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Quality Hardwood Veneer

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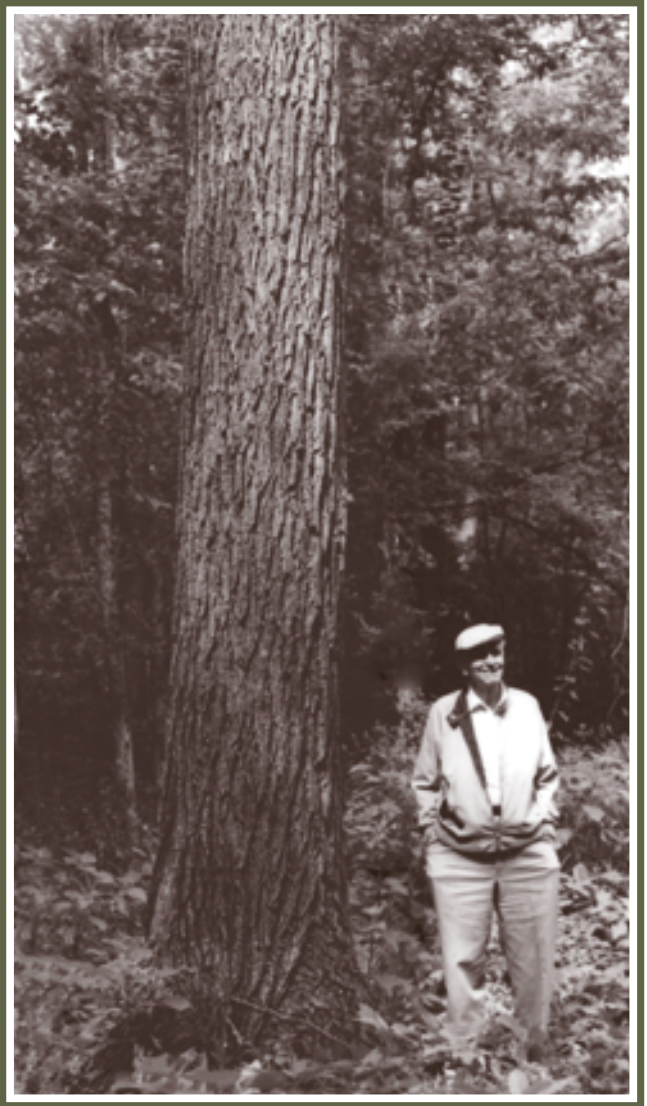
Private forest landowners have long understood that some trees are distinguished as being exceptional. Not every forest contains such rare trees. In the hardwood industry, such trees are termed *veneer*. From veneer trees come veneer logs; from veneer logs come veneer sheets. Unlike most logs that are processed into conventional lumber, veneer sheets are thin layers of wood produced by slicing logs.

Essentially any log can be processed as veneer. However, for hardwood trees, normally only those logs of desired species and with the finest characteristics are selected. This is especially the case when the finished wood product is used as a **face veneer** (surface-covering) on top of core stock veneer for decorative purposes. **Core stock** is the underlayer on which the face veneer is placed. Core stock is common and does not require the fine characteristics as does face veneer. For example, red oak cabinets could have side panels with a thin layer of fine oak face veneer overlaid on a thicker layer of common yellow poplar core stock. The focus of this publication is primarily on hardwood face veneer and the trees that are used to produce it.

Veneer is erroneously accepted as a modern development in the forest product industry. In truth, veneer was used in Egyptian coffins nearly 3,500 years ago. Modernization and expansion in the veneer industry occurred in the 20th century, improving construction and design of furniture and leading to better utilization of the wood resource.

Figure 1.



A top-quality black walnut veneer tree with more than 600 board feet.

Veneer Markets

Markets for veneer are classified as markets for **veneer trees** and **veneer logs.** Forest owners are most concerned with markets for their veneer trees. Many wrongly informed landowners have mistakenly sold fine veneer trees as standard lumber trees, receiving a fraction of full market value. Landowners who are not expert at identifying, measuring and appraising veneer trees should seek the assistance of an experienced professional forester.

Most loggers, timber buyers and mill operators are potential markets for standing veneer trees. Such individuals often have direct markets with veneer mills, and for small quantities of veneer trees, are a landowner's best opportunity. However, when a timber sale has exceptional-quality veneer trees, or a large quantity of them, owners should extend beyond these markets and include the veneer mills (both domestic and export markets exist). Hardwood veneer buyers are scarce and there are very few hardwood veneer mills, particularly in the Southeast. This is why an experienced professional forester is needed.

Veneer logs are marketed for four major uses: architectural, secondary manufacturing, profile-wrapped moldings and paneling. The ***architectural market*** is for premium logs only – those without defects, longer lengths and a narrow, well-centered heart. Architectural veneer becomes wall and door paneling in executive offices and public buildings. Groups of veneer trees originating from the same forest are especially sought after for this market because their physical traits (color and texture) will be similar. These trees can be bulked and marketed together and used to fill large orders for the same building. The ***secondary manufacturing market***, serving primarily the furniture, cabinet and flooring industry, is less rigid in quality specification than is the architectural market. Shorter lengths of veneer are used that can be cut between defects. Uniformity in wood color, however, is important for consistency in product. ***Profile-wrapped molding market*** is a market that fits between the previous two. This veneer is wrapped or glued around reconstituted products such as fiberboard and is used to substitute for solid wood molding. ***Wall paneling market*** is the lowest class and includes 8-foot mismatched wall panels. Because panels do not need to match, some wood defects (if sound) are acceptable.

Methods of Slicing Veneer

Manufacturing quality face veneer is highly specialized and capital-intensive, requiring watchful control on the quality of logs to be processed. Only the finest logs will pay for the cost of processing, a standard that varies with each mill. Three common methods of slicing hardwood veneer are flat slicing, half round and rotary cutting.

The finest decorative face veneers are produced from **flat slicing**. With this method, "flitches" are first created. Flitches are pieces of wood produced when a veneer log is halved or quartered (see Figures 2 and 3). The side of the flitch with the most aesthetically pleasing face is the side used to slice the veneer sheets. To make slicing easier, flitches are first heated in water vats to soften the wood. At the slicing machine, the flitch is held down (or dogged) into place on a metal frame that rapidly moves down against a long, stationary knife, producing thin sheets of veneer. **Half round** production also employs flitches; however, the flitch is rotated against the knife edge while being held in place on a half round machine. The half round machine resembles a lathe and produces slices the size of flitches. Sheets vary in thickness, but the standard for most domestic uses is 1/32 of an inch (thinner for export markets).

Rotary cutting, also referred to as peeling, is a method that is primarily used to manufacture commercial veneers for construction-grade plywood from softwood markets where strength, not appearance, is needed. With rotary cutting veneer, the log is turned against a giant lathe, unrolling the veneer into extended sheets as the log turns (much like unwinding a roll of paper). With hardwoods, it is used to produce core stock

for underlayment of finer flat-sliced stock, or it is stained or printed and finished to imitate a more expensive wood.

Veneer is processed in several other ways as well, including quarter-slicing, rift-cut and length-wise slicing. Each method produces a different visual effect, forming unique grain patterns.

Figure 3.

Freshly stacked veneer ready to be clipped for the export market. This photo shows how veneer is stacked in the order of sequence as it is sliced from the flitch.

Figure 2.

A flitch is maneuvered into position on the half-round lathe in the veneer mill for slicing.

Criteria for Veneer Trees

Criteria for qualifying as a fine face veneer tree can be condensed into one precondition – top quality. Top quality is related to the amount and extent of **grade defects** found in the lower trunk of the tree. Typically veneer logs are only produced on the butt log (first log cut from the lower tree trunk). Grade defects are abnormalities that lower quality by reducing utility. Two types of grade defects are recognized: **exterior** and **interior**.

Exterior grade defects include abnormalities on the bark surface that can be seen. They indicate interior degrade, and include bumps, bulges, buttswell, knots, lesions and sweep (or curve). Holes (both large and very small, including bird peck) are also exterior grade defects, as are seams caused by lightning, frost or drought. Perhaps the most difficult exterior grade defect to detect is dormant buds. These are very small recessed buds that exist along the trunk from which small sprouts (called epicormic branches) will periodically flush. If logs with dormant buds are processed into veneer slices, the resulting veneer slice will be of lower value. Refer to Figures 4 - 7 for some common exterior grade defects.

Figure 4.

Bird peck caused by the yellow-bellied sapsucker.

Figure 5.

Knot caused by limb mortality or removal.

Figure 6.

Borer overgrowth caused by the carpenter worm.

Figure 7.

Seam caused by lightning, frost or mechanical injury.

Interior grade defects are abnormalities that are typically not apparent on the exterior bark surface but that become visible on the end when the tree is felled and "bucked" into logs. The most common interior grade defect noticeable from the end of the log view is discoloration such as staining or streaking of the wood. Interior defects also include double pith (two hearts resulting from two stems growing together when they were young), loose heart (separating of the annual growth rings) and grease spots, soak or pin worms (all results of poor site quality or mismanagement of the forest). Refer to Figures 8 - 10 for some common interior grade defects.

Figure 8.

Loose heart caused by wind.

Figure 9.

Stain and streak caused by poor site quality, pasturing or fire.

Figure 10.

Pinworm caused by the ambrosia beetle.

Internal natural wood characteristics such as texture and color are also factors. Premium veneer logs must have a well-centered heart and an even-grain texture, meaning that the annual growth rings are relatively evenly spaced, not fluctuating between rapid and slow growth. The wood color should be consistent, without mineral or fungal streaks. It should be noted that there are limited markets for off-colored, lower-quality veneer wood.

Interior grade defects are very difficult to detect. Proficiency comes only after years of experience. Seasoned foresters, veneer buyers and loggers are often surprised by the presence of internal defects once harvested, even though the tree's exterior signals *appeared* safe prior to the harvest.

Judgment on interior wood quality often can be associated with the **characteristics of the forest**. Forest clues can signal poor internal wood quality. For example, evidence of heavy woodlot grazing or ground fires indicate an increased potential for lower grade veneer. Poor sites also indicate high risk and typically exhibit shallow topsoil, droughty conditions, poor internal drainage and are often found on southern and western slopes. Further, forest stands that are overly mature are also high risk for interior grade defects. Overly mature forests have trees with many broken tops, stem holes or swollen (often hollow) bases. Irregular bark pattern will often signal damage, indicating a

site limitation or that tree growth has been altered by a pathogen or environmental stress such as fire, ice or wind.

Specifications relative to **log length and diameter** must also be met. Markets for quality face veneer logs require a minimum of 8 feet in length (10 to 12 feet for top price) and prefer at least a 16-inch diameter inside the bark (dib) at the small end of the log. This is a general guide. Many veneer mills have their own specifications.

Most hardwood trees never qualify as veneer. Normally only 1-2 percent of the board foot volume in a hardwood timber sale is veneer. Yet that same volume could account for as much as 20 percent of the total sale value. Thus, mis-grading a veneer tree as a standard lumber tree could be very costly.

A summary of the characteristics of the ideal veneer log includes straight and round, without defects on the log surface, with a centered pith, having uniform color and growth rate, and without mineral deposits.

Hardwood Tree Species Commonly Sold as Veneer

Virtually all tree species can be manufactured into veneer, but only a few species are in sufficient demand to develop sustainable markets. Traditional hardwood face veneer markets include white oak and red oak, and black walnut. Recently, sugar maple and black cherry have increased in demand. Lower value core stock, used as underlayment for face veneer, includes primarily yellow poplar, sycamore and sweetgum. The following is a brief description of commonly veneered species.

White oak (Quercus alba, L.) – very plentiful; color is white to pinkish; price range is medium to medium high; moderately easy to process; export demand typically stronger than domestic; is the most common tree used for veneer in Tennessee; species occasionally substituted include chinquapin, swamp chestnut oaks, swamp white and bur oaks.

Northern red Oak (Quercus rubra, L.) – very plentiful; color is pinkish to red (color is very sensitive to site quality and lighter color is preferred); price range is medium; moderately easy to process; substitute species include cherrybark, Shumard and Nuttall oaks.

Black walnut (Juglans nigra, L.) – limited availability; easy to process; price range is high; strong domestic and export demand; no domestic substitute species; if grown on moist sites will develop a wide, light-colored sap ring, lowering value.

Sugar maple (Acer saccharum, Marsh.) – very limited availability in the Southeast; color varies from white to cream to light reddish-brown (lighter colors are preferred); price range is medium; difficult to process; best quality grows in Northeastern states; bird peck often hinders maple veneer.

Black cherry (Prunus serotina, Ehrh.) – very limited availability; color is light reddish-brown; price range is medium to high; moderately easy to process; best quality grows in Northeastern states; Southern-grown cherry is often hindered by gum pockets.

Yellow poplar (Liriodendron tulipifera, L.) – very plentiful; color is pale yellow-green; price range is low: easy to process.

Sycamore (Platanus occidebtalis.L.) – limited availability: color is light red-brown; price range is low: easy to process.

Forest Management for Oak Veneer

Normally forests are not managed to specifically grow hardwood veneer trees. Rather, if found, they are a bonus. Veneer logs, just as with lumber logs, pallet and railroad crosstie logs and pulpwood, are among many products that result when hardwood forests are harvested. However, the likelihood of a forest producing more veneer trees increases if proper silvicultural procedures and best management practices are followed.

To produce oak veneer trees, the following must occur: (1) quality seed sources (acorns) must be present, (2) sunlight reaching the forest floor during establishment must be adequate, (3) during early stand development undesirable competition must be controlled, and (4) stocking during stand development must be regulated while protecting and favoring those trees with veneer potential.

Seed Source – because of their shape and weight, oak acorns will not travel far from their parent tree. If adequate seed sources are not present, oak will not likely regenerate following a harvest. Even when seed sources are present, if genetics is inferior or the site is too poor, the potential to produce quality veneer oak trees will be limited.

Sunlight – oak species are classified as intermediate in shade tolerance, meaning that they do not regenerate nor develop well in shaded environments. Therefore, single-tree selection (STS) is not recommended for oak development because STS does not allow sufficient sunlight to reach the forest floor. Instead, oak regenerates best in partial to full sunlight, such as that resulting from shelterwood, group selection or clearcutting systems. Even with these silvicultural methods, if a yellow-poplar seed source is present and on good forest sites, oak will often be overtaken by the yellow poplar.

Control of Undesirables – Undesirable species compete for growth elements, slowing, suppressing and even killing the preferred trees. Through a process called ***crop tree release***, young forests stands can be manipulated to improve the percentage of potential veneer trees (Refer to University of Tennessee Agricultural Extension Publication SP 559, *Crop Tree Release in Precommercial Hardwood*).

Regulating the Stocking – stocking describes available growing space. Producing top-quality veneer trees requires that the appropriate amount of growing space be ***consistently*** maintained and progressively enlarged as trees increase in size. Forest stands should be thinned on well-timed intervals to assure consistent growth. Waiting too long will cause the trees to be suppressed, and then when released, trees will grow too rapidly. This sudden increase in growth leads to wider-than-normal annual growth rings and often epicormic branching. Both reduce the chances of a tree becoming veneer. Only an experienced forester should be trusted to select and thin stands for veneer production.

A final consideration for managing forests to produce veneer is patience. Financial maturity of hardwood veneer trees requires decades. Most of the higher-value veneer trees must measure at least 18–20 inches in diameter (measured inside the bark at the small end of the log). This equates to a tree with an outside-the-bark diameter at 4½ feet above the ground of approximately 22 to 24 inches. Depending on the productivity of the soil, attaining diameters of this size could require 60 to 90 years.

Selling Your Veneer Trees

Before selling any trees, seek the assistance of an experienced professional forester. Do not select and sell only the best trees from your forest while leaving the undesirables. Doing so is "high-grading" or removing the most valuable, highly desired trees, while the undesirables are left to reseed and perpetuate the future stand. This is not good forestry.

Instead, select trees for harvest based on their financial maturity. This might include veneer trees that have matured, but should also include smaller, inferior trees or those undesirable species whose crowns are competing with future veneer trees. In other words, manage your forest with a constant goal of improvement, leaving species and trees with good potential following the harvest.

Your professional forester is trained to understand selection of trees for harvest based on the above criteria. Trees for harvest should be marked with paint, measured to estimate volume and appraised to arrive at a fair market value. A separate listing of your veneer trees should be kept. With proper marketing, your trees can be exposed to all potential regional markets, bids accepted and the contract awarded. For a list of professional foresters serving your area, contact your local University of Tennessee Extension office or state forester.

Pricing your veneer trees can be very difficult and is often based more on the seller's experience, knowledge of the markets and "whatever the market will bear." Published reports of veneer prices are virtually non-existent, sporadically reported and difficult to interpret.

The mistake of not correctly identifying a veneer tree can be costly. Consider a white oak tree with a 12-foot butt log that measures 20 inches in diameter inside the bark at the small end of the log, containing 192 board feet (Doyle Scale). The log will have substantially different value, depending on the grade and the market for which it is sold. An estimate of the log value, by grade, is summarized in Table 1.

Table 1. Estimated Value of White Oak Log Based on Grade

Grade	Price/Board Foot*	Value
Prime veneer	$2.00	$383
Select veneer	1.00	$192
Grade 1 lumber	.45	$ 86
Grade 2 lumber	.22	$ 42
Grade 3 lumber	.07	$ 13

* Prices are estimates, used only to show the affect of grade on log value.

From this table, the importance of proper log grading is apparent. A prime veneer log could have a value of $383, while the same dimension log of lower grade #3 has a value of $13. It would require 30 grade #3 logs to equal the value of one prime veneer log.

Conclusion

Hardwood veneer is a complex wood product – correct identification, valuation and marketing are activities that few landowners do regularly. Even professionally trained foresters aren't always adept at the understanding the idiosyncrasies of the hardwood veneer market. Professional experience is vital to assure that you are fairly paid for veneer logs. This publication has provided some insight on how to maximize the amount of veneer volume and its value on your forestland.

Figure 11.

A well-stocked veneer log yard with logs procured from several locations.

For further reading on veneer, consider these references:

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