checks opened up during heating of the tamarack bolts, but they were confined to the portion of the bolt normally left as the core in rotary veneer cutting. Most of the veneer was smooth and fairly tight. Some of the sapwood veneer, however, was fuzzy.

The flitches were heated in water at 180° F. before being sliced into veneer. Defects due to heating did not appear in the flitches nor in the veneer. Most of the veneer was smooth and fairly tight but, again some of the sapwood veneer was fuzzy.

The approximate heating times required for conditioning 8-foot tamarack bolts of various diameters in water at 160° F. to insure a temperature of 120° F. at a core diameter of 6 inches are as follows (5):

Log diameter (Inches)	Heating time (Hours)
12	5
24	30
30	48

The approximate heating times required for conditioning 8-foot flitches of various end dimensions in water at 180° F. to insure a temperature of 160° F. at the flitch center are as follows (5):

Average end dimension of flitch (Inches)	Heating time (Hours)
6	4-1/2
12	17
16	29

The data in these tabulations are based on an assumed starting temperature of 70° F. If the wood is colder, additional heating time is required.

Veneer Cutting

Rotary Cutting

The lathe settings given in table 2 were satisfactory for cutting smooth, fairly tight veneer. The sapwood veneer was smoother and had less shelling when cut with a horizontal nosebar opening larger than that used for the heartwood veneer (table 2).

Most of the veneer was smooth and uniform in thickness. The knife checks were shallow in the 1/16-inch-thick veneer and moderately deep in the 1/8-inch-thick veneer. Most of the knots cut smoothly and did not damage the edge of the lathe knife. Veneer containing compression wood cut smoothly.

Slicing

The slicer settings given in table 3 were suitable in most cases for cutting veneer of good quality On portions of the flitches from which all sapwood veneer was cut, however, the sapwood was fuzzy and often severely shelled.

The quality and appearance of the sliced veneer was similar to that of the rotary-cut veneer.

The 1/8-inch-thick veneer had slight roughness in half of each sheet (9). In general, smooth veneer was cut when the angle between the ground face of the slicer knife and the wood rays was less than 90° (10). Slightly rough veneer was cut when this angle was greater than 90°.

Veneer containing compression wood cut smoothly.

Veneer Drying

The veneer was dried in a mechanical roller-conveyor-type dryer. Drying schedules used are shown in table 4. Most of the veneer dried flat and smooth and had few splits or other drying defects.

Sapwood veneer that had been cut with excessive nosebar pressure often broke apart along the annual rings during drying. Veneer, 1/16-inch thick, containing compression wood often buckled severely during drying. Veneer, 1/8-inch thick, containing compression wood, usually buckled only moderately during drying.

Shrinkage of veneer dried to between 4 and 9 percent moisture content was moderate.

Veneer Yields and Grades

Rotary-Cut Veneer

There was little loss of veneer from defects; or roundup at the lathe as three of the four bolts were nearly cylindrical. The actual board foot yield of veneer was about 19 percent greater than the log scale (Scribner Decimal C).

Veneer cut 1/16-inch thick was graded (12) for use in structural plywood. Based on the total yield of dry veneer, an average of about 19 percent was "A" grade; 4 percent, "B" grade; 76 percent, "C" grade; and 1 percent, "D" grade.

Rotary-cut veneer 1/8-inch thick was graded for use as box shook (14). When this veneer was clipped so as to obtain the maximum amount of acceptable shook, there was an average of about 73 percent acceptable shook 4 inches wide, based on the total yield of dry veneer.

Most veneer degrade was caused by knots.

Sliced Veneer

Yield measurements made on two flitches (Nos. 241-12 and 242-21) showed that about 66 percent of the green flitch volume was recoved as dry veneer.

There was little loss of sliced veneer because of defects. The actual board-foot yield of veneer, measured on one of the flitches, was about 5 percent less than the log scale.

Veneer, 1/16-inch thick, was graded for use as faces for decorative plywood. An average of about 13 percent of this veneer was suitable for clear faces, 30 percent for knotty faces, and 57 percent for back or core grade, based on the total yield of dry veneer.

Sliced veneer, 1/8-inch thick, was graded for use as box shook (14). There was an average of 68 percent acceptable shook when the sheets of veneer were clipped for grade, based on the total yield of dry shook 4 inches wide.

Most veneer degrade was caused by knots.

Stain

The wet veneer developed a blue-black stain upon contact with iron or steel. The stain was easily removed by swabbing the wood with oxalic acid (3).

Gluing

Plywood panels of good quality were made with some of the veneer. Attractive-decorative panels were made with faces of sliced veneer, 1/16-inch thick, of both the clear and knotty grades. The panels were five-ply with the core of ponderosa pine, 1/8-inch thick, and crossbands of yellow-poplar, 1/24-inch thick. A phenolic film glue was used for bonding.

Sheathing-grade plywood, 1/2-inch thick, was made with five plies of rotary-cut tamarack veneer. The core and crossbands were 1/8-inch thick and the faces and backs were 1/16-inch thick. The plywood was made with an extended phenolic glue of the type frequently used for interior-type, sheathing-grade plywood. These panels had a random knot and grain pattern, much like that seen in some Douglas-fir plywood, and were fairly flat and free from checks. Based on these limited studies, tamarack would be considered as moderately easy to glue.

Finishing

The decorative plywood panels made with knotty faces were filled with a neutral-colored wood filler. No filler was used on the panels with clear faces. The panels were lightly sanded and then were finished with two coats of clear lacquer. The panels were readily sanded to a smooth surface and were finished without difficulty.

Appearance and Potential Use of the Veneer

Tamarack plywood, faced with knotty or clear sliced veneer, makes attractive-decorative paneling. The knots are usually small and fairly tight, and the wood has a warm yellowish-brown color with a slight-greenish cast. Veneer containing compression wood had an orange cast without the greenish tinge. Sheathing-grade plywood made with rotary-cut veneer would probably be suitable for structural use (4). Based on its specific gravity and modulus of elasticity, tamarack would fall into Species Group I as listed in the Commercial Standards for Western Softwood Plywood (12). Rotary-cut veneer also seems suitable for box shook.

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Table 1.--Description of tamarack logs used

Log No.	Average diameter inside bark		Length	Average width of sapwood	Average eccentricity of pith	Total number of rings	Number of rings per inch		Log grade[1]	Approximate log scale (Scribner Dec. C)	Average specific gravity[2]		Average green moisture content[3]		Defects
	Small end	Large end					Maximum	Minimum			Sapwood	Heartwood	Sapwood	Heartwood	
	In.	In.	Ft.-in.	In.	In.					Bd. ft.			Percent	Percent	
240	16.6	20.9	8-3	1.0	0.6	66	10	5	3	90	0.40	0.48	175	58	Many knots on all faces, split, overgrown injury, fluted butt, much taper
241-1	14.6	18.6	8-6	1.5	1.0	65	10	5	1	70	.43	.46	157	47	Many knots on two faces
241-2	14.0	14.8	8-4	1.3	.5	58	13	4	2	60	.41	.41	169	48	Many knots on three faces
242-1	10.5	11.9	8-6	.8	.4	69	25	5	2	30	.42	.49	147	66	Knots on three faces
242-2	9.6	10.8	8-5	1.0	.1	.....	.....	.....	2	30	.....	.....	134	63	Few knots on all faces

[1] Grade specifications for eastern white pine logs--Northeastern Timber Salvage Administration. The Log Grade Specification was established by the U.S. Forest Service for use in the purchase of logs during the New England Hurricane Emergency Project 1938-1943.

[2] Based on green volume and ovendry weight.

[3] Based on ovendry weight.

Table 2. --Settings used to rotary cut tamarack veneer

Veneer thickness	Type of wood	Lathe knife		Pressure bar		
		Bevel	Angle	Bevel	Vertical opening	Horizontal opening
In.		Deg.	Deg.-Min.	Deg.	In.	In.
1/16 (0.0625)	Sapwood	21	90-15	75	0.014	0.061
	Heartwood	21	90-15	75	.014	.057
1/8 (0.125)	Sapwood	21	89-50	75	.028	.123
	Heartwood	21	89-50	75	.028	.115

Table 3. --Settings used to slice tamarack veneer

Veneer thickness	Slicer knife		Pressure bar		
	Bevel	Angle	Bevel	Vertical opening	Horizontal opening
In.	Deg.	Deg.-Min.	Deg.	In.	In.
1/16 (0.0625)	22	90-25	78	0.030	0.057
1/8 (0.125)	22	90-30	78	.030	.115

Table 4. --Drying schedules used for tamarack veneer

Veneer thickness	Type of wood	Drying temperature	Drying time	Average dry moisture content	Range of moisture contents of dry veneer	Average shrinkage	
						Radial	Tangential
In.		° F.	Min.	Percent		Percent	Percent
1/16 (0.0625)	Sapwood	250	11	5.3	4.9-5.8	3.3	7.4
	....do.....	320	5	8.1	4.3-11.7	4.9	6.0
1/16 (0.0625)	Heartwood	250	8	6.5	4.8-7.1	4.8	4.9
	....do.....	320	4	5.3	3.6-8.9	5.2	7.9
1/8 (0.125)	Sapwood	250	20	8.5	5.8-11.4	2.6	5.0
	....do.....	320	10	14.8	11.0-19.2	3.7	3.5
1/8 (0.125)	Heartwood	250	14	13.4	12.5-17.0	1.7	3.0
	....do.....	320	8	12.3	10.1-13.8	2.7	2.8