

Wood as a Plant:

The Trunk and Its Branches: The cross-section of a tree shows the following well-defined features in succession from the outside to the center: (1) bark and cambium layer; (2) wood, which in most species is clearly differentiated into sapwood and heartwood; (3) pith, the small central core. The pith and bark, of course, are excluded from finished lumber. Most branches originate at the pith, and their bases are intergrown with the wood of the trunk as long as they are alive. These living branch bases constitute intergrown or tight knots. After the branches die, their bases continue to be surrounded by the wood of the growing trunk, and thus loose or encased knots are formed. After the dead branches fall off, the stubs become overgrown and subsequently clear wood is formed. All growth in thickness takes place in the cambium layer by cell division. No growth in either diameter or length takes place in wood already formed; new growth is purely the addition of new cells, not the further development of existing cells.

Annual Rings: Most species grown in temperate climates produce well-defined annual growth rings, which are formed by the differences in density and color between wood formed early and wood formed late in the growing season. The inner part of the growth ring formed first is called “spring wood,” and the outer part formed later in the growing season is called “summer wood.” Spring wood is characterized by cells having relatively large cavities and thin walls. Summer wood cells have smaller cavities and thicker walls, and consequently are more dense than spring wood. The growth rings, when exposed by conventional methods of sawing, provide the grain or characteristic pattern of the wood. The distinguishing features of the various species are thereby enhanced by the difference in growth ring formation.

Heartwood: Heartwood consists of inactive cells formed by changes in the living cells of the inner sapwood rings, presumably after their use for sap conduction and other life processes of the tree have largely ceased. The cell cavities of heartwood might also contain deposits of various materials that frequently provide a much darker color. All heartwood, however, is not darker. The infiltrations of material deposited in the cells of heartwood usually make lumber cut from there more durable when exposed to weather. All wood, with the possible exception of the heartwood of redwood and western red cedar, should be preservative-treated when used for exterior applications.

Softwoods and Hardwoods: Native species of trees and the wood produced by these trees are divided into two botanical classes—hardwoods, which have broad leaves, and softwoods, which have needle-like or scale-like leaves. This botanical classification is sometimes confusing because there is no direct correlation between it and the hardness or softness of the wood. Generally, hardwoods are more dense than softwoods, but some hardwoods are softer than many softwoods.

Medullary Rays: Medullary rays extend radially from the pith of the log toward the circumference. The rays serve primarily to store food and transport it horizontally. They vary in height from a few cells in some species to four or more inches in Oaks and produce the flake effect common to the quarter sawn lumber in these species.

Sapwood: Sapwood contains living cells and performs an active role in the life processes of the tree. It is located next to the cambium and functions in sap conduction and storage of food. Sapwood commonly ranges from 1-1/2 to 2 inches in thickness. Maples, Hickories, Ashes, and some Southern Yellow Pines and Ponderosa Pine may have sapwood 3 to 6 inches in thickness, especially in second growth trees.

Characteristics of Often-Specified Wood Species:

Birch, Yellow—“Natural”: Yellow Birch has been and continues to be one of the prominent wood species used for architectural woodwork. This is due not only to its attractive appearance but also to its general availability both as lumber and as veneered products, its adaptability to either paint or transparent finish, and its abrasion resistance. The heartwood of the tree varies of color from medium to dark brown or reddish-brown, while its sapwood, which comprises a better than average portion of the tree, is nearly white. Despite its wide usage, some confusion exists as to the common terms used to describe Birch lumber and/or veneer. Virtually all commercially used Birch is cut from the Yellow Birch tree, not from the White Birch tree, which botanically is a distinct species. The term “Natural” or “Unselected” Birch means that the lumber or veneer might contain both the sapwood or white portion as well as the heartwood or dark portion of the tree in unrestricted amounts. The term “Select Red” Birch describes the lumber or veneer produced from the heartwood portion of the tree, and the term “Select White” Birch describes the lumber or veneer produced from the sapwood portion of the tree. To obtain “Red” or “White” Birch exclusively requires selective cutting with a corresponding cost premium as well as considerable restriction on the width and length availability in lumber. Birch, in veneer form, is readily available in all “selections” and is usually rotary-cut. While sliced veneer is produced that simulates the same grain effect as lumber, its availability and cost reflect the same cutting restrictions that are incurred in producing the “Select” forms of Birch lumber.

Walnut, American Black: American Black Walnut is perhaps our most highly prized domestic wood species. Its grain pattern variations are extensive and in veneered form produce, in addition to the normal plain sliced cuts, quartered or “pencil-striped” as well as specialty cuts such as crotches, swirls, burls, and others. Its heartwood color varies from gray-brown to dark purplish brown. The sapwood, which is very prevalent in solid lumber, is cream-colored, and its complete elimination by selective cutting is very costly. Fortunately, if this natural effect is felt to be undesirable, its appearance can be neutralized by sap staining in the finishing process. The growth conditions of Walnut result in significant width and length limitations in its lumber form. Its potential is best expressed in veneered products.

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Mahogany Tropical American, (Honduras): Honduras Mahogany actually encompasses all of this species that grows throughout Mexico, Brazil, Peru, and Central America. Its traditional identity with fine cabinetry and furniture justifies its position as one of the finest woods for this purpose. Its stability, workability, warm appearance, and firm grain make it a favorite of all woodworking craftsmen. It is an open-grain wood, with its heartwood color ranging from a light tan to a rich golden brown depending to some extent on the country of its origin. Its outstanding stability and decay resistance expand its potential to include exterior applications for “monumental” projects. It is most generally available as plain sawn lumber and plain sliced veneer with different veneer cuts available on special order.

Mahogany, African: This, one of the true Mahoganies, is perhaps the most widely used on the several Mahogany species. This is due to its excellent cutting and working characteristics and versatility. While its use has been largely for interior purposes, its innate stability and moderate decay resistance justifies its consideration for selected and demanding exterior applications. It has a very pleasing open grain with its heartwood ranging in color from light to medium dark reddish brown. In lumber form it is more readily available as plain sawn and selectively so as quarter sawn. In veneer form quarter or “ribbon-stripped” cut predominates, but plain slices as well as many of the exotic “figure” cuts can be produced on special order.

Maple, Hard “Natural”: Hard Maple is very similar in general characteristics to Yellow Birch. It is heavy, hard, strong, and resistant to shock and abrasion. The heartwood of the tree is reddish brown and its sapwood is nearly white with a slight reddish-brown tinge. Another natural characteristic is the prevalence of dark mineral streaks (predominantly in the heartwood), which can be minimized in the sapwood by selective cutting. Like Birch, common usage of descriptive terms does cause some confusion. The term “Natural” or “Unselected” Maple indicates that the lumber or veneer might contain both the white sapwood and the darker heartwood. The term “White” Maple means that the lumber or veneer is selected and separated from the pieces containing the dark heartwood. Unlike Birch, the heartwood is so low in content that no comparable selection is available. Maple’s close identification with furniture and specialized industrial use overshadows its potential for architectural woodwork. Its modest cost and pleasing and mild grain pattern warrants its consideration, especially on items subject to hard usage. General availability in veneer form is limited but can be produced to special order.

Oak, Red: Red Oak is one of the most abundant of our domestic hardwoods. Its moderate cost, strength, wearability, and appealing grain characteristics make its use widespread. It is open-grained and in its plain sawn or sliced form expresses a very strong “cathedral”-type grain pattern. The heartwood is reddish tan to brown and very uniform in color. Its sapwood is lighter in color and minimal in volume, making its elimination by selective cutting very easy. Red Oak is also available in rift sawn or sliced forms which produce a very uniform, straight grain effect. Less frequently it is quarter sawn or sliced, still producing a straight grain but with “flake” of the medullary ray accented. Some sacrifice in width and length availability occurs when producing either rift or quarter sawn lumber. Mineral stain is common to Oak doors and is caused by tannic acid in the wood coming in contact with iron in the presence of moisture. This leaves a blue or black stain in the veneer. One way to prevent this is by never using steel wool on Oak veneer. If mineral streaks do appear on the veneers, there are two products on the market that will correct the problem: Ply Brite and Erusto Salts Special. Follow manufacturer’s directions carefully, making certain the entire door is treated to eliminate spotting. Rinse the treated area well, allow to dry, then sand with fine sandpaper prior to finishing.

Oak, White: White, like Red Oak, is perhaps one of the best known hardwoods in the world, and its use for architectural woodwork is widespread. It is hard and strong, and its heartwood has good weathering characteristics, making its use for selected exterior applications appropriate. It is open-grained and in its plain sawn form is highly figured. The heartwood varies considerably in color from light grayish tan to brown, making the maintenance of color consistency difficult. Its sapwood is much lighter in color and is fairly prevalent. Its elimination is accomplished by selective ripping. White Oak is often rift sawn or sliced producing a very straight grained effect or frequently quarter sawn or sliced producing straight grain but with the “flake” of the medullary ray greatly pronounced. The special cuts mentioned are more readily attained in veneer form since the solid lumber cutting techniques greatly restrict its width and length potential. Mineral stain is common to Oak doors and is caused by tannic acid in the wood coming in contact with iron in the presence of moisture. This leaves a blue or black stain in the veneer. One way to prevent this is by never using steel wool on Oak veneer. If mineral streaks do appear on the veneers, there are two products on the market that will correct the problem: Ply Brite and Erusto Salts Special. Follow manufacturer’s directions carefully make certain the entire door is treated to eliminate spotting. Rinse the treated area well, allow to dry, then sand with fine sandpaper prior to finishing.

Poplar, Yellow: Yellow Poplar, sometimes incorrectly called “Whitewood,” is an extremely versatile and moderately priced hardwood that is well adapted to general interior woodwork usage. It is even textured, close grained, stable, of medium hardness, and has an inconspicuous grain pattern. The heartwood is pale greenish-yellow while the sapwood is white. Occasional dark purple streaks also occur. The tight, close grain results in outstanding paintability, while its modest figure and even texture permits staining to simulate more expensive hardwood. Due to its indistinct grain figure, Poplar is seldom used for decorative veneered products.

Cherry, American Black: American Wild Black Cherry is a fine and especially stable, close-grained cabinet and veneer wood. Its heartwood color ranges from light to medium reddish brown. Its sapwood, which is a light creamy color, is usually selectively eliminated from the veneer and lumber. In some respects it resembles Red Birch but has a more uniform grain and is further characterized by the presence of **small dark gum flecks** which, when sound, are not considered as defects but add to its interest. Cherry is available in moderate supply as lumber and architectural paneling and is usually plain sawn or sliced. Exceptionally rich appearance is achieved with transparent finishes, which together with its fine machining characteristics, justifies its identity with Early American cabinetry and furniture manufacturing thus adding to its prestige as one of our most desirable native woods.

Fir, Douglas: Douglas Fir is a large, fast growing species and is native to the Northwest. It accounts for much of the lumber produced in North America. While the preponderance of its production is developed for structural and construction type products, some of its upper grades are used for door frames and specialized woodwork. Its heartwood is reddish tan while its sapwood is creamy yellow. Since its growth rings are conspicuous, a rather bold grain pattern develops when either plain sawn for lumber or rotary cut as is common in plywood. Some lumber and veneer is cut edge or vertical grain, producing a superior form of the product, since the tendency to “grain-raise” is greatly reduced.