



Eastern white pine, left, with its light color and even grain, continues to be the cabinetmaker's first choice in pine because of its easy working and even finishing characteristics. The light color of west-

ern yellow pine, center, is very similar to that of white pine, but it also exhibits some of the contrast between latewood and earlywood that produces the showy figure of southern yellow pine, right.

Pine

Capturing the special charm of a common timber

by Jon Arno

Pine is so relatively inexpensive, readily available and easy to work that it is often dismissed as a wood for beginners to practice on until they're experienced enough to work with more expensive hardwoods. This theory is wrong. Pine is a very respectable cabinet wood with a long tradition in American furniture-making. And although some species of pine are easily worked, others can be fairly difficult to handle and a nightmare to finish.

While there is no such thing as "good" pine or "bad" pine, generally speaking there is a right pine for any given project based on the wood's structural properties or its traditional use. To get the most out of pine, therefore, you must know something about the limitations and applications of the more than 30 native North American species. Fortunately, for practical purposes, these species can be divided into three main groups: white pine, western yellow pine and southern yellow pine, as shown in the photo above.

Although white pine is structurally the weakest and least durable of the three groups, it has the best working characteristics. Eastern and western white pine are virtually interchangeable and are ideal woods for colonial New England pieces. Sugar pine, a type of white pine, is a pleasure to work because of its uniform, fine texture and sweet aroma, but it is inappropriate for period reproductions due to the large, dark resin canals that produce flecks in the grain pattern.

The southern yellow pine group contains the hardest and heaviest of the pines. These pines have showy figures with high contrast

between the soft earlywood and the hard latewood. This group is most frequently used as construction timber, but is authentic for some antebellum furniture as well.

Ponderosa and lodgepole are the dominant species of the western yellow pine group, and are the species most commonly found at lumberyards. These pines have a tamer figure, with more earlywood and thinner bands of latewood than southern yellow pine, and are softer and easier to work. In fact, unfinished western yellow pine looks similar to white pine, but the abrupt transition between earlywood and latewood requires different finishing techniques.

Grades of pine—With experience, it is not difficult to distinguish the various pines by sight and feel, but normally they are clearly labeled with a grade stamp (see sidebar on p. 93). Because of the great demand for pine in the construction industry, there is a premium on long, clear and structurally sound boards. Clear white or sugar pine, when you can find it, can cost as much as walnut. This economic reality often forces woodworkers to use the lower grades of wood. Usually clear stock is not that essential; knots that are tight and structurally sound can add charm and character to some furniture styles, as shown in the photo on p. 92. Just make sure the knots are at least 1 in. from the ends of the boards, where they won't interfere with joinery. Avoid knots ringed with a black line, as they will almost surely work loose or fall out.

If you need clear pine for repairing period pieces or reproductions, you can get fairly sizable sections from lower grades of stock. Pines produce branches in whorls 18 in. to 24 in. apart along the main trunk, which results in beautifully figured clear wood between the whorls, as shown in the photo below. My rule of thumb is to buy plenty of the lowest grade of wood that will yield at least 50% usable material for a given project. When I need long, clear pieces, I buy the top grade for just those pieces, provided I can get both grades in the same type of pine. Unless the piece is going to be painted, don't mix pines from the different groups because they don't generally finish the same way, and grain patterns and colors will vary considerably. You should also buy your stock from lumberyards that allow customers to select their own wood. Woodworkers can usually find the right kind of light, soft pine even in a pile that has already been picked over by construction contractors, who tend to prefer the stronger heartwood that is too resinous and bland for furniture. If you only need short, clear pieces, you can use boards with loose or missing knots.

Working with pine—Pine's scent is one of the most pleasant fragrances in the world, but this benefit only compliments the primary pleasure of working with a wood that machines with so few problems. You do need sharp cutting edges and sawblades to prevent tearout with a soft wood like pine. Pine is also resinous enough to gum up cutting edges, so clean the blades frequently. But the resin has little effect on most glues; glue joints will be stronger than the wood itself. In addition, pine's spongy texture absorbs shock and, while pilot holes are needed for screws, nails can be driven into all but the hardest southern yellow pines without splitting the wood.

Even though pine is a soft wood, you can build furniture for rough, daily use by taking a tip from woodworkers of an earlier era and bulking up the design. Thicker stock makes for rugged components and stronger joinery, which traditionally has included everything from dovetails to butt joints and nails. Because pine has always been a timber of choice for utilitarian pieces, the joinery has tended to be simple, cheap or easy. Mortise-and-tenon and dovetail joints were preferred in colonial days as alternatives to scarce and expensive nails and screws. Pegged joints were frequently used, but as iron and steel became more readily available, square-cut nails and screws proved to be a more convenient choice. The Tremont Nail Co., Box 111, Wareham, Mass. 02571, manufactures a line of historically accurate square-cut nails and other fasteners.

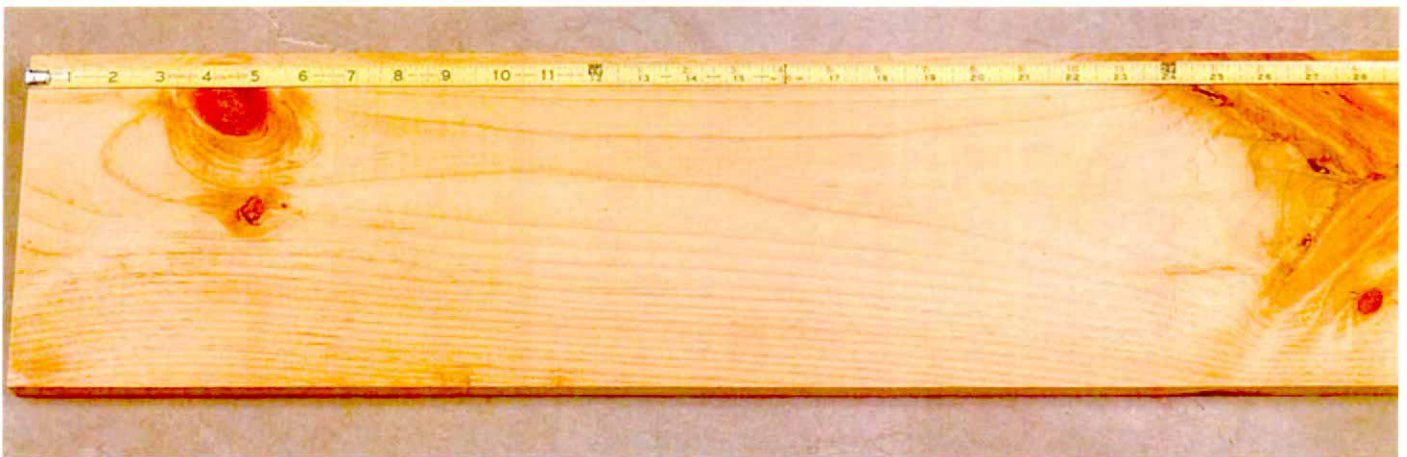
When cutting joints like dovetails or mortises and tenons, you have to compensate for pine's spongy, easily compressed texture

by cutting the pieces to fit a little snugger than you would if you were working with hardwoods. Also, minimize test fitting the joints to avoid excessively compressing the wood before final assembly. Tenons should be cut as large as possible and slightly longer than those used with hardwoods. A mortise cut in $\frac{3}{4}$ -in. stock should be no wider than $\frac{1}{4}$ in. Using stock a full 1 in. thick or heavier will not only leave more material for the walls of the mortise, it will also allow for a thicker tenon. Cut dovetails with wider pins and at a slightly greater angle than you would for hardwoods—a 1:5 ratio should work well. This angle will reduce the likelihood of failure due to compression of the wood. However, the greater the angle, the greater the chances that the corner of the tail will split, so don't go overboard.

In developing your designs, remember that early American pieces were generally built with stock of various thicknesses rather than with today's standard $\frac{3}{4}$ -in. stock. It was easier to get odd sizes of stock years ago when the woodworker could order virtually any thickness from the local sawmill. But even today it's worth the extra effort to plane down thicker stock or add edge moldings to achieve a thicker appearance.

Applying finishes—Perhaps the greatest challenge in working with pine is to select an appropriate finish and apply it properly. As with any other wood, preparation is the key to the quality of the final finish. Because pine is usually predimensioned—hardwoods are commonly bought rough—you might think that sanding with 120- or 180-grit paper would be sufficient. These fine abrasives don't cut deep enough, however, to remove the chatter marks left by fast-feed, high-speed commercial planers. The results are blotchy lines across the boards when stain is applied. I have found that belt sanding with 80-grit prior to assembly and then finishing up with progressively finer-grit paper yields dependable results. For more authentic reproductions, handplane the wood, and then use a scraper to remove any planing marks.

Further surface preparation will depend on the type of finish to be applied, and there are many choices. As a common utility wood, pine was often left raw to develop a natural patina, or simply rubbed with linseed oil or beeswax to protect the surface. Other finishes have ranged from shellac to varnishes to paint, each with its own peculiar problems due to the basic nature of pine. Pine's aggravating characteristics include the wood's natural resins, solvents that will dissolve many finishes, and showy figures caused by a large variation in grain density, ranging from as low as 0.28 specific gravity for the soft earlywood to as high as 0.78 for latewood. If pine is not sanded properly, the variation in



Depending upon the width needed, 18 in. or more of clear eastern white pine could be cut from this piece of #4 Common bought at the local lumberyard. By selective cutting, even boards with missing knots can provide beautifully figured, high-grade lumber.



This cabinet of #4 Common ponderosa pine, the cheapest grade available, was stained, but not sealed, to emphasize the figure.

grain density can result in wavy surfaces and uneven absorption of stains and finishes.

Shellac is one of the primary weapons in combating pine's finishing problems. As a final coat, shellac tends to spot or cloud when exposed to moisture, and has generally been superseded by harder, more durable varnishes. However, shellac is alcohol based and therefore not affected by pine's natural turpenes, so it can be used to seal knots and prevent the turpenes from bleeding into the modern topcoat varnishes. Turpentine- or mineral spirit-base finishes may not harden or dry if they are contaminated by the turpenes. A single coat of 3-lb. cut orange shellac works well as an undercoat; an additional coat serves as a very heavy-bodied sealer that compensates for pine's grain swelling tendency by building to a glassy-smooth surface. Shellac can help control color variations and stain penetration as well when used by itself or in conjunction with other finishes, as will be explained in the following discussion.

Oil and/or beeswax are common finishes on early American pieces. Oil finishes, unprotected by varnish, oxidize, absorb dust and grime, and eventually turn almost black. Beeswax or clear finishes on eastern white pine develop an orange patina known as pumpkin pine. Because time is an essential ingredient in developing this mellow appearance, pumpkin pine is hard to duplicate. A technique I have used to simulate this patina is to first wipe on a tint coat, made by dissolving $\frac{1}{4}$ oz. of raw sienna oil pigment in a quart of mineral spirits. When this is dry, seal the surface with several coats of orange shellac rubbed out with 0000 steel wool. The shellac further softens the color and creates an authentic, traditional look, since the finish was used as early as the late 1600s.

To achieve the darker look of oxidized oil or to make yellow pine resemble white pine, staining is necessary. Applying stain directly to yellow pine will result in a reversal of the grain contrast as the soft earlywood absorbs most of the stain and very little stain penetrates the hard latewood. To temper this high contrast, apply a wash coat of diluted shellac, one part of 3-lb. cut white shellac to two or three parts alcohol, prior to staining. The shellac penetrates into the earlywood and reduces its porosity, while a light sanding, once the shellac is dry, removes most of the sealer from the latewood. Now stain penetration of the earlywood is reduced, but the latewood will absorb the stain at nearly its original rate, so the color contrast between the two areas will be less obvious. Because stain penetration is decreased, you may have to use a darker stain to achieve the desired results. To reduce yellow pine's natural hue

and make it look more like white pine, the stain should be made slightly redder by adding about $\frac{1}{2}$ oz. of burnt sienna pigment per quart of stain. A coat of orange shellac applied over the stain, but prior to the final varnish coat, will also give this finish a warmer tint.

Distressed finishes—Although I prefer a reproduction piece to look, as it did when it was new, it is possible to simulate centuries of use by distressing edges, feet and work surfaces by rubbing them with sand or otherwise denting and abrading selected areas. By applying the finish before the piece is distressed, a more natural antique appearance can be duplicated. Once the piece has been abused to taste, apply a final coat of either black paint or dark brown stain and immediately rub it off, but leave some of the pigment on the wounds and in corners. The previously applied finish makes this rub coat, designed to simulate the grime of ages, easy to lighten with rags and turpentine if the contrast first appears too vivid.

While pine is often stained, historic evidence indicates that paint was a more traditional finish. Some of the fancier pieces were painted in several tones, with lighter tints on panels and darker, complimentary colors on frames. Also, pine was often painted to simulate the natural figure of more prestigious woods. A base coat was applied and then mottled, sometimes in conjunction with another tint or pigment, using a dry stiff-bristle brush, rags, feathers, combs or crumpled paper to achieve a grain-like appearance. Although with paint you don't have to worry about what species of pine is used, the knots should still be sealed with shellac to prevent their resins from bleeding.

Generally, early American pigments were somewhat loud, and it is helpful to visit museums to get a sense of the colors that were popular for certain period pieces. Milk paint was the primary vehicle for these pigments and its lack of opacity and tendency to raise the grain gave it a character all its own. While milk paint is still available (Van Dyke's, Box 278, Woonsocket, S.D. 57385; 605-796-4425 or The Old Fashioned Milk Paint Co., Box 222, Groton, Mass. 01450; 508-448-6336), a reconstituted, syrupy mix of non-fat dry milk colored with universal pigment or acrylic artist's pigments will achieve comparable results. This homemade variety is not moisture resistant, but it can be protected with a coat or two of varnish. Also, making your own milk paint allows unlimited choice of colors. Although the colors aren't authentic, flat latex paints can be used. Since they tend to raise the grain on raw wood, they simulate the look of milk paint better than oil-base paint, but a satin varnish topcoat is needed to provide a little luster.

A scrubbed pine or limed look can be achieved by rubbing a thin, almost transparent coat of oil-base white paint on raw wood and sealing it with satin varnish. This finish compliments even the racy figure of yellow pine. The paint tends to soften the grain's contrast, while the wood's natural yellow tones mellow out the paint's stark white pigment to achieve a rich, creamy beige finish. (For a further discussion of limed finishes, see "Creating a Limed Finish" on pp. 82-83 of this issue.)

A very striking appearance can be achieved by layering coats of different color paints and then sanding through to expose the lower layers at points where normal wear would occur. Any combination of two or more colors can be used. Apply two coats of the first color and then a coat of clear varnish between each succeeding coat of different color paint. This allows for a greater margin of error when sanding down to expose a previous layer. A final coat of satin varnish will enhance durability and soften contrast. □

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Grade stamps: understanding the language of pine

Until early this century, woodworkers in eastern North America could buy pine with relative confidence that they were getting white or yellow pine from the vast pine forests of New England, the Great Lakes region and the South. While there are subtle differences between the southern yellow pines and the northern yellow pines, there is only one eastern white pine. The wood of this pine, *Pinus Strobus*, is so much softer and uniformly textured that it was the preferred species for cabinet work and interior trim and was easily distinguished from other pines.

As the eastern forests became exhausted, supply shifted to the west, introducing not only two more white pines, western white and sugar pine, but also the western yellow pines, predominantly ponderosa and lodgepole. Further compounding the situation, these western yellows proved to be softer and have a milder figure than the yellow pines of the east, making them very acceptable for most interior trim and finish work. Although unfinished western yellow pine looks a lot like eastern white pine, staining yellow pine emphasizes the grain variation between earlywood and latewood much more than it does with white pine.

It is possible to distinguish the western yellow pines from true white pines by subtle differences in the weight, color and texture or by a faint, dimple pattern commonly found on the flat sawn surface of ponderosa pine. But the far easier approach for distinguishing pines is to look at the grade stamp, which provides five categories of information that indicate the grade or quality of the material, the species or group of species, the moisture content when surfaced, the certifying association and the processing mill number.

Grading standards have been established by regional lumber associations, which also help their members market products. There are currently nine organizations in the United States that have been certified by the American Lumber Standards Committee Board of Review and 10 more in Canada, but for purposes of identifying species, it is only important to be able to break them down into three regional groups corresponding to the natural ranges of North American pines. For this purpose the initials of their trademarks are often descriptive enough. For example, WWP stands for Western Wood Products Association (1500 Yeon Building, 522 S.W. Fifth Ave., Portland, Ore. 97204-2122; 503-224-3930), while SPIB represents the Southern Pine Inspection Bureau (4709 Scenic Highway, Pensacola, Fla. 32504; 904-434-2611) and NELMA identifies the Northeastern Lumber Manu-

facturers Association (272 Tuttle Rd., Box 87A, Cumberland Center, Maine 04021; 207-829-6901). These non-profit organizations are generally very helpful, and they offer brochures, usually for a nominal charge, on grading rules and procedures as well as other information on the lumber industry. The American Lumber Standards Committee Board of Review (Box 210, Germantown, Md. 20874; 301-540-8004) also offers a facsimile sheet that contains information on all of the 19 approved agencies, as well as samples of each agency's grade stamp.

Identifying lumber grades: Understanding the grading systems used for pine is complicated by the similar but not identical guidelines used by each of the associations throughout the country. And although these various grades are generally comparable, the situation is further complicated because the nomenclature used to describe

the grades varies by species and area of the country. For example, grading for Idaho white pine is expressed as Choice & Btr, Quality, Sterling, Standard or Utility. This compares roughly to C & Btr, D, #2 & Btr, #3 Common or #4 Common grades used for the other western pines. Corresponding grades for southern yellow pine are C & Btr, D, #1, #2 and #3 while NELMA uses C Select, D Select (or more commonly D & Btr), Finish, Premium, Standard and Industrial. For a better understanding of these grades, you can order a copy of the grading rules from the agency in question.

In many cases, the abbreviations used on the grade stamps are self-explanatory, but a few require interpretation. IWP stands for Idaho White Pine, one of the nicest of the western pines and almost indistinguishable from eastern white pine. Two Ps used back to back designate ponderosa pine. In recent years, however, there has been a trend toward mixing species and a lot of ponderosa is shipped with lodgepole, designated as PPLP. Another commonly encountered stamp is S-P-F that stands for Spruce-Pine-Fir and comes almost exclusively from Canada; however, some of the Eastern mills are starting to use an S-P-F Eastern stamp. As the mixed-species stamps become more prevalent, it becomes more difficult to determine exactly what type of wood you are dealing with, so the association trademark becomes the only clue as to the species involved.


While the association's trademark, included as part of the grade stamp, normally provides all the geographic information needed to close in on a probable species, you can probe still further by asking the association for information about the mill number in the grade stamp. By locating the mill, you can establish specific areas of origin.

Determining moisture content: The moisture content of the lumber at the time it is surfaced is also specified in the grade stamp. Three different levels are specified: S-Grn indicates the moisture content (MC) was above 19% when surfaced; S-Dry or KD-19 means surfaced dry at 19% MC or less; and KD-15 or MC-15 denotes 15% MC or less. The drier the lumber is when surfaced, the more dimensionally accurate it will be when purchased. Also, there is a greater tendency for lumber surfaced green to be twisted, warped or bowed.



Although the usefulness of these markings is becoming diluted, they are still very helpful in identifying at least the major group to which a particular pine belongs. Armed with this knowledge, the woodworker can make an intelligent choice of pine for furniture-making or repair work. —J.A.

107 S-DRY  PREMIUM EASTERN WHITE PINE

A piece of premium-grade eastern white pine processed by NELMA-approved-mill no. 107 would bear this stamp. S-Dry indicates surfacing was done at 19% MC or less.

SPIB-[®] No. 1
KD 15 

The SPIB in this stamp identifies not only the agency, Southern Pine Inspection Bureau, but also the species, southern pine. This stamp would be used by mill no. 7 on a #1 grade board, kiln dried to 15% MC or less before surfacing.

12  1 MC 15 

This grading stamp of the Western Wood Products Association would be used on a #2 grade lodgepole pine board that was surfaced with 15% MC or less at mill no. 12. WWPA can further pinpoint the origin of the material through the mill number if needed.