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Fine WoodWorking

October 1994, No. 108
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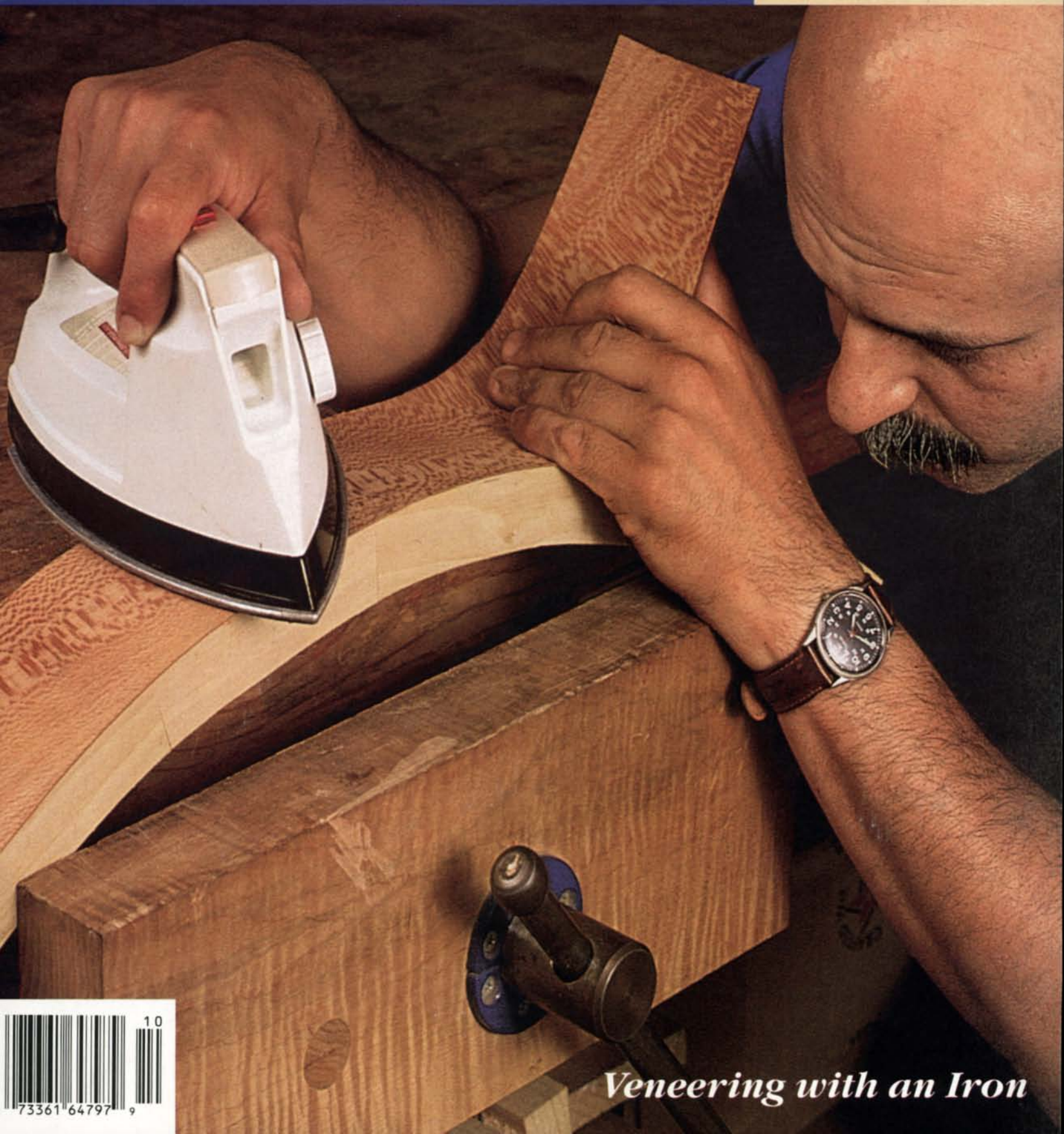

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Fine WoodWorking®

September/October 1994 No. 108

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On the Cover: *Mario Rodriguez shows an easier way to adhere veneer using ordinary woodworking glue and a household iron. See the full story on p. 48. Photo: Alec Waters*

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***Home Furniture* debuts**—The excitement began soon after we called for entries for a book of finely crafted household furniture in *FWW* #103. When the entries poured in, we knew there was more there than just a book. We kept asking ourselves how we could better show off the wealth of talent in the entries. The answer came as we began to see a need for a new publication that would go beyond the nuts and bolts of woodworking techniques covered in *Fine Woodworking* to explore in detail areas of design and style that contribute to successful furniture, furniture meant to be used. What resulted is a new quarterly magazine, the core of which will be beautiful examples of expertly made furniture. But there will also be departments and articles covering everything that goes into a piece of furniture to make it succeed before there is any sawdust in the shop. The resulting magazine will not only be an asset for woodworkers, but it should become a resource for interior decorators, architects and anyone wanting to furnish a home with quality pieces. Watch for it on newsstands this fall.

Iron-on veneer—The concept of ironing on veneer with a household iron and yellow glue has generated more excitement among woodworkers we've contacted than virtually anything we've run in the magazine in recent years. Just talking about it sent all sorts of woodworkers scurrying to their shops (after a quick trip to the laundry room to pick up an iron), so they could try out this technique. Of course, we've learned from a number of independent sources that the technique is not absolutely new. It, like so many other woodworking techniques, was independently discovered by woodworkers in widely separated shops.

But whether it's a new discovery or a great rediscovery, it works. Contributing editor Mario Rodriguez provides a good introduction to the technique on p. 48 and in the companion Video Take. Chemist Chris Minick adds a technical explanation of why and how the process works. It's a great invitation to try something new, opening up the world of veneers to folks who might be afraid to give that part of woodworking a try.

Working green wood—Not unlike veneer, green woodworking is an ancient but specialized part of woodworking. Woodworkers who haven't given it a try should find Harriet Hodges' article on p. 90 of interest.

Some of you who read the fine print to the right of this column have already noted that Harriet is our indexer, a job she has handled with aplomb since 1980. This article represents her first contribution to the magazine outside of the painstakingly compiled index information that makes *Fine Woodworking* such a valuable reference tool. Harriet, an avid reader of the magazine, landed her job as indexer after she told then-editor John Kelsey she thought she could do a better job than whoever was doing the index then. Little did she know it was Kelsey himself.

If Harriet's introduction to working green wood wets your appetite for more, she recommends hands-on instruction from a competent teacher. Among the teachers and workshops we know that offer such instruction are Country Workshops (90 Mill Creek Road, Marshall, N.C. 28753-9321), Green Woodworking and Blacksmithing Workshops (Box 1322, Mendocino, Calif. 95460), Warwick Country Workshops (1 East Ridge Road, Warwick, N.Y. 10990) and Michael Dunbar (Box 805, Portsmouth, N.H. 03802).

Woodworking computer bulletin boards—Another breakthrough area in woodworking information is electronic. Woodworking has become just another stop along the information superhighway, as Michael Covington explains on p. 126 in our "Notes and Comment" section. In addition to the Internet woodworking forum he talks about, there is also an active group on Compuserve, and we've heard about a number of independent woodworking computer bulletin boards that have started up. We're curious how widespread the use of such services is and how much our readers are interested. If you have tips or information about woodworking bulletin boards or would just like to read more about them in *Fine Woodworking*, drop us a line.

—William Sampson, editor

Buying fans and motors—In *FWW* #106, we listed Grainger (333 Knightsbridge Parkway, Lincolnshire, Ill. 60069-3639; 800-473-3473) as a source for axial fans (p. 48) and as a source for vacuum motors (p. 86). Several readers have called to say that Grainger does not carry a 9-in.-dia. fan, but they do have a 10-in. fan (Dayton model 4C688). Before you build Jim Whetstone's air-filtration box, make sure you have a fan in hand, so you can check that the dimensions will work.

Readers have also called to say that they were having difficulties buying both items over the counter. Grainger, an industrial and commercial equipment and supply company, will sell only business-to-business as a matter of company policy Grainger officials said. They will not sell directly to consumers, but will sell wholesale to companies. They require identification from all purchasers.

—Alec Waters, associate editor

Fine WoodWorking

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Writing an article

Fine Woodworking is a reader-written magazine. We welcome proposals, manuscripts, photographs and ideas from our readers, amateur or professional. We'll acknowledge all submissions and return those we can't publish. Send your contributions to *Fine Woodworking*, PO Box 5506, Newtown, CT 06470-5506.

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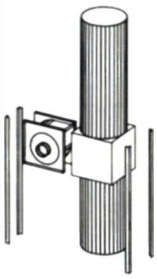

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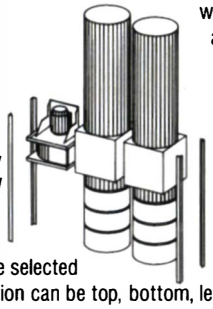

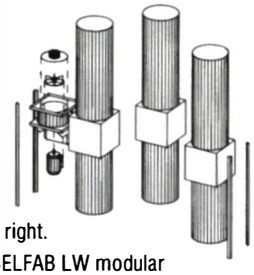

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READER SERVICE NO. 131

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Tim Carter

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READER SERVICE NO. 173

Where was HVLP when he needed it? I have just had the opportunity to read the article in *FWW* #106 by Nick Yinger ("Vacuum Motor Turns into a Spray Rig"). In the sidebar on p. 87 where Dave Hughes discusses the effect of spraying with high-volume, low-pressure (HVLP) vs. conventional spray systems, he comments, "Where was the paint missing from the conventional gun? All over." I was reminded of a spray job I did back in my underpaid teaching days. I think it is good for a laugh.

I contracted to paint a 2-ton panel truck in the familiar checkerboard design of a Ralston Purina dealer. First off, the gray body had to be made white; what better way to paint it than with a spray gun? I was working out of doors, behind the dealer's shop, and the work came out nicely. But the strangest thing happened: Every automobile within a few hundred yards developed little white blemishes, much smaller than the size of a pin head. Everybody was completely puzzled. Only I knew where the little blemishes originated, and you can believe it, I wasn't talking. *—Tom E. Moore, Clarksville, Va.*

HVLP turbine shows good engineering—I'm not one to write letters to magazines, but after reading the article by Nick Yinger (*FWW* #106), I feel compelled to. He has written what may be the finest technical article I have ever seen on home-built equipment. I have been thinking about purchasing a high-volume, low-pressure finishing setup, but the cost has been a problem. I now know that I can build one after reading Nick's well-organized article.

As an aerospace engineer, I design systems that require extreme attention to detail to meet vibration and noise specifications. The way Nick isolated the turbine from the wooden box with silicone rubber sealant and rubber tubing spacers is an excellent example of good engineering with a simple and well-thought-out design. The readers who build this unit will create a long-lasting, low-vibration compressor that will give them years of satisfaction because of Nick's simple but elegant design. I would like to add that it's refreshing to see such a comprehensive project detailed using only three pages. It requires quite a skill to condense so many topics without exhausting the reader.

I hope Nick and others like him continue to write about home-made equipment because I believe many of us will benefit from the satisfaction of building our own high-quality equipment while saving a bundle. *—John Moody, Kinnelon, N.J.*

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HVLP updates—The timely article on high-volume, low-pressure (HVLP) in *Fine Woodworking* #106 was much appreciated. Grainger now has a three-stage Ametek vacuum motor #116764-13, which, though rated for 500 hours instead of 700 hours, is less costly per hour, more efficient and quieter than the one recommended by the author. Also, if you end up choosing a spray gun that is the non-bleeding type, you must install a pressure relief valve. Accuspray sells a complete pressure relief assembly #92137 for less than $60. Besides the Hitachi, Graco/Croix (800-367-4023) and Accuspray (800-618-6860) also have true HVLP rigs for sale.

Because this technology is relatively new to the market, feedback is difficult to find. Perhaps *FWW* could run an evaluation of several guns. This would give me time to build my turbine! *—Kenny Andersen, Fort Worth, Texas*

Clamps that deflect less—In "Clamps in the Woodshop" (*FWW* #106), Mr. Bernie Maas says "Hard-steel bodies deflect less than soft-steel ones." This is a common misconception. Engineers sometimes forget: Deflection is a function of the modulus of elasticity, which is fixed for a given material, such as steel, copper and aluminum. It cannot be changed, at least by currently known methods.

Hardening will permit greater load/tightening of the clamp before it is bent permanently, but has no affect short of the load that will cause a permanent bend/deflection. This may be what the author had in mind. I found the article worth reading, and I continue to find *Fine Woodworking* great reading and a continuing source of useful information. *—J. Francis Pfrank, Schaumburg, Ill.*

Edge-joining one board at a time—The article "Bigger Boards from Smaller Stock" by Jim Tolpin (*FWW*#106) is well presented. I've tried all the alignment methods he suggested, but I prefer my method because it's simpler and easier. I glue one joint at a time. I start clamping at one end, progressing along the board, pulling the two boards into perfect alignment by feeling the working side of the joint. The process is so simple it only takes a few minutes. I glue up the two units of two boards each. Then in about 30 minutes, I can joint each unit to remove any damage or distortion and then glue the third (middle) joint to form a four-board unit. A few strokes with a scraper is all that's needed to remove any surface mismatches. *—Ross Roepke, Tullahoma, Tenn.*

Finger-joining without waste—On the subject of "Finger-Joining Small Boxes" by Jack Danilchak (*FWW* #106): Finger box joints and jigs have been used for many years by woodworkers

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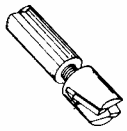

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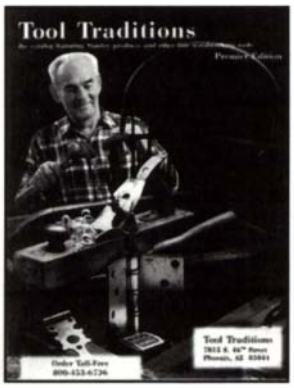

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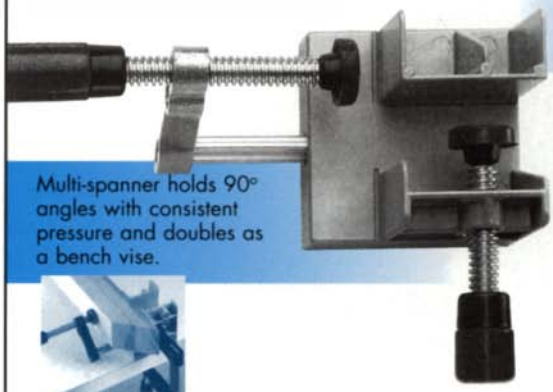

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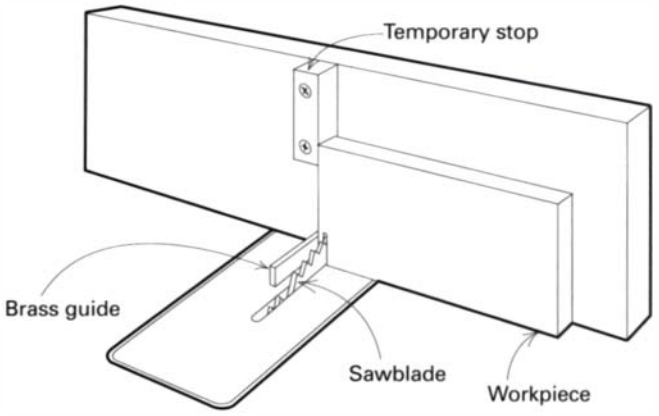
to make boxes, cases and strong joints. However, if you are using expensive wood, you cannot waste any; therefore, the method of making joining fingers should have been explained. To do this, the start point of each corner must be alternated or staggered, so there is no waste. Four of the corners must be cut up against the guide while the other four corners are started with a slot or have a stop at the inner edge of the sawblade to start with. This eliminates the need to straighten the offset that occurs when all the sides are made starting at the same index point.



By making opposite fingers, which can be done accurately with a removable stop atop of the jig, as shown in the drawing above, the parts are ready to fit or groove for the lids.

If the ends are staggered properly, you need not stop the lid groove before the corner because the groove, if it is made small, becomes part of the finger joint.

I have made numerous attaché cases, boxes and even display shadow bows, using the finger-joint technique, and it works great. It even makes great router-bit boxes.

—Phillipp J. Quedens, Berlin, Conn.

Encounters with bog oak—A while ago (*FWW* #100 and #101), your correspondents asked about bog oak. I saw one on the roadside last week when driving between Ramsey and Huntingdon, north of Cambridge, England. This is in the black soil belt of England where the land was drained about 200 years ago and is decaying naturally so that ancient trees emerge as the level of the land lowers. It has gone down about 15 ft. since the drainage. So although your correspondents might not find any in Ireland, they can be found in the Fenland of Cambridgeshire.

If your readers would like to see the grandest use of Irish bog oak, it is to be found in the wonderfully carved roof of St. David's Cathedral in Pembrokeshire, Wales. In the Middle Ages, the local trees had all been cut down, so the archbishop imported bog oaks from Ireland, a short sea voyage away.

Incidentally, the laws about cutting down trees were not special to Ireland; they still apply here. I am a teacher at a college in Cambridge, and we are being stopped from building a student dormitory because it would involve cutting down a fine western red cedar. Apparently, we have to go right up to the government in London to ask for permission. That cedar would make fine woodworkers' wood! *—Sam Edwards, Cambridge, England*

Improved folding sawhorses—H. M. Smith's folding sawhorse, described in *FWW* #103 appealed to me very much, and

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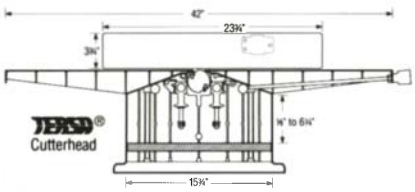

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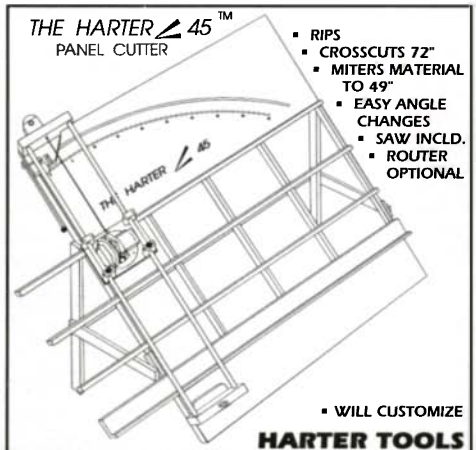

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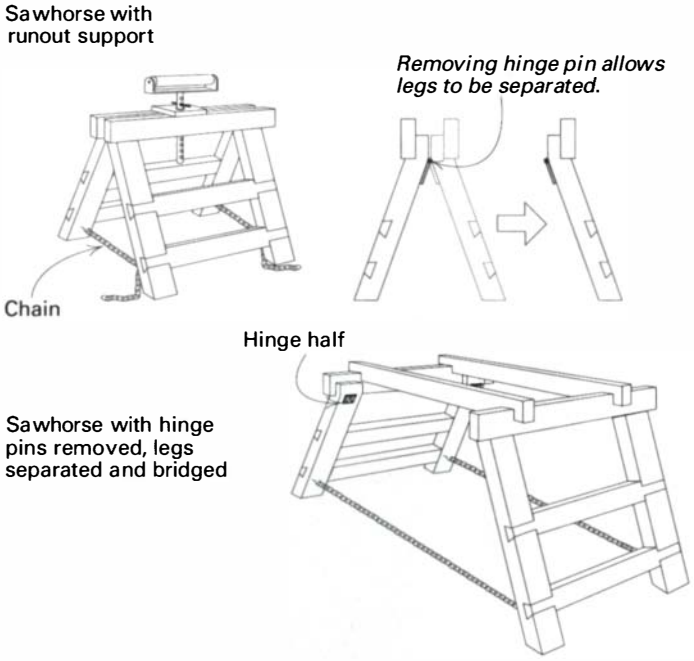
while building one, I added a few features, as shown in the drawing below. The top rungs in my design are rectangular (70mm by 45mm) and vertical, and the legs lean at 20° to the vertical.



When the horse is assembled, it can also be used as a stand for a runout support. (The adjustment for height by means of a cross pin and a series of holes can be improved on.)

By extracting the hinge pins, the two ladders may be separated and bridged over by two notched beams to form a convenient bench. The chain must naturally be made long enough.

—Abe Peled, Ramat-Hasheron, Israel

Sassafras oil not safe—I enjoyed Jon Arno's article on sassafras (*FWW* #106), which is one of my favorite woods. Please note, though, that the oil of *Sassafras albidum* has not been a commercial item for the last few decades. ("Although the oil distilled from sassafras bark has remained an important commodity for scenting soap and flavoring foods and medicines...," p. 65.) Safrole, the leading constituent of the oil, is hepatocarcinogenic and has been banned from foods and beverages by the Food and Drug Administration since 1960. Use of the wood for furniture should present no health problems, however.

—Arthur Tucker, research professor, Department of Agriculture and Natural Resources, Delaware State University, Dover, Del.

Warnings about using plastics—As a plastics engineer and a recent subscriber to *Fine Woodworking*, I'd like to comment on the article "Plastics in the Woodshop" in *FWW* #105. Many plastics are susceptible to degradation, particularly cracking in stressed areas when exposed to ultraviolet radiation. This makes them poor candidates for extended exposure to sunlight. I got a nasty surprise when mildly bent strips of acetal broke into bits when exposed to direct sunlight for only a few weeks. Inclusion of dense pigments or fillers reduces this susceptibility, but it is there with most plastics.

Polycarbonates, though wonderfully tough and transparent, have a pronounced Achilles' heel: They become brittle upon exposure to hydrocarbons, even hydrocarbon vapors. Thus the polycarbonate safety guard that offered such good protection

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when first made may be less than trustworthy if it has been wiped with paint thinner or has been in a confined space with a lawn mower that has a leaky gas tank. As usual with plastics, this tendency is most pronounced in stressed areas such as those squeezed by mounting screws or clamps. Coated sheets of polycarbonate intended for window glazing are available, though not easily. They are not only less susceptible to embrittlement by hydrocarbons but often more scratch-resistant than uncoated polycarbonate.

In the article, the statement is made that "acetals are the toughest and most resilient of thermoplastics." I have two problems here: First, the statement is not true (one might make such a statement about urethanes). Second, the folks who develop plastics work night and day to create new compounds that continually redefine the limits of plastics' properties: The toughest today may look like a wimp tomorrow.

—Don Reiterman, Hemet, Calif.

More efficient dust collection—I believe that your dust-collection article in *FWW* #106 will give your readers a false sense of security. Air velocity drops to 10% of the hose velocity at a duct distance equal to one hose diameter. In the photo on p. 49, Mr. Jakob appears to be sanding about 2 ft. from the hood. Using a formula from "Industrial Ventilation," published by the American Conference of Governmental Industrial Hygienists, the velocity 2 ft. from the hood is 0.1% of the hose velocity. Mr. Jakob's system is not capturing any dust from the sander or providing him any protection.

Mr. Fulton's planer dust collector shown on pp. 46-47 also has problems. It may collect the chips but it is blowing the finer and more harmful dust all over his shop. Connecting a shop vacuum with a paper filter to the excellent dust hood he made would be a major improvement. *—D.O. Sutter, Wilbraham, Mass.*

Wanted: better router for router tables—I read with interest the recent letters on routers for router tables. What I find astonishing is that no one manufactures a router intended just for router tables. There would surely be a market for them because anyone who can afford to leaves a router permanently attached to his table. There are probably 100,000 router tables on this continent, all of which are awkward and inefficient because all of them hold routers designed for hand use.

Such a machine could have a separate on/off switch that could be easily attached to the front of the table, a large wheel to adjust height and easily accessible speed control. Tool companies of the world, wake up! *—John Weidner, San Francisco, Calif.*

Pat Warner defends router—Both Mr. Collins and Mr. Ardizzoni have important criticisms about router-table use (*FWW* #106), but I think a cursory analysis will show it's the limitations of the routing process in general, rather than the Porter-Cable 7518 in particular.

Mr. Collins' first complaint about chips falling into the motor casting is not restricted to Porter-Cable routers. A vacuum should be used at the cutter for chip collection. His second complaint is also nonspecific to the 7518. All two-piece, fixed-base routers must be well-secured when upside down. I advocate single-depth cuttings in the router table for this reason. Many motor depth changes just increase the risk of an accident.

Mr. Collins goes on to say that he fastened his 7518 to a mounting plate and was concerned about an accidental lift of the plate out of the table. My contention was that the base casting should

be permanently bolted to the router tabletop, not to a plastic insert, which indeed may squirm or otherwise dislodge from its rabbet in the top.

I share Mr. Ardizzoni's complaint regarding under-the-table depth-of-cut changes. I also concede that fixed-base routers are nowhere near as handy to depth-adjust as plunge routers, but this again is nonspecific to Porter-Cable. Bosch, DeWalt, Milwaukee, Black and Decker and the imports all suffer somewhat in under-the-table height adjustments.

Notwithstanding, I stick to my original direction that table work should be single-depth work—single vertical depth, that is. The cutter height should be set once to full vertical depth and a fence used for the lateral incremental or continuous depth changes. Vertical cutter changes (whether fixed or plunge router) require an under-the-table manipulation that I believe is done more safely and in clear view with the fence on the top side of the table. *—Pat Warner, Escondido, Calif.*

Probed vs. probeless moisture meters—While John Sillick's article "Taking the Measure of Moisture Meters" (*Fine Woodworking* #105) was informative, I must take issue with a few points he made, especially in view of his full endorsement of "surface" contact meters. First and foremost, surface meters that use "electromagnetic fields" to measure moisture do not "average the moisture content in the area of their magnetic field." To the contrary, surface meters produce readings biased by the moisture content of the wood close to the meter's electrode, in this case, at the surface. In simple terms, any form of moisture gradient, while undetected by the meter, does affect the reading. Such effect is further emphasized by the diminishing force of the electromagnetic field penetrating the wood.

There is room in the market for surface meters where pin marks must be avoided and where their limitations can be accepted. But the selection of a surface meter should be made with full knowledge of their capabilities and not only on the basis of their convenience.

Pin-type meters give the serious woodworker reliable information on moisture content, its range and gradient. For practical purposes, this information often proves more valuable than the accurate oven test on a few small samples.

—Thomas J. Laurenzi, manager, Delmhorst Instrument Co., Towaco, N.J.

JOHN SILLICK REPLIES: Manufacturers of probeless moisture meters claim their units measure moisture within a board not just on the surface. I see no reason to contest this after testing their units repeatedly on air-dried lumber and finding that they gave readings similar to probed meters tested side by side. Although I continue to use a probed meter myself, I am not skeptical of the probeless meters.

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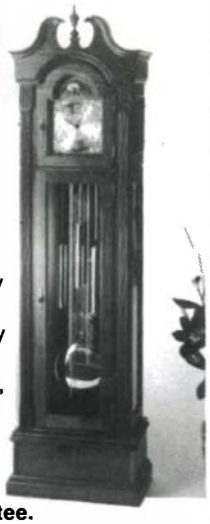

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Carpal tunnel syndrome spawns controversy, tips—Dr. Kirk Kundtz's article on carpal tunnel syndrome (CTS) in *FWW* #105 garnered strong and diverse reaction from our readers. Most of it was overwhelmingly positive, echoing an increasing interest in health and safety issues related to woodworking. Several readers have offered tips for care and prevention, and a number of physicians have responded with more information. Here's a sampling. *—William Sampson, editor*

Physician says most CTS misdiagnosed—Like Dr. Kundtz, I am also a physician and an active woodworker. Where we may differ is that a large chunk of my practice for the past few years has been devoted to the evaluation and treatment of patients with use-related arm pain and suspected carpal tunnel syndrome. I have seen several hundred such patients and am currently writing a medical paper on my findings.

The overwhelming majority of those with use-related arm pain do not have CTS or any other well-defined medical condition. CTS is rare, occurring in only about one per thousand workers per year. Most of those who are told they have CTS are misdiagnosed. Criteria for the diagnosis of occupational carpal tunnel syndrome are misleading most of the time. In most industries, of every 100 people with arm pain who meet the criteria for having CTS, over 80% will not in fact have true CTS.

Actual swelling and inflammation of the wrist tendons solely due to use almost never occurs. I routinely examine the surgical notes on my patients who have had carpal tunnel surgery. I have yet to find a single patient who had tendon inflammation visible to the operating surgeon or even to the pathologist when the removed tissue was examined under a microscope.

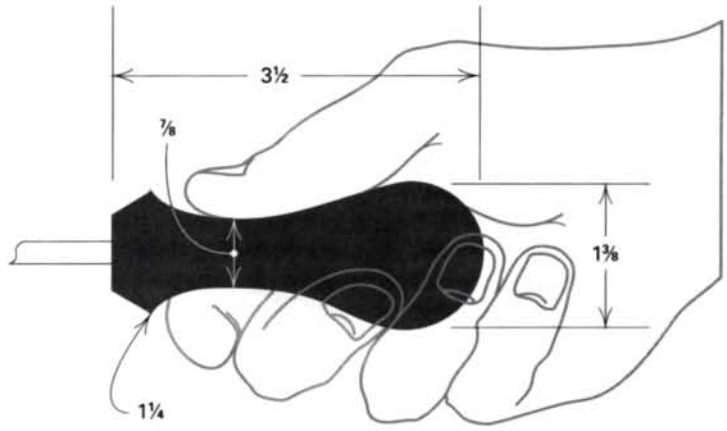
Dr. Kundtz did not mention the one condition that woodworkers should be made aware of: hand-arm vibration syndrome, or vibration white-finger disease. Hand-held vibrating tools can cause disturbances in both blood supply and nerve function of the fingers. Whether or not vibrating tools cause pure CTS is still being debated.

Where did all this nonsense about repetitive use and CTS come from? Well, mainly from a group of bioengineers at the University of Michigan. These people are not physicians, and a critical reading of their papers leads one unable to draw any meaningful conclusions about what their subjects suffered from, except that their arms hurt. Unfortunately, the Michigan group's assertions had not been tested and validated when the Occupational Safety and Health Administration (OSHA) took up the cause and proclaimed that repetitive use caused damage and that the workplace needed to be altered to prevent this damage. The bioengineers and ergonomists have profited mightily from this; those with arm pain have not. They continue to hurt, in ever-increasing numbers. *—Steven G. Atcheson, M.D., Arthritis & Rheumatism, Ltd., Reno, Nev.*

Dr. Kirk Kundtz replies—When I was writing this article, the literature was rife with articles describing work-related overuse of the hands and wrist as a major cause of CTS. OSHA had just come out with a guideline for diagnosing CTS. Thousands of cases were being diagnosed monthly. From this milieu, I described the then-current thinking regarding the patho-physiology of work-related CTS. Clearly, Dr. Atcheson finds this model outdated and is encouraging us to rethink the whole subject of CTS and "use-related arm pain."

Tool handle relieved his CTS symptoms—I make my living as a woodworker, and as such, I find myself using carving tools for weeks on end. This has led to some symptoms of carpal tunnel syndrome (*Fine Woodworking* #105). May I share with your readers a tool handle that has relieved my symptoms?

The handle shown in the drawing can be turned out of any suitable hardwood. The dimensions shown below fit my hand and may be altered to suit the individual. When gripped to push, the end of the handle is near the entrance of the carpal tunnel, but because the handle is substantially larger than the standard tool handle, the pressure is spread over a larger area. In addition, the thumb and forefinger absorb a great deal of the forward pressure, thus relieving the heel of the hand. When gripped to strike with a mallet, the high spot fits neatly into the palm, while the overall length gives ample clearance for the mallet blows.



I have used tools with this type of handle for some three years, and in addition to the health benefits, I find that the added bulk of this handle has given me far greater control of the tool. This alone has improved and speeded my work.
—Michael Burton, Ogden, Utah.

More suggestions for carpal tunnel relief—Thanks to Dr. Kundtz for his fine article on carpal tunnel syndrome (*FWW* #105). I'd like to add that there are often problems outside the carpal tunnel that can sensitize the median nerve and make it difficult to manage CTS without surgery. Anything that impinges on the median nerve (or its roots in the neck) anywhere along its entire length can make the nerve more vulnerable to pressure at the wrist (Upton and McComas, 1973). Many cases of CTS disappear after correction of a mechanical problem in the neck, elbow, or wrist; or through relief of muscular congestion; or shortening in the shoulder, upper arm or forearm.

I would also add another suggestion for CTS sufferers: Gently cool the inside of the wrist and forearm with a cold pack over a thin cloth for 10 to 15 minutes after work and at bedtime. This can be repeated hourly if needed to reduce swelling and irritation in the tunnel. In this way, the inflammatory reaction these tissues sometimes have to repetitive tasks may often be controlled.
—John C. Boye, D.C., chiropractic physician, Brookings, Ore.

Carpal tunnel complaints contagious—I was interested in the item in *Fine Woodworking* #105 on carpal tunnel syndrome and the woodworker. However, I thought I should issue a warning that this complaint is indeed highly contagious and is likely to sweep through shops and organizations like wildfire.

Some years ago, the press and other media in this state caught hold of this problem and gave it heaps of publicity. It started as CTS but was given the name of Repetitive Strain Injury (RSI). In a short time, it became flavor of the month, and about 10% of workers caught it. It was particularly prevalent among public servants (people in government departments) and became the principal excuse for claiming compensation, insurance, sick pay and even early retirement on health grounds. It was quite a long time before the epidemic passed away, so do be warned.
—W. Cyril Brown, Point Lonsdale, Victoria, Australia

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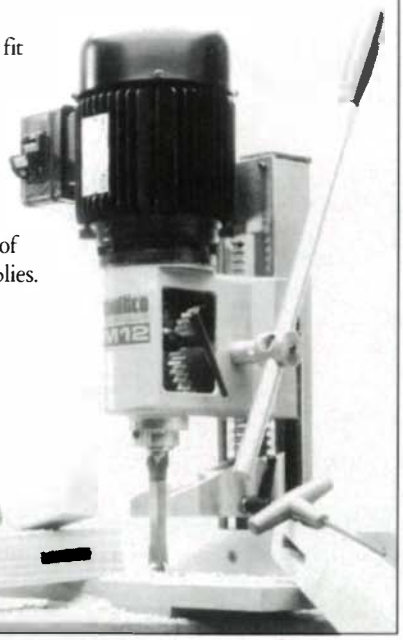

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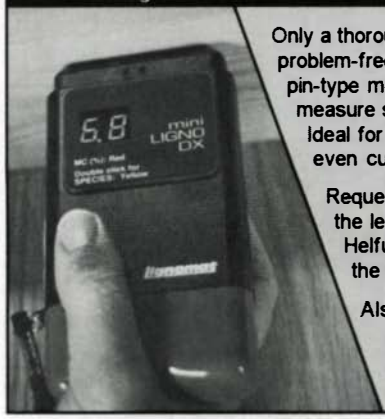

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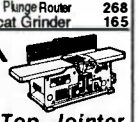

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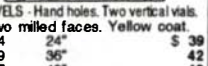

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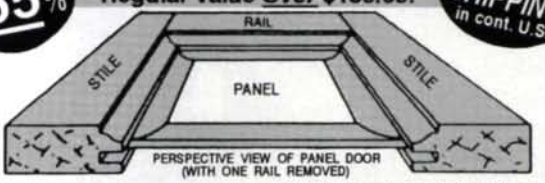

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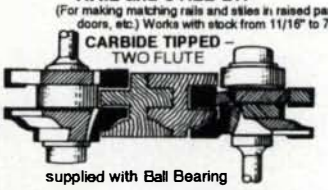

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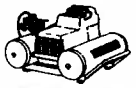

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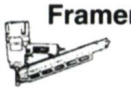

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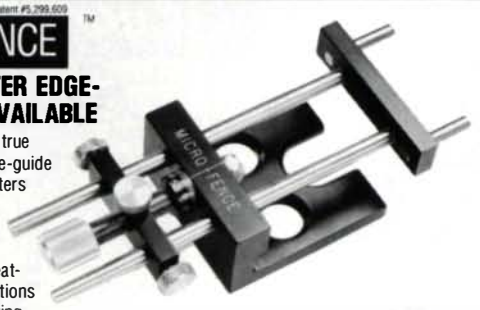

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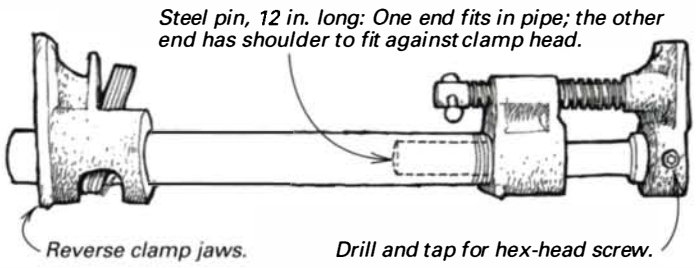
edited and drawn by Jim Richey

Disassembly clamp



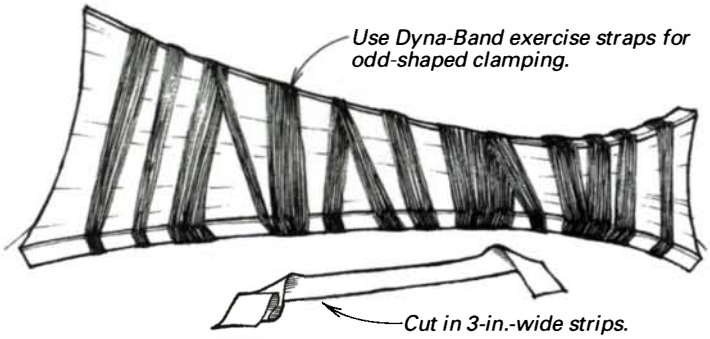
Since I began focusing my work on furniture repair, I have become acutely aware of a pressing need: a clamp that will force pieces apart rather than squeeze them together. I have used Quick-Grip's spreader clamp, but this tool does not exert sufficient pressure when I need to disassemble chair spindles pinned with nails, which is typical of the work that I experience.

My homemade alternative starts with a regular ½-in. pipe clamp and adds a 12-in.-long shouldered steel pin. Size the body of the pin for a sliding fit inside the pipe. The pin's shoulder should fit into the pipe-clamp head. If you don't have access to a metal lathe, any machine shop can make the pin. Now just install the pin and reverse the jaws, as shown. Fasten the clamp head to the steel pin by drilling, tapping and installing a hex-head screw. *—Merritt Brown Jr., Panama City, Fla.*

Keyhole saw

There are some sawcuts, such as a keyhole shape, that require the control of a hand tool. For such situations, I use a 10-in., 18-tpi metalworking hacksaw blade, bound around its middle with enough electrician's tape to make a comfortable handle. I grind one end of the blade almost to a point, so it can be entered in a hole and used with a pull stroke, thus reducing the risk of buckling or breaking the blade. I leave the other end of the blade unaltered and use it where there is enough space for a push stroke. *—Percy W. Blandford, Stratford-upon-Avon, England*

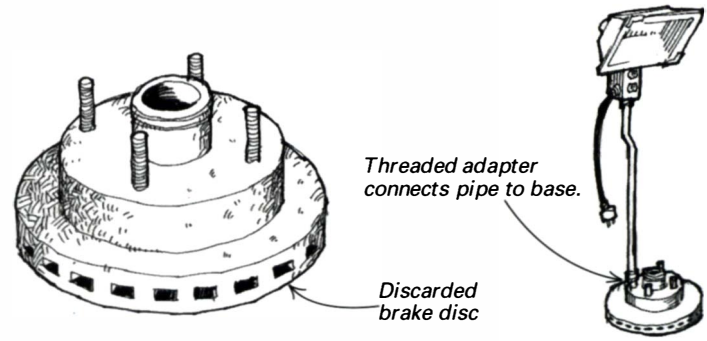
Clamping awkward shapes



I was having trouble figuring out how to apply laminates to the corners of a sculptural baptismal font when, at an aerobics class, a novel solution presented itself. In the class, we use springy rubber strips called Dyna-Bands for exercise resistance. The strips, which are about 6 in. wide and 36 in. long, come in a variety of strengths. They are available from Fitness Wholesale (800-537-5512) in packs of 15 for about $1.50 each. I cut each strip in half lengthwise to produce two 3-in.-wide strips.

To use, wrap the first turn around and over itself. This will anchor one end of the band. Now keep wrapping, as shown in the sketch, securing the far end by tucking it under the band. No need for clips or staples. The wood is not marred, and the edges of the strips are firmly pressed together. You can vary the amount of pressure from just enough to hold things in place to enough to make glue march out of the joint. Glue peels off, and the band doesn't stick to the workpiece. To preserve the strips, keep them in a Ziploc bag with a little talcum powder. *—Charles Schafer, Annandale, Va.*

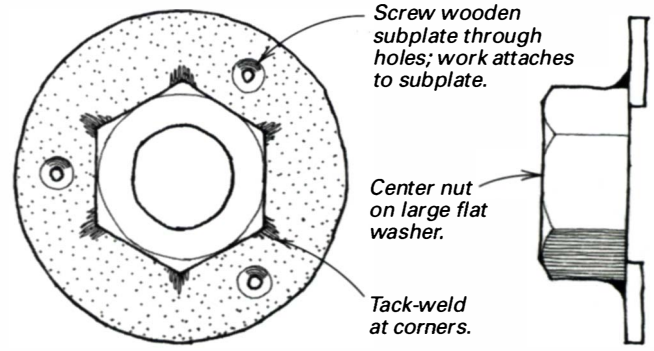
Stand bases from brake discs



A good source of heavy bases for stands are old brake discs. Auto repair shops throw out discs when they are too thin to be machined safely. You can mount pipe or conduit to the bases by using pipe flanges or making adapters that thread onto the wheel studs. *—Eddie Zanrosso, Pasadena, Calif.*

Quick tip: Common household vinegar (acetic acid) makes an excellent rust removal agent. Soaking the rusted tool for a couple of hours will chemically dissolve the rust. Follow this by wiping with a neutralizer, such as baking soda. Then lightly sand with 600-grit silicon carbide sandpaper, and apply three or four coats of furniture finishing wax, allowing each coat to dry about 10 minutes before buffing. *—Robert R. Stagner, Concord, Calif.*

Inexpensive faceplate



There are advantages to leaving a turning on its faceplate from the first cut through finishing. It eliminates the work of reattaching and re-centering the work and provides a handle to remove the work from the lathe while the finish is wet. But because I may have dozens of turnings in process at any one time, it was unfeasible to mount each on a $20 commercial faceplate. So I came up with this method for making inexpensive faceplates from hardware store material. The last batch cost $1.50 each.

The faceplate is nothing more than a hex nut welded to a large flat washer. Select a big nut to fit your lathe's headstock and a large, thick washer with an inside diameter smaller than the nut. Center the washer on the nut, and clamp with two small C-clamps before welding. If the nut and washer are plated, grind away the plating in the welded area.

Now tack-weld the nut to the washer at all six corners. It is better to stagger the welds rather than weld around the nut in sequence. This lessens the chance of warping the washer. Clean off the weld splatter, and countersink three holes in the washer.

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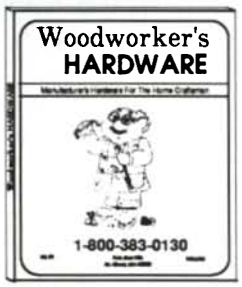

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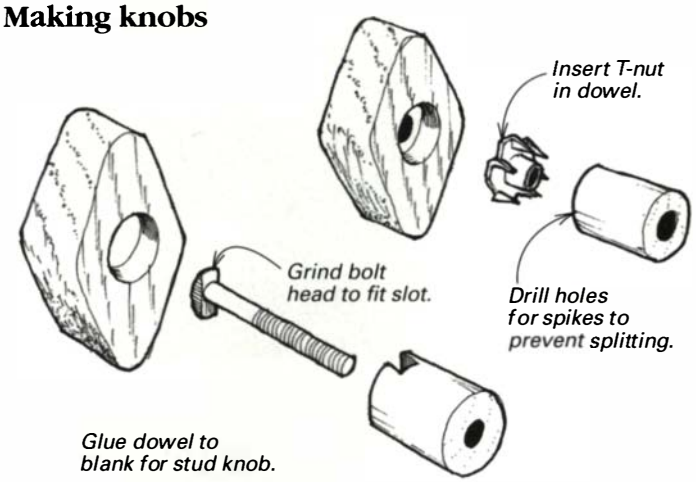
Only rarely will the steel portion of the faceplate run true. So attach a wooden subplate to the faceplate, and turn it to eliminate any wobble. Attach the work to the wooden subplate.

—Robert Calvert, Squaw Valley, Calif.

Quick tip: When cutting a dado with a backsaw, tack down a wooden straightedge for a guide.

—Gary Gene Gautier, Surbiton, Surrey, England

Making knobs

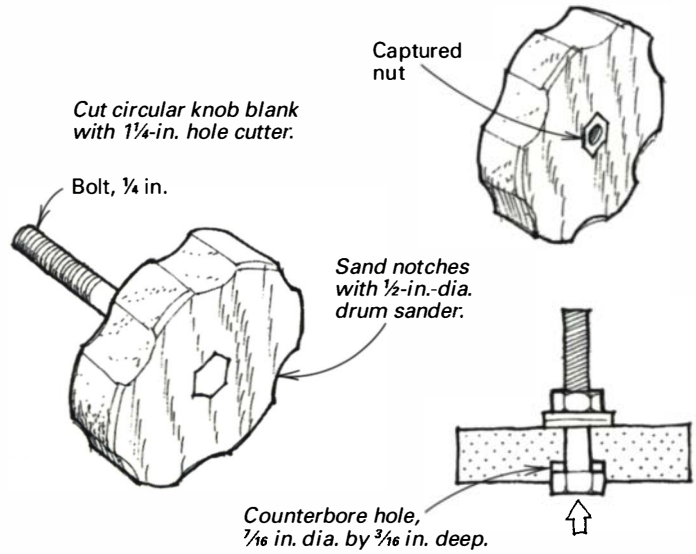


I use lots of jigs in my shop, so I always need odd-sized knobs and handles. Here's how I make them. There are two types, stud and captured nut, both use a ¾-in. dowel insert. To make the stud knob, cut a slot in the end of the dowel insert to trap the bolt head you've modified by grinding. To complete the knob, put a little glue on the dowel, and press it into the knob body.

The captured-nut knob has a similar dowel, which traps a T-nut. Drill a ⅛-in. hole for each spike to keep the dowel from splitting. Size the hole through the knob slightly larger than the bolt, so the knob will spin on and off easily.

—Bill Tenny, Canfield, Ohio

More knobs



To make a stud-type knob, cut a circular knob blank with a 1¼-in. holesaw fitted with a ¼-in. pilot bit. Counterbore a 7/16-in.-dia. hole 3/16 in. into the face of the knob. Insert a 1½-in.-long,

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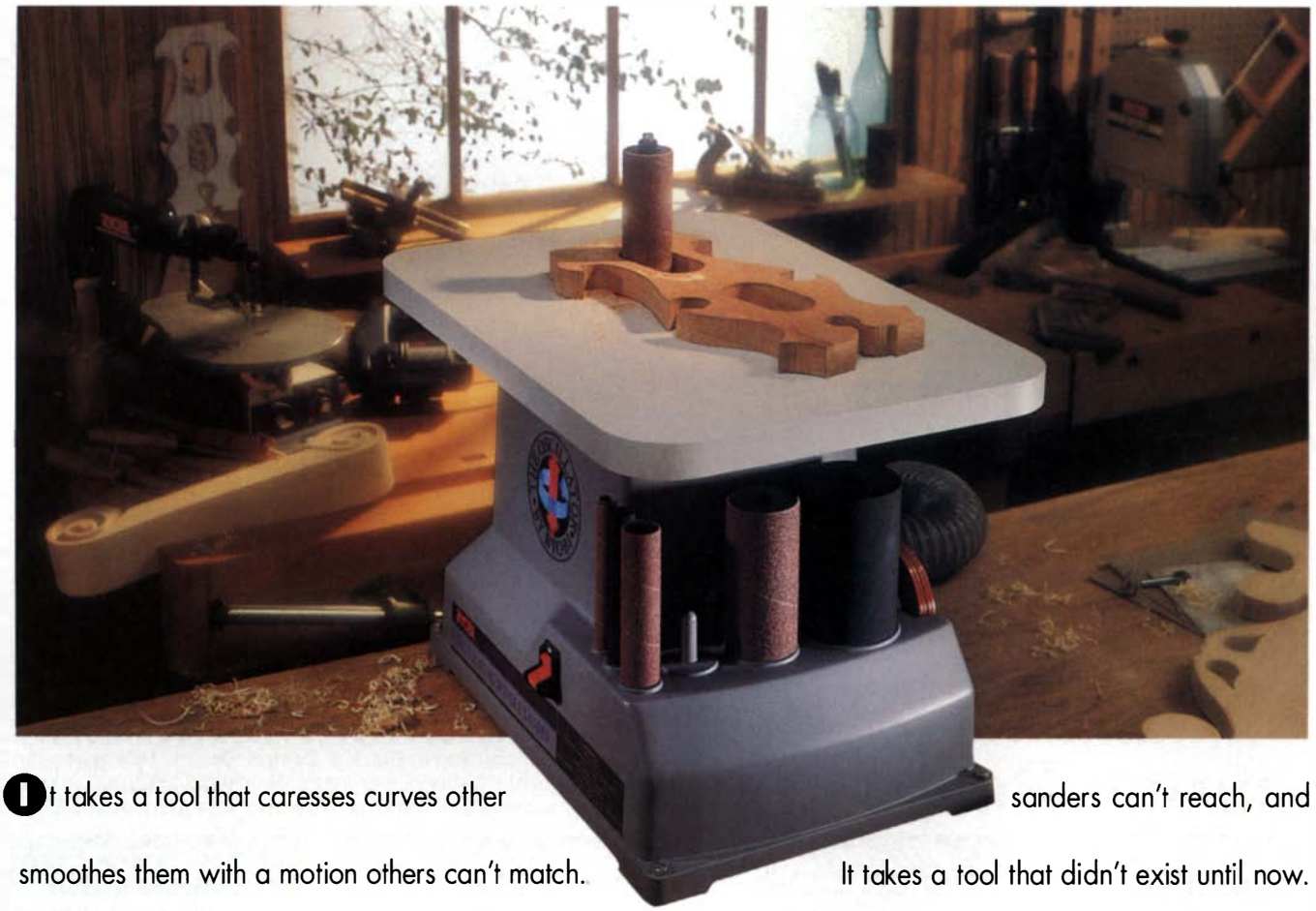

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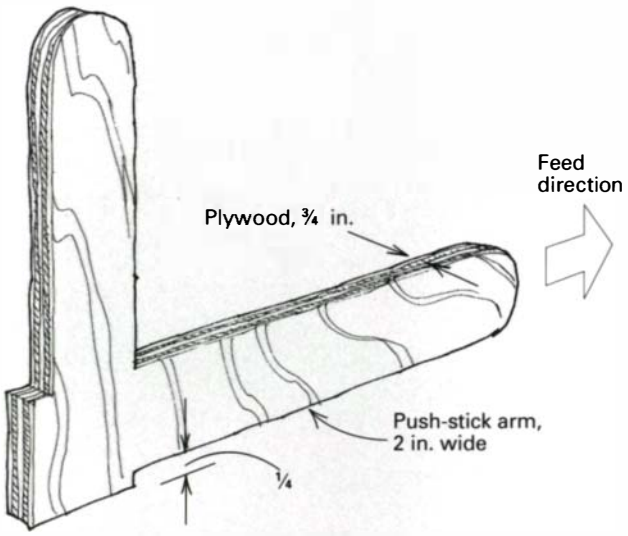
¼-in. bolt in the pilot hole and, using a couple of washers and a nut, tighten with a wrench until the bolt head is pulled flush to the knob body, as shown. Soften the arris (top edge) of the knob blank, and sand indentations around the knob, if desired, with a ½-in.-dia. sanding drum.

The captured-nut knob uses the same principle but with a slightly different installation method (see the drawing) to pull the nut flush. *—John Plank Sr., Waupun, Wisc.*

"L" push stick



Fifteen years ago, Norman Buchholz showed me the best push stick that I have ever seen. It works equally well at the jointer and the tablesaw; either arm can be used as a handle. Make the sticks from ¾-in. scrap plywood, and jettison used ones regularly. *—M. Felix Marti, Ridgway, Colo.*

Pouring liquids into small openings

I like to pour my finish oil into a bowl to make it easier to apply. To return the unused oil to the container, I use a trick learned in college chemistry. Hold a scratch awl or screwdriver against the edge of the bowl, and pour the liquid onto the tool as it is held over the hole of the container, as shown. Surface tension will keep the oil flowing along yet clinging to the tool until it enters

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Model	Description	List/TDT
2684	7 1/4" Circular Saw 13 amp motor	$267/$149
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1166	3/8" VSR Drill 4 amp motor	$118/ $66
1167	3/8" VSR Drill keyless chuck, 4 amp	$125/ $70
2600	3/8" VSR Drill 4.5 amp motor	$167/ $93
3158K	Jig Saw Kit 4.5 amp	$277/$155
3379	Elu Plate Joiner Kit 6.5 amp motor	$429/$239
2714	Elu Palm Sander 2.0 amp motor	$97/ $54
2670	1/2" Impact Wrench 7.5 amp motor	$287/$160
2872K	NEW Super Cyclone 12V Drill/Driver Kit with 2 batteries	$352/$189
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Heavy Duty Magnum Hole Shooter Model 0234-1 Mfg. Sug. Price $237.00 TDT Price: $132.00

Heavy Duty Cordless Screwdriver Model 6539-1 Mfg. Sug. Price $130.00 TDT Price: $74.00

Model	Description	List/TDT
0228-1	3/8" VSR Drill 3.5 amp motor	$195/$109
0229-1	NEW 3/8" VSR Drill keyless chuck 3.5 amp	$195/$109
6140	4 1/2" Angle Grinder Max. 10,000 RPM	$168/ $95
6527	Super Sawzall Kit VS with case. 8 amp	$320/$179
6507	Sawzall Kit VS with case. 4 amp	$264/$147
6365	7 1/4" Circular Saw 13 amp motor	$218/$124
5397	3/8" Hammer Drill Kit VSR. 5.0 amp motor	$255/$144
6755-1	Drywall Screwdriver VSR. 5.0 amp motor	$170/ $99
0235-1	1/2" VSR Holeshooter keyless chuck. 5.2 amp	$237/$132
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7/8 Horsepower Router Model 100 Mfg. Sug. Price $190.00 TDT Price: $106.00

Model	Description	List/TDT
347	NEW 7 1/4" Circlesaw 15 amp motor	$225/$128
447	NEW 7 1/4" Circlesaw 15 amp with brake	$245/$138
330	Block Sander 1.2 amp motor	$110/ $60
505	Finishing Sander orbital action 2.3 amp	$230/$128
333	Quicksand Dustless Sander. 1.7 amp	$135/ $75
7549	Bayonet Jig Saw VS 1" stroke, 4 amp motor	$270/$151
555	Plate joiner with case 5 amp motor	$320/$179
7334	Random Orbit Sander 3.7 amp motor	$225/$126
7335	Random Orbit Sander 5" vari-speed, 3.7 amp	$245/$137
9647	Tiger Cub Saw Kit 4.5 amp motor	$210/$117
690	1 1/2 H.P. Router 10 amp motor	$260/$145
9637	Tiger Saw Kit VS, 8 amp motor	$270/$151

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2 HP Variable Speed Plunge Router Model 1613EVS Mfg. Sug. Price $359.00 TDT Price: Call for Current Price

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Model	Description	List/TDT
B7000	NEW Corner Detail Sander	$122/$63
3000VSRK	3/8" Drill Kit w/case 2 batteries, 9.6 volt	$261/$137
3050VSRK	3/8" ScruDrill w/case 2 batteries, 9.6 volt	$288/$149
1582VS	"Click" Jig Saw VS orbital, 4.8 amp	$275/$149
3283DVS	5" Dustless Sander random orbit 2.3 amp	$169/ $93
1273D	Dustless Belt Sander 4"x 24", 10.5 amp	$380/$213
1615EVS	3 1/4 H.P. Plunge Router VS, 15 amp motor	$505/$285
1604A	1 3/4 H.P. Router 11 amp motor	$250/$140
B1650K	NEW Plate Joiner Kit 5.8 amp motor	$289/$165
B4050	NEW In-Line Jigsaw VS, 3.6 amp motor	$199/$114
1614EVS	1 1/4 HP Plunge Router VS 7.8 amp motor	$283/$159
3054VSRK	3/8" ScruDrill w/case 2 batteries, 12 volt	$330/$179

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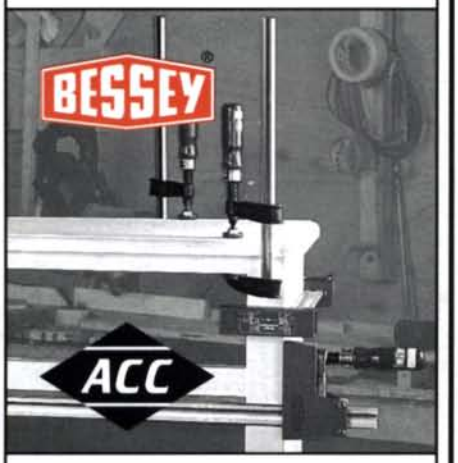

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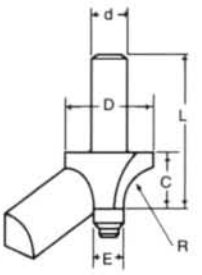

Model	R020	R025
L	1 7/8"	2 9/16"
d	1/4"	1/2"
C	5/8"	1 1/8"
R	3/8"	3/4"
E	1/2"	1/2"
D	1 5/16"	2 1/8"
Price	$15.75	$18.75

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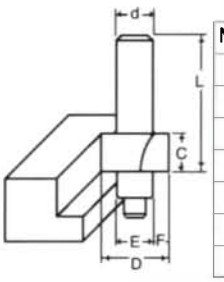
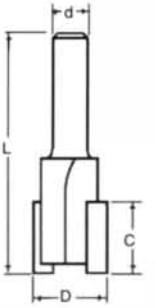


Model	R030	R031
L	1 3/4"	1 15/16"
d	1/4"	1/2"
C	9/16"	1/2"
F	3/8"	3/8"
E	9/16"	9/16"
D	1 3/8"	1 5/16"
Price	$12.75	$12.75

STRAIGHT CUTTER



Model	R008	R013
L	2 1/8"	2 1/8"
d	1/4"	1/4"
D	1/2"	3/4"
C	3/4"	3/4"
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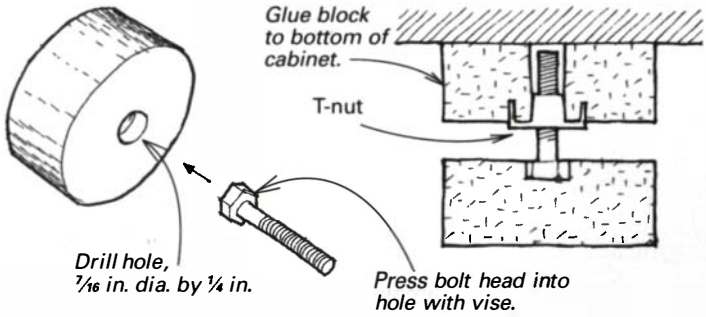
the container. Steady hands and practice will enable you to return any liquid to its container without a mess. Wipe the tool dry when you're done. —*William Roberts, Bend, Ore.*

Homemade cabinet leveler



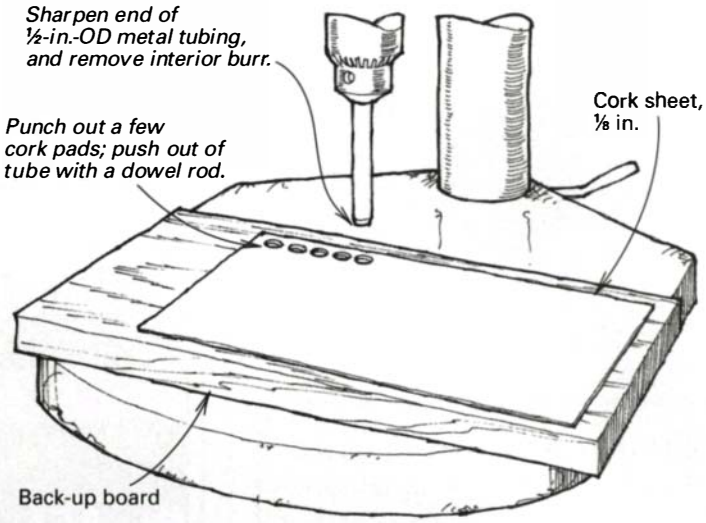
To make this cabinet leveler, slice 3/4 in. off the end of a 2-in.-dia. hardwood dowel. Bore a 7/16-in.-dia. hole, 1/4 in. deep, into the center. Now force a 1/4-in. hex-head bolt head into the hole with a vise. The dowel will fit surprisingly tight. To complete the adjustment mechanism, attach a T-nut to a hardwood block, and glue the block to the bottom of the cabinet.

—*Mark Smith, Hamilton, Ont., Canada*

Quick tip: Stair tread, which is usually 1-in.-thick clear yellow pine with a bullnose profile on one edge, looks better, costs less, is easier to find and is stronger than run-of-the-mill yellow pine. Trim off the bullnose to yield a usable width of about 10 3/4 in., or incorporate the shaped edge into your project.

—*Thomas W. Chadwick, Estell Manor, N.J.*

Making cork pads



It seems wickedly extravagant to order a small package of cork disc furniture pads for my music boxes, pay inflated shipping and handling charges and wait a week or more when I can make hundreds in my own shop for pennies.

Start with a short length of 1/2-in.-OD steel tubing, which is easy to find in most machine-shop scrap bins. Grind one end of the tubing to a sharp cutting edge, and remove the interior burr. Now purchase a 1-ft.-sq. sheet of 1/8-in. cork at your local hobby shop. Insert the tube in your drill press, and then lower the quill just enough to score a circular impression on a piece of scrap lumber. (The indentation will allow the tube's sharpened tip to

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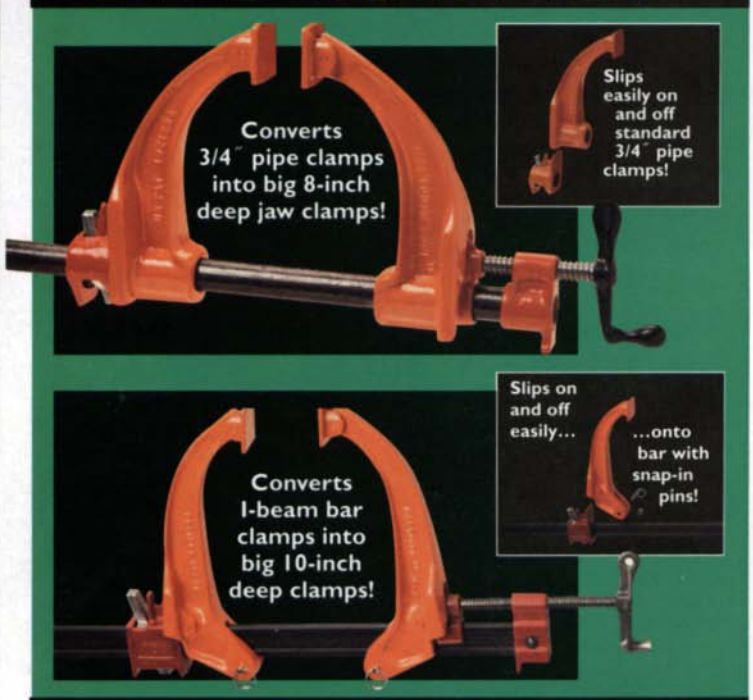

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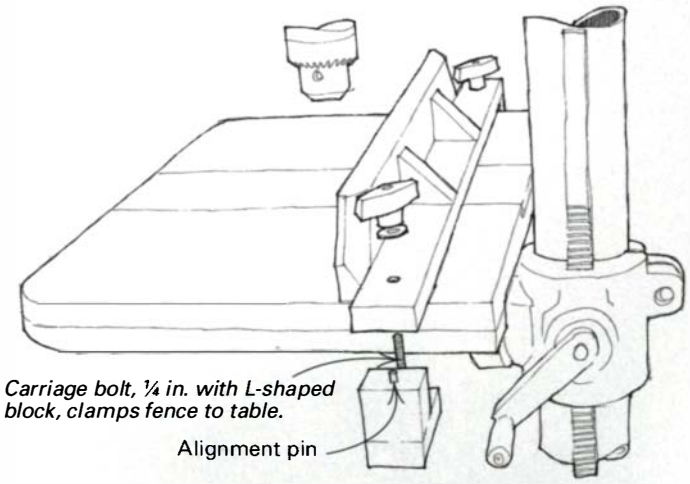
completely pierce the cork.) Leaving the scrap as a back-up, start plunge-cutting discs. When you have cut about eight or so, remove the tube, and push out the cork buildup with a dowel rod. Attach the pads to your work with a dab of white glue.

—Jim Tite, Fayetteville, Ark.

Improvements for a drill-press auxiliary table

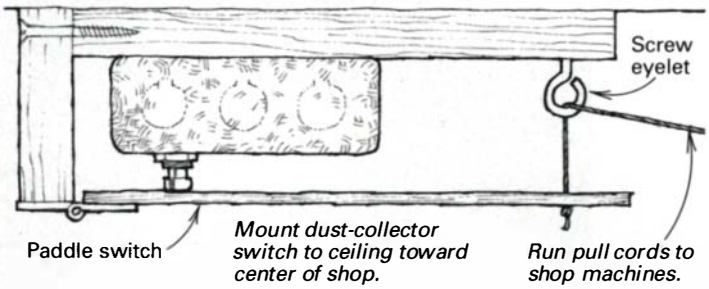


I was glad to see David Harvey's idea for an auxiliary drill-press table (*FWW* #101, p. 12) because I had recently purchased a floor-standing drill press. However, when I built my auxiliary table, I modified the fence so that it would position easily and have more range.

The primary modification to the fence is the clamping device. This is simply a ¼-in. carriage bolt through an L-shaped block that, when tightened, grips the bottom of the table. A steel guide pin, made from the shank of a salvaged bolt, keeps the block lined up.

—Arthur W. Griggs, Glencoe, Ill.

Simplified dust-collector switch



Over the years, I have seen several designs in *Fine Woodworking* for switching a dust-collection system on and off. All seemed too complicated or impractical for my situation.

My alternative is a simple mechanical system using a cord, much like what is used on a city bus to signal the driver for a desired stop. I located the switch box at a convenient central location on the ceiling of my shop. Then, by running several cords to different areas of the shop, I am able to turn the dust collector on or off simply by reaching up and pulling the cord from whatever machine I am using. *—Kim Anderson, Loyalton, Calif.*

Methods of Work buys readers' tips, jigs and tricks. Send details, sketches (we'll redraw them) and photos to Methods, Fine Woodworking, *PO Box 5506, Newtown, Conn. 06470-5506. We'll return only those contributions that include an SASE.*

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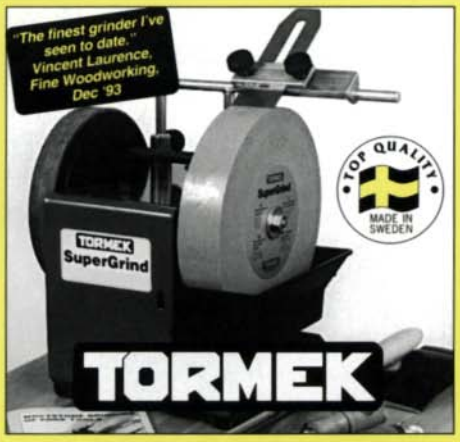

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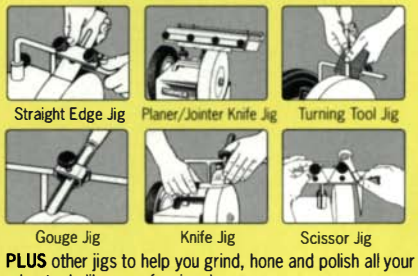

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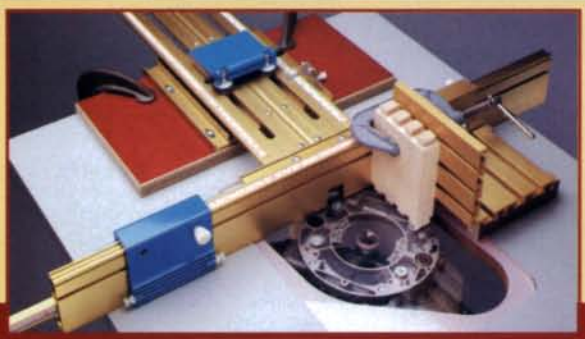

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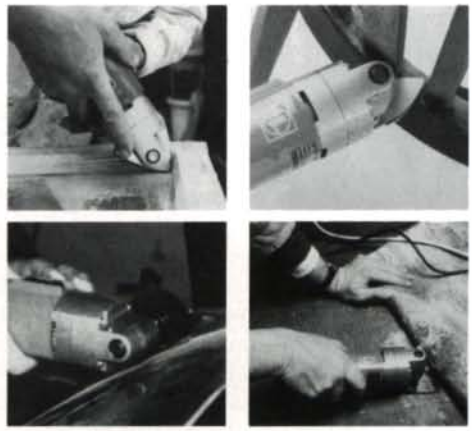

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READER SERVICE NO. 165

Oil finish for bookshelves

I am about to finish a set of cherry bookshelves but have been given conflicting recommendations on finishing alternatives. I prefer the look and feel of oil finishes, but I am afraid that the shelves will bleed oil into the books, especially during humid months. I have been told that hardening agents can be added to pure oil to prevent this problem. I would prefer not to use polyurethane or other harmful chemicals because my basement shop is small and has terrible ventilation, and my family and I would have to breath the harmful fumes.

—Jakob Klopfer, Beverly Hills, Mich.

Nancy Lindquist replies: I agree with you, Jakob, cherry has a lovely glow with an oil finish. The commercial products you will find with the generic name tung oil finish will give you an easy finish to wipe on in three or four coats. Such a finish will be tough enough to endure the abrasion of books moving back and forth over the shelf surfaces. The oil will not bleed back because the added metallic salts (called driers) help speed up the drying time of these oil products. Once dry, they will not dissolve unless attacked by strong solvents. Let each coat dry overnight, and scuff-sand in between coats for good adhesion. When the last coat is dry, even out the sheen with 0000 steel wool, and wax for a nice look and feel.

When a finish is wiped or brushed on, it minimizes the amount of vapor from the application. Always pour the amount you will use into a clean jar or can, and cover it to minimize evaporation while you are working. It is better to do this work with the windows open and a fan for some air flow. If you can schedule your finishing project on a clear day that's above 60°F, why not take it outside? Or take the easily moved parts out to reduce the smell in the house. I find it easier to see what I'm doing with good lighting, which is often hard to come by in basement shops. The low film buildup in oil finishes makes it easy to dust off any aerial projectiles that fall on the wet finish. Spread out used rags outside to dry before discarding safely. They are a fire hazard.

You can get an idea of what the Occupational Safety and Health Administration (OSHA) has recommended for a healthy adult male working eight hours a day, 40 hours a week by asking for the Material Safety Data Sheet for the product you want to buy. Ask your family doctor whether there is a problem with using the chemicals listed in the first section of the sheet in your home. Mineral spirits are the common solvent for oil finishes and can be irritating for people with respiratory problems.

[Nancy Lindquist is a woodworker, designer and finishing specialist in Chicago, Ill.]

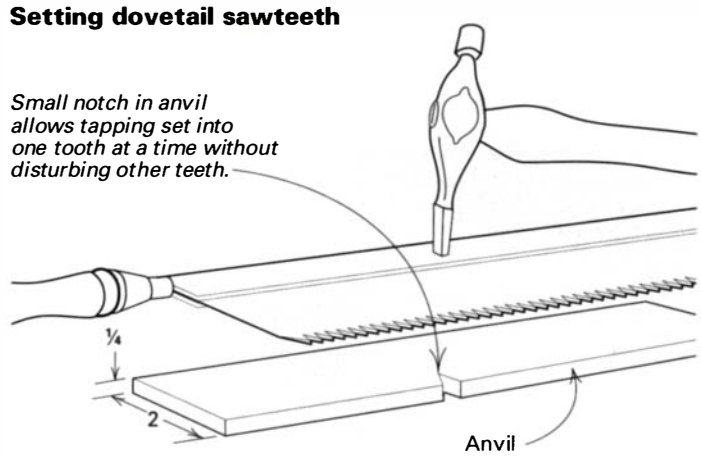
Setting tiny sawteeth

I have a fine-toothed (20 tpi) dovetail saw that I reserve for decorative or otherwise highly visible joints. After several sharpenings, it has lost most if not all of its set, making it difficult to use. The problem is that once you've started the cut, you cannot correct its direction of cut. I've tried a commercially made saw set, but it won't set teeth anywhere near that fine. I'm also familiar with both Tage Frid's method of placing a screwdriver in the gullet between the teeth and twisting and Ian Kirby's method of using an "anvil." Frankly, I've not had much success with either method. Can you suggest some way of resetting the teeth on my dovetail saw?

—Alex E. Acle, Mountaintop, Pa.

Mario Rodriguez replies: I suspect that your problem with either Tage Frid's method or Ian Kirby's anvil method is that you can't ensure a uniform degree of set from one tooth to the next. I don't care for Frid's method myself, but you should give Kirby's another try, with a variation this time. I imagine that as you strike one tooth when you use the anvil (simply a ¼-in.-thick strip of steel about 2 in. wide with a small chamfer along one edge), the two flanking teeth, which should be set in the opposite direction, are bent at the same time. A solution might be to cut a small notch (about the width of a single tooth) into the anvil, as shown in the drawing below, instead of a continuous bevel. A notch would allow you to isolate and set a single tooth at a time, without disturbing the other teeth. Another big help for me when working with such fine teeth is a magnifying lens, which gives me a much better view of what I'm doing.

Setting dovetail sawteeth



This notched-anvil technique will require that you move the saw for every tooth you set. I know this sounds like a lot of work, but because you'll only have to reset your saw every five or six sharpenings, in the long run, it won't be much trouble at all. And remember to set your saw before sharpening.

[Mario Rodriguez is a contributing editor to *FWW* and a woodworker in Warwick, N.Y.]

A cure for tortured teak

I was recently given about 100 ft. of 5½-in.-wide by 1-in.-thick teak. I kept it outside, covered with plastic, for about a year. Recently, I cut the teak down to 5-ft. lengths and brought it into my shop. After about a week, I noticed that not only were several boards cracked on their ends, but worse, many were severely bowed and warped in several directions. The teak is virtually unusable as is. Is there any method to straighten these boards and preserve their thickness?

—Martin A. Kluger, Great Neck, N.Y.

Jon Arno replies: Regrettably, I suspect the net outcome of the experience you relate is that you've learned a powerful lesson on how not to store lumber. Unfortunately, to learn it on such a sizable batch of one of the world's finest and rather rare cabinetwoods is truly a revolting development. As for the end-checks you describe, it is conceivable they could be glued and clamped or possibly avoided by ripping the boards into narrower strips, but there is no totally satisfactory remedy short of cutting them off.

As for the warps and bows, it is possible to permanently change the shape of wood by steam-bending it. The natural adhesive in wood, lignin, is thermoplastic and can be softened with heat, as discussed in "Steam-Bending Basics" by Andrew Weegar (*FWW* #107, pp. 62-66), but it's highly unlikely that you can straighten boards with this technique. In all likelihood, your teak will still be usable as it is, provided you select projects requiring short pieces that can be jointed or trued up without serious loss in thickness.

The one remaining mystery to me is how you could have done such a thing to teak. I certainly don't mean this as an admonishment, but rather from the perspective of shear plausibility. The natural oils in teak make it one of the most durable and stable timbers in the world. In fact, it is prized for use as marine decking because of its great durability and amazing resistance to fluc-

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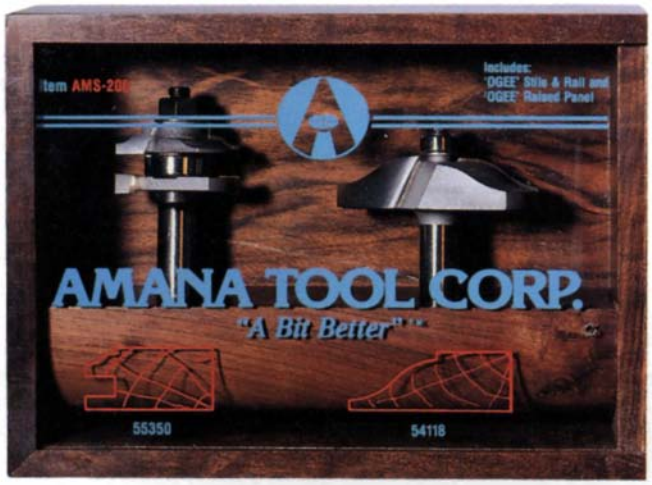

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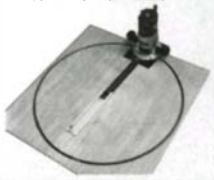

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tuations in humidity. Its year outside under a plastic tarp must have been fraught with incredible extremes, which would have turned a less weather resistant species into pure mush.
[Jon Arno is a wood technologist and consultant in Troy, Mich.]

Preventing planer infeed roller slippage

The infeed rollers on my seldom-used, 2-year-old planer often slip when I'm feeding stock into the machine. After sharpening the blades and replacing the drive belt, the problem still exists. All height and belt adjustments were also made, and they did not correct the problem either. Additionally, I have not been especially pleased with the planer's general performance even when it wasn't slipping. Could you help me solve the slippage problem and provide some tips or give a reference on improving its general performance.

—Jay Trinia, Culpeper, Va.

Robert Vaughan replies: There are several possible causes for slippage of the infeed roller. If the roller simply spins on the stock, it could be because the stock was not face-jointed before planing. If you're planing rough stock, you may want to raise the bed and feed rollers slightly. Also, the lumber may be too wet or twisted or the bed may not be waxed enough. Perhaps you're trying to take too heavy a cut.

Over time, the rollers can build up a glaze from the pitch in the wood and begin to loose their grip. A rubdown with lacquer thinner, or other solvent, could restore the rubber. And make sure that you unplug the machine before doing any work on the planer. Typewriter platen restorer also works if you can still find such stuff.

Without seeing exactly what's going on, I can't say whether the problem is technique or technology. For more information on setting up and fine-tuning your planer, see *FWW* #107, p. 72. [Robert Vaughan is a contributing editor to *FWW* and a woodworking machinery rehabilitation specialist in Roanoke, Va.]

Pricing your work

I am in the process of setting up my own cabinet and furniture shop. I could use some assistance in taking the guesswork out of how to price my work. Do you know of any publications, such as books, magazines, articles, that might be helpful in this regard? Any information or direction you can provide would be most appreciated.

—Charles F. Mallon, Lakewood, Colo.

Jim Tolpin replies: If you are anything like me, the easiest and most fun part of establishing a woodworking business is getting the shop tooling up and running and then developing product designs and production processes. The absolutely worst part is figuring out what to charge for the stuff that you make. Wouldn't it be nice if we could just make the stuff, set it out by the door, and then have someone else price and sell it?

But I have yet to find anyone that crazy—or who wants to get that crazy. Left to my own resources, I begin to figure out pricing by seeing what the market will bear. I look in showrooms and catalogs to see how they price similar products. Then I sit down and figure what I would make per hour if I sold my stuff for these prices. (Remember that the market prices are list prices—at least twice what I would expect to get selling at wholesale.) Fortunately, I now have enough shop experience behind me, carefully recorded on job cards, to tell me how long certain production processes take per volume of material. In cases where I lack this data, I fall back and make my best guess at how long it takes to get through the various production stages

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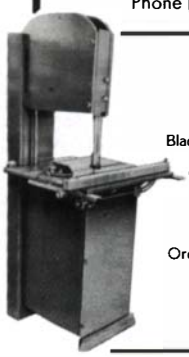

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I originally avoided your blades because of the cost in comparison with other models on the market. I saw some chips missing in my old blades, and it was time to toss and replace with new blades. I sighed and ate the additional cost and purchased your blades and stiffeners.

I find your blades of the highest quality. They produce a velvet cut with a polished finish which is not surpassed by any other manufacturer on the market. The wood passes through the saw like a hot knife through butter: smooth and with little effort. I see a similar glide whether it is maple, oak, pine, or whether it is thick or thin. Really fine stuff.

Your production staff can be proud of their work. The production quality is not just good, or to specification, it is exceptional.

In retrospect, the minor difference in cost is well worth the final result. Besides it is the blade that produces the cut for a piece to outlast the maker.

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I've got to tell you, I was skeptical of the claims; but, I bought the blade and stiffener anyway. That purchase was one of the smartest investments I have ever made--the blade performs exactly as advertised!

Over the past few years, I have purchased several table saw blades so I'd have the correct blade for every type cut and material. Although I didn't buy the top of the line in each category, my collection represents a sizable amount of money. Much of this money could have been used to purchase another tool, instead of spending it on saw blades that didn't live up to the manufacturers' claims.

Mine is the story of many others who have failed to heed the old adage "You get what you pay for". In the case of your saw blade, it is truly a quality product. With the smooth, glass-like results I've achieved, I will reconsider the need for a jointer. Although I will pay a little more for your blades, I will more than make up for the cost because I'll need only one blade to do the work of three.

In today's environment, it is nice to find an American company such as yours, who delivers a quality product and doesn't just preach the "total quality" rhetoric.

Sincerely,

FRANK L. GRIFFIN
Fairfax, VA

NO GEN. PURPOSE BLADE PRODUCED BETTER RESULTS than the FORREST 40 tooth Woodworker II. Install and leave it for plys & woods to 1 ½". W. Krier, (Edit Staff, Wood Magazine) OUT-PERFORMED 36 OTHER PREMIUM BLADES in WOOD Mag. test P. 45, Sept. 93. *Save $45! Save $45! Save $45! Save $45! Save $45!* Get 9 - $5 sharpening discount coupons on FORREST or other make carbide blades or dados if ordering before October 31, 1994. MUST mention FWW for coupons and another EXTRA BONUS.

WOODWORKER II

TABLE-SLIDE & CHOP -MITERS (gen. prps.) & small PORTABLES (Skil, etc.)

Things you asked us for:

With this ONE ALL PURPOSE blade (40 Teeth) you can SMOOTH RIP & CROSSCUT 1"-2" ROCKHARDS and SOFTWOODS with **smooth-as-sanded surface.** PLY-VENEERS (oak/birch) crosscut with NO BOTTOM SPLINTER.

- Mostly 1/8 kerf 15°, ATB and 20° face hook (easyfeed).
- DOUBLE HARDER and 40% STRONGER CARBIDE.

- Ends **blade changing** (does rip, combo and crosscut).
- Ends **scratchy saw cuts** (for the rest of your life).
- Ends **second step finishing** (jointing or sanding).
- Ends **cutting 1/16" oversize** to allow for RESURFACING.
- Buy and **sharpen ONE** blade instead of 3 (24T rip, 50T Combination, 80T Crosscut).
- *Strongly* recommend our *.001* flat **large stiffener-dampener** against out side of blade for smoothest, quietest cuts by this and any other blade.
- Use 30T if ripping mostly 2" - 3" hardwoods.
- Side wobble held *.001* - others .004/.010 is common! RAISE for THICK woods, LOWER for THIN woods and *perfect cut everything!* All 5/8" holes, unless otherwise noted.

	List	SALE		List	SALE
14" x 40T x 1" BORE	$215	$149	9" x 40T	$146	$109
14" x 30T x 1" "	195	139	30T	125	99
12" x 40T x 1" "	183	129	*8-1/4" x 40T 3/32	136	99
12" x 30T x 1" "	162	119	8" x 40T 3/32	136	99
10" x 40T 1/8 & 3/32	156	119	30T 3/32	115	89
30T 1/8 & 3/32	135	99	7-1/4" x 30T 3/32	112	69
			New 6" x 40T 3/32	139	89

5/8" holes std. Boring up to 1-1/4"
$7.50 extra - Shipping $4.50

Saw Boss
** NEW For Sears & Makita Table Saws*

QUIET! *Also help all your other blades to cut better.*
Use our 1/8" DAMPENER STIFFENERS, against one side

4" - $21
5" - $24
6" - $25

Tryable and RETURNABLE. CUTS by 1/2 to 3/4. Stops vibration, flutter, cutting noise and blade ring. Parallel and flat to .001 • 7" and larger available.

5/8" holes std. Boring up to 1-1/4" $7.50 extra. Others available. Add $2.50 Shipping.

REDUCE NOISE 50%—75%

WE RECOMMEND OUR FACTORY SHARPENING as some local sharpening creates problems with Micro-chipped edges reducing blade life & cutting quality. 2-4 DAYS ON THESE AND ALL MAKES OF FLAT FACE & CONCAVE CARBIDE TIP SAWS. SHIP VIA UPS. Typical 10 x 40T $15.00, 60T $17.75. Add return UPS $4.50 or 2nd Day Air $6.

SATISFACTION GUARANTEED OR FULL CASH REFUND.
47 years of fine American saw making & sharpening.

NEW DADO KING DELUXE *DADO SET* cuts *ALL* 1/8 - 29/32 **flat bottom** grooves WITH or CROSSGRAIN all woods. OAK, BIRCH, VENEER PLYS, and MELAMINE. NO SPINTERING due to unique 4T Neg. Face fillers and 24T outside saws.
OUT PERFORMS 29 + 32 OTHER DADO SETS-WOOD Mag., Oct. 91 "Best Value"

"No tearout on all five woods tested." *Fine Woodworking July/Aug. 1991*

Boring up to 1-1/4" $25 per set — SALE! 10% OFF $5.50 Per Set Shipping — NEW 3/32 Chipper & Shims incl.

8 - 5/8" Bore List $321/SALE $289 • 10 - 5/8" & 1" Bore List $389/SALE $349

WOODWORKER I - For TABLE and RADIAL SAW

this trim and crosscut ALL PURPOSE blade gives scratch free POLISHED cuts on all materials RIP or CROSSCUT up to 2".

- All 60T and 3/32" *THIN* kerf 30° ATB and 5° face hook on 10" dia and under. 12" and 14" are 20° ATB 1/8" K.
- DOUBLE HARDER and 40% STRONGER carbide.
- THIN KERF:
  Saves 1/3 wood loss on each cut, radial or table. Feeds easy when used for moderate rip and crosscut on table saw. **Reduces "JUMP IN"** greatly for better "PULL CONTROL". Practically **eliminates bottom splinter** on RADIAL-CROSS CUT.
- Totally stops ALL bottom and top splinter on ply veneers in push-cut mode on RADIAL.
- Our STIFFENER STRONGLY RECOMMENDED AGAINST outside of blade only for best cuts.

Made and serviced in USA for your benefit.

	List	SALE
14" x 60T x 1" 1/8"	$224	$159
12" x 60T x 1" or 5/8" 1/8" K	198	139
10" x 60T x 5/8" 3/32" K	162	129
9" x 60T x 5/8" 3/32" K	156	119
8" x 60T x 5/8" 3/32" K	150	109
New 8-1/4" x 60T x 5/8" 3/32" K	150	109

RYOBI RA200 TS200 SEARS — MAKITA 500B NBA
HITACHI PSM8 — PORTER CABLE 368-1

CHOPMASTER SLIDING COMPOUNDS & MITER SAWS

New specs. 5° Neg. Pts. & flat, dial .001/.002 for perfect, tight, smooth, splinter-free miter joints.

NEW AVAILABLE SIZES			List	SALE
Delta Sidekick 6-1/2"	6-1/2" x 40T x 5/8"		$149	$ 89
Sears 8-1/4"& Delta	8-1/4" x 60T x 5/8"		170	99
Hitachi 8-1/2" DeWalt 8-1/2" & Ryobi	8-1/2" x 60T x 5/8"		179	109
Delta	9" x 80T x 5/8"	For good gen. prps. cuts use Woodworker II 30T & 40T or Woodworker I	204	119
Ryobi-Makita & all	10" x 80T x 5/8"		207	129
Hitachi & B&D & DeWalt	12" x 80T x 1"		229	139
Ryobi-Makita	14" x 100T x 1"		266	179
Hitachi	15" x 100T x 1"	Use small stiffener where possible	277	189

DURALINE HI-A/T FOR TABLE & RADIAL SAWS

ALL FLAT FACE
5/8" HOLES. Boring up to 1-1/4" $7.50 extra
Larger holes - time basis. Shipping $4.50

	List	SALE		List	SALE
7-1/4" x 60T 3/32"k	$149	$129	12" x 80T x 1"1/8"k	$212	$181
8" x 80T 1/8 & 3/32"k	202	169	12" x 100T x 1"1/8"k	253	215
9" x 80T 1/8 & 3/32"k	207	179	14" x 80T x 1"	232	197
10" x 80T 1/8 & 3/32"k	207	159	14" x 100T x 1"	266	226
Special sale price 10" diameter only		$159	16" x 80T x 1"	262	223
			16" x 100T x 1"	294	243

Above 1" bore std.
CARBIDE is THE HARDEST OF THE C-4 grades and 40% STRONGER, NOT WEAKER!!
For 50% to 300% longer life!

FACT: Duraline Hi-AT with dampener stiffener is the quietest blade on the market.

You've probably read the recent articles on the new "quiet" blades. But the fact of the matter is a Forrest 80 tooth Duraline Hi-AT with blade stiffener cuts 50% quieter than those called "quiet" blades.

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READER SERVICE NO. 156

involved in producing the particular product. (I cover job cards as a way of developing pricing factors in my book *Working at Woodworking*, The Taunton Press, 1991).

If the price falls within the range of what I feel I should make per hour, then I suspect I may have a good product for my shop. If the selling price appears to be too low, but I want very much to make this product, I'll explore other options in production techniques that may increase my efficiency. Or, I'll see if I might get more money for the piece selling through other kinds of markets. To help me understand how to establish a realistic shop rate and to learn other ways to manipulate pricing and production strategies, I consulted and recommend these two books: *Make Your Woodworking Pay for Itself* by Jack Neff (Writer's Digest Books, 1507 Dana Ave. Cincinnati, Ohio 45207, 1992) and *How to Sell What You Make* by Paul Gerhards (Stackpole Books, Mechanicsburg, Pa. 17055, 1990).

I found another book, *Simplified Woodworking I* by A. William Benitez (Mary Goens, publisher, P.O. Box 43233, Austin, Texas 78745, 1989) to be a good overview of making money in the woodworking business, though its specific treatment of pricing strategies is rather light.

If you have access to prior issues of this magazine, you may find these articles of interest: *Planning for Profit* by Tim Nash-Jones in *FWW* #56; *Making 50 Tables* by Peter Pennypacker in *FWW* #44; and *Pricing Work* by Douglas Sigler in *FWW* #6.

[Jim Tolpin is a woodworker and technical journalist in Port Townsend, Wash.]

Balancing veneer construction

Several years ago, I acquired a large fork from a cherry tree. After drying it, I bandsawed it into 1/8-in.-thick veneers exposing a spectacular flame pattern. I now want to glue these veneers to a plywood base to make a tabletop for a large dining table. Is it necessary to counter-veneer the underside of the plywood tabletop, or can I forego this and still achieve adequate stability? ***—Walter R. Tschinkel, Tallahassee, Fla.***

Frank Pollaro replies: It is necessary to veneer the underside of the panel, and this is true of all veneered panels. It is also preferable to use a similar species and thickness on both sides of the panel, but when using a very expensive veneer such as ebony, I use mahogany on the back side instead. Veneers on both sides of a panel maintain a balance that helps keep the panel from warping or twisting.

It is also important to apply equal coats of finish to the bottom and top of the panel to seal and balance the panel. In all phases of work, whatever you do to one side, you should also do to the other side.

[Frank Pollaro teaches veneering classes and is a designer and builder of fine furniture in East Orange, N.J.]

Source for unplated screws

I have been unable to find antique fasteners, such as slotted head, unplated iron or steel wood-screws, for use in period reproductions. Can you help me out?

—Robert H. Kuiper, Rock Hall, Md.

Charley Robinson replies: The only source I'm aware of for unplated screws is Warren Fasteners (201 Morgan Ave., Brooklyn, N.Y. 11237; 718-417-4010). Although Warren doesn't have a catalog, it offers a variety of unplated steel nuts, bolts, screws and washers for historic restorations. Call Warren regarding availability and pricing of the screws that you need.

Historic cut nails are available from The Tremont Nail Co.

Tune in to The New Yankee Workshop on PBS to see what Norm's up to this week. Nationally funded by

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SFNI	Finish Nailer	299.
SLP20	5/8" – 1-5/8" Brad Nailer Kit	269.
SFN40	1-1/4"–2-1/2" Finish Nailer	385.
SCN200R	Coil Roofing Nailer	459.
SN70	New Framing Nailer	479.
SPSP12	Roofing Stapler	329.
M3+	15 Ga. 1-1/4" – 2-1/2" Stapler	429.
SKSL12	1/4" Crown Stapler	279.

HITACHI

M12V	3 H P VS Plunge Router	235.
P20SB	3-1/4" Planer,3.4 Amp	95.
C8FB2	8" Compound Miter Saw,New	599.
C10FC	10" Compound Miter Saw,New	269.
C7BD	7-1/4" Circular Saw, Elect. Brake	135.
W6V2	VSR Quiet Drywall Screwdriver	89.
CB75F	Bandsaw/Resaw	*1995.
F1000A	12" Planer/6" Jointer Combo	*1995.
P12RA	Port. 12" Planer/6" Jointer Combo	989.
NR83A	Full Head Stick Nailer	389.
NV45AB	Coil Roofing Nailer	399.
N5008AA	1/2" Crown Stapler, 5/8" - 2"	319.
N3824A	1" Crown Roofing Stapler	345.
NT65A	16 Ga. Finish Nailer	319.

ADJUSTABLE CLAMP

		Ea.	Box/12
50	3/4" Pipe Clamp Fixture	7.95	89.
		Ea.	Box/6
3706	6" Steel Bar Clamp	6.49	36.55
3712	12" Steel Bar Clamp	6.99	39.75
3718	18" Steel Bar Clamp	7.75	42.99
3724	24" Steel Bar Clamp	8.39	47.75
3730	30" Steel Bar Clamp	9.55	53.45
3736	36" Steel Bar Clamp	10.39	58.75
0	Wooden Handscrew, 4-1/2" Open	11.95	62.95
1	Wooden Handscrew, 6" Open	12.95	71.49
2	Wooden Handscrew, 8" Open	15.95	81.89

RYOBI

RS115	4-1/2" VS Random Orbit Sander	75.
TFD220VRK	12v Cordless Drill Kit	165.
L1323ALSK	3-1/4" Planer Kit, Lg. Base	125.
JM100K	Biscuit Joiner Kit	219.
RE600	3 HP VS Plunge Router	255.
TR30U	Laminate Trimmer	88.
BE321	3" x 21" VS Belt Sander	129.
BE424	4" x 24" VS Belt Sander	168.
TS254	10" Miter Saw	209.
AP12	12" Portable Planer	449.
BT3000	10" Sliding Table Saw w/Stand	569.
JP155	6-1/8" VS Jointer	305.
RA202	8" Radial Arm Saw w/Control cut	399.
SC160	16" Scroll Saw	139.

DELTA

22-540	12" Portable Planer	409.
34-763	10", 3 HP Unisaw, 1 PH	*1590.
34-782	10", 3 HP Unisaw/Unifence, 1PH	*1779.
31-730A	6" Belt/12" Disc w/Electricals	*1095.
37-350A	8" Long Bed Jointer w/Electricals	*1479.
43-379	3 HP HD Two-Speed Shaper	*1499.
11-990	12" Bench Drill Press	209.
14-650	Hollow Chisel Mortiser	299.
17-900	16-1/2" Drill Press	*339.
46-700	12" VS Wood Lathe	399.
28-283	14" Bandsaw w/Encl. Stand, 3/4 HP	*709.
34-444	10" Contractors Saw, 1-1/2 HP	619.

CALL FOR QUOTES ON MACHINES NOT LISTED

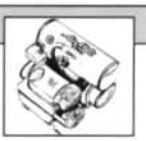
SKIL

2735-04	3/8" VSR 12v Cordless Drill Kit, w/2 Bat.	135.
77	7-1/4" Wormdrive Saw	145.
5860	8-1/4" 60° Wormdrive Saw	169.
3810	10" Miter Saw	225.
1605-02	Plate Joiner Kit	119.
HD77M	New Magnesium 7 1/4" Wormdrive	179.

BOSCH

3050VSRK	3/8" Cordless Driver/Drill2 Bat.	139.
3051VSRK	Cordless Driver/Drill w/Keyless Chuck	149.
1003VSR	3/8" VSR Drill,Keyless,0-1100 RPM	85.
1021VSR	3/8" H.D. VSR Drill 0-1100 RPM	105.
1194VSR	1/2" VSR Hammer Drill	159.
1024 VSR	3/8" Mighty Midget VSR Drill	109.
1025VSR	1/2" Mighty Midget VSR Drill	118.
1347AK	4-1/2" Mini Grinder Kit	108.
1348AE	5" EFC Mini Grinder	118.
11219EVS	1-1/2" Rotary Hammer, VS	579.
11212VSR	3/4" VSR SDS Bulldog Rotary Hammer	198.
11304	Brute Breaker Hammer	1229.
11305	Demolition Hammer	689.
3296K	Power Plane Kit	169.
1942	Heavy Duty Heat Gun	78.
1604A	1-3/4 HP Router	139.
1608LX	Laminate Trimmer w/Deluxe Guide	109.
1608T	Tilt Base Laminate Trimmer	105.
1609K	Installers Trimmer Kit	179.
1609KX	Deluxe Installers Trim Kit	229.
1615EVS	NEW! 3-1/4" HP EFC VS Plunge Router	265.
1273D	4" x 24" Dustless Belt Sander	198.
1273DVS	4" x 24" VS Dustless Sander	219.
1370DEVSK	6" VS Random Orbit sander w/Access	299.
3283DVS	5" Dustless R/O Sander	105.
1613EVS	2HP VS Plunge Router	199.
3270DVS	VS, 3"x21" Oustless Belt Sander	165.
1587VS	New Top Handle CLIC Jig Saw	165.
1584VS	New Barrell Handle CLIC Jig Saw	159.
1587DVS	CLIC Jig Saw w/Dust Collection	194.
1614EVS	1-1/4 HP Plunge Router	159.
1632VSK	VS Panther Recip. Saw Kit	145.
1420VSR	VSR Drywall Driver, 0-4000RPM	88.

Emglo



AM39HC4V 3/4 HP Vert. Twin Tank 295.

AM78HC4	1-1/2 HP Twin Tank	299.
AM78HC4V	1-1/2 HP Vertical Twin Tank	309.
AM99HC4	2 HP Twin Tank	369.
K15A8P	1-1/2 HP Portable Compressor	669.
K5HGA8P	5 HP Honda Gas Portable Compressor	729.

Lamello

TOP-10	Joining Machine w/Asst Biscuits	539.
Standard-10	Hand Joining Machine w/Asst Biscuits	399.
COBRA	NEW! Plate Joiner	269.
PLATES	#0, #10, #20, 1000/Box	35.

freud

LM72M010	10" x 24T Rip	39.
LU73M010	10" x 60T ATB	47.
LU84M008	8" x 40T Combination	44.
LU84M011	10" x 50T Combination	40.
LU85M008	8" x 64T ATB Fine Cut Off	49.
LU85M010	10" x 80T ATB Fine Cut Off	59.
LU85M014	14" x 108T ATB Fine Cut Off	105.
LU85M015	15" x 108T ATB Fine Cut Off	105.
LU87M008	8" x 22T Thin Kerf	43.
LU87M010	10" x 24T Thin Kerf	44.
LU88M010	10" x 60T Thin Kerf	45.
LU91M008	8-1/2" Miter Saw Blade	42.
LU91M010	10" Miter Saw Blade	59.
LU98M010	10" x 80T TCG	68.
TK203	7-1/4" x 24T Framing Blade	18.
TK204	8-1/4" x 24T Framing Blade	23.
TK303	7-1/4" x 40T Finish Blade	23.
TK304	8-1/4" x 40T Finish Blade	24.
TK906	10" x 50T Combination Blade	29.
TK406	10" x 60T Cut Off Blade	35.
SD308	8" Dado Set	117.
SD506	6" Super Dado	165.
SD508	8" Super Dado	194.
F410	10"x40" Quiet Blade	54.
F810	10"x80" Quiet Blade	76.

makita

BO5000	NEW! 5" Dustless R/O Sander	69.
DA391DW	VSR Cordless Angle Drill, 9.6v,keyless	159.
5090DW	3-3/8" Saw Kit, 9.6v	139.
6093DW	3/8" VSR Driver/Drill Kit, 9.6v	139.
6095DWE	12V Mak Pak w/2 batteries	149.
632007-4	9.6V Battery	30.
6211DWE	12V Mak Pak w/2 batteries	169.
6302	1/2" VSR Drill, 5.2 AMP	115.
6201DWE	3/8"VSR Hi-Torq Driver/Drill Kit	159.
DA3000R	3/8" VSR Angle Drill	159.
6404	3/8" VSR Drill, 0-2100 RPM	58.
G3500R	3500w Generator	1075.*
9207SPC	7" Electronic Sander Polisher	159.
N1900B	3-1/4" Planer Kit	129.
9820-2	Blade Sharpener	199.
BO4510	1/4 Sheet Finishing Sander	57.
BO4550	1/4 Sheet Dustless Finishing Sander	54.
9401	4"x24" Dustless Belt Sander	189.
9900B	3"x21" Dustless Belt Sander	155.
LS1011	10" Compound Miter Saw	549.
LS1030	10" Miter Box	229.
LS1440	14" Miter Saw	599.
4200N	4-3/8" Trim Saw	145.
5007NBA	7-1/4" Circular Saw, Elec. Brake	129.
5077B	7-1/4" Hypoid Framers Saw	155.
5402A	16" Circular Saw	459.
2012	12" Portable Planer	499.
2708W	8-1/4" Table Saw	299.
2711	10" Table Saw w/Brake	569.

Milwaukee

0402-1	VSR 12v Driver/Drill w/Keyless Chuck	168.
6539-1	Cordless Screwdriver	75.
6546-1	Cordless Screwdriver, 2-spd	82.
0222-1	3/8" VSR Drill, 0-1000 RPM	107.
0224-1	3/8" Magnum Holeshooter, 0-1200 RPM	114.
0230-1	3/8" Pistol Drill, 0-1700 RPM	112.
0234-1	1/2" Magnum Holeshooter, 0-850 RPM	119.
0238-1	1/2" Pistol, 0-650 RPM	119.
0239-1	VSR Keyless Chuck Drill	125.
0244-1	1/2" Magnum Holeshooter, 0-600 RPM	119.
0375-1	3/8" Close Quarter Drill	127.
0379-1	1/2" Close Quarter Drill	145.
0567-1	Drain Cleaner Kit	235.
1676-1	Hole Hawg Kit	247.
3002-1	Electricians Rt. Angle Drill Kit	197.
6140	4-1/2" Angle Grinder	99.
6141	5" Angle Grinder	109.
5352	1-1/2" TSC Eagle Rotary Hammer	455.
3102-1	Plumbers Rt. Angle Drill Kit	197.
3107-1	VS Right Angle Drill Kit	204.
5371-1	1/2" Rev. Hammerdrill Kit	185.
5397-1	3/8" VS Hammerdrill Kit	139.
5192	Die Grinder, 4.5 Amp	175.
5455	7"/9" Polisher, 1750 RPM	140.
6072	9" Sander, 5000 RPM	130.
5362-1	1" TSCR Hawk Rotary Hammer	319.
8975	Heat Gun	59.
5936	4"x24" Dustless Belt Sander	228.
6008	1/3 Sheet Finishing Sander	115.
6010	1/2 Sheet Finishing Sander	119.
6016	1/4 Sheet Finishing Sander	52.
6126	6" Random Orbit Sander	125.
6215	16" Electric Chainsaw	172.
6215	16" Electric Chainsaw	172.
6365	7-1/4" Circular Saw	120.
6377	7-1/4" Wormdrive Saw	175.
6460	10-1/4" Circular Saw	259.
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6511	2-spd Sawzall	129.
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[Charley Robinson is an associate editor for *FWW*].

Spotting bird's eye

In my search for figured maple, I met a gentleman who told me that he is able to distinguish bird's-eye maple from looking at the standing tree. Is this possible?
—Robert Burns, Picton, Ont., Canada

Jon Arno replies: Yes, in most cases it is possible to tell if a standing maple tree contains bird's-eye figure. In fact, experienced timber cruisers are even able to predict with relative accuracy the quality and extent of the bird's-eye figure in the tree simply by examining the bark. However, the exact cause of bird's-eye figure is unknown. At one time, it was thought to be the result of malformed buds, but close examination of the wood tissue indicates that this is not the case. Buds form as convex protrusions extending out toward the bark while the "eyes" in bird's eye are actually concave depressions or dimples in the grain that recede inward. The eyes seem to form as a result of uneven growth in the cambium layer, which is the band of living tissue located between the bark and sapwood of a tree. As the cells of the cambium divide, they produce bark (phloem) on the outside and woody tissue (xylem) on the inside. Consequently, the abnormal tissue development that results in bird's eye is apparent both in the wood and the bark.

The cambium layer's failure to produce even growth may be the result of an infection or possibly the scarcity of some essential nutrient. As far as I know, no virus or other pathogen has yet been identified as the cause. Until more information becomes available, I favor the theory that bird's eye results from the tree being exposed to stress or some form of environmental deprivation. Trees containing bird's eye seem to be more abundant in crowded stands and in regions near the extreme of maple's native range. For example, northern stands of hard maple such as those found in the upper peninsula of Michigan produce relatively large quantities of bird's-eye lumber. Similar figures are found in bigleaf maple, native to the Pacific Northwest and even occasionally in other species that do not belong to the maple genus, *Acer*.
[Jon Arno is a wood technologist and consultant in Troy, Mich.]

Restoring old furniture

I like to restore old furniture, but I have a problem with mildew stains on varnished pieces. The finish tends to crack on varnished pieces that have been exposed to the weather. The piece is then susceptible to mildew where the cracks have developed. I have tried to get rid of the mildew stains by first sanding off the varnish and applying household bleach but with no success. Any suggestions? —Sam Rogers, Essex, Conn.

Tom Wisshack replies: Household bleach is usually ineffective against mildew stains; frankly, I haven't found much use for it at all in woodworking. What you want is oxalic acid crystals (available from Daly's Wood Finishing Products, 3525 Stone Way North, Seattle, Wash.; 800-735-7019). The company makes an oxalic acid neutralizer (OAN) that should be used as a follow-up to the bleaching process.

To a quart of boiled water, add about ¼-cup oxalic crystals. Brush a liberal coat onto the horizontal surface of the damaged

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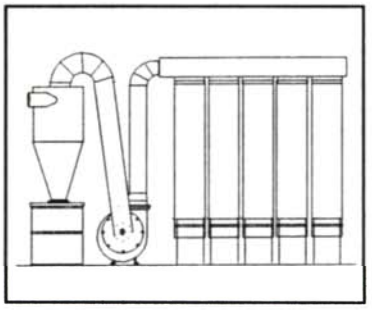

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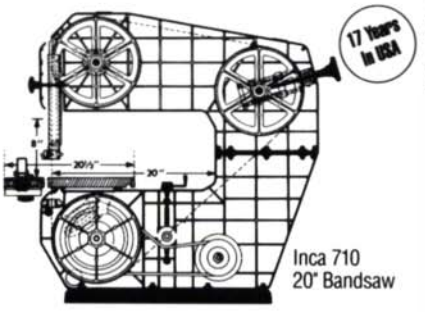

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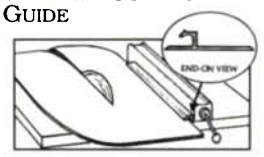

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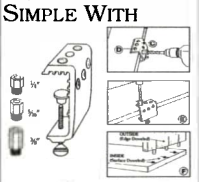

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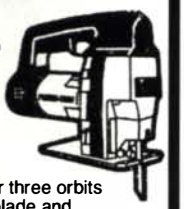

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wood. Within a few minutes, you should see results. If not, simply add more crystals to the water in small increments until it is effective. Always wear a respirator when using this product. This is especially important when mixing because the steam from the hot water will carry the oxalic acid fumes into your face. The fumes could irritate your respiratory system. Oxalic acid will not burn your skin, but it's still best to wear gloves. Follow up with the neutralizing solution, and rinse the wood with clear water several times.

Let the wood dry, and sand as usual. Even after using a neutralizer, it's best to wear a dust mask in case some of the dried acid is still in the wood. Oxalic acid also does a superb job of removing ink stains from old furniture that has been stripped. It will remove rust stains that have reacted with the tannin in woods like oak and often does a respectable job on marble.

A distinct advantage of oxalic acid is that, unlike household bleach and other products designed to remove the wood's natural coloring, it won't have any affect other than removing the unwanted blemish.

[Tom Wisshack is an antique furniture historian and wood finishing consultant in Galesburg, Ill. He has been making and restoring fine furniture, and writing about it, for over 30 years.]

Tight joints with cheap wood

I make reproduction Shaker-style and primitive furniture from drawings and pictures, using #3 pine for an authentic look. But this cheap wood has caused some problems. When putting the pieces together, I assemble them so that the joints are tight. But after a short time, the wood shrinks, and I have daylight in the joints. Although some imperfections in the appearance are desirable, open joints aren't one of them. Would gluing every joint together cause the wood to crack somewhere else? And is it possible to seal all the surfaces with something prior to assembling the piece?

—Doug Fuerst, Welch, Minn.

Mario Rodriguez replies: Although you probably followed true period construction methods faithfully, you must keep in mind that these Shaker and primitive pieces were originally installed into locally heated homes and buildings: the heat being isolated to the immediate area around the fireplace. This condition allowed the piece to move more slowly and to dry out and shrink gradually without the extreme changing conditions found in modern centrally heated homes.

You might try building your furniture to allow for this movement. I think you could continue to use #3 pine, but it should be well-conditioned before cutting any joints. Try storing the wood in the warmest and driest part of your shop. This will at least reduce the problem. You could also try making your joints deeper and your tenons and tongues longer so that they better engage each other and hold together longer.

Also, try to avoid any construction technique where the movement of a wide board is inhibited by a cleat (shelf or drawer support) nailed across it. You can attach these supports using screws and slotted holes. Sealing the wood surfaces with a sealer or finish will not help at all. Finally, I would try to examine real Shaker pieces to get a good first-hand look at the originals. You'd be surprised what you could learn.

[Mario Rodriguez is a contributing editor to *FWW* and operates Warwick Country Workshops in Warwick, N.Y.]

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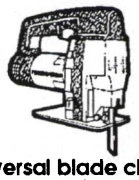

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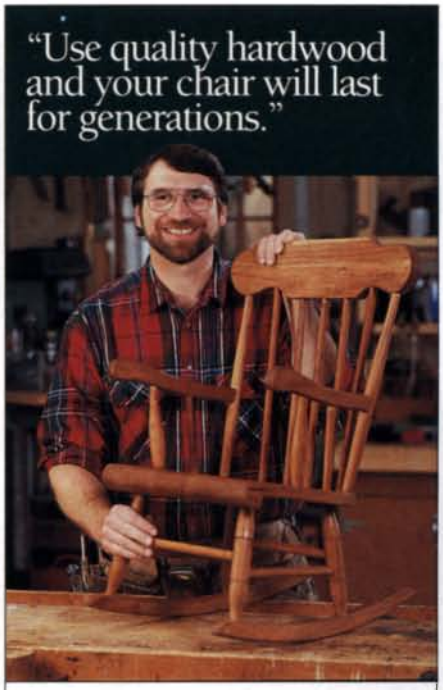

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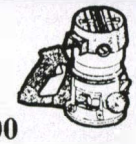

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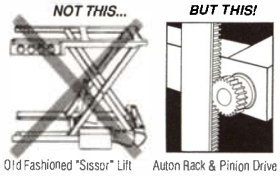

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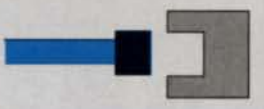

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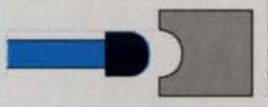

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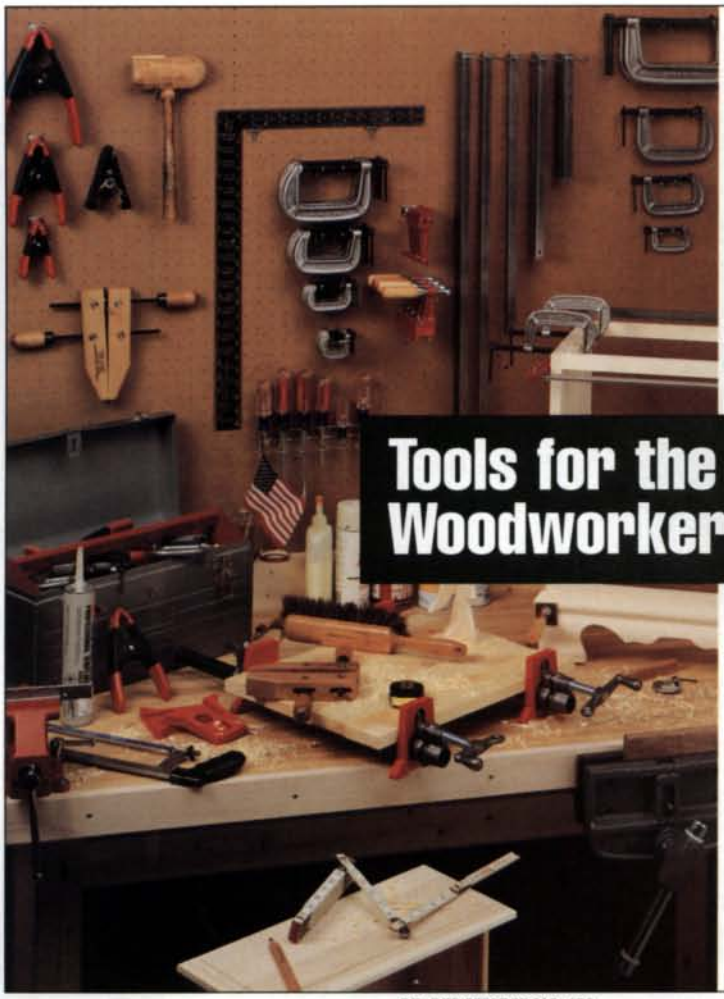

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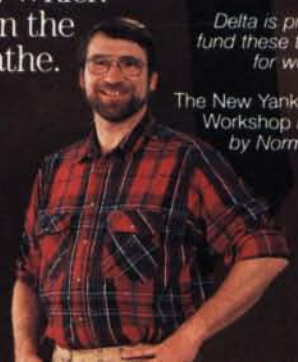

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READER SERVICE NO. 49

Dressing up a Basic Box

Add-on moldings transform a bookcase

by Phil Lowe

Easily applied elements can dramatically alter a cabinet's appearance. I added clustered columns, an octagonal base, waist moldings and a blocked cornice along with a quatrefoil and arched surround to a simple frame-and-panel base cabinet and an open bookshelf top unit. The result was Gothic detailing that would blend into my client's home. These elements also create a dramatic play of light and shadow, particularly in a piece to be painted. And, ironically, the most complicated detail I added, the intricately carved cornice block, is the easiest to use. It is a precast piece that simply glues in place (see the story on p. 46).

Building the cabinets

The basic forms started with two rectangular boxes, as shown in the drawing on p. 47. The tops and bottoms, arched surround and backs were made up of ¾-in.-thick, lumber-core birch plywood. The sides and doors were poplar frames with ¼-in.-thick birch plywood panels. Ogee moldings glued and nailed around the inside edges of the door and side frames add more detailing and shadow lines. Before assembling the boxes, holes were drilled into the stiles of the case sides for adjustable shelving pins. The cases were glued and screwed together with the screws located so the cornice, base and waist moldings would cover the screw heads.

Adding a Gothic arch

To make the Gothic arch, the lumber-core birch plywood was cut to width and length. Plywood eliminated panel glue up and minimized any expansion or shrinkage that would play havoc with the cornice and arched moldings. After the arch was

***Add-on moldings create a new look—** Tacking on some simple moldings has transformed a basic pair of boxes into a Gothic showpiece. One key to the fine detailing is the precast composition capital, which saved hours of carving time.*

Photos except where noted: Susan Kahn

laid out and bandsawn to shape, it was rabbeted to receive the molding that covers the plywood's edge. The molding for the arch (see the drawing detail) was shaped with an ogee curve on the front face, a quarter round with fillet on the opposite edge and a rabbet on the back to mate with the rabbet on the plywood. The curved section of this molding was faceplate-turned on the lathe. These moldings were cut to size, glued and nailed to the arch. The arch was glued and screwed in place.

***Molding hides joinery details**—The waist molding provides a smooth transition from upper to lower case, and it hides the joint where the two units meet.*

***Details make the difference**—The pointed-arch panel dressed up with detailing sets off the upper bookcase unit. The author purchased the elaborate molded capitals and only had to glue them in place.*

Joining top to bottom

Before assembling the two cases, filler pieces were applied around the bottom of the upper case, as shown in the drawing. These filler pieces help position the top and provide screw blocks for securing the top to the bottom. The top case was then positioned on the lower case and the cases temporarily screwed together. The cases can be separated for moving, but I wanted the top and bottom units screwed together when applying the waist molding that hides the joint between the two units.

Applying base moldings

To provide a platform for the clustered columns, two half-octagonal blocks were glued to the face of the base cabinet, as shown in the drawing. Two different base moldings were mitered to wrap around the corners and the octagonal blocks and then glued and nailed in position.

Defining the waist

The waist molding was composed of a lower cove, central torus and an upper ogee and hides the joint between the two cases. The torus is glued and nailed flush with the bottom edge of the top case after applying the half-octagonal blocks, as shown in the drawing. The cove molding, butted tight to the bottom edge of the torus, provides a smooth transition into the lower case. After applying the half-octagonal blocks, the cove was glued and nailed to the top edge of the lower case. The ogee, the width of which was determined by the distance from the top of the torus to the top of the bottom shelf, was glued and nailed. Make sure that the bottom edge is seated against the top of the torus. It is better to make this molding a hair wider than needed than to make it too narrow. The molding can be trimmed easily to the shelf, but it wouldn't take much to sand through the thin veneer face of the birch plywood while leveling the shelf to the molding.

The cornice tops it off

The cornice at the top of the upper bookshelves went on in three stages: the ogee (or cyma recta) first, the reverse ogee (or cyma reversa) second and the fillet last. These moldings wrap around a rectangular cornice block at the top of the clustered column. The size of the block was determined by the precast capitals that I bought (see the story on p. 46).

Capitals and columns

Once the cornice has been applied, the capitals are pushed tight to the underside of the cornice blocks and glued and screwed to the case from the inside. The two-piece clustered columns were fabricated by molding the two edges on the in-

Precast ornaments save time, effort and money

Precast ornaments, or compo decorations, are molded from wood fibers or resins and binders, usually hide glue. This material can be molded accurately to duplicate intricately carved details (see the photo). Precast ornaments can be stained, and on painted pieces, they can fool experienced woodworkers. They cost from a few dollars up to several hundred dollars, but they can save laborious hours of carving, especially on painted furniture.

Selecting precast ornaments: Although precast ornaments can be custom-made, there's a vast array of stock designs. To get the most out of stock ornaments, however, it's best to select ornaments during the planning phase, so you can alter the design to fit available sizes. All the suppliers offer catalogs (see the sources of supply box), and some of these catalogs offer extensive application, design information and product listings. If you're going to use compo moldings regularly, the catalogs are quite helpful.

Durability and working characteristics: Precast ornaments are fairly durable and somewhat pliable when fresh. After application or with age, they harden to an almost china consistency but not as fragile. The manufacturers recommend not ordering too far in advance, so they'll be fresh and more easily manipulated.

Because the ornaments are made with hide glue, a separate adhesive is not required.

Applying precast moldings is easy, requiring no special equipment and can dramatically transform a case. And the moldings are inexpensive compared to hand-carving the intricate details.

The glue is reconstituted by steam, softening the ornament and making it more pliable. When steamed a bit longer than usual, they can be molded into concave shapes or around convex curves by pressing them in place with your fingers. The decorations can be applied to wood, plaster, drywall, metal or mirrors.

Applying the ornaments: No special surface treatment is required, but surfaces should be clean, dry, smooth and dust-free to ensure a good bond.

To steam the ornaments, you'll need a heat source, such as a double hot plate or camp stove, a tray large enough to hold the ornaments and a ¼-in.-sq. mesh screen with canvas stretched over it for setting the ornaments on, as shown in the photo. The pan or tray is filled with water and heated on the hot plates to a low, steady boil. The canvas covered screen is bent to support the ornaments about an inch above the water surface. Two or three ornaments at a time are set on the canvas, which should be coated with a thin layer of hide glue. The fresher an ornament is, the less steam time it will need: usually 30 seconds to two minutes. Aged ornaments will take longer. The ornament is ready when the bottom surface is slightly wet, sticky and the ornament is pliable.

When the ornament is ready, lift it from the canvas with a spatula, and place it where needed. You have a few moments to adjust and position it before it begins to harden and adhere. Be careful not to burn your fingers, and be sure to turn down the heat if you get too much steam. Once the ornament is in place, a chisel or knife can be used to clean the ornament if needed.

The canvas should be kept clean by dipping a brush into the steaming water and scrubbing the canvas. Oversteaming can cause the ornaments to become too soft or too wet. Oversteamed ornaments should be left to cool, design side down, or blotted on cardboard before applying. Cooled ornaments can be re-steamed, if necessary. If you place an ornament incorrectly, it can be removed with a spatula within 10 minutes of application, reheated and reapplied. —*P.L.*

ner piece slightly more than quarter round. The outer portion of the column was molded to a shape a bit more than half-round in section (see the drawing detail on the facing page). These shapes were glued and nailed together to form the clustered columns and then cut to length to fit between the octagonal blocks and capitals on the upper case. Cluster columns also were cut to length and glued in place between the half-octagonal blocks of the base cabinet.

Applied decorations

The quatrefoils and panels that reflect the shape of the space above the arch are also applied pieces. Their layout was done by drawing concentric curves and parallel lines to the arch, cornice and clustered columns. Three circles were drawn to create spaces around the quatrefoils and space in the center. The quatrefoils were drawn inside a circle concentric to the first circle. Once molded and sanded, the decorations were glued and nailed in place.

Decorating the doors

The doors were constructed with a solid frame, plywood panel and ogee molding. The outer edges of the door frames were decorated with the same shaped molding used along the inner edge of the Gothic arch. This molding created a thicker door. When mounting the hinges, the fillet of the molding was aligned with the front surface of the cabinet, and the hinge knuckle was fully exposed for more swing. □

Phil Lowe designs, fabricates and restores fine furniture in Beverly, Mass.

Sources of supply

The following companies manufacture or supply precast or composition ornaments:

Bomar Designs, 2062 State Highway 265, Branson, MO 65616; (417) 338-5133. Catalog: $8.

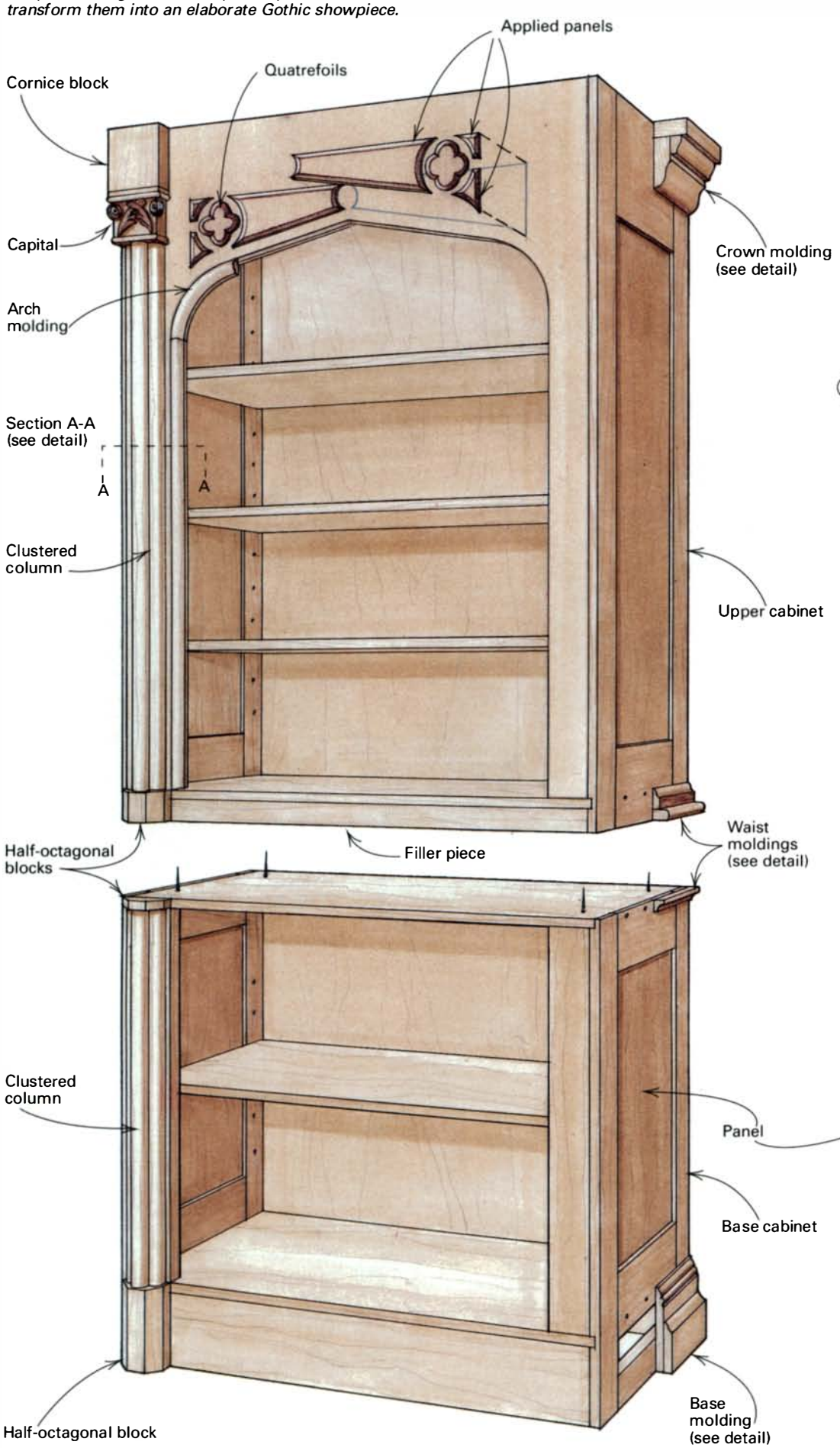
The Decorators Supply, 3610 South Morgan St., Chicago, IL 60609; (312) 847-6300. Compo catalog: $15.

J.P. Weaver Co., 941 Air Way, Glendale, CA 91201; (818) 500-1740. Catalogs: $85 each. Catalogs (about 200 pages each) cover four different topics: historical applications, complete listing of more than 8,000 different molds available, design handbook and custom-design services.

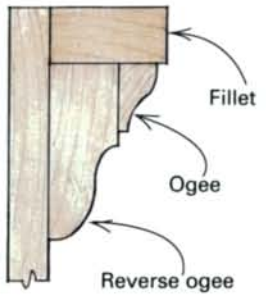
Photo this page: Charley Robinson

Gothic bookcase

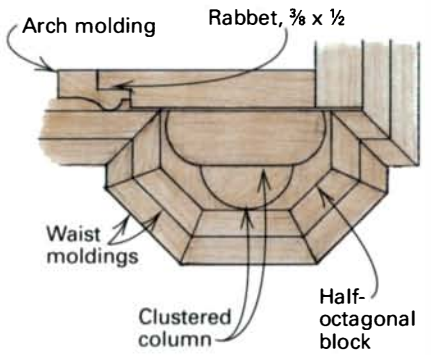
Simple moldings added to a pair of plain boxes transform them into an elaborate Gothic showpiece.



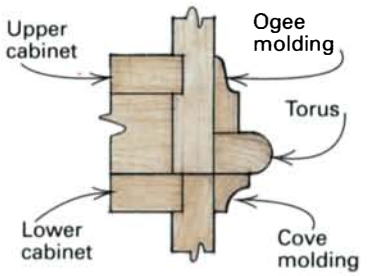
Detail: Crown molding



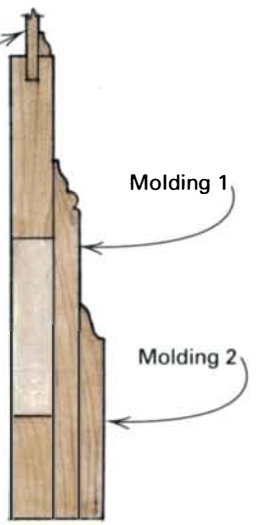
Detail: Section A-A



Detail: Waist molding



Detail: Base molding



Drawing: Kathleen Rushton

Easy Veneering with a Household Iron

Dried glue, heat and pressure bond a lovely wood skin onto any project

by Mario Rodriguez

Ironing on veneer is simple and quick even on curves like this apron. First apply yellow glue to both the substrate and the veneer; let them dry. Then place the two together, and reactivate the glue with an ordinary iron.

VIDEO TAKES
SEE PAGE 50

Photos: Alec Waters

Being able to veneer can dramatically extend the scope of projects available to a woodworker. You can take veneer, a beautiful but unstable material, and apply it to a solid, flat substrate. You can also repeat or book-match patterns for a spectacular effect. But what's the best way to glue down the veneer and keep it down?

Mentioning traditional techniques of hot hide glue and a veneer hammer produces accelerated pulses and sweaty palms for most woodworkers. In my veneering workshops when students get over their initial fear of gluing veneer, they are okay.

But when I visited former apprentice Ken Vigiletti, he turned me on to another way of applying veneer using waterproof yellow glue and a household electric iron (see the photo on the facing page). At first, I was skeptical. But after seeing a demonstration, I was anxious to get back to my shop to give the technique a try. And the project I had in mind—a small half-round hall table that I wanted to cover with sycamore veneer—was perfect because veneer would enhance the table's form (see the photo at right).

Vigiletti's demonstration was not the first time I'd seen veneer adhered with an iron. The technique also appeared in *FWW* #87, p. 66. But in that article, the author applied white glue to the substrate, and then he immediately ironed on the veneer. With that method, the veneer can slide on the wet glue, causing misalignment and gaps at the seams. By contrast, when you heat the dry glue through the veneer, it adheres in place right away. And water is less likely to evaporate out of the glue and through the veneer, causing bubbles.

About the adhesive

The main appeal of veneering with yellow glue is that many of us use it daily. With yellow glue, you don't have to worry about water-to-glue ratios, soaking time, temperature, hammering pressure or the mess associated with hide glue. And by using an ordinary iron, there's no need for a vacuum bag, an expensive press or any complicated clamping cauls. But because I wasn't keen about the idea of having to redo the veneer if the bond failed, I was still hesitant about heating waterproof glue with an iron. So I asked one of *Fine Woodworking*'s regular contributors, Chris Minick, about the process. Minick, a research chemist, heartily endorsed the technique (see the box on p. 50).

Even before talking to Minick, I was attracted to the prospect of ironing veneer over waterproof glue for a couple of reasons. In situations where the wood will be exposed to moisture, such as in a sink cabinet or in a vanity for a bathroom, the veneer isn't likely to come loose. Also, once this type of glue is cured, it isn't sensitive to common finishing solvents, so finishing shouldn't affect the veneer bond.

Another advantage of this method is that you can glue down burl or crotch veneer without getting glue stains, which can cause finish delamination and uneven staining. When you glue down these veneers using a press, the glue bleeds through. This is because of the capillary action caused by the high percentage of end grain. Unless you use hide glue, the glue stains are nearly impossible to remove. However, by allowing the yellow glue to set up beforehand, you create a barrier near the surface that minimizes the bleed-through.

While I was talking to Minick, I learned of another technique that prevents the glue from bleeding through onto the face of the veneer. First seal the back side with shellac (use a 3-lb. cut). Once the shellac is dry, apply the glue and wait for it to dry. Then you can iron the veneer. Minick, who used the method on some quilted mahogany veneer, said that the shellac undercoat works well because shellac is thermoplastic, just like the glue and just like the burn-in repair sticks that furniture repairers and restorers use. And, if you get a dab of shellac on the veneer face, no big deal. Shellac is a great sealer; it's compatible with virtually any finish.

Cutting and taping the veneer

On the table project, I started by veneering the tapered legs (the legs made good practice before I did the top) and ended with the more difficult curved apron. I cut veneer for the legs using a sharp chip-carving knife. When veneering the top, I used narrow strips of veneer tape along the seam, and I reinforced the joint with shorter straps of tape running perpendicularly.

Veneer can emphasize a table's form. *To bring out this table's traditional shapes, like tapered Federal-style legs, the author veneered it with sycamore. The table is suitable for an entrance hall or this formal dining room at the historic Peach Grove Inn in Warwick, N.Y.*

Stabilizing and gluing veneer—With a scrapwood backup, Rodriguez rolls glue onto the back of the veneer. By spraying water on the face of the veneer, he keeps the piece from curling. He has already smoothed the front of the apron and coated its surface with glue.

Scraping the veneer leaves a clean, smooth surface. Once the glue is cured and the veneer is set, the author uses a scraper to remove skid and scorch marks left by the iron. He keeps the scraper even and the strokes light to prevent the burr from digging into the surface.

Before gluing, I also taped all the cracks, which is especially important if you're using curly veneer. To see if there are any splits, hold the veneer up to a light. If there are any cracks of light, even slightly suspect areas, tape them.

Some veneers, like burls and crotches, require a substrate veneer laid 90° under the face veneer. This underlayment absorbs the movement of the face veneer and prevents tiny surface checks. Because of the relatively straight grain and the 1/28 in. thickness of the sycamore veneer (most veneer is 1/64 in. thick), I omitted this step on my table.

Applying the glue

To apply the Titebond II glue, I used a small paint roller with a short nap. I heavily coated both the substrate and the back of the veneer. Before setting the veneer to dry, I sprayed the face side with a little water to minimize any curl (see the top photo). One thing to remember when you're working with veneer: What you do to one side, do to the other. In this case, the water mimics the glue.

Ironing the veneer

After setting down the veneer to dry for about 30 minutes, I placed the veneer with some overhang all around. Then, using a steam iron on the cotton setting, I pressed the veneer firmly and worked from the center out. I kept the pressure steady and the iron moving slowly. Looking for any gaps or open seams, I went over the veneer several times, allowing the iron to linger over any trouble spots. If you leave too much overhang on the veneer, the edges could curl away from the substrate, preventing a clean, tight job. To remedy this, limit overhang to 1/8 in., and apply steam from the iron. The steam causes the veneer to expand on the face side, which allows it to lie flat again.

The iron left some light skid and scorch marks, but these were easily scraped off later after the glue cured (see the bottom photo). On larger areas, I work from the center out toward the edges to avoid creating bubbles or creases. But I've learned that every veneer behaves differently—even within the same species. So on certain jobs, you may want to iron the edges first. Experiment on scrap to see.

The heat from the iron should drive out excess moisture from the glue, which might otherwise bubble up under the veneer. Steam also works to temporarily release the veneer when you want to reposition it or when you need to iron out blisters and bubbles.

On my table project, the veneer was large enough to cover the apron in one piece, but often I have to join narrow pieces to span a larger surface. You can shoot and tape the seams prior to gluing, and then treat the assembly as one piece. Or you

How thermoplastic adhesives work

by Chris Minick

Ironing on veneer is a sound idea. It'll work with yellow glue, white glue and waterproof yellow glue (such as Titebond II) because all are types of polyvinyl acetate (PVA), which are thermoplastic adhesives. This means the solid resin (dry glue) becomes flowable (plastic) at a certain temperature. The range can be from under 200° to over 400°F. To visualize this phenomenon, picture your sandpaper gumming up when you sand hardened glue. The heat produced by friction causes the glue to melt. This same thermoplastic attribute will allow you to veneer with an iron.

A household electric iron (not a travel iron) will produce enough heat to melt most PVA glues. The glue will become workable and sticky for a period of time. But here's where there are differ-

Video: Ironing on veneer

VIDEO TAKES

If you like the look of veneer, but you don't like the mess of hot-hide glue or the fuss of vacuum bags and clamping cauls, Mario Rodriguez will show you a slick way to glue down ve-

can lay the veneer one piece at a time, and cut your seams in place. You do this by overlapping the second piece onto the first and cutting through both of them. After passing your saw or knife over the seam several times, lift the top waste piece away from the seam. Then gently lift the edge of the top sheet, and remove the waste strip from the bottom piece of veneer. If you can't lift the veneer, use a bit of steam from the iron to loosen up things. When both waste strips are removed, press the seam firmly. After ironing, apply veneer tape lengthwise down the seam, and place tape straps across the seam (which prevents the seam from creeping open). Leave the tape in place for 24 to 48 hours.

Trimming the veneer

To trim the veneer for the hall table, I used a sequence of hand tools. First I cut the veneer with a veneer saw, as shown in the top photo. I prefer a French veneer saw (which is available from the Garrett Wade Co. Inc., 161 Avenue of the Americas, New York, N.Y. 10013-1299; 800-221-2942) because its teeth point toward the center of the blade arc from both ends, which lets me score the veneer before beginning the cut. And because the handle is directly alongside the blade, a French veneer saw gives me better control than the more common offset-handle veneer saws.

Next, paying close attention to the direction of the veneer's grain, I use a block plane to trim the veneer almost flush with the adjacent surface. For this job, I use a Lie Nielsen block plane. And rather than risk tearing the veneer or digging into the wood, I leave the veneer edge proud. After planing, I use a 10-in.-long second-cut file to level the veneer to the substrate. I work from the edge into the veneer so that I don't chip it, and I lift the file on each return stroke.

Then I use a Sandvik scraper to smooth out the file marks, as shown in the center photo, while again noting the direction of the grain. The scraper leaves a clean surface that will ensure tight, almost invisible, seams. By keeping about three-fourths of the scraper on the work, I prevent the scraper's burr from rolling over the edge.

After gluing veneer to the adjoining surface and allowing it to dry, I repeat the above steps to trim the veneer where it meets at the corner. Finally, I slightly bevel the edge of the veneer at the joint using a smooth file (see the bottom photo). □

Mario Rodriguez teaches woodworking at the Fashion Institute of Technology in New York City, and offers traditional veneering clinics in Warwick, N.Y. He is a contributing editor to Fine Woodworking.

TRIMMING VENEER

Saw off the veneer leaving a little overhang to protect the edges. *The author drags his veneer saw along the tabletop (top) leaving about 1/32 in. excess.*

File and then scrape the surface flush, so the corner will be tight *(center). After Rodriguez files the veneer edges level with the leg, he scrapes them smooth.*

Chamfer adds a finishing touch—*Using a smooth file (above), the author bevels the veneer edges, which eases and protects the table's corners and helps to disguise the seams.*

ences: Regular white glue can be reactivated indefinitely at a temperature of only around 180°F (below the "delicate" setting). Yellow (aliphatic resin) glue must be heated to about 250°F (between "delicate" and "wool"), and you might have a window of a week or more to do this. Waterproof glue requires a temperature of 350°F or more in the "cotton" to "linen" range. And because it's a cross-linking PVA, you're better off getting it ironed down within 72 hours. To find out exactly how long you have to reactivate your adhesive, call the manufacturer.

If you're unsure about your glue and how hot to set the iron, take some scrap veneer, and start ironing at a low temperature. Then use more and more heat until the glue is workable and you can adhere the veneer. Once you move the iron away, the glue will cool fairly quickly, and your veneer will be set in place. This minimal-heat approach may prevent you from overheating a piece of delicate veneer. □

Chris Minick is a product-development chemist in Stillwater, Minn.

neer using a household iron. He also goes into detail about trimming veneer and getting clean joints. And he shows how to handle difficult veneers like curly and crotch. Send for "Ironvid," a $10, 28-minute video cassette (VHS) companion to this article. Order #011039, The Taunton Press, P.O. Box 5506, Newtown, Conn. 06470; (203) 426-8171.—*Alec Waters, associate editor*

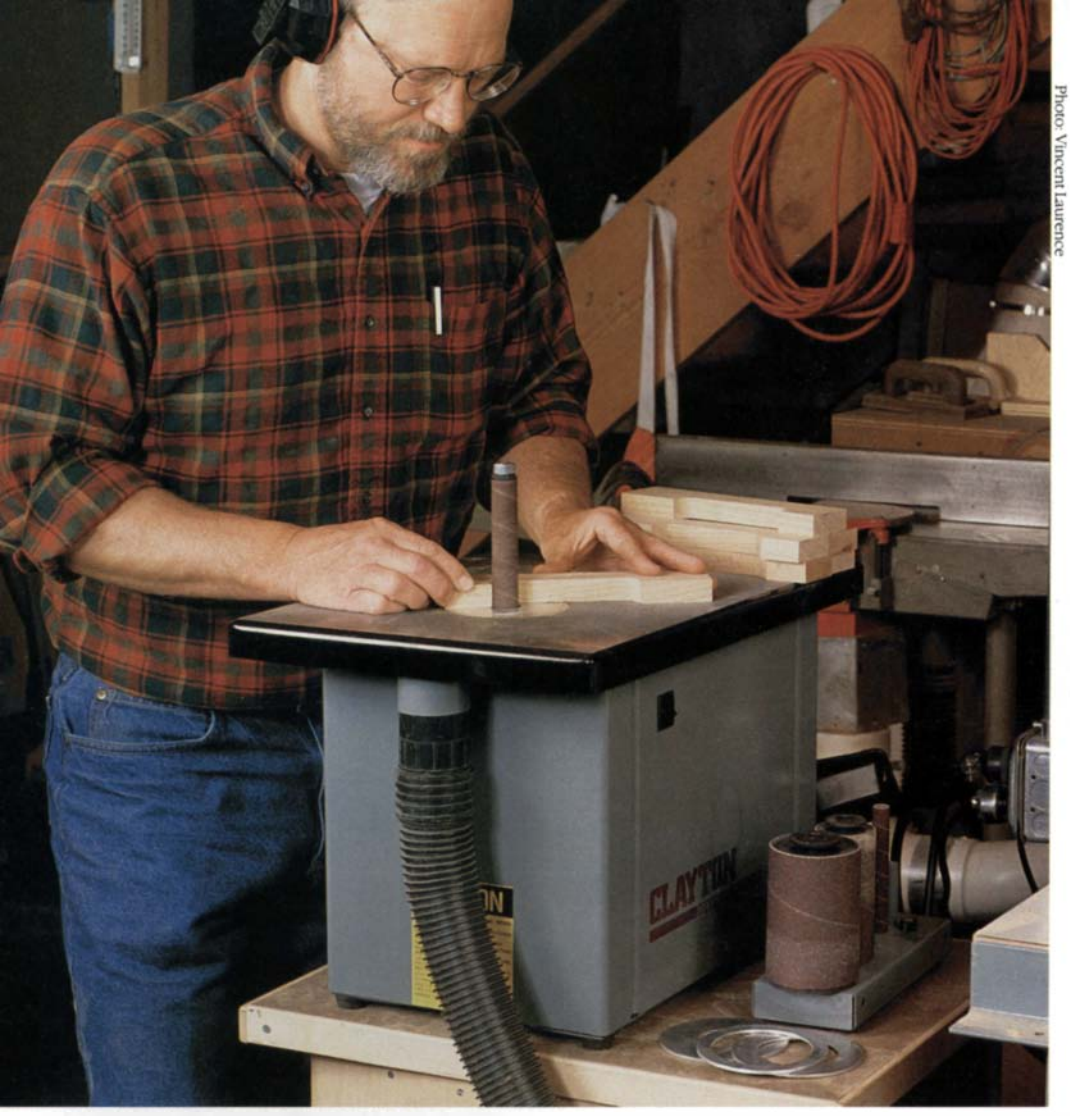


Photo: Vincent Laurence

***Oscillating spindle sanders smooth sinuous curves**—Shown below, from left, Ryobi OSS450, Vega OS-3, Powermatic model 14 and Clayton model 140 are all portable machines priced from $175 to $635.*

***Designed for production**—The Clayton, (left) the biggest and most expensive of the portable sanders reviewed, offers sealed bearings and precision machined and balanced parts that enable it to run all day.*

Oscillating Spindle Sanders

Why you should have one and which you should buy

by Charley Robinson

Everybody who owns a jigsaw, scrollsaw or bandsaw has searched for an easy way to clean up the sawmarks on those sinuous curves they've been cutting. Most home shops have probably made do with a drum sander chucked in a drill press. But that's not totally satisfactory. A drum sander on a drill press tends to burn wood and leave sanding scratches. The sandpaper clogs quickly, and you only use a small section of the drum.

Oscillating spindle sanders are the solution. They eliminate burning, scratches and clogging, and their up-and-down action uses more of the drum surface for longer abrasive life. These sanders also make work quicker, easier and more accurate: They allow you to cut close to your line and sand precisely to it so that you don't have to make perfect sawcuts.

But until recently, oscillating spindle sanders were something only commercial shops could afford. There are now, however, four manufacturers offering small, portable spindle sanders for less than $700: Clayton, Powermatic, Vega and Ryobi (see the sources of supply box on p. 56). And both Delta and Sears have indicated they will have comparable machines early in 1995.

Oscillating spindle sanders require no special training to operate, they're safe to use (with proper dust protection) and do a great job. Their small size means they can be stored easily.

If you do much curved work, the question at this point is not *whether* to buy an oscillating spindle sander, but *which* one to buy. I had a chance to look over four of the units, and here is what I found to be the strong and weak points of each of them.

Photos except where noted: Robert Marsala

Ryobi model OSS450

Ryobi's introduction was well-targeted and priced precisely for its intended market: the hobbyist woodworker. The OSS450 has a list price of $340, but it usually sells for about $175, making it the lowest priced spindle sander in the category. The 3.5-amp motor (about ⅙ hp), the smallest of any of the sanders, spins at 2,000 rpm and produces 58 strokes per minute with a ⅝-in. spindle travel. The ½-in.-dia. spindle will accept a 4½-in.-long sanding sleeve directly or rubber drums over which larger diameter sanding sleeves can be slipped. A 1-in.-dia. drum is standard and ¾-in.-, 1½-in.-, 2-in.- and 3-in.-dia. drums are available. Individually, the drums range from $6 to $26, but you can buy them as a set for $40. Drums and sleeves are easily changed by loosening the spindle nut and dropping on the new sleeve or drum.

The molded plastic base has convenient, built-in storage for drums and a ½-in. sanding sleeve. There's also a molded pocket to hold the five table inserts that keep the gap between the drum and the table opening to a minimum. In use, the inserts drop into a rabbet in the tabletop. The inserts fit flush with the top, which is made of medium-density fiberboard (MDF) covered with plastic laminate, including both sides and edges. In addition to keeping stock from accidentally jamming between table and drum, the tight-fitting inserts also increase the draw when a shop vacuum is plugged into an opening on the underside of the top for dust collection. The vacuum port has a short connector tube, however, so it is easy to insert the vacuum hose too far, effectively cutting off the air flow. When properly installed, most of the dust is sucked away.

Although I found the sander to be stable when just set on top of my bench on its rubber feet, Ryobi recommends attaching it to a plywood platform and then clamping the plywood to the bench. This setup really let me lean into the sander with a piece of oak. I was surprised to find that I couldn't bog down the motor or cause the drive belt to slip even under the heaviest pressure.

I found on the Ryobi, as on all of the other machines, that the spindle was not perfectly square to the table in all directions. I did find on all the machines that the spindles were square in one direction and only slightly out at 90° to the first measurement. This had little affect on performance because I simply marked the points on the tables that were square to the spindle, and for critical sanding, I oriented my work over those points.

The Ryobi's instruction manual was the best of the lot (in both French and English) and peppered with safety warnings, although these machines are relatively benign. A safety switch with a removable key prevents accidentally turning on the machine. The OSS450's light weight (27 lbs.) makes it the easiest machine to pick up and put on your workbench. But in spite of Ryobi's classifying it as a benchtop tool, I thought it, as well as all the rest of the sanders, was more comfortable to use on a lower stand.

Vega OS-3 oscillating sander

Vega Enterprises prides itself on bare-bones, basic machines and this $350 spindle sander is true to its heritage. The 40-lb. unit has a plate-steel base and a 12-in. by 16-in. particleboard tilting top covered with plastic laminate. Because the top is laminated only on the top side, I'd be concerned about its stability over time. The top's edges are protected with a rubber molding. A ¼-hp motor turns the spindle at 1,750 rpm and produces 40 strokes per minute with a ¾-in. travel. A line-mounted switch, which is a lot less con-

Photo: Vincent Laurence

***What's under the hood?** The Ryobi's small motor and plastic drive train deliver unstoppable power, which is great for the occasional user, but it can't be expected to stand up to continuous duty (below).*

***Convenience and economy in a lightweight package**—The 27-lb. Ryobi (left) is easy to set up or store and its molded plastic base provides convenient storage for wrench, inserts and sanding drums.*

venient to use than a cabinet-mounted switch, turns the motor on and off. Because the base is small, only 12¾ in. wide by 6½ in. deep, it's tipsy when aggressively sanding, and there is no convenient way to bolt the machine to a stand or benchtop.

Three sanding drums, ½-in., 1-in. and 2-in. sizes, come as standard equipment and are the only sizes available. They're stored along with the Allen wrench needed to change spindles in a block of wood screwed to the side of the base. An adapter ($2.95) is available for using Singley drums (see the sources of supply on p. 56). A Singley drum uses regular sandpaper, which eliminates the need to stock a lot of different sizes and grits of sleeves.

Each drum mounts on its own 5/16-in.-dia. spindle. The spindle drops into a hole in the center of the oscillating shaft and is held in place with an Allen-head screw. Access to the Allen-head screw is inconvenient: You have to work from the back of the machine through about a 1-in. gap between the table and base. Sleeves are easily changed, though, by loosening the thumbnut on top of the spindle and sliding off the old sleeve.

The OS-3 doesn't use table inserts. It has a tilting top that requires an oblong hole in the table when used in the tilted position. The major drawback to this arrangement for straight-up vertical sanding is that even with the largest diameter drum in the machine, there is still enough space at the front of the drum for a workpiece to get jammed between the top and the spindle. Vega suggested clamping a piece of Masonite or plywood to the sander's top with a hole just large enough for the spindle in use. Another problem with the tilting top is that it caused Vega not to include any vacuum attachments. These machines generate a lot of dust, so I consider dust collection a must.

Powermatic model 14 oscillating sander

At a hefty 65 lbs., the Powermatic model 14 sells for between $300 and $330. Contributing to the model 14's mass is a 14⅝-in.-sq. cast-iron, tilting tabletop. The steel base encloses a big ½-hp motor turning at 1,725 rpm that uses a direct drive to create the 74 oscillations per minute with a stroke of 1 in. With the drive unit on top of the motor, the Powermatic model 14 is the tallest machine of the four at 18½ in. high and almost requires a special stand. The steel-and-brass gear-drive mechanism is the quietest and the smoothest of all the machines.

Early versions of this sander had coarsely ground tabletops, but Powermatic has subsequently revised the manufacturing process, and the current tops are smoothly polished. The top does tilt, but Powermatic found a way to include an effective dust pickup below the table and steel table inserts in the top. Two of the inserts are for regular vertical sanding, and two have oblong holes for tilt sanding. An optional insert is available for a 3-in.-dia. drum for $5. The inserts fit well and are easily removed, even with the drum in place, by reaching in under the top and pushing it up out of its rabbet. This is good because getting the insert out of the way is almost a prerequisite to change the left-hand threaded spindle, which requires a pair of wrenches and working under the table.

The spindle screws into the oscillating shaft and requires one wrench to hold the shaft and one to tighten or loosen the spindle. For sanding with the ¼-in.- (the model 14 is the only sander with a spindle this small), the ½-in.- or the ¾-in.-dia. spindle, the sanding sleeve slips directly over the steel spindle shafts that come as standard equipment. The sleeve is held in place at the bottom of the spindle with a screw and retainer clip.

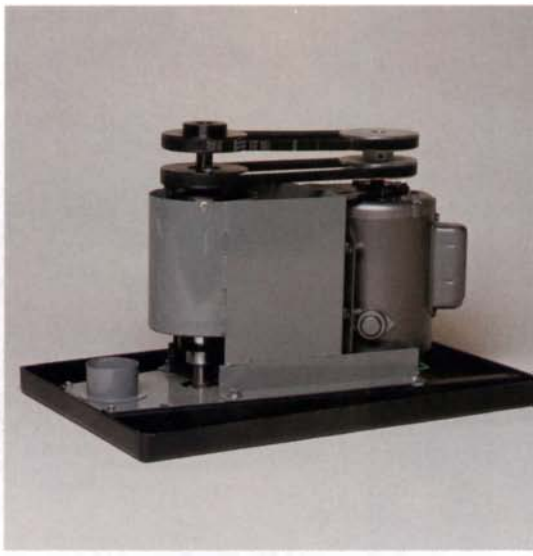
The left-hand threaded spindle hinted at something different from the rest of the machines: a clockwise spindle rotation. Although a surprise the first time I used it, I quickly got used to this rotation, and it presented no problems.

There are three rubber sanding drums available for the Powermatic: a 1½ in. and a 2 in. dia. that come with the unit and a 3-in.-dia. drum available as an option (about $35). The drums fit over the ¾-in.-dia. spindle and are unusual in that they are driven by a removable key let into the shaft. The usual nut at the top of the

***Good motor but light-duty drive**—Vega's ¼-hp motor is up to the job, but the spindle oscillated erratically under heavy pressure. Plastic mountings and components may wear in the long run.*

***Direct drive with lots of power**—Powermatic couples a ½-hp motor with a steel-and-brass gear-drive mechanism for smooth, quiet operation. The in-line drive increases the height of the unit.*

***Built for the long haul**—A heavy-duty ½-hp motor with ball bearings, an oil-bath oscillating unit, hardened-steel shafts and machined and dynamically balanced parts ensure a long life for the Clayton.*



spindle causes the rubber drum to expand when tightened and prevents the sleeve from slipping on the drum. This same nut makes the frequent task of switching from one grit to another on the same size drum a thankfully easier task than changing spindles. At 5½ in., the sanding sleeves on the model 14 were the longest of all the sanders. For most tasks, they left plenty of clean abrasive at the top of the sleeve so that you could simply take the sleeve off and flip it over for a fresh spot on the sleeve.

The dust pickup worked quite well with just one minor problem. The 2-in.-OD dust connector is an odd size and doesn't fit my shop vacuum. I couldn't find any adapter at the hardware store that would work, so I duct-taped the hose in place. That's inconvenient if you move your vac from one machine to another, but effective. Powermatic representatives said they would look into the matter and consider adopting a more standard size.

Clayton model 140 oscillating spindle sander

It's big. It's heavy. It's expensive. With a 14-in. by 21-in. fixed, ground-steel tabletop, weighing in at 75 lbs. and costing $625, the Clayton model 140 topped all other models in weight and expense. The spec sheet on this sander boasts lots of features. The heavy-duty ½-hp induction motor with sealed ball bearings turns the spindle at 1,750 rpm while a sealed oil-bath oscillating unit provides sixty ¾-in. strokes per minute.

With precision machined and dynamically balanced parts, here's a machine that's designed to run all day. As further indication that this machine was designed for rugged industrial applications, it's available wired for 220v, with an optional power interrupt to meet Occupational Safety and Health Administration requirements. A power interrupt automatically prevents start-up when power resumes after an outage.

A hardened steel, ½-in.-dia. spindle is part of the drive train and mounts a 4½-in.-long sanding sleeve or a variety of rubber drums for other sanding options. Three of the 4½-in.-long drums come

Photo: Vincent Laurence

***Bare-bones, basic machine**—The Vega OS-3 is the second most expensive machine and offers a tilting table, but it lacks some of the amenities that even the least expensive machine includes, such as a dust hookup and table inserts.*

Sources of supply

The following companies manufacture oscillating spindle sanders.

Clayton Machine Corp., PO Box 513, Clawson, MI 48017; (810) 548-2380, (800) 971-5050

Powermatic, 607 Morrison St., McMinnville, TN 37110; (615) 473-5551, (800) 248-0144

Ryobi America Corp., PO Box 1207, Anderson, SC 29622; (803) 226-6511, (800) 525-2579

Vega Enterprises, Inc., Route #3, PO Box 193, Decatur, IL 62526; (217) 963-2232, (800) 222-8342

The following companies offer sanding supplies.

Klingspor's Sanding Catalogue, PO Box 3737, Hickory, NC 28603-3737; (800) 228-0000: full line of abrasives and related supplies

Singley Specialty Co., Inc., P.O. Box 5087F, Greensboro, NC 27435; (910) 852-8581: sanding drums that use sheet sandpaper

***Smooth and quiet**—The Powermatic model 14 was the smoothest running and the quietest machine. It has a cast-iron tilting top, complete with inserts and dust collection. Because of its tall profile, it works best on a separate low stand.*

as standard equipment: the ¾ in., the 2 in. and the 3 in. Available at additional cost are 1 in. ($19.80), 1¼ in. ($21.10), 1½ in. ($22.50), 2¼ in. ($26.50) and 2½ in. drums ($27.50). Also standard is a separate steel drum rack and 16 sanding sleeves in four grits for each of the stock spindle/drum sizes.

The dust-collection hookup sucks in about 95% of the dust generated by the sander with no hose connection problems—a first. Aluminum inserts keep the open space around the drum to a minimum, and the fit to the tabletop can be fine-tuned with four nylon setscrews in the insert rabbet, a feature not offered by any of the other machines.

With all the emphasis Clayton puts on precision and balance, I was somewhat disappointed to find a low-level rumble in the machine I was using. It set up a vibration on the table surface that was fatiguing over time and also added to the operating noise as the steel side panels vibrated. A quick call to Clayton confirmed that this is not normal and a replacement unit was forwarded. The new unit was as smooth as I had expected and performed admirably. There aren't many frills with this machine, but it runs well, and I would expect it to continue to do so for a long time.

Replacement sanding sleeves

No matter which sander you choose, you will find sanding sleeves aren't always available at the corner hardware store. It's best to plan ahead, and order the sleeves you will be needing. All of the manufacturers offer sleeves to fit their machines in a variety of grits, sizes and packaging. Prices can range anywhere from approximately $1 per sleeve to $6 per sleeve, depending on size, grit and manufacturer. Although a hardware store may not have the exact size you want, you can often get by with a shorter sleeve when sanding standard ¾-in.-thick stock; you can find 2-in.-long sleeves in many hardware stores or home centers. For those who really plan ahead, you also can order sleeves from Klingspor's Sanding Catalogue (see the sources of supply box above). They have most 3-in. and 4½-in. sleeves in stock for immediate shipment, and they can custom order 5½-in. or non-stock items in about two to four weeks. Several of the mail-order tool catalogs also include sanding supplies.

Conclusions

Choosing one of these sanders depends on your needs and your budget. For just $225 (including the accessory pack of drums), the Ryobi delivers lots of performance for the money and will well serve the woodworker with an occasional need for contour sanding. But because of its plastic drive components, the OSS450 probably won't stand up to the rigors of daily use. The Powermatic model 14 is a smooth-running machine that is a pleasure to use (but not to change spindles on). For around $300, you get a powerful motor, the only machine with a ¼-in.-dia. spindle and a heavyweight machine that will stand up to heavier use. If money were no object and I did a lot of contour sanding or if I had to depend on one of these machines to make a living, I'd buy the Clayton model 140. It's a well-built machine that should be a steady performer for years. □

Charley Robinson is an associate editor for Fine Woodworking.

Photo this page: Vincent Laurence

Fill the Grain for a Glass-Smooth Finish

Simple steps are key to success with pore fillers

by Chris A. Minick

Woods like mahogany, ash, walnut and oak, which have large pores, give a natural open-grained appearance to furniture. But to get a glass-smooth surface on these woods, you have to fill the pores with a grain filler before applying the finish. Tight-grained hardwoods, like maple and most softwoods, usually don't require grain filling.

You need only a few tools to use grain fillers (see the photo at left), and grain-filling is pretty straightforward: Thin and tint the filler, prepare the surface, brush on the filler and pack the pores, remove the excess before it hardens, sand to the wood once the filler is dry, and clean off any residue. But though the process is straightforward, filling grain takes time, is messy and is generally not much fun. Even so, the results are well worth the effort, as the left side of the butternut board shows in the photo below right.

Oil-based and water-based options

Don't confuse grain fillers with the wood putty used to fill nail holes. Grain filler, also called paste-wood filler or pore filler, is a thick clay-like mixture of solvent, resin binders and finely ground minerals, often called silex. Fillers come in oil-based formulations, like Behlen's Pore-O-Pac (available from Woodcraft Supply, 210 Wood County Industrial Park, P.O. Box 1686, Parkersburg, W.V. 26102; 800-225-1153) or in water-based formulations, like Hydrocote's Fast Dry (available from Highland Hardware, 1045 N. High-

Surface imperfections are magnified by pore filler, *so it's critical that the wood be properly scraped and sanded beforehand. The rust-colored filler used on this piece of butternut reveals even small surface blemishes (top right corner).*

Grain fillers are essential for open-pored woods. *Here, Minick applies water-based filler to a mahogany tabletop. Using a disposable brush, he packs the pores. He masked the edges with tape to avoid scraping filler from the routed profile.*

land Ave. N.E., Atlanta, Ga. 30306; 800-241-6748). Both varieties can be purchased as a thick paste that must be thinned before use, or in a pre-thinned, ready-to-use consistency. Even though oil-based grain fillers have been around longer, I prefer water-based fillers because they work easier, dry faster and are easier to clean up. In addition, water-based fillers, once completely dry, are compatible with virtually all finishes.

Tinting the filler

Pore fillers come in a variety of wood tones, so you can match your project. They also come in off-white and in a neutral color, which can be custom-tinted in your shop. The choice of tint is a matter of taste. You may want a light, unobtrusive filler color on oak, or you may want to contrast the grain by using a dark filler. I almost always go for a darker filler because I like to bring out grain patterns. Similarly, you can pick up highlights in the wood—reds in mahogany or maroon in walnut, for example. I usually stick with earth-tone pigments, such as burnt umber (chocolate-like color), ochre (yellowish), burnt sienna (reddish) and lamp black. To my eyes, colors that are bright and bold look artificial on wood.

If you decide not to tint your off-white or neutral oil-based filler, be aware that the binders in the mixture will likely cause the filler to yellow or darken with age. This is not a problem if you use a water-based grain filler. Pigmented universal tinting colors (UTCs), available from most large paint stores, and dry fresco powders work well at coloring water-based and oil-based fillers. Japan colors (pigments ground in a varnish base), artist's oil colors and the pigment sludge found on the bottoms of oil-based stain cans are only useful for tinting oil-based fillers. For more on tinting, see the photo and story at right. In any case, make sure your coloring medium is a pigment. Transparent dye stains will not adequately color the quartz particles found in most grain fillers.

Preparing the surface

Sloppy sanding and pore fillers don't mix. That's why I usually power-sand the wood with a random-orbit sander through 180-grit sandpaper. Then I hand-sand with 220-grit to remove pesky swirl marks. Likewise, tearouts, gouges or other defects must be puttied and sanded flat before applying the filler. A poorly prepared surface will be magnified a hundred fold once the blemishes are packed with pore filler (see the photo at right on p. 57).

Pore fillers tend to seal the wood surface, which makes staining after filling difficult. If you plan to stain the wood, do it before you fill the grain. I like to use water-based dye stains under the filler because the inevitable sand-throughs are easily repaired by reapplication of the same strength dye stain. Once the stain is dry, you should seal it (I prefer shellac or vinyl sealer). There are three reasons for sealing: First, the sealer protects the stain layer from scratches during the filling process. Second, sealing before filling eliminates an undesirable smudging effect that commonly occurs (for more on this, see *FWW* #107, p. 85). Third, because sealers smooth out surfaces, they allow easy removal of excess filler.

Applying the filler and removing the excess

Once thinned to the consistency of heavy latex paint, pore filler is ready to apply. Paint on a fairly thick coat of filler (see the photo at left on p. 57), and then pack the filler into the pores using a forceful circular motion of the brush. (This is why I like to use disposable brushes.) Stir the filler frequently because filler particles are heavy and rapidly settle to the bottom of the can.

Working oil-based fillers

by Andy Charron

Before you apply oil-based paste filler, you need to tint it to the right color for your project. The filler not only plugs up pores but also helps color the immediate surrounding areas of the wood (see the article on p. 72). Because the silex in the filler does not accept stain, you cannot readily change filler color once it's dry. But the color can be adjusted beforehand by blending different fillers together or by adding pigments to neutral filler. You can achieve the wood tone you want through trial and error (see the photo).

Start with neutral grain filler and add pigments, *such as universal tinting colors (UTCs), to get the color you like.*

Besides needing tint, oil-based filler usually has to be thinned as well. If the filler is too thick, you'll need lots of elbow grease to brush it on and to rub off the excess. If it's too thin, it will be easy to apply and clean up, but it won't fill up large pores well and it will take longer to dry. Once you've thinned the filler to a creamy consistency, apply it in stages over small areas. I like to use an inexpensive stiff bristle brush to work the filler into the wood, applying it with the grain first and then going back over it perpendicularly to the grain.

Immediately after you've filled the grain (while the wood is wet), remove all the excess by scraping the surface at a 45° angle. One filler manufacturer recommends using a plastic credit card. A thin ripping of the project's scrapwood also works well. I cut one end of the filler scraper to a point, so I can get filler out of hard-to-reach places like inside corners.

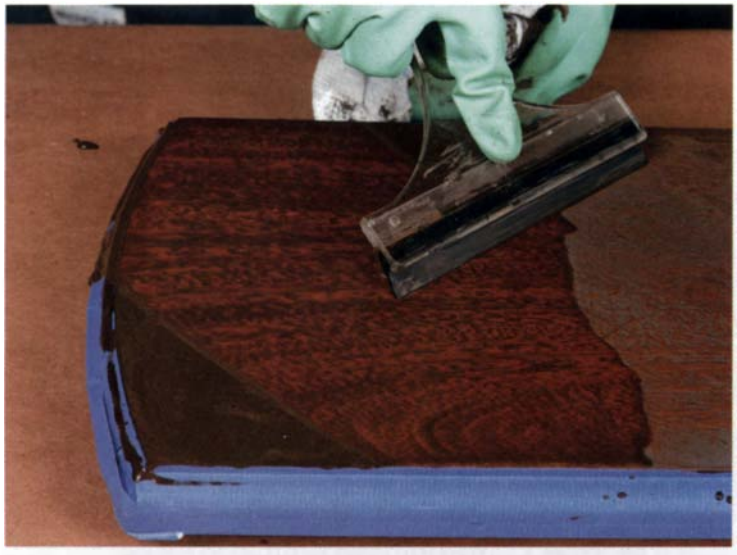
Once you've scraped the surface clean, allow the residual filler to dry until it takes on a flat, crusty look (usually 5 to 10 minutes). At this point, start rubbing with a piece of burlap. When the burlap begins to weigh down with excess material, shake it out, and it will be ready to wipe some more. Finally, polish the wood with a soft cotton cloth. After the surface has been wiped off, you may need to sand it lightly. But I've found that just a firm rubbing with a clean rag usually will shine the wood to a perfectly smooth surface. □

Andy Charron is a writer and cabinetmaker living in Red Bank, N.J.

Photos: Alec Waters

Remove excess filler from the surface with a stiff rubber squeegee (available from a glass-cleaning supply store) for water-based filler or a plastic putty knife for oil-based filler. Pulling the squeegee or pushing the putty knife diagonally across the grain minimizes the chance of removing the filler from the just-packed pores (see the top photo). If you're using oil-based filler, use coarse burlap rags to clean residual filler off the wood before it dries. The more filler you remove now, the less sanding later.

Getting a feel for the proper drying time takes practice. Generally, you can begin removing an oil-based filler when the surface starts to look dull or hazy. A light sprinkling of mineral spirits over the filler will slow down the drying and allow a bit more working time. But water-based fillers dry so rapidly that if you wait for them to haze over, it's too late. Instead, work on small patches at a time and immediately squeegee the excess filler from the surface as soon as pore packing is complete. Because the filler won't leave lap marks, you don't have to fill the entire surface at once. But sprinkling water on hardened water-based filler is no help. If you wait too long to squeegee, you'll have to sand off the excess.



Scrape off the grain filler while it's still wet. *Wearing rubber gloves, the author drags a rubber squeegee diagonally across the grain. The scraped area to the right has already hazed over.*

While the squeegee method works quite well at removing the bulk of wet filler from large flat surfaces, turned pieces and intricate moldings are different matters. I've had some luck removing excess filler from turnings using a terry-cloth towel. I've also been marginally successful at removing dried filler from molding nooks and crannies using a shaped scraper. But I often avoid the problem by not filling turned pieces and moldings. The visibility of the pores in these regions is usually disguised because the end-grain wood will finish darker (more absorption) and because of shadows made by the profiles. To prevent filler from getting on these areas, I simply mask them off beforehand (see the photo at left).

Sand, clean and seal before you finish

Dry time (or more appropriately, cure time) of pore fillers varies significantly. While water-based fillers can usually be sanded and finished within three or four hours, oil-based fillers require two to three days to dry thoroughly. The residual solvents and oils in uncured oil-based filler can cause tiny white spots in the finish if top-coated too soon. This is particularly true when waterborne finishes and some nitrocellulose lacquers are used.

Once the filler is completely dry, sand down to the sealer, removing all the filler residue from the surface (see the center photo). Leave filler only in the grain pores. Sand carefully: It's easy to sand through the sealer coat into the base stain. Oversanding can also open up unfilled pores, which will force you to start the whole process over again. Periodically, wipe down the wood with a rag dampened with mineral spirits to inspect your progress. You should wind up with a surface that looks somewhat like the left tabletop in the bottom photo.

Because grain fillers shrink about 10% as they cure, your freshly filled and sanded wood is probably not going to be silky smooth. You can repeat the process to fill the pores completely, but I prefer to fill the small sink holes with sanding sealer (it's a lot easier). I apply a coat or two of sealer and sand it back to a flush surface. The sealer also provides a good base for the finish (see the tabletop on the right in the bottom photo). Finally, always make sure your topcoat, sealer and filler are compatible by testing your finishing sequence on scrapwood from your project. □

Chris Minick is a finishing chemist and a woodworker in Stillwater, Minn. He is a regular contributor to Fine Woodworking.

Sand down to the wood (or sealer) once the filler is dry. *Minick uses 120- and then 220-grit paper to produce the fine powder shown. If the paper starts to gum up, it means the filler is not quite dry.*

Clean and seal the surface. *Wipe off filler residue, and dust with a soft cloth. Then reseal the wood before the topcoat. The mahogany top on the left has been cleaned; the right top has been shellacked.*

Fine Furniture for Tools

Tool chest combines storage and convenience while showing off its maker's skills

by Steven Thomas Bunn

***Fit for a showroom**—Because the author doesn't have a display of finished furniture, he built this toolbox to advertise his capabilities to drop-in customers. It also offers lots of convenient storage with 20 removable drawers that can be carried to the workbench.*

I wanted a toolbox that was both visually striking and had a lot of storage space. Appearance was a prime consideration because as a one-man shop, I can't afford to keep finished work around as showpieces, and piles of wood or half-finished parts are not impressive to a drop-in client who isn't familiar with cabinetmaking. I needed a toolbox that, like the journeyman's boxes of old, was an advertisement and demonstration of my capabilities.

I like the European-style toolbox that hangs on the wall with tools hung neatly inside. However, I don't like the large volume of wasted space behind the closed doors. In addition, the sheer number and weight of tools I possess ruled out a box that could be hung on the wall. I like the out-of-sight storage of drawers, similar to a mechanic's toolbox. I also like the idea of grouping similar tools in a single drawer so that I can pull out a drawer of chisels or gouges, set it on my bench and then go to work. Also, drawers keep sawdust and wood chips from accumulating over my tools.

Incorporating drawers meant the cabinet needed to be relatively deep: I calculated about 17 in. deep to be effective. For both design and practical reasons, I decided to put the tool chest on its own stand, as shown in the photo above. The cabinet and stand offer

Photos: Charley Robinson

exceptional storage capacity for fine hand tools at a height that keeps me from having to reach up or bend down to get to anything. But with some slight modifications of the interior storage arrangements, the tool chest could easily house linens, china or electronic equipment. In fact, my tool chest is an interpretation of the Gate's sewing cabinet shown in *Measured Shop Drawings for American Furniture* by Thomas Moser (Sterling Publishing Co., Inc., N.Y.; 1985).

***Shop or home furniture?** This tool chest could be equally at home in the parlor with just minor changes to the interior to accommodate china, silver or even stereo equipment.*

Building the carcase

The solid panels of the case top, sides, shelves and bottom are all made of ¾-in.-thick stock, as shown in the drawing on p. 63. After preparing the stock, I routed stopped dadoes into the side panels for the shelves and bottom, guiding the router against a fence. To ensure the dadoes were aligned, I clamped the sides together with the back edges butted against each other. I positioned the fence, squaring it to the front edge of one of the side panels, and clamped it in place.

After the dadoes had been routed into the sides, I joined the top and sides of the carcase with through-dovetails and then dry-assembled the joints. Once satisfied with the fit of the dovetails, I cut a rabbet on the inside back edge of the top and sides for the back. The rabbet in the top was stopped at each end and squared up with a chisel. I then reassembled and glued the dovetails. The bottom was sprung into its dadoes, aligned 1 in. behind the case front to allow for the bottom face frame and screwed into place with glue blocks from underneath, as shown in the drawing.

The shelves were driven in from behind with taps from a deadblow mallet. The front of the shelves were notched to fit tightly against the case side and hide the dadoes. I left a ⅛-in. gap at the back of all the shelves as a safety measure in case of unequal expansion in the sides and shelves. So if the shelves swell more than the sides, the shelves won't break out the back of the case. Only the bottom was left full depth to provide a place to anchor the board-and-spline back. The interior shelves also stop 3 in. shy of the front to leave room for the tools hung on the inside of each door.

***Oversized storage holds big items**—This two-drawer box slides into place between the shelves to hold long items that don't fit in the smaller drawers.*

Slide-in drawer dividers

Four vertical drawer dividers slide into dadoes routed in the two top shelves to form the drawer support system, as shown in the drawing. Before installation, I cut matching dadoes in all four dividers to make the drawer-guide grooves. I followed Tage Frid's advice in *FWW on The Small Workshop*, pp. 18-19 (The Taunton Press) and made a series of grooves at 1¼-in. intervals. The theory is that you could make drawers in 1¼-in. increments for greater storage flexibility. Using Frid's modular system, you could take out two 1¼-in. drawers and replace them with one 2½-in. drawer. I've found this doesn't work in the real world. I'm not about to start making new drawers to replace ones that I already have, and changing the drawers around makes finding tools a guessing game. But beyond that, I'm tired of always being asked, "how come there are more grooves in the dividers than drawers?"

The two outside drawer dividers were installed first. Then I locked the shelves in place with one screw at each end of the shelf, driven through the carcase sides from the outside, as shown in the drawing. The counterbored and plugged screw was centered in the shelf about 1 in. behind the leading edge. The unglued shelf is free to float in its dado behind the locking screw. The two center dividers were added last from the back of the cabinet.

All drawer parts were batched together and cut at the same time. I built the drawers, wherever possible, from wood scrap except

the drawer fronts, where I attempted to cut all three fronts in a row from the same cherry board for grain matching. The drawers were half-blind dovetailed at the front and through-dovetailed at the back, as shown in the drawing.

Before final glue-up, I cut the groove for the drawer bottom in the sides and fronts on the tablesaw. The back was trimmed, as shown in the drawing on the facing page, so that the drawer bottom extends past the back and can move with the seasons. Planning the drawer bottom so that just the right amount protrudes lets the bottom act as a stop against the cabinet back when the drawer is closed.

After final fitting of the drawers to their openings, I glued strips to each side. The strips act as drawer runners, and they fit into the grooves cut into the vertical drawer supports.

The two longer drawers below the main drawer section are housed in a separate box, which was an addition that I made later to store tools like rulers and oversized screwdrivers.

***Preventing door sag**—Legs screwed to the doors' lock stiles help support the heavy tools hung on the doors and prevent the hinge screws from pulling out.*

***Supporting heavy loads**—Corner braces reinforce the mortised-and-tenoned rail-to-leg joint and enable this elegant base to support the heavy tool chest.*

Board-and-spline back for seasonal movement

The back is made from seven boards (see the drawing). A ⅛-in.-wide by ½-in.-deep groove was cut into both edges of five of the boards and only one edge of the remaining two boards. The two boards with only one groove were glued on their ungrooved long edges to the case-back rabbet. The remaining boards were screwed to the case top and bottom with a 3/16-in. gap between each board. Splines were slid into the grooves from the bottom edge of the case until they butted into the rabbet at the top of the case. These splines float freely in the grooves with enough leeway to allow for seasonal expansion. A small brad was driven through a drilled hole in the center of each spline at the carcase base to keep the splines in place.

Legs support the frame-and-panel doors

Two frame-and-panel doors were made and fitted flush with the front of the case (see *FWW* #107, p. 67). I added a drop-down leg to the back of each door's lock stile to support the weight of the opened doors and the heavy tools stored on them, as shown in the photo on p. 60. The legs are short enough to fold up and stow out of the way so that the doors close freely, as shown in the photo at left. A lock and strike plate were mortised into the lock stiles and a keyhole cut in the face of one door. I had planned to add wooden door knobs to the completed case, but the two plain doors were so striking without them that I never added the knobs. I use the key in the keyhole to open and close the case.

Base puts chest at convenient height

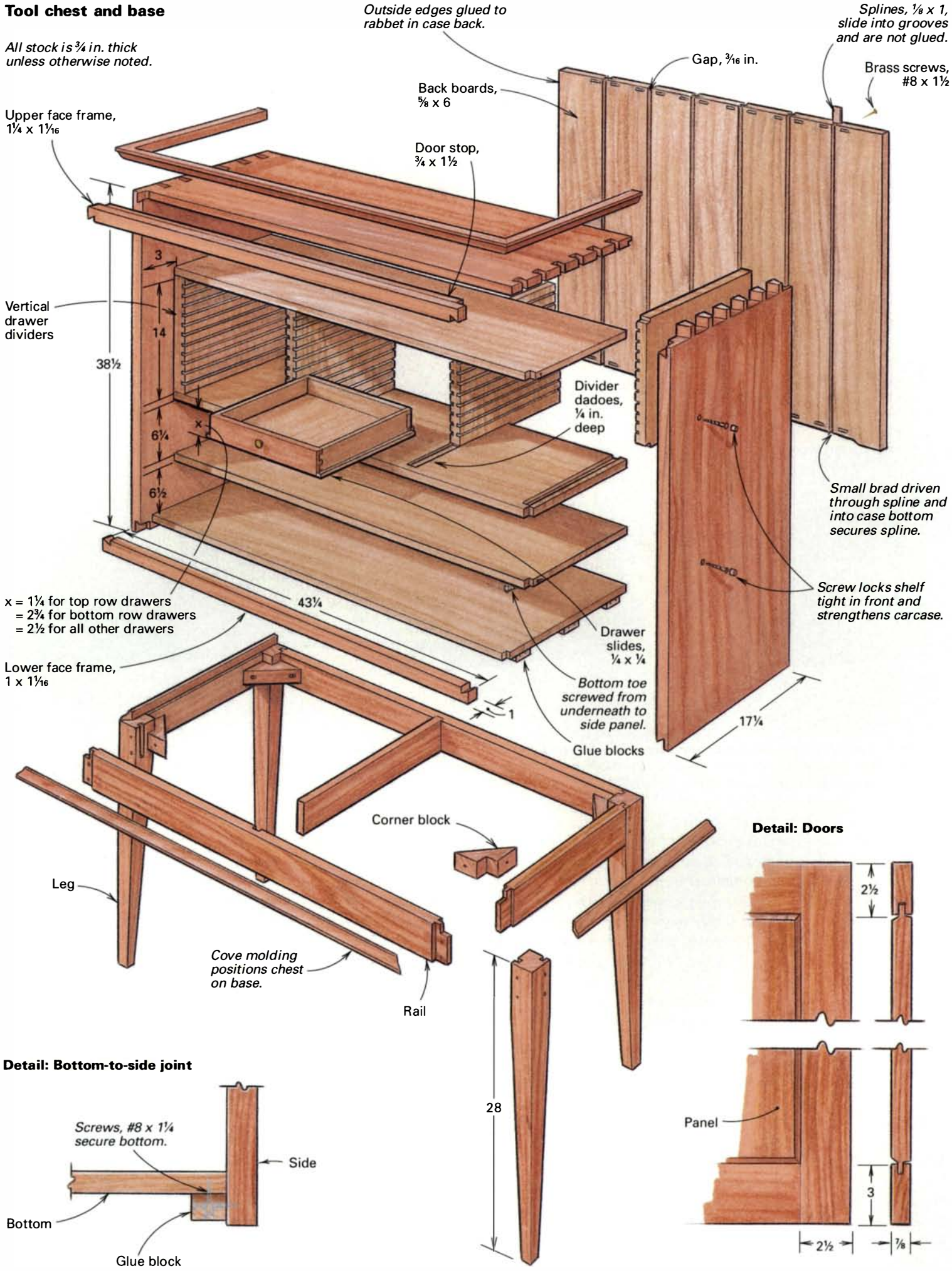
A four-legged base, 28 in. high, was made to hold the chest, so I don't have to bend over to get to my tools. The chest sits on the rails, and cove molding glued to the top edge of the rails hides the joint between the chest and base. The chest is not screwed to the frame; its weight is sufficient to keep it from moving. The legs were tapered on a bandsaw and cleaned up on the jointer. Corner blocks strengthen the base and add support for the tool chest, as shown in the bottom photo.

I have been using this chest for the past six-and-a-half years and am very pleased with it. The only thing I would change is the excessive number of drawer slide grooves in the drawer dividers. I also have considered replacing the stand with a lower case for storing items like routers and drills. But this one looks just too nice to change. □

Steven Bunn is a woodworker in Bowdoinham, Maine.

Tool chest and base

All stock is ¾ in. thick unless otherwise noted.

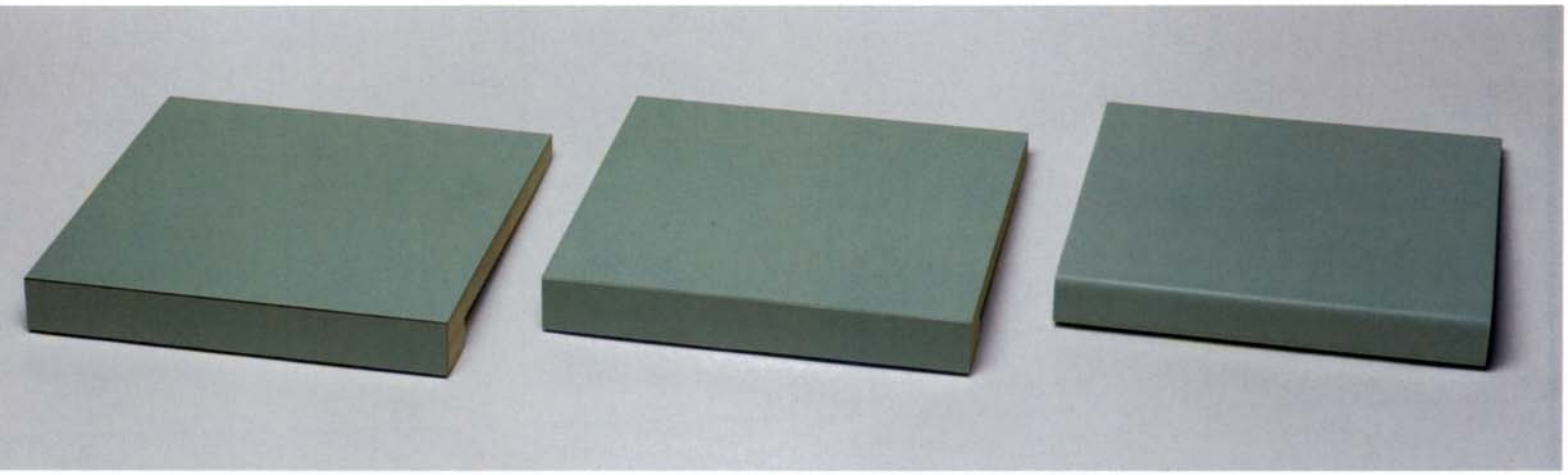


Drawing: Bob La Pointe

Working with Synthetic Countertop Materials

Tough, inexpensive and nearly maintenance-free, these plastics belong in the woodworker's repertoire

by Ken Picou



Synthetic countertop materials are durable, virtually maintenance-free and easy to work. *Plastic laminate with only its top layer colored is the least expensive (left), followed by laminate colored all the way through (center), which costs about three times as much. Solid surface materials (right) are more expensive yet, but look like natural stone and can be refurbished if scratched.*

Synthetic countertop materials are often specified for kitchen and bath installations as well as for most office furnishings. Their durability, low maintenance and, at least for the plastic laminates, their comparative inexpensiveness as a countertop material make them an excellent choice anywhere you don't want to worry about ruining wood. Moreover, they'll actually protect the custom cabinets you've built down below by keeping liquids away from the woodwork.

That's why every professional woodworker should have some familiarity with how to work plastic laminates and the newer solid surface materials. Even if you're a hobbyist, knowing how to work with these materials can save you money and open up your options. Working these materials isn't difficult, but because they're so different from wood, it helps to understand a little about them and the special tools and materials they require.

The materials

The countertop material we see most commonly, like Wilsonart, Formica and Micarta, is made of kraft (grocery bag) paper saturated with melamine, the plastic that was used to make those unbreakable plates from the '50s. Layers of this melamine-saturated kraft paper are then subjected to high temperatures and tremendous pressure, creating a dense, tough, brittle sheet. In most cases, the color and pattern of the sheet is only one layer thick and is determined by the color of the top sheet of paper (see the photo above). Laminate is most commonly sold in 4x8 sheets. This standard type of laminate (one layer of colored paper) generally retails for between $1 and $1.50 a sq. ft.

There are laminates available in which every layer of paper is colored. The advantage of this type of laminate is that seams at the edge of a countertop almost disappear because the color is consistent throughout the thickness of the laminate. The down side is that you'll pay up to three times as much for this aesthetic improvement—generally between $4 and $4.50 a sq. ft.

The solid surface materials (Gibraltar, Corian, Avonite, Surell, and Fountainhead) consist of acrylic and/or polyester resins, depending on the brand, mixed with fillers and coloring agents. They usually come in ½-in. sheets, 31 in. by 145 in. (an inch over 12 ft.) but may also be cast into sinks or moldings at the factory. Solid surface material typically costs between $15 and $20 a sq. ft.

Working with plastic laminates

As when using wood veneers, you should cover both sides of the substrate to prevent warping due to uneven moisture transfer. An

Photo this page: Robert Marsala

A carbide-tipped scoring tool makes cutting laminate quick work. *When cutting a sheet of plastic laminate down to rough size (above), use a light touch for the first couple of passes. Increase pressure gradually until you're through the top layer.*

For a less-conspicuous seam *when using conventional plastic laminate, glue the edge on first, and then trim it flush with the top using a laminate trimmer or small router (below). That way, the top sheet of laminate will cover over the strip along the edge, making the seam less evident.*

Venetian-blind slats permit precise placement *of the top sheet of laminate when using contact cement (right). Starting with strips every 10 in. or so over the length of this section of countertop, the author removed all the slats left of center. Next he works from the center out to the right, putting pressure on each section as he removes a slat, being careful to avoid creating air bubbles.*

inexpensive noncolored laminate called backer board is sold exclusively for this purpose. If, however, the substrate is secured to a strong supporting framework, this step may be skipped.

The materials used most commonly as a substrate for plastic laminates are particleboard, medium-density fiberboard (MDF) and plywood. Laminates are usually bonded to the substrate with contact cement, although white glue also works well. In kitchen-cabinet factories and other large operations, the contact cement is usually sprayed, but for the hobbyist or small-shop professional, a knobby roller made especially for applying contact cement or a serrated squeegee will do just fine. I prefer the knobby rollers, which you can find in most places where laminate is sold.

When covering a countertop with laminate, you can either edge the countertop with wood or use the same material on the edge that you did on the top. If you're going to use wood, wait until after you have the laminate on the top trimmed flush with the edge before you glue and clamp the edge to the substrate. But if you're going to use laminate on the edge, you'll want to glue it on first, trim it flush and then do the top (see the top right photo). The idea is to make the seam as inconspicuous as possible.

Cut plastic laminate oversize: Trimming to exact size is done after the laminate is glued to the substrate, using a laminate trimmer or other small router with a bearing-guided, flush-trimming router bit.

You can cut plastic laminate to rough size on the tablesaw. Carbide-toothed, triple-chip blades work best, but as long as you're cutting oversize, any blade will do. Another consideration on the tablesaw is to make sure the laminate can't slip under the tablesaw fence and mess up your cut. Clamping a piece of wood to the fence so that the wood is flush with the table will do the job.

Another way of getting plastic laminate down to rough size is to use a straightedge and a carbide-tipped scoring tool made expressly for the purpose (see the photo at left). These knives are generally available wherever you can buy the laminate itself. To use this tool, score the laminate lightly on the first couple of passes, and then exert increasing pressure for another few passes. All you need to do is get through the first layer of the laminate; then you can fold the sheet up and down, and it will break cleanly along the scored line like drywall or tile, for example.

Before applying any adhesive, make sure that both the back of the laminate sheet and the face of the substrate are clean. Even small bits of debris will keep the two surfaces from mating nicely. Once the mating surfaces are clean, spread contact cement on both of them, and let them dry until just barely tacky to the touch.

When the two surfaces touch, they will bond immediately and

Photos except where noted: Vincent Laurence

FACE-JOINING

Mixing the seam adhesive is easy. *Seam kits (left) provided by the manufacturer of the solid surface material are used to edge-join sheets of the material or build up stacks of the strips to create a thicker edge. The kits consist of a bag with both resin and catalyst inside, separated by a plastic clip. You just remove the clip, knead till thoroughly mixed, move the seam material to one side by scraping the bag against a bench edge, and clip and squeeze.*

A knobby contact-cement roller is perfect for spreading seam material *(below), ensuring an even coat of the right thickness.*

Spring clamps provide adequate pressure for face-joining *and will not starve the joint. Because solid surface materials are non-porous and very dense, tightening down on pipe or bar clamps could easily squeeze out all the seam material. Also, the seam material shrinks as it dries, so the spring clamps compensate for this by maintaining consistent pressure (right).*

permanently, so it's important that the laminate be positioned exactly where it belongs. The best way to do this is to lay a number of Venetian-blind slats (thin wood slats will work in a pinch) on the substrate at 10-in. to 12-in. intervals. Then set the laminate on top of these, positioning it precisely. After checking to see that the laminate is properly positioned, carefully remove the slats starting from the center and working outward. Gently lower the laminate to the surface as each successive slat is removed (see the bottom right photo on p. 65). Once the top is down, you can ensure a good bond across the entire sheet by applying pressure to the surface with a hard-rubber roller or by pounding on a wooden block with a hammer. Make sure there are no air pockets.

Because the contact cement bonds immediately, you can trim the overhanging edges flush right away. If you need to trim farther into a corner than the laminate trimmer's baseplate will allow, cut the laminate with a hacksaw blade, and then finish trimming it with a file.

If you are using laminate for the front edge, it's best to chamfer the edges with a 7°-trimmer bit, which will give you a crisp edge but one that won't cut you.

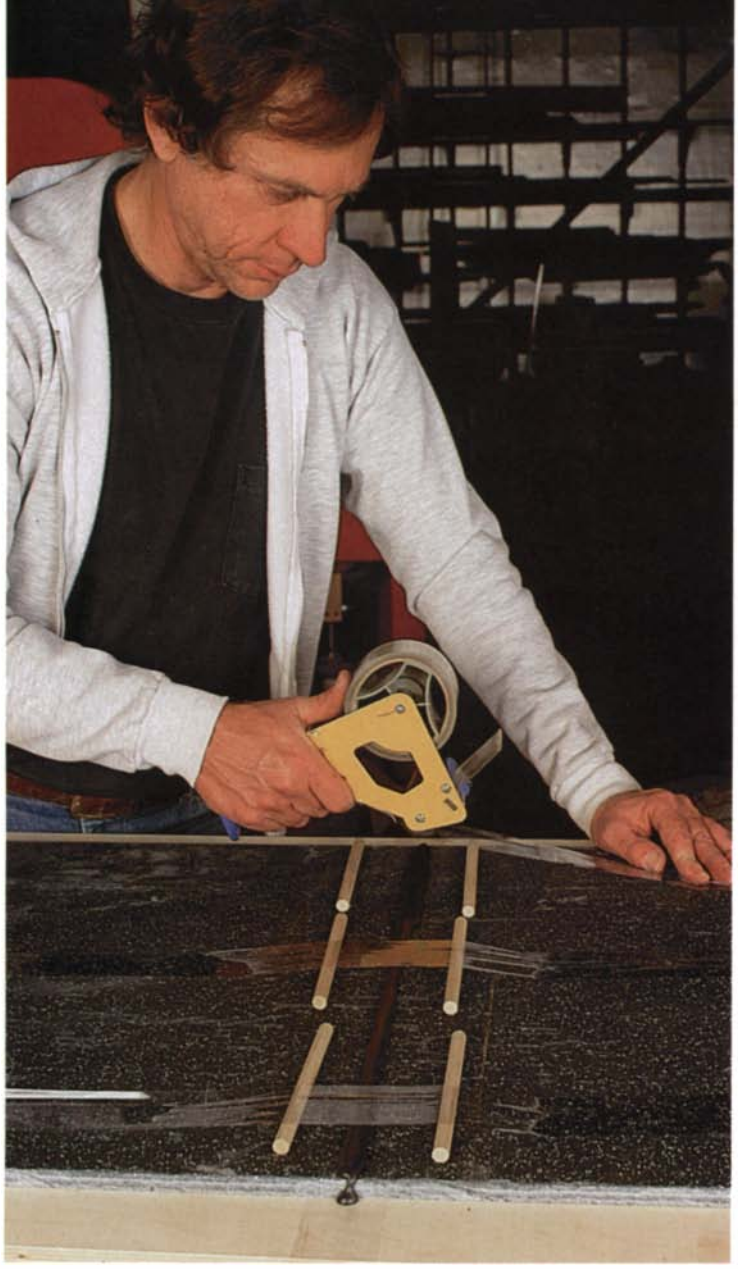
Solid surface materials

These high-dollar countertop materials are most often made to look like natural stone, but they're also available in a variety of solid and flecked colors. Solid surface materials don't require a substrate, though sheets of it are usually mounted to the framework of a counter using dabs of silicone sealer. The silicone allows for the slight expansion and contraction of the solid surface material.

Solid surface materials can be cut or shaped with most woodworking tools. Inside corners should have a radius of at least ¼ in. to avoid stress fractures. Seams should be at least 1 in. from inside corners and 3 in. from sink cutouts. There should always be some supporting structure below a seam.

Sheets are joined and edges are built up using manufacturer-supplied seam kits in colors that essentially disappear when a seam is done right. These seam kits consist of a sealed plastic bag containing a catalyst and colored resin, separated by a plastic clip on the outside of the bag. When the clip separating these components is removed, you can mix them by simply kneading the bag in your hands until the contents are thoroughly blended. Then you move all the seam material to one side of the bag, snip an opposite corner and squeeze out the seam material as needed (see the top left photo). I use the same kind of knobby roller to spread the seam material as I do the contact cement (see the photo at right above) because it leaves a consistently thick layer of adhesive.

As the seam material dries, it shrinks, so normal bar, pipe or speed clamps could loosen. I use spring clamps, which maintain a steady pressure on the joint (see the bottom left photo above). An-



EDGE-JOINING

***Packing tape and dowels hold an edge joint together** while the seam material sets up (left). The dowels keep the tape out of the joint, and the tape, stretched taut across the joint, provides enough pressure to get the joint to fuse. A strip of tape beneath the joint keeps it from bonding to the plywood work surface.*

***A flat-bottomed router bit eliminates most of the excess of dried seam material** (below). Sanding in stages down to 600-grit will clean up the rest and polish the surface to a nice luster.*

other advantage of using spring clamps is that you can't overtighten them. Because of the nonporous nature of these solid surface materials, it isn't difficult to squeeze all of the bonding resin out of the joint if you use regular clamps.

To join these solid surface materials edge to edge, I clean the edges with alcohol and position the pieces about ⅛ in. apart. I squeeze a bead of the seam material between the two pieces that I'm joining, working it into the joint if necessary. Then I pull the joint tight by hand, making sure there is squeeze-out over the full length of the joint. I hold the joint together while the seam material is drying by laying small dowels or pencils along both sides of the joint and then stretching lengths of packing (or similar) tape tightly across the joint and over the dowels (see the top left photo above). There's sufficient elasticity in the tape that I can stretch it so that it will maintain tension on the joint.

After the seam material has dried thoroughly (45 minutes to an hour), I trim the hardened squeeze-out flush using a router with a flat-bottomed bit and two clearance blocks mounted to its baseplate (see the bottom right photo). The seam sands out easily to a glossy finish using regular 600-grit wet-or-dry sandpaper, but a matte finish is generally recommended by the manufacturers because it hides scratches better. □

Ken Picou is a designer and woodworker in Austin, Texas.

Sources of supply

The following companies manufacture synthetic countertop materials (regular laminate = L; colored laminate = CL; solid surface material = SSM). Product literature is available from all of them. Some have instructional materials on use and installation.

Ralph Wilson Plastics Co. Inc., PO Box 6110, Temple, TX 76503-6110; (800) 433-3222

Products: Wilsonart (L), Wilsonart Solid Core (CL), Gibraltar (SSM)

DuPont Co., Corian Products, PO Box 80702, Room 1218, Wilmington, DE 19880-0702; (800) 426-7426

Product: Corian (SSM)

Formica Corp., Samples Division, 1504 Sadler Circle South, Indianapolis, IN 46239; (800) 367-6422

Products: Formica (L), Colorcore (CL), Surell (SSM)

Avonite Inc., 1945 South Highway 304, Belen, NM 87002; (800) 428-6648

Product: Avonite (SSM)

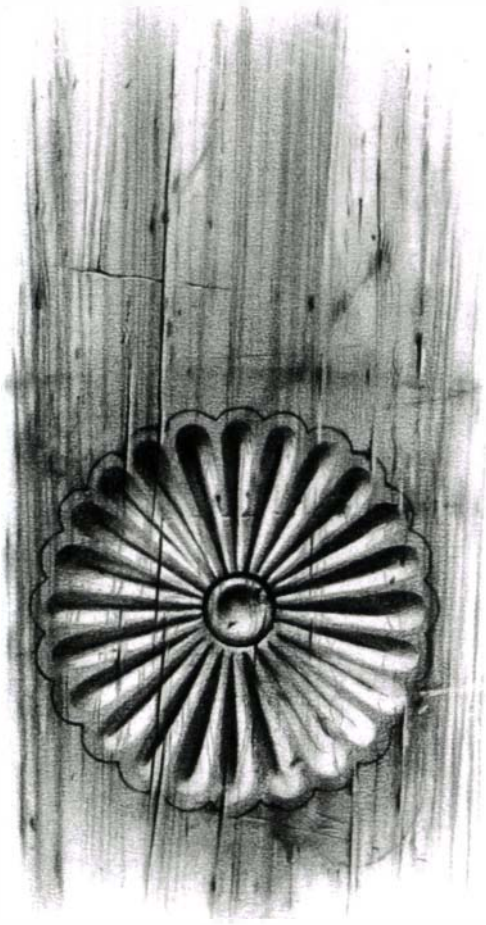
International Paper, Nevamar Division, 8339 Telegraph Road, Odenton, MD 21113; (410) 551-5000

Products: Nevamar (L), Fountainhead (SSM)

Making Furniture, New Mexican Style

Traditional details influence current work in Southwestern American shops

by Sven Hanson



ROSETTE

The splendid isolation of northern New Mexico has created and preserved a style of furniture that, in its most authentic form, is called Spanish-colonial. In its Indianized, Anglicized and modernized versions, it's tempting to call it Southwestern. But what I'm referring to is the distinct Rio Grande style of furniture developed specifically in New Mexico.

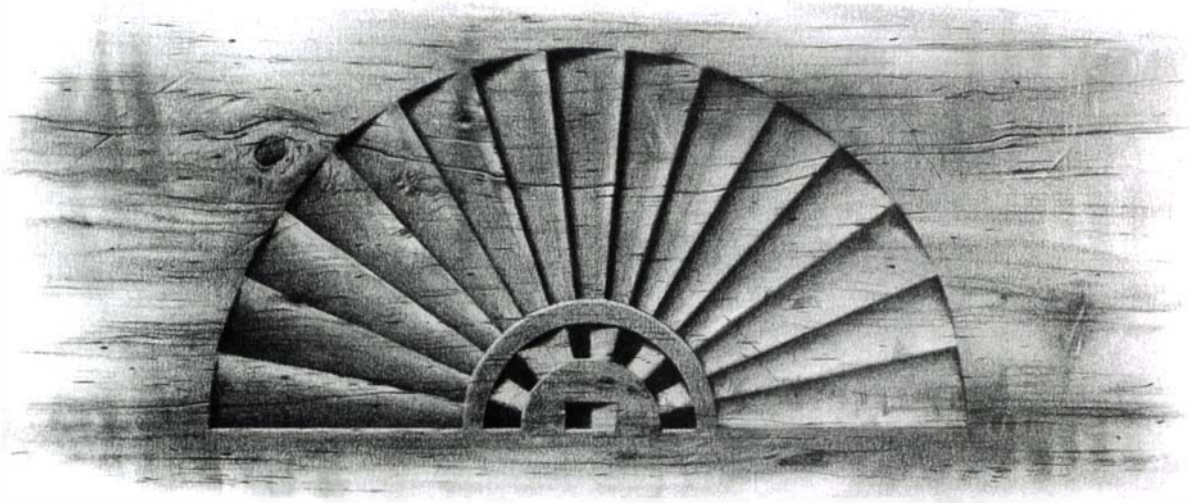
New Mexico's early colonists made beautiful and comfortable furniture, even though they lacked many tools, materials and time. That sounds like many woodworkers' lives today. Because significant historical and cultural influences are at the root of this furniture style (see the box on p. 70), its sturdy components, traditional joinery and painted and carved decoration continue to be used by cabinetmakers in the region (see the photo above). And craftsmen outside the area borrow and refine its details, techniques and finishes (see the story on p. 72). Today's New Mexican style of furniture still relies on a traditional hand-crafted look. And you can build this type of furniture using whatever tools and materials you have on hand.

Common pieces

Historians identify six main types of New Mexican furniture: chest (*caja*), cupboard/cabinet (*trastero*), shelf (*repisa*), chair (*silla*), bench (*banco*) and table (*mesa*).

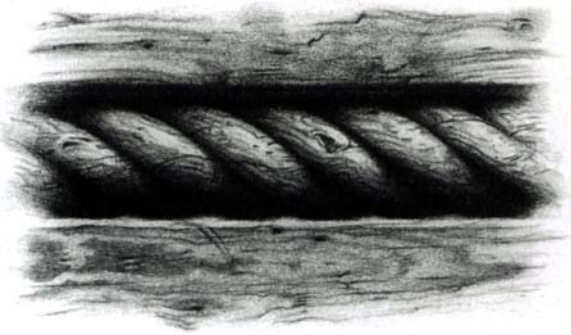
Chest—New Mexico's most universal and important furniture piece was the *caja*

Photos except where noted: Alec Waters



SUNBURST

***Southwest cabinets can be big and bold** (left). This* trastero, *or cupboard, made by George Sandoval of Albuquerque, N.M., is modern but borrows elements from originals built in the mid 1800s. Spanish-colonial and Mexican furniture influences are evident in the heavy through-tenoned members, the door spindles and the carved panels.*



ROPE

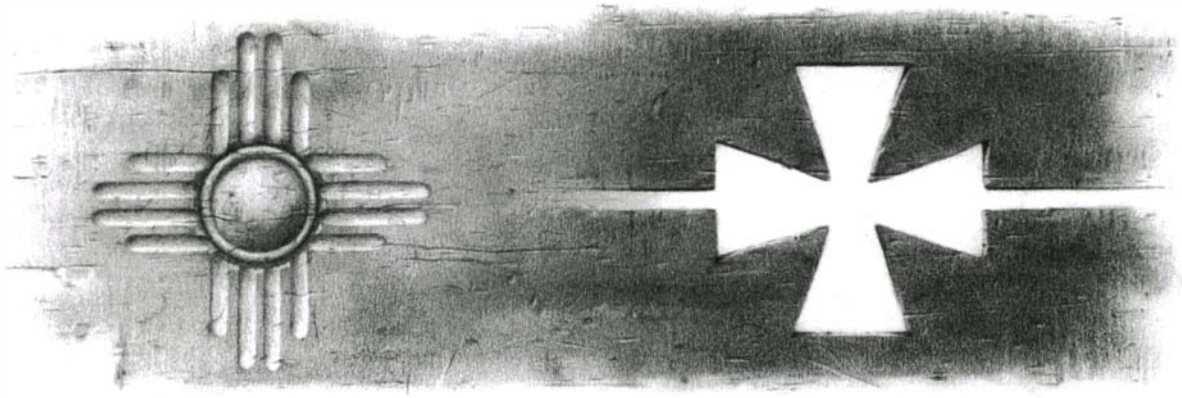
***Embossed metal can be used as panels**—After Jim Power traces the template of a thunderbird onto a plywood-backed piece of galvanized sheet metal, he punches around the outline. He then dulls the panel with a Scotch-Brite pad. Power often makes his own pie-safe-like patterns by plotting designs with his computer.*

(pronounced KA-ha), which functioned as luggage, storage, seating and as sort of a billboard. Traditional chests were often brightly painted and/or relief-carved. Common decorative motifs include rosettes, crosses, lightning bolts and bullets. Visible corner dovetails added further ornamentation. For hardware, chests typically had simple hinges along the back and an offset hasp lock at the front. Chests had various names based on their purpose: an *harinero* held the family's grain supply; an *hembra* held a bride's trousseau. A variation is the *vargueño*, a portable desk, which has a trestle base and a fall-front lid.

Cupboard/cabinet—Next most common to chests were *trasteros* (trah-STAIR-os). Usually as tall as its owner, a *trastero* is commonly half that dimension in width (see the photo on the facing page). The doors can have raised panels or spindles in almost any combination. The through-tenon joinery can be wedged or pegged. A headpiece might have carved shells, always with an odd number of flutes.

Because hardware was scarce, doors were often hung on cotter-pin hinges that had interlocked eyelets (available from Dimestore Cowboys Inc., 4500 Hawkins N.E., Albuquerque, N.M. 87109; 505-345-3933). Door panels can also be made of metal. Early tin panels were made from salvaged food cans, which were flattened and punched out, not unlike the panel that's being made in the photo above.

Drawings: Michael Gellatly



CROSSES

Mortise-and-tenon joinery typifies New Mexican furniture— *After routing rail mortises in two chair posts, Sven Hanson squares the ends of the mortises by tapping an old hollow-chisel mortiser. Hanson cut pueblo steps in the top of the posts to add some simple detail.*

Shelf—The folksiest piece in New Mexico's furniture armada is the *repisa* (ray-PEE-sa), a wall-mounted shelf used to hold plates, books or knickknacks (see the drawing below). Some *repisas* have a row of coat pegs below the shelf and others have a bar for towels or quilts. It's a versatile piece that most *carpenteros* built in their own style. A *repisa* is a practical project that's easy to make. You can add carved elements, such as the ones shown throughout the article, or you can use paint to add color.

Chair—Though early New Mexican settlers owned few *sillas* (SEE-yas) and probably had little time to sit in them anyway, two basic kinds of these chairs graced the domestic landscape: armless and with arms. Neither of them had upholstery. Armless *sillas* were sized to suit a smaller person. The depth at the seat might be as little as 13 in. When enlarged to an 18-in. seat, though, the basic design makes a fine dining chair. The arm chair was rare. Early immigrants thought that only a priest sat in one, which is probably why such chairs were misnamed *padre* chairs.

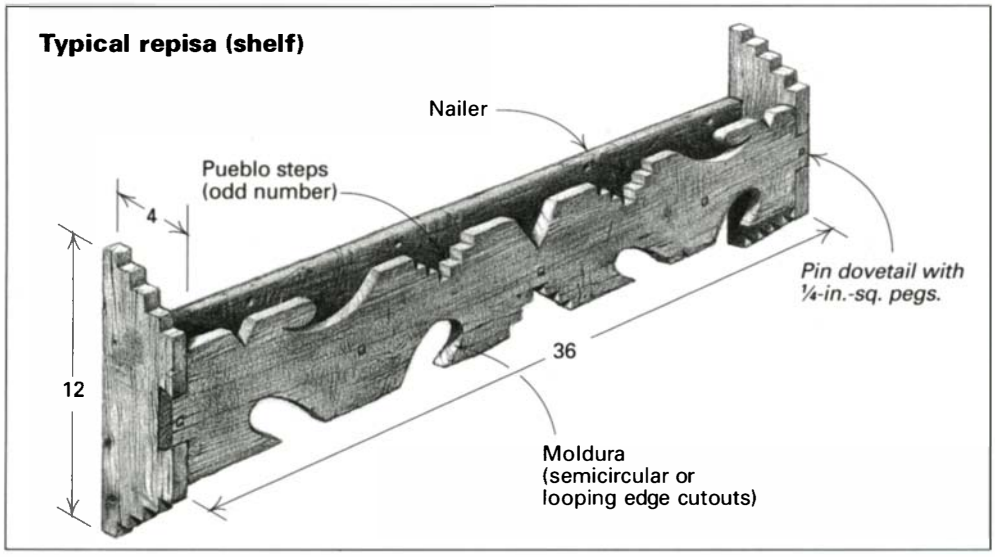
Bench—A *banco* (BAHN-ko) looks like a wide arm chair, and like a *silla*, a banco has a slab seat and no cushion. It has an odd number of spindles along the back and below the seat front (see the top photo on the facing page). Original *bancos* had cutout (*moldura*) or beaded rail edges. As evidenced by the number of benches being built today, the *banco* is arguably one of New Mexico's hallmark pieces.

Table—New Mexican *mesas* (MAY-sahs) were rarely used to sit at. Dining tables were not common. Even wealthy households didn't have enough chairs to go around. The aprons and stretchers found on museum tables would usually block a chair from sliding beneath. Legs and rails were invariably joined by through-tenons.

Tools

Anyone can build attractive New Mexican furniture pieces using readily available tools. Antique tools from the region date back to the late 1700s. Expedition manifests showed the colonists had modest tools: adze, saw, plane, chisel and drill.

With the opening of the Santa Fe Trail in 1821, new tools entered the cabinetmaker's toolbox. Twenty-six years later, the Territory's U.S. Army built the first sawmill. Shortly after that, the power lathe was in-



Influences on New Mexican furniture

New Mexico's furniture story begins in 1590. A band of soldiers, civilians and clerics traveled north out of Mexico and settled in an Indian pueblo on the Rio Grande just north of what is now Santa Fe. The colonists adopted the Native American food and architecture, though they remained true to their Spanish language and traditions. They built buildings of adobe (earthen brick),

Bench is rich with Southwest details. *Guided by old New Mexican benches, the author used sturdy and boldly shaped members. Here he hammers in plugs (disguised as through-tenons) over long screws, which secure the arms. The bench can be brightly painted or left alone so the sun and rain weather the wood.*

troduced, allowing spindles to be turned instead of hand-shaped. Improved planes made working more accurate and efficient. Bowsaws made cutting curves and pierced work easy. In short, cabinetmakers became fully equipped. Woodworkers today can use the same basic list of tools, but power tools reduce the drudgery.

Materials

Pine was and still is the most common wood used in New Mexico's furniture. Early Spanish makers, who were used to modest-sized hardwood components and ordinary joinery, soon discovered native ponderosa pine required bigger dimensions and through-mortising to make the furniture sturdy (see the photo on the facing page). To counteract the tendency of the pine to splinter, hard edges and corners were often rounded over.

Today, you can use construction lumber or 1x pine to make New Mexican-style pieces. You can glue up pieces into thicker timbers or plane down the store-bought sizes to create the dimensional variety typical of old work. You don't have to hew the surfaces with an adze to make them look authentic. But consider removing millmarks with a plane or scraper.

Joinery

In early pieces, exposed dovetails and through-tenons were the most common ways to join components. Tenons were usually under-width so that they could be wedged in the ends, as shown in the photo at right. When a through-tenon joint began to wobble, the owner could drive a wedge into the joint, and then another wedge. The wedged through-tenon makes for a strong long-lasting joint.

Although modern adhesives make pinning a tenon to its mortise unnecessary if it fits well, many New Mexican antiques have pegged tenons similar to the ones shown in the photo on p. 72. To further strengthen the furniture, woodworkers built larger stretchers and moved them farther down the legs. You can find a very low front stretcher on virtually every chair and bench, similar to the one in the bench in the top photo. It probably also served as a foot rest, keeping the sitter's feet off the

Wedged through-tenons are popular. *Unlike common through-tenons that have wedges near the middle, end-wedged tenons are typical of New Mexican furniture.*

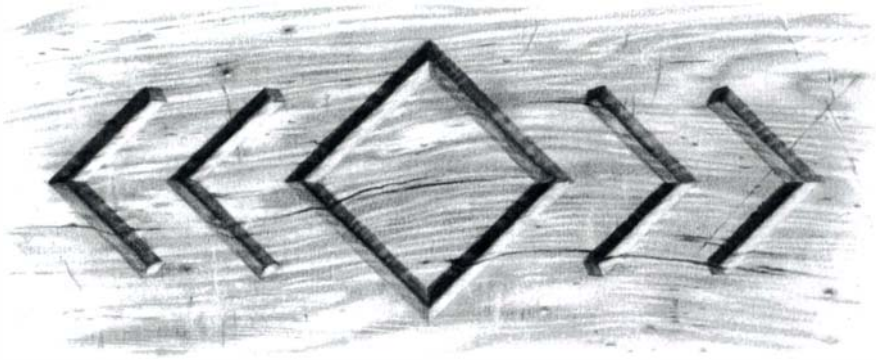
and they furnished these structures with modest 16th-century furniture.

The furniture ranged from Moorish to Baroque, spawned by trade with Europe (via Mexico). The Moorish influence was most prominent. Because the Moors came from arid lands lacking large timbers, their furniture was thin, light and versatile—appropriate for nomadic people. They also used surface ornamentation, inlaid metals, mosaics and intarsia. Their carving was shallow with complex detail. Artists, working to exalt God, used mostly geometric, alphabetic and nature-based designs.

Beginning in 1821, the Santa Fe Trail brought new goods and influences. The furniture began to show beefed-up components and overall proportions, which echoed the architecture of thick adobe walls and massive roof timbers. Even bigger changes in furnituremaking occurred in the 1880s when the railroads arrived. Mass-produced goods and immigrants from "back East" flooded the territory. It was no longer necessary to build furniture locally. Fortunately, tourism became the territory's salvation.

Easterners brought an appreciation of other cultures and news of the booming Arts-and-Crafts movement—Gustav Stickley and Mission-style furniture. The Stickley principles fit perfectly: local material, honest craftsmanship and durable joinery. Under the Mission influence, New Mexican pieces developed even heftier sections and exaggerated projecting tenons. Heavy and plain, this genre is popularly called Taos furniture.

As New Mexico's furniture progressed into the 20th century, it became known as Colonial Revival. It often used bright paints to accentuate more and deeper carving. Native American and Art Deco designs were adapted as well. Work featuring these combined elements is called Pueblo Deco. This style is most responsible for influencing today's New Mexican furniture. To learn more about the history of Southwestern design, see the further reading box on p. 72. —*S.H.*



DIAMOND & CHEVRONS

cold, damp earth floors. Many antique chairs show heavy wear in this area.

Carving and finishing

Early New Mexican furniture carvings were shallow and widely spaced. Later the carving became deeper and more stylized. The painted details followed similar lines. A carver's or painter's options tripled when Indian and Anglo-American motifs were included (see the drawings throughout the article).

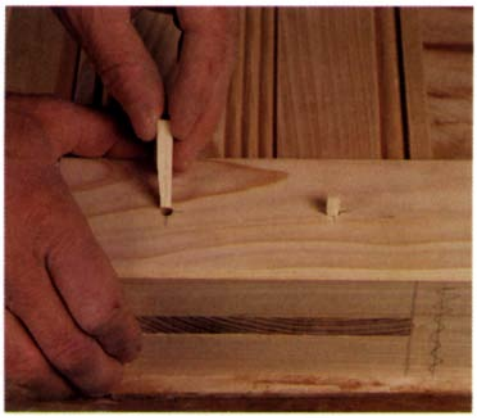
For a finish, the colonists often used beeswax. Depending on how the pieces were cared for, early furniture ranges from looking finished to rustic. Today, you can stain, oil, varnish, pickle or paint to obtain a Southwest finish (see the box at right).

Current furniture trends

Recently, there have been three movements, or departures, in New Mexican furniture design: first, cowboy furniture, which has heavy construction and is decorated with the doodads of Western life, such as spurs and cattle horns; second, Native-American furniture, which uses classical Indian decoration and talismans, like those found on fine jewelry; and third, Mexican furniture, which has deeper, more ornate carving and is often done in finer woods such as mahogany. The detailing and joinery is usually more sophisticated than traditional New Mexican furniture as well. For a fine example of contemporary New Mexican furniture with stylized carvings, see the back cover of *FWW* #107.

Though New Mexico's furniture style will likely diverge, traditional joinery and hand-craftsmanship will continue to be its defining qualities. □

Sven (Skip) Hanson is a professional woodworker in Albuquerque, N.M.



A square peg can fit a round hole. *To complete the traditional joinery on this bed post, Hanson inserts wedge-shaped pegs. The beads on the rail were shaped with a handplane for authenticity.*

Further reading

Crafting New Mexican Furniture by Kingsley Hammett. Red Crane Books, 826 Camino de Monte Rey, Santa Fe, NM 87501; 1993

Furniture from the Hispanic Southwest by William Wroth. Ancient City Press, Inc. Distributed by Johnson Books, 1800 South 57th Court, Boulder, CO 80301; 1984

Furniture of Spanish New Mexico by Alan C. Vedder. The Sunstone Press, PO Box 2321, Santa Fe, NM 87504; 1993

New Mexican Furniture 1600-1940 by Lonn Taylor and Dessa Bokides. Museum of New Mexico Press, PO Box 2087, Santa Fe, NM 87504; 1987

New Mexico Home Furnishings (resource guide). Fine Additions, Inc., 2405 Maclovia Lane, Santa Fe, NM 87501; Summer 1993

"Southwestern Furniture" by Gary A. Zeff. *Fine Woodworking* #72, p. 90

Southwestern detailing

Routed, colored shapes accent a pickled-oak finish

by Andy Charron

Our client was looking for one piece of furniture that would play two roles: an entertainment center to contain a stereo and television and a glass-shelved display case to house an extensive collection of Southwestern pottery and art. The challenge was to integrate traditional Southwest elements into an airier, more modern piece.

Although Southwest furniture often appears heavy and bold, my partner, Bob Grause, and I were dealing with a small room, so we had to think along lighter, simpler lines. Our client wanted a pickled finish that wouldn't get lost against the bleached-out oak floors. To counteract this, we used accent shapes and colors to add visual interest, to define the style of the piece and to tie the lower and upper cabinet together (see the top left photo on the facing page).

Routing the headpiece groove: The ½-in. groove along the headpiece makes the teal accent strip sharp and frames the upper limit of the case. Routing the groove was a matter of cutting a ¼-in. plywood template with angled steps, clamping it to the wood and guiding the router along. A collar on the router follows the template, so the bit cuts a parallel groove. We cleaned up the groove with a chisel and then sanded it smooth.

Getting the pickled look: Preparing the oak for the finish was a three-step process that began with planing. Next we used a scraper to clean the wood, removing planer marks and tearout. We then used 220-grit paper to sand away scratches and blemishes.

Because red oak has large, deep pores, we leveled the surfaces using paste filler, as described in the story on p. 57. The off-white filler actually started the pickling process because it helped tint the oak to a pale white.

After letting the filler dry overnight, we applied Behlen's white pickling stain, which is not only easy to use but offers a depth of color lacking in some other brands we tried. We wiped the stain on, let it sit for a few minutes and then rubbed it off. The key is deciding when to wipe. The longer you wait, the more opaque the color. But if you wait

***Accents tie this piece together**—To unify the upper and lower part of the cabinet, the author used accent colors and shapes.*

***Making the pulls standout**—Andy Charron made the pulls out of two pieces, so the raised, stained part has more impact.*

too long, you can end up with a sticky mess that's hard to remove and uneven in tone.

We applied two coats of stain, letting the first one dry for five minutes before wiping it off. After 24 hours, a heavier coat was left on the surface for no more than a minute. This way, the second coat provided depth and uniformity of color without hiding the grain or giving a thick, painted look (see the inset photo above).

Adding color: The teal accents on the door and drawer pulls and along the headpiece add a colorful touch, drawing your eyes to the design elements. But applying the contrasting teal and pickled stains without letting them run together required a little patience and a lot of masking tape.

Masking off the groove for gel stain: We began by masking off the area on both sides of the headpiece groove, being careful to completely cover all of the edges and pointed corners. We then used a small foam brush to apply two thick coats of Minwax Frosted Jade gel-stain, as shown in the photo at right. (The stains come in several other pastel colors as well.) Rather than wiping off excess stain, we let each coat sit until fully dry to make the accent

***Staining a groove makes an instant accent strip**—After Charron template-routed a Southwest-style groove in the headpiece, he used a foam applicator to dab on a coat of Minwax Frosted Jade gel stain. Vinyl masking tape keeps stain off the top.*

strip stand out against the white-washed background. We sealed the groove by wiping on Watco oil.

To finish the rest of the headpiece, we simply reversed the position of the masking tape by rolling small lengths of it into tubes and placing them in the groove. Pressing down on the tubes expanded them to close off the bottom and edges of the groove. We applied the pickled finish to the body of the headpiece the same way as the rest of the cabinet. Removing the tape after the finish was dry revealed a crisp line of color.

Accenting the drawer pulls: Finishing the two-piece pulls for the doors and drawers offered another challenge. Again we had to prevent the light and dark colors from running into each other (see the inset photo at left), but we couldn't admit stain into the areas that would be glued together. To accomplish this, we first placed some tape, sticky side up, on the workbench. Next we set each of the thin top pieces of the pulls face-up on the tape. This allowed us to stain and oil the front and edges just as we had done the groove. The tape enabled us to move the pieces without touching them.

Once the pulls were dry, we peeled them off the tape and glued them to the handles. We wiped pickling stain on the body of the pulls to finish them like the case. We didn't bother masking off the accent pieces; we just wiped off excess stain with a clean cloth before it was dry.

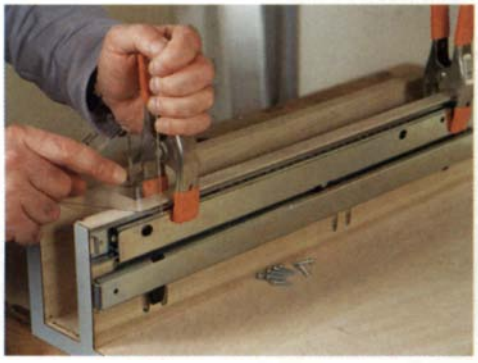
The final finish: To get the hand-crafted look common to Southwest furniture, we rubbed several coats of Watco oil over the carcase, drawers and doors. A topcoat of paste wax gives the cabinet a soft glow. □

Andy Charron writes about woodworking and runs a cabinetmaking shop in Red Bank, N.J.

Inset photo: courtesy of Einrosia Photography

Roller-topped drawers increase outfeed table capacity. *By extending the bottoms of two drawers at the back of his tablesaw, Frank Vucolo created a place to mount outfeed rollers. Here, he opens one drawer to rip a piece of 6/4 mahogany.*

Drawer slide alignment is important. *With the outfeed table flipped, the author positions a slide before he screws it to the poplar rail. Precise alignment ensures smooth operation of the outfeed rollers. A leg socket is below the square.*



Shopmade Outfeed Table

Extend your tablesaw's reach for sheet stock and ripping

by Frank A. Vucolo

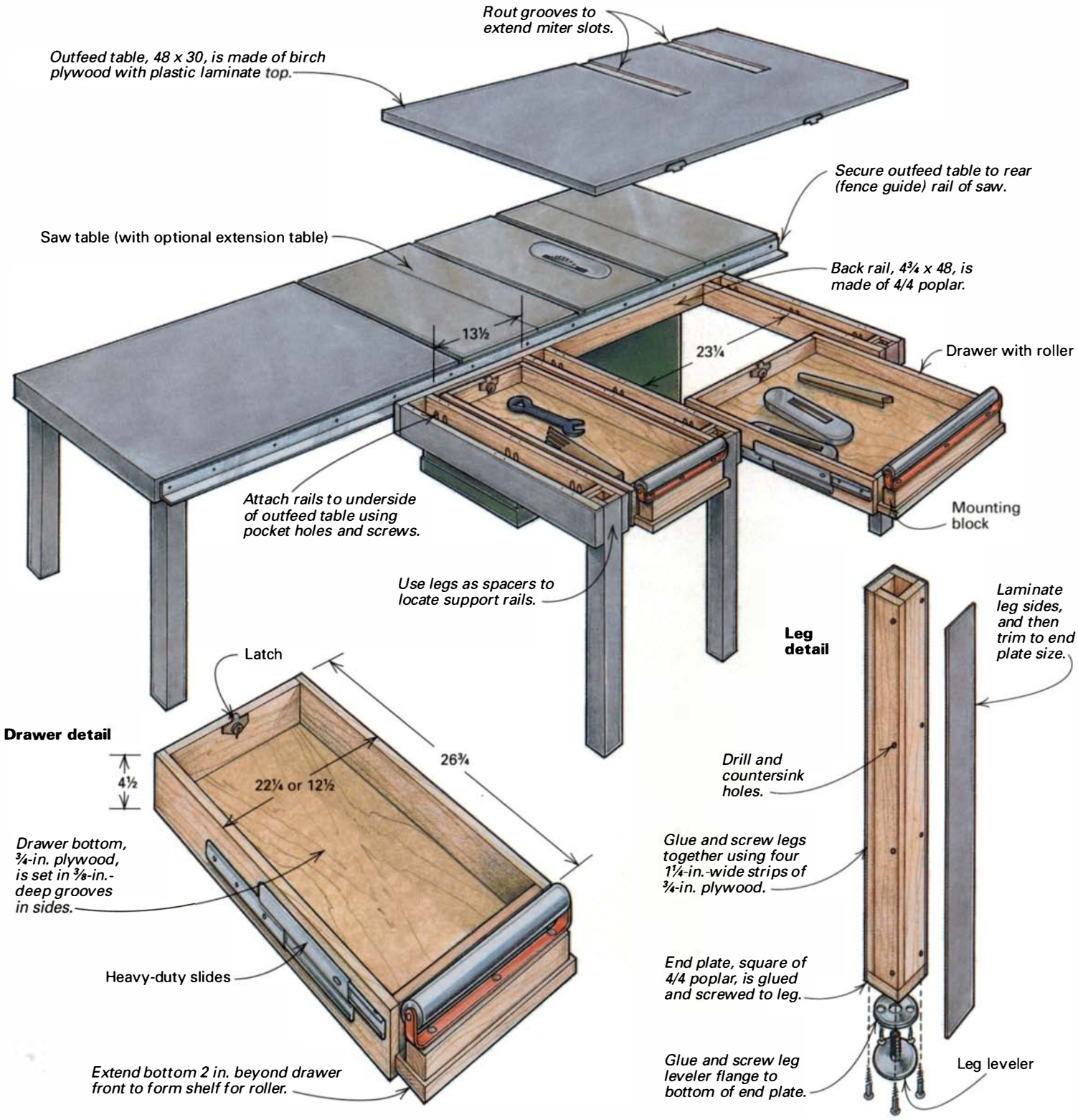
In my small shop, ideal concepts are often compromised by the reality of limited space. My design for an outfeed table is a classic case in point. I started out thinking big. Ideally, I wanted the outfeed surface to extend 48 in. from the back of my tablesaw, so I would no longer have to set up and then reposition unstable roller stands. My ideal was quickly squashed, however, when I realized I couldn't dedicate that much permanent floor space. I need the space behind the saw to store my planer and router table when I'm not using them.

After some careful measuring, taking into consideration where I would locate all the machines, I concluded that the outfeed table should extend 30 in. from the back of the saw. But I still needed more support to rip long stock and to cut sheet goods.

While I was pondering possible solutions, I started to think about rollers that could extend off the back of the fixed table and then retract into it when they weren't needed. Then I remembered how amazed I was at the strength of Accuride's extension drawer slides (150-lb. capacity) when I had used them for file drawers in a desk pedestal. After a little more head scratching, nudged along by a couple of cups of coffee, I decided to incorporate the slides into a pair of drawers with rollers mounted on the front of them for the outfeed table (see the photo at right above). Now I

Photos: Alec Waters

Outfeed table assembly



simply open a drawer to get an additional 24 in. of outfeed surface when I'm ripping long boards or cutting sheet stock.

Design and materials

Allowing an extra 1 in. for the extension rollers and the drawer slide action, the outfeed table is designed to support work up to 55 in. from the back of the saw table. With the drawers in the closed position, only 30 in. of floor space behind the tablesaw is committed. I made the drawers different widths so that I have various outfeed options, and I extended the drawer bottoms out in front of the drawers. This way, I have a place to mount the rollers (see the detail above). As a bonus, I get two drawers for storing saw accessories. And because the rollers are an integral part of the outfeed table, they are adjusted precisely in relation to the tabletop.

I constructed the outfeed table's top, legs and drawer bottoms out of ¾-in. birch plywood. The under-table support rails are made from 4/4 poplar, as are the drawer sides, fronts and backs. For added protection and to give a nice slick surface, I covered the legs and top with plastic laminate.

To complete the material requirements, I bought the following hardware: two metal rollers, one 13 in. long and one 22 in. long (Wilke Machinery Co., 3230 Susquehanna Trail, York, Pa. 17402;

Drawing: David Dann

800-235-2100), two sets of heavy-duty drawer slides (I picked up Accuride's file-cabinet model from The Woodworkers' Store, 21801 Industrial Blvd., Rogers, Minn. 55374; 800-279-4441), three leg levelers (available from Woodworker's Supply Inc., 1108 North Glenn Road, Casper, Wyo. 82601; 800-645-9292) and a couple of latches (window sash locks), which I bought at a local hardware store. When you're determining the size of your drawers, keep in mind that the slides come in 2-in. increments, 12 to 28 in. long.

Making and mounting the table

To build the outfeed table, first determine the overall size (mine is 48x30), and then cut the tabletop out of plywood. Temporarily mount the plywood to your saw, and level it using braces. This is so you can determine the length of the three legs. Measure each leg separately, and allow some room (½ in. or so) for height adjustment. The leg levelers will take up the play. Disassemble the table, and then fabricate the legs, as shown in the drawing detail on p. 75, including the plastic laminate.

With all three legs complete, lay out the support rail locations on the underside of the plywood top. Approximate the two different widths of the drawers plus their slides. Rip and crosscut the poplar pieces to size, and begin fixing the members to the plywood. I drilled pocket holes and then glued and screwed the rails in place. Start at one end, then use an assembled leg as a spacer to set the second rail. Next do the other end of the table, using another leg as a spacer. Set the two center rails in a similar fashion. Then attach the rear rail across the ends of the support rails. Also, cut and attach blocks behind each leg using the leg as a guide.

Mount the carcase portion of each drawer slide to the rails (see the photo at left on p. 74). Make sure you position all the slides the same distance from the bottom of the table. I used the rails as a reference. The drawers must be perfectly parallel to the top. While you have the table flipped, laminate the sides of the top, and trim them with a flush-trimming bit in a router. Turn the table over, so you can laminate and flush-trim the top.

Now temporarily mount the legs, and align the laminated table to your saw exactly as it will be positioned in use. Carefully mark the position of the miter slots on the top. Determine the depth of the grooves by referencing off the tablesaw. If you have a T-slot or dovetail-shaped miter-gauge runner, lay out the slots so that they will be a bit wider than the widest (bottom) part of the tablesaw slot. The outfeed table slots will be for clearance only.

Remove the outfeed table. Run the miter gauge all the way past the blade, so you can find the length of the runner as it hangs off the back of the saw table. Mark this length plus a bit extra onto the outfeed tabletop. If you use sliding jigs, like a crosscut box, check that their runners will work in the laid-out slot, too.

Using a straight bit and your router, cut the grooves in the surface of the outfeed table. A straightedge can be used to guide the router. But don't try to cut the whole depth in one pass. It's better to make two or three passes, removing a little at a time. Soften all the corners of the laminated top using a fine file. Also, ease the edges of the miter-gauge slots, and feather the edge that will go against the tablesaw. This will ensure that workpieces won't get hung up as they slide from the tablesaw onto the outfeed table.

How you mount the outfeed table to the saw will depend on the type of saw and fence guide rail you have. You can use angle brackets or drill directly into the rail. After you have the outfeed table in its approximate position, use a straightedge and a level to adjust the screw feet until the outfeed table is lined up to the saw table (see the photo at left).

***Level the outfeed table to match the saw table**—After Vucolo secured the outfeed table to the rear guide rail of his saw, he turns the leg levelers (screw feet) to line up the two surfaces.*

***Pocket holes and screws join drawer boxes**—After temporarily clamping a drawer back, the author drives three screws into the sides using a flexible-shaft extension for his drill.*

Adding the drawers and extension rollers

The drawers should have a ¾-in. plywood drawer bottom extending 2 in. beyond the front of the drawer. This will provide enough rigidity for the extension rollers (see the drawing detail on p. 75). To receive the bottom, I plowed a ⅜-in.-deep groove down the inside of each drawer side using a dado blade in my tablesaw. After I glued and screwed the bottom to each drawer, I butt-joined the front and back pieces together using pocket holes and screws (see the far left photo). Then I attached the other part of the drawer slides to the outsides of the drawers.

It's critical that the rollers are mounted at the correct height. They should be at, or just barely above, the outfeed surface; they need to roll freely, without disrupting the travel of a workpiece. To get the proper height, I mounted the rollers using spacer blocks. First I set the roller on the shelf created by the extended drawer bottom. Then I measured from the top of the roller to the tabletop. I cut the block a bit oversized and then planed it down to thickness. If the roller is not parallel to the outfeed top and you can't adjust the drawer slides enough, taper the blocks slightly with the plane until the top of the rollers are level with the table. Finally, install a latch on the inside back of each drawer, so you can lock them in the open position. □

Frank Vucolo builds furniture for his home in East Amwell, N.J.

Curved Cope and Stick

Router templates help make wavy window bars

by Jeff Greef

Cope blocks and templates help cut a curving profile in end grain. *Cope blocks pinch the delicate workpiece, providing stability, tearout prevention and a nailing surface for the curved template. After flush-trimming, the same template guides the contoured cope bit.*

I learned cope-and-stick joinery for doors and windows while an apprentice at Davenport Mill, a custom architectural millwork shop in Santa Cruz, Calif. Although most of the cope-and-stick work we did there was on rectilinear doors and windows, clients also had us do various curved forms ranging from simple arcs to circles, ellipses and free-form lines. After I left the mill, it occurred to me that I could easily take the curved cope-and-stick techniques I had learned on the shaper and apply them to cabinet work by using some of the rail-and-stile router bits commonly used for kitchen cabinet doors. I think the system I use takes the head scratching out of making sash with curved cope and stick.

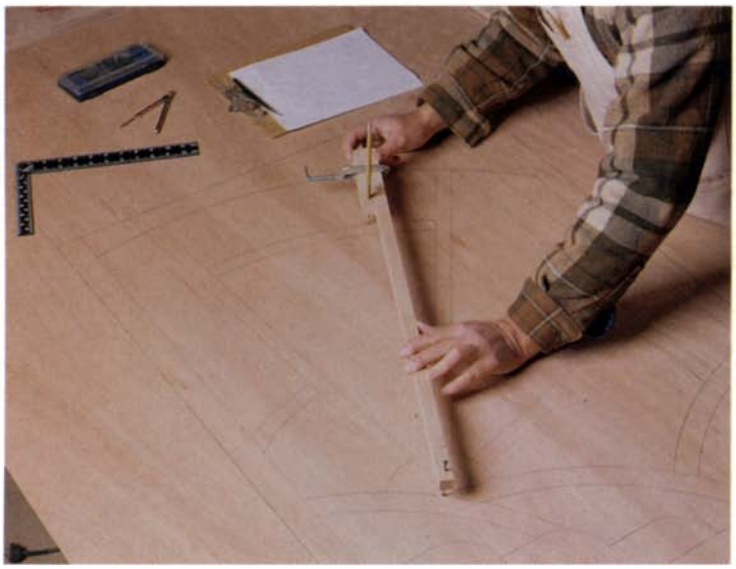
The *stick* of cope and stick refers to the molded edge along the inside of a door or window frame and on both sides of a window's crossbars, or muntins. When you want another piece to butt against the sticking to make a joint, the solution is to cut a cope (which is a negative profile of the sticking) on the end of any part that will join the sticking. A good cope produces a tightly fitting, gapless joint that on small pieces can often be glued up without further reinforcement.

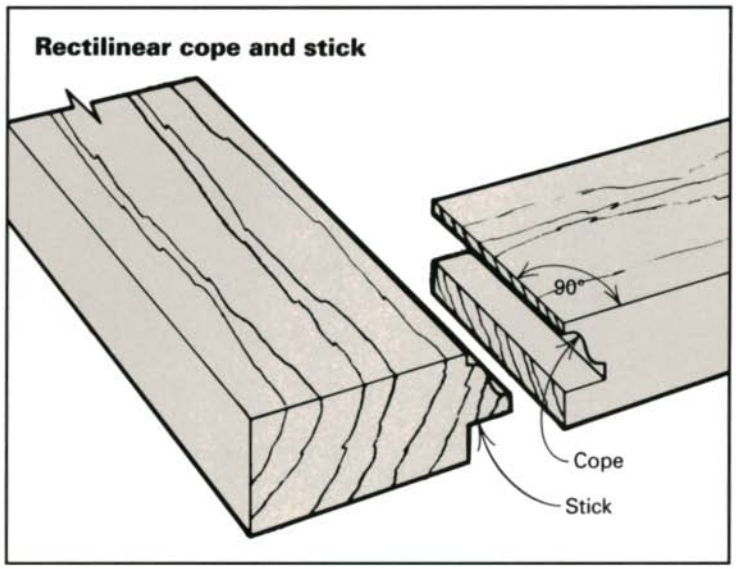
With rectilinear work, cope-and-stick cuts are fairly straightforward, as shown in the drawing on p. 78. The edges that get sticking are all straight, and the ends that get coped are all cut at 90°.

Photos: author

Proceed piece by piece for best fit. *For curved cope-and-stick work, the author dry-assembles the frame and then copes and fits the interior components one at a time.*

Full-scale layout orients curved parts. *Use trammel points to strike the arcs and record their radii for making templates.*





(For an explanation of conventional cope and stick, see "Coping with Sash," *FWW* #64 or *The Best of FWW: Traditional Woodworking Techniques*, The Taunton Press; 1991.) But a few challenges arise when you attempt to cope and stick curved pieces.

I solve these problems with a system of curved templates like the one in the photo on p. 77, which can be quickly and accurately produced with a router screwed to a shopmade radiusing jig. Three types of templates are required: one for shaping curved glazing bars, another to make cope blocks (disposable pieces that stabilize and back up the cope cuts), and a third to guide the router bearing while coping the ends of pieces that join curved members. I screw handles to the templates to make controlling the cuts easier and to keep my hands well away from the cutters. I'll explain how I make the templates and then how I use them to do curved cope-and-stick work like that shown in the top photo.

First, though, a word of caution: These router techniques require that you cut very small parts on the router table, as well as climb cut against the grain. There are safe ways to do both of these, but if you are new to routers, I suggest you use a design that incorporates larger parts with larger radii.

Full-scale sash

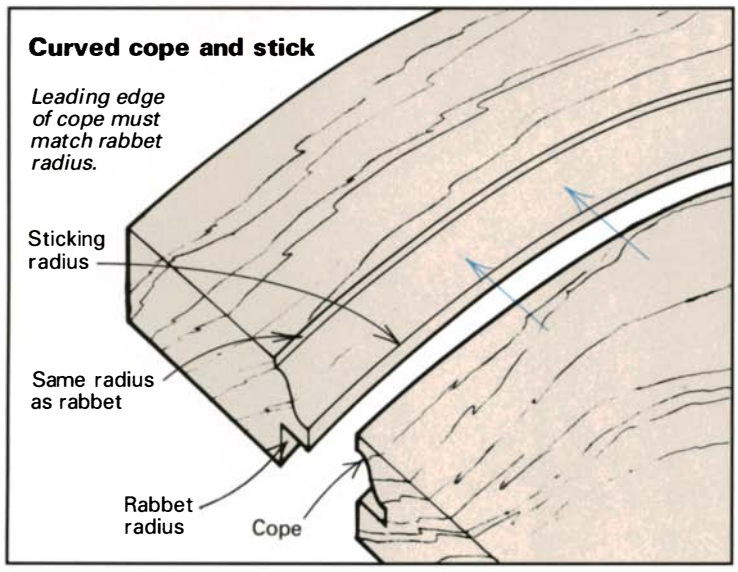
The first step in any curved cope-and-stick project is to make a full-scale drawing. I find this essential and constantly refer to it as I'm working to establish the length, location and curvature of different parts and templates. First experiment with various designs on the drafting table using a compass; then draw your favorite design full scale on a sheet of plywood. I use shopmade trammel points to draw the full-scale arcs and record the radius of each arc on the drawing. This is the easiest time to get the radii—all you have to do is measure between the pencil and the pivot point on the trammel bar. This will give you the radii for cutting bar templates; add or subtract the depth of the rabbet from these radii to make templates for cope blocks and end coping.

Turning out templates

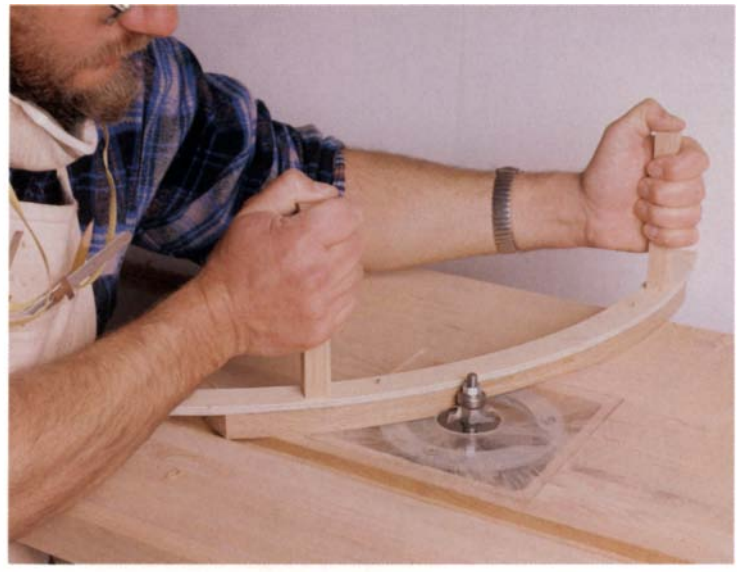
Now make a template for every curved part in your door or window. To cut the curved edges of the templates, you can use a simple router jig like the one shown in the top photo on the facing page. The jig consists of a teardrop-shaped plywood substitute base for your router with a long arm of solid wood attached to it.

Drawings except where noted: Maria Meleschnig

Rout the arcs for templates all at once; then separate them. *The author uses a shopmade jig to rout pairs of concentric arcs in a sheet of stable, void-free Baltic-birch plywood. He'll make end cuts with a sabersaw to free the templates. Template-arc radii are computed from the full-scale drawing.*



Start in the middle when sticking curved bars. *Half the cut will be with the grain and half against. Climb cut against the grain, holding the handles firmly, making the cut in a series of passes.*



A small block of wood that's clamped to the arm and drilled to accept a 10d nail provides an adjustable pivot point from which to swing the arcs.

I cut the templates from ¼-in. Baltic-birch plywood, which is strong and stable, routs to a clean edge and is free of voids, providing a smooth surface for the router's guide bearing. Don't forget: Measure from the outside of the router bit to the pivot point on the radiusing jig to cut the internal radius of a template. For an external radius, measure to the inside of the bit. You can use a plunge router to make the arcing cuts. Or do as I do, and simply tilt the router up to turn it on, and then lower it into the ply; make the templates over long, and cut off the plunge point where the cut is not true. I usually cut all the templates at once, making all the radius cuts with the router and cutting the templates free with a sabersaw. To make small-radius templates, I use a circle-cutting setup on the router table, as shown in the photo on p. 81

Templates for end coping and for the cope blocks are sized differently from templates for the bars. As you can see in the drawing on this page, when you make a curved edge with sticking on it, the outer edge of the sticking has one radius, and the rabbet shoulder has another. When making templates and joining parts, it's important to remember which is which. I call the outer radius the sticking radius, and the other one the rabbet radius. When you cope something, either the end of a part or the edge of a cope block, you'll need a template sized to the rabbet radius of the sticking it will mate with.

Shape the bars

Once you've made all the bar templates, cut the sticking and coping on the rails and stiles. Then cut the joints in the door or window's outer rails and stiles, and glue up the frame. A simple, strong solution is to mortise both rails and stiles and insert floating tenons. By cutting the joints after you cut the cope and stick, you can be sure the joint is in the rabbet and doesn't interfere with the profile. With the frame together, you can begin to fill it in, dry-fitting one bar at a time. For an explanation of the cope-and-stick bits you'll need and the sequence of cuts, see the box on p. 81.

I attach handles to the sticking templates with flat-head screws, countersunk and driven from below. Then I fix the template to the workpiece with nails hammered into the back of the part or into

MARKING AND COPING A CURVED BAR

To mark coping lines, *set the part in its place on the layout board, and use spacer blocks to support the frame-in-progress directly above the drawing as you scribe to the rabbet (top right).*

Affixing a template*—Clamp the cope blocks to the workpiece, and nail a template to the scribe line (bottom right). Then bandsaw close to the template before flush-trimming on the router table.*

Cutting the cope*—After flush-trimming to the template, cut the cope with a guide bearing riding on the workpiece (below).*

ends that will be cut off, making sure I locate them out of the path of the router bits. Holding the handles firmly, I flush-trim the piece to the template.

Using the template and handles in the same way, as shown in the bottom photo on p. 79, cut the sticking and the rabbet next. Take small passes to come to the profile gradually. On curved parts, you will invariably have to cut against the grain. To avoid tearout, climb the cut—move the part into the cutter with the direction of the spinning bit, rather than against it as is customary. To do so safely, bear down on the safety handles, move the part slowly but steadily and take light cuts.

Steps to good coping

With the sticking and rabbets cut in all the bars, begin coping by making cope blocks to fit onto the sticking on either side of the parts to be coped, as shown in the photos above. The cope blocks serve several purposes. They help eliminate tearout by backing up the cope cut, which is made across the end grain of the small-section bars, while also providing infeed and outfeed surfaces for the router bearing. The blocks also help stabilize the narrow workpiece and give you something to grab as you make the cut. And last, they provide a larger surface for mounting the coping templates for more accurate placement. To make the cope blocks, you'll need templates that match the curves of the rabbets on each side of the bar. Use them to flush-trim and cope the blocks.

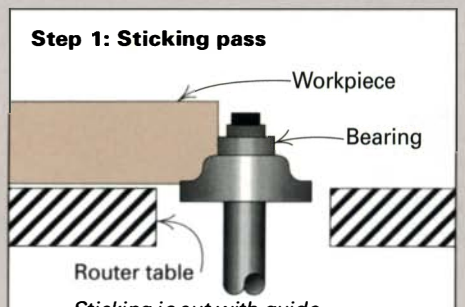
Press the cope blocks onto the bar, and put them in place on the full-scale drawing. Next place the door or window on top of them with its corners resting on spacer blocks. Make sure it is directly over its corresponding lines on the drawing. Then run a pencil along the curve of the rabbet, scribing a line across the top of the cope blocks and the bar itself, as shown in the top photo.

Coping the bars*—*I set up two router tables to cope the ends of the bars: one with a flush-trimming bit and one with a coping bit. This is important because it is often necessary to go back and forth between the two setups during the fitting procedure. If you don't have two full-fledged router tables, screwing your router to a piece of plywood clamped to sawhorses will work fine.

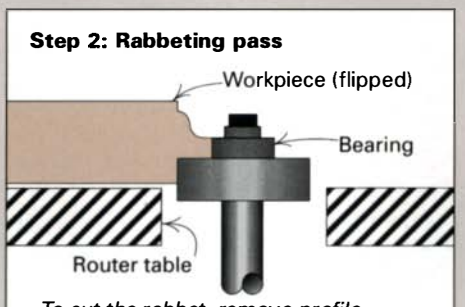
It's hard to swing a tiny arc with a hand-held router. *Small-radius curves are most safely made with a circle-cutting setup. The jig consists of a crossbar clamped to the router table and a pivot pin that goes through the crossbar into the workpiece.*

Choosing bits for curved sash

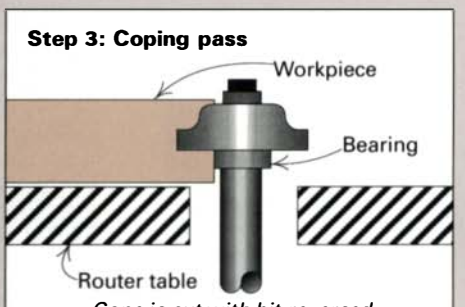
Curved cope and stick can be used with both glass panes and solid panels. Most of the router bits sold for cope and stick these days are designed primarily for making paneled kitchen cabinet doors, for which a groove (rather than a rabbet) is required below the sticking. Many of these bit sets are adaptable for making a glass rabbet, often by simply adding a cutter to the shank, so that the area below the sticking becomes a rabbet instead of a groove. Solid bit sets that cut the whole bar profile in one pass are available, but it's best to buy stacking bits. With stacking bits, you can switch the guide bearing from top to bottom and change from rabbeting to grooving configuration. As long as the bits you use are capable of the three major steps shown in the drawings below, you'll be able to make cope and stick with either a glass rabbet or a panel groove. I used bits from Eagle America (800-872-2511), part #184-0305, along with their optional accessory kit #100-8420, which allows the set to cut glass rabbets. (For an in-depth look at the various types and brands of bits available, see *FWW* #107, pp. 50-54). *—J.G.*



Sticking is cut with guide bearing above the bit.



To cut the rabbet, remove profile cutter, and replace with rabbeting cutter.



Cope is cut with bit reversed and guide bearing below.

Lift the door or window off its blocks, and choose a coping template that matches the scribed line. Then nail the template to the coping blocks, as shown in the bottom right photo on the facing page. Use a quick-release clamp to keep the cope blocks tight against the bar. Bandsaw away most of the waste, and flush-trim to the template. From there, go directly to the cope setup, as shown in the bottom left photo on the facing page.

Now duplicate the process to fit the other end of the bar. To establish its length, first lay the bar on the full-scale drawing. Next rest the door on top, and butt the already coped end against the rabbet of the piece it will join. Then scribe along the curve of the rabbet of the intersecting piece at the opposite end. It's prudent to cut the part a bit long at first to see how it fits. Shorten it if necessary by repeating the flush-trim step with the part protruding just a hair and then coping again. And now, voilà, you have a properly oriented and coped curved bar. When all the parts are fitted, glue them in one by one. Use glue with a long open time, like brown glue (urea formaldehyde), so you'll be able to make minor adjustments as you work. Use masking tape to hold the pieces in place as the glue sets. Be sure to apply the tape away from the joint, so you have access to clean the glue squeeze-out.

To cut window glass, trace the rabbets from the glued-up frame, and make templates from the tracings. Cutting glass along outside curves is not terribly difficult, but inside curves present more of a challenge. You should at least be prepared for some failures, and perhaps consider letting a professional cut glass to your templates. Once the panes are cut, you can use either putty or wooden stops to hold them in the frame. I use putty because there's a danger of splitting the narrow bars when nailing in stops.

All of the procedures I've described in this article involve curves that are true arcs of circles and, hence, easily made by arcing with a router in a radius jig. But you can use the same system to make cope-and-stick pieces of any curve you choose. This will be more challenging, though, as you will have to make the templates by hand, and coping templates will also have to be sanded to fit adjoining parts. □

Jeff Greef is a woodworker and writer in Santa Cruz, Calif.

Drawings this page: Matthew Wells

Gate-Leg Table Is Light but Sturdy

Precisely routed and tablesawn joinery gives the table its strength

by Gary Rogowski

***Contemporary lines and thin gate legs give this table a light feel** (top). The table's size, 60 in. by 84 in., seats eight, but when the leaves are down, the table is more compact and can be moved against the wall for more floor space (bottom).*

I was shown a picture once of a gate-leg dining table. It had eight cabriole legs, and it looked like an insect with a tabletop on it. I delicately convinced my prospective clients to let me design a table with a little more grace that still had the drop leaves and gates they wanted. The tabletop was to be an oval large enough to seat eight comfortably. My concern was to lighten the base visually and still provide adequate support for the leaves. The table that resulted satisfied my clients' needs for utility and complemented its surroundings well (see the photos above).

Gate-leg tables were designed to save space. A leg-and-apron assembly, or gate, hinged to the table or pivoting on pins set into the table's framework, swings out to support a leaf that's hinged to the tabletop. In this way, a small table can be transformed easily into a larger one. A single gate can support a leaf on a smaller table, or double gates can be used for larger leaves, such as on this dining table. The gates can also be on one or both sides of the table, depending on the function of the table and how much extra space is desired. When not in use, two leaves take up hardly more space than one. For the finest appearance, rule joints are used between the leaves and top. This joint looks clean and provides support for the leaves. (For how to rout rule joints, see *FWW* #80, p. 48 or the reprint of that article in *The Best of FWW: Router Projects and Techniques,* p. 106.)

Double gates can pivot either toward or away from each other. I decided to have the gates pivot away from each other so that with the leaves down, the gate legs would sit side by side. Measured together, the pair of gate legs are 2½ in. wide, or the same width as one of the outer table legs. This lightens the table visually by making it look like there's only one leg in the center of the table rather than two.

Joinery and pivots

The table is made of cherry. I used 12/4 stock for the legs to avoid laminating thin-

Photos this page: Jim Piper

Drill bit marks pivot point. *After trimming pivot posts to size and checking the fit of the gates, the author marks where he'll drill for the bushing and hinge pin. He drops a drill bit through the bronze bushing in the rail to make a mark.*

ner stock to get the 2½ in. I wanted. Crosscutting something this thick can be a problem. A 2½-in. leg is too thick for a 10-in. tablesaw blade when the leg is riding in a crosscut carriage with a ¾-in. base. I got around this by using two miter gauges with a fence screwed on between them. With this two-miter-gauge setup, I can cut all the way through the legs in one pass. The two gauges also minimize any side-to-side slop that might occur with just one gauge, and the long wooden fence between the two gauges lets me clamp a stop to it to index the length of my cuts for accurate multiple cuts.

I used mortise-and-tenon construction for all the joinery on this table, routing the mortises and cutting the tenons on my tablesaw. The jigs I used for these two operations are as simple as could be, but they do their jobs well and take practically no time to make (see the box on p. 86).

The leaves needed to fold down without binding on the top of the gate. For this to work out, the gates had to pivot out of the way into the table base itself (see figure 1 on the following page).

After cutting, routing and dry-fitting all the joinery, I cut notches in the top and bottom rails where the gate legs will nest, dadoing them just ¾ in. deep. Keeping the dadoes this shallow ensured I didn't weaken the rails. It also meant I'd have to notch the legs later, so they'd tuck into the rails inside the plane of the table's outer legs. I made the notches in the rail a little wider than the combined width of the two gate legs to allow for the swing of the legs as they open and close.

I debated between using wooden dowels or steel pins for hinging the gates and ended up opting for the steel pins, which I set in bronze bushings. This choice allowed me to deal with glue-ups with something approaching leisure, letting me add on the two gate assemblies later. Another advantage of using steel pins and bronze bushings is that they will probably last through more than a few dinner parties.

Photos except where noted: Vincent Laurence

Fig. 1: Gate-leg table

Measurements do not include tenons.

Rule joints

Batten

Wedge

Top rail, 1¾ x 3 x 55

End rail, 1¾ x 3 x 18½

Leg, 2½ x 2½ x 28

Detail: Pivot post

Top steel pin, 2 in.

Bushing, ½ in. dia., ½ in. long

Bottom steel pin, 1½ in.

Vertical column, 1¼ x 1¼ x 18½

Gate leg, 1¼ x 1⅞ x 28

Steel pins in bronze bushings in rails and pivot post form hinge for the gate.

The plug in the bottom rail keeps pin from dropping out.

Pivot post, 1¼ x 1¼ x 18½

Gate rails, 1¼ x 1¼ x 9½

Both rails and gate legs are notched, allowing drop leaf to hang straight down.

Bottom rail, 1¾ x 1¾ x 55

Fig. 2: Mortising fixture

Whole assembly is clamped securely to bench over the hardwood scrap.

Center of mortise

Masonite, ¼ in.

Squared scrap of hardwood, glued and nailed to Masonite

Workpiece

Detail: Accounting for the offset distance

Offset distance

Template guide

Template guide will follow cutout in Masonite, but offset between edge of bit and outside of template guide's collar must be taken into consideration. That distance must be doubled because you're routing to both sides of the bit.

Fig. 3: Tablesaw tenoning jig

Hardwood block back stop must be square in all respects to plywood scrap.

Drywall screws, above blade's maximum height

Hardwood block back stop

Plywood scrap

Drawing: Heather Lambert

I drilled the rails for the gate-pivot pins and bushings on my drill press. For the ½-in.-OD, ⅜-in.-ID bushings I found at my hardware store, I used a ½-in. brad-point bit and drilled exactly ½ in. into the rails. Next I centered a 13/32-in. bit (⅜ in. was just a little too snug for the steel pins) on the dimple at the bottoms of the bushing holes in the rails and drilled all the way through the rails into scrap to prevent tearout. Then I took a smear of epoxy and glued the bushings into their holes in the rails.

The bushings were twice as long as I needed, so I came up with a simple, quick way of turning one into two. I marked the bushings with a pencil midway along their length, stuck a ⅜-in. dowel most of the way through the bushing and then chucked the dowel into the drill press.

I set my hacksaw on a wooden block and adjusted the drill-press table so that the hacksaw blade was even with the pencil mark and the blade's teeth face into the rotating bushing. I cut the bushing with the drill press set at its lowest speed (see the photo at right). I could tell when I was through the bushing because the blade started spitting sawdust. I deburred the inner edges of the bushings before epoxying them into the legs and pivot posts.

As a last step before gluing, I dry-clamped each half of the base together to ensure that everything fit well. And then I marked and mitered the ends of the upper rail tenons on both the ends and sides.

A hacksaw blade makes quick work of an overlong bushing. *With his drill press set at its lowest speed, the author makes two ½-in. bushings from one 1-in. bushing. It's easy to tell when you're through the bushing because sawdust from the dowel starts coming off the blade.*

Glue-up sequence

I glued the vertical columns to the long rails first, taking care to make sure that the frame went together perfectly square by temporarily dry-clamping the legs to the rails. Next I glued the long side rails to the legs. After that joint set up, I joined the two long assemblies with the short end rails. It helps not to be too liberal with the glue for the long side rails because you'll have the glue puddling up inside the mortise for the end rails. Then you'll have to wipe or chip the mess out.

I checked both gates as I was gluing them up to ensure they stayed flat, and I was careful not to overclamp. A twisted gate will cause major problems when you try to fit it to the table. I sighted across the posts and rails of the gate to see that they were in line. If they had been out of alignment, I would have used some judicious clamp-tweaking to pull them flat. After the gate assemblies had dried, I notched the gate-leg posts on the tablesaw so that they would mate with the notches on the rails and be out of the way of the leaves.

Fitting the gates

I set the two gate assemblies in place so that the center of the pivot posts lined up with the centers of the bushed holes in the rails. I trimmed the pivot posts as necessary to fit between the top and bottom rails without binding and without too much play. I also checked to ensure that the reveal between the gate legs was even top to bottom. Once I was satisfied with how the gates looked in relation to the rest of the table, I marked centers on the pivot posts by dropping a ⅜-in. bit down through the bushing in the top rail and pushing it up through the bushing in the bottom rail (see the photo on p. 83). Then I just repeated the procedure I went through for the rails on the pivot posts, drilling for the bushing first and then for the steel pin. I plugged the hole in the bottom of the bottom rail later to keep the pin from dropping out with the gate attached to the base.

I also slightly beveled the insides of the outer gate legs where they come together, so they wouldn't bind when both were opened together. Then I marked and trimmed the bottoms of the legs so that with plastic glides on them, they're just touching the floor. If the legs are too short, they won't support the leaves. If they're too long, they'll lift the table and stress the hinges connecting the leaves to the table.

Each gate leg also needs to be tall enough to support its leaf without any sag. Leaves that are perfectly flush with the center portion of the tabletop are what you're looking for. The problem is that if your leg is at just the right height, there's virtually no clearance to swing the gate by the leaf without scraping the bottom of the leaf. To prevent this scarring, I cut the leg between 1/16 in. and ⅛ in. less than I really wanted it to be, and later I screwed a wedge in place on the underside of the table to make up for that shortfall (see figure 1). This provides the necessary clearance and gives a nice flat appearance across the whole top.

Making the oval tabletop

The tabletop is an oval measuring 60 in. by 82 in. I laid out a quarter of an oval on some thick paper folded in quarters. I cut out the quarter-oval, unfolded the paper and retraced the whole oval onto a sheet of cardboard to get some idea of how the tabletop would look. I used this rough pattern to lay up boards for the tabletop. If a board had a knot or defect at one end, I used it where that end would be cut off during the final shaping. I glued up my top and leaves, sanded them, cut and shaped the rule joints and hinged the leaves to the center of the top, all before I cut my oval.

I roughed out the oval with a sabersaw, a good blade and a steady hand. For the finish-cut, though, I created a router jig based on the instructions for drawing an ellipse in Ernest Joyce's *Encyclopedia of Furniture Making* (Sterling Publishing Co. Inc., 1987). A similar jig is shown in *FWW* #82, p. 88. I used my plunge router to make the cuts just ⅛ in. deep each pass. I took my time to minimize tearout, especially at the two sections where I was cutting against the grain. The final pass, which uses the entire cutting edge of the router bit, needs to be done very slowly and carefully. Once it's cut, though, you have a perfect oval that needs just a bit of sanding along its edge.

One other feature I added to the top is a pair of battens beneath each leaf to keep the leaves flat. I positioned them right behind the wedges, so they also prevent the gates from rotating too far. The center part of the tabletop extends far enough out to the sides that the top rail doesn't get in the way of the battens or prevent them from hanging straight down. □

Gary Rogowski designs and builds custom furniture and teaches woodworking at the Oregon School of Arts and Crafts.

Jigs and fixtures: They don't have to be fancy to work well

I like low-tech solutions, and I'm not given to buying expensive jigs or fixtures when I can make my own. For the mortises on this table, I made a template-routing fixture for my plunge router. It consists of a little piece of Masonite nailed to a squared scrap of hardwood, and it takes less than a half-hour to lay out and build (see figure 2 on p. 84).

I use a piece of Masonite wider than my workpiece and the scrap hardwood side by side to give my plunge router a stable platform. The hardwood scrap should be a little less deep than the workpiece, so the workpiece can be clamped to the bench. I figure out the distance from the inside edge of the hardwood scrap, which sets against the face of my workpiece, to the center of the workpiece and mark this distance on the underside of the Masonite.

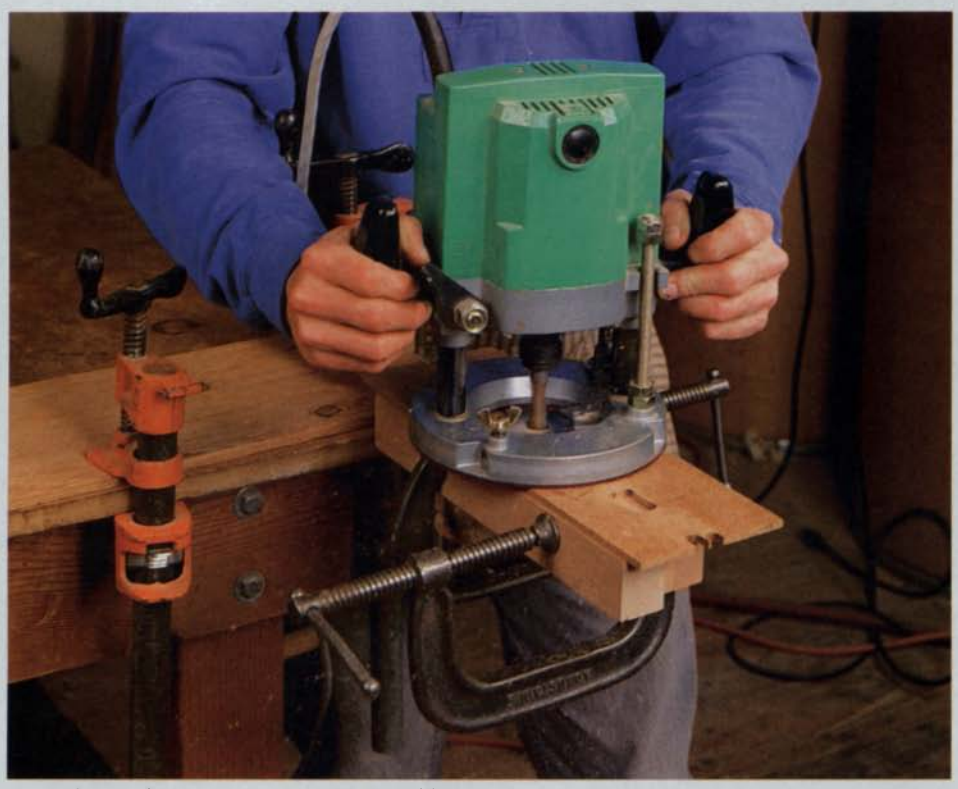
I make the cutout in the Masonite as wide as my template guide. To get the correct mortise length, I add twice the offset distance (from the edge of my router bit to the outside of the template-guide collar) to the mortise length and mark that overall length on the underside of the Masonite (see the detail in figure 2 on p. 84).

To make the cutout in the Masonite, I set up the fence on my router table so that the bit is centered on what will be the center of the mortise cutout in the Masonite, and I rout away. I use the penciled marks on the underside of the Masonite as my stop marks. Because the hardwood block is squared, I can use it as a reference surface against my router table's fence.

To rout the mortise, I simply clamp the fixture to my workpiece, clamp the workpiece to my bench and have at it (see the photo at left). The template guide takes care of the rest.

My tablesaw tenoning jig is simpler yet. I take a length of plywood a bit shorter than my rip fence and glue and screw a 4- or 5-in.-high block of hardwood scrap to it so that the forward face of the block is at 90° to the table (see figure 3). If you screw the block to the plywood as I did, make sure you do so above the maximum height of your tablesaw blade. My right hand presses the workpiece and plywood tight against the rip fence. My left hand keeps the workpiece snug against the plywood and the hardwood block as I guide the workpiece through the blade (see the photo at left). You could also attach a toggle clamp to the hardwood block to hold the workpiece in place for more safety.

I cut the shoulders of the tenons first using a regular crosscut box, and then I rough-cut the cheeks on the bandsaw. I take the cheeks down to final thickness (dictated by my mortises) on the tablesaw with this simple jig. —*G.R.*



Simple and accurate mortising. *The author's template-guide fixture makes for accurate mortises as long as they're laid out properly and the router is held square to the workpiece. He plunges and routs a little at a time to save wear on the router's bearings.*

From the scrap bin, a serviceable, dependable tenoning jig. *It may not look like much, but the author's tenoning jig has seen more than a few projects go out of the shop over the years. An accurate 90° back stop is all it takes; careful guiding of the workpiece does the rest.*

Building a Kitchen Island

Small butcher-block table adds counter space and storage

by Sandor Nagyszalanczy

Big block on a small island. *The author's kitchen chopping island provides a generous chopping surface and open storage without presenting the obstacle of a large built-in island.*

I'll admit it; I'm the kind of woodworker who hates to see any little scrap go to waste. The kind who has an embarrassing number of boxes lying around the shop filled with little hardwood cutoffs too precious to use for kindling. So when I saw a countertop installer throwing away cutoffs and sink cutouts of clear-grained, 1½-in.-thick maple butcher block, it took me but a nanosecond to salvage them. Back at my shop, I realized that these scraps were enough to build a freestanding island for my counter-space-poor kitchen, with the large sink cutout reborn as an attractive and functional top. The island I built, as shown in the photo at right and the drawing on p. 88, took less than a weekend to complete and has made my kitchen a joy to work in. It provides not only a perfect surface for slicing up vegetables or setting a casserole for sprinkling on the garnish but a tray below the top for storage of wayward pots and pans. A knife block, towel rack and bottle opener provide the finishing touches that make this island the functional centerpiece of my kitchen. Although I was able to build my island counter from someone else's leftovers, you could build a similar island from maple lumber and a scrap piece of ¾-in. plywood. You could glue up your own chopping surface or buy a 3-ft. length of butcher block at a lumberyard or home center.

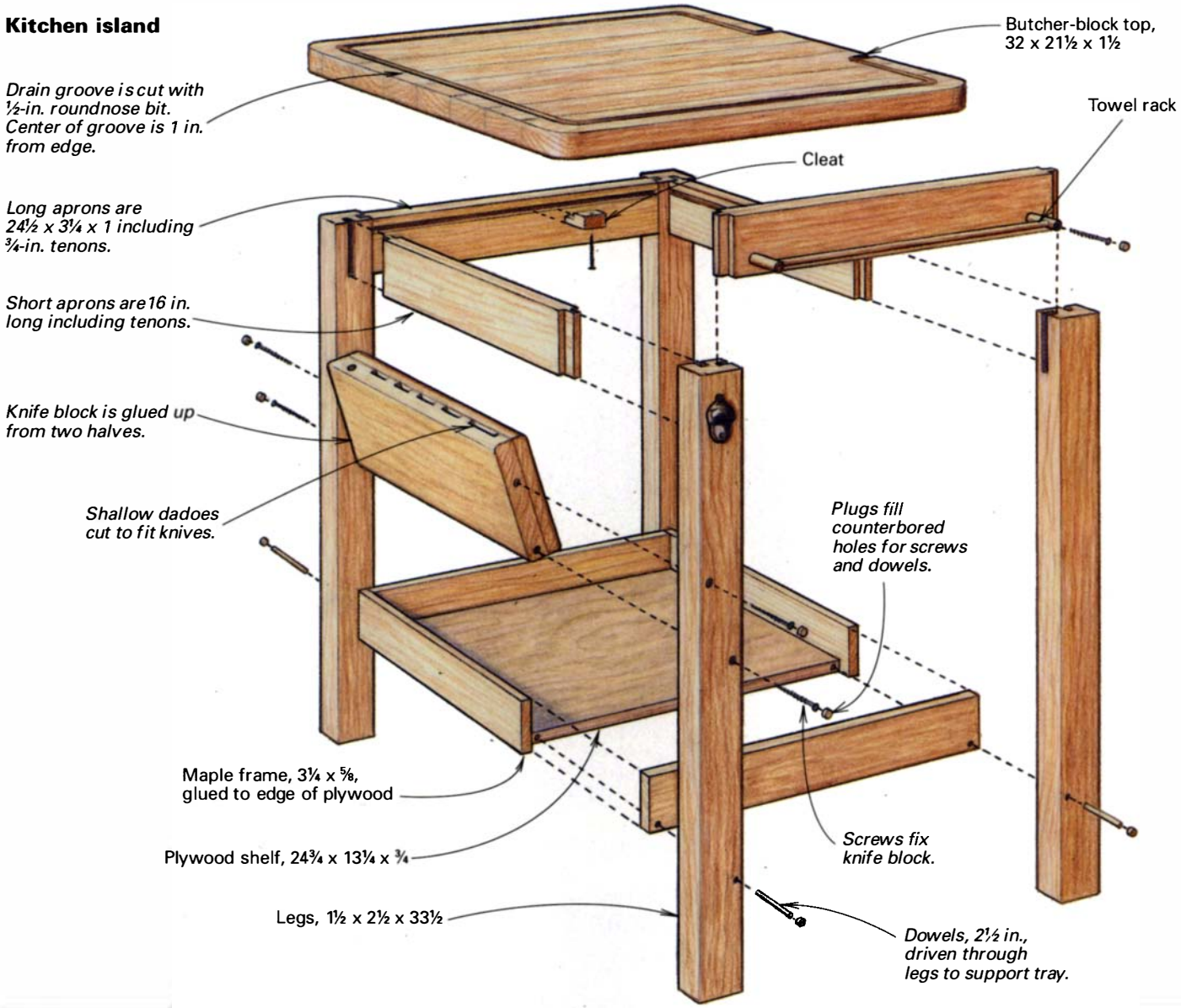
Quick mortise and tenon

My kitchen island relies on mortise-and-tenon joinery between the legs and the apron for its rigidity. In deciding how to cut the joinery, as with all the other processes in making the piece, I aimed for speed and simplicity as well as strength. For the leg mortising, I used a dado blade in the tablesaw to make stopped slots on two adjoining faces at the top end of each leg, spaced as shown in the leg mortise detail on p. 88. I clamped a stop block to the rip fence to limit the travel of the leg, making each slot 3¼ in. long (see the center photo on p. 89). After all the slots were cut in the legs, I used a chisel to square up the bottom end of each slot, so it would serve as a mortise.

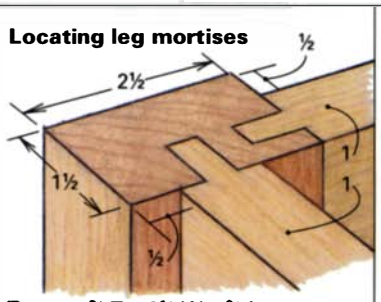
I cut the tenons on the apron members with a quick combination of plate joiner and radial-arm saw. I cut the cheeks first, using my portable plate joiner. To locate the cuts properly, I placed shims under the plate joiner. Then I set the depth of cut to ¾ in. and made a series of plunges in the end of the apron to cut the first cheek. Next I flipped the apron and reclamped it to cut the second cheek (see the top photo on p. 89). With all the cheeks cut, I finished the tenons by making two 5/16-in.-deep shoulder cuts with a radial-arm saw. To complete the apron parts, I used a dado blade on the tablesaw to cut a ⅜-in. by ⅜-in. groove along the inside face of each piece, ½ in. from the top edge. These grooves would be used later to mount the top.

Photos: Sandor Nagyszalanczy

Kitchen island



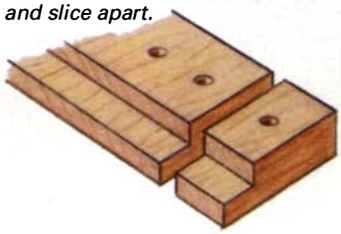
Locating leg mortises



Tenons, ⅜ T x 3¼ W x ¾ L

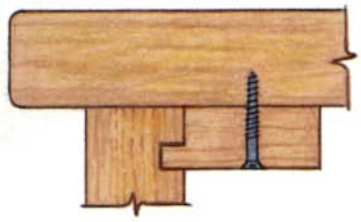
Producing cleats

Rabbet a cross-grained strip of solid stock; then drill for screws, and slice apart.

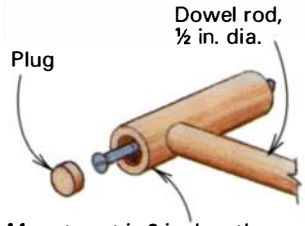


Tabletop attachment

Cleat is screwed to top. Cleat's lip fits in apron groove.



Towel rack



Mount post is 2 in. length of ¾-in.-dia. dowel rod.

Pattern-routing a drain groove in the top

One of the annoyances of working on any counter that doesn't have some sort of raised lip is that liquid from wet vegetables or juicy meats drips right down onto the floor. The easiest way to prevent this on a wooden countertop is to rout a drain groove around its perimeter. To get an attractive, evenly spaced drain groove on my butcher-block top, I decided to pattern rout it, following a template with a guide bushing mounted to the subbase of my router.

First I rounded the corners of the butcher block to a 2½ in. radius with a sabersaw and sanded them smooth. Then, to cut the drain groove, I made a flakeboard template shaped to make the groove run out of the top at one end. I cut out the template on the tablesaw, cut the curves with a sabersaw and cleaned them up with a drum sander. With the template clamped over the top, the bushing rides along the edge of the template, guiding a roundnose bit, which makes a nice round-bottomed groove that's easy to clean. Because I wanted the centerline of the groove to be 1 in. from the edge of the top and I would be using a ½-in. roundnose bit and a ¾-in. guide bushing, I made the template 1⅜ in. smaller than the top. This made the radius of the template 1⅛ in. at the four corners, and I used the same curve where the groove turns to exit the top. After routing the drain groove, I rounded over the top edge of the butcher block with a ⅜-in. roundover bit in the router.

Assembly

With the legs and apron ready for assembly, I made a simple tray not only to provide storage but also to act as a stretcher assembly for the island, adding rigidity by joining the four legs near the

Drawing: Lee Hov

floor. The tray consists of a ¾-in. plywood shelf surrounded by a ⅝-in.-thick, 3¼-in.-wide maple frame, butt-joined and glued without joinery onto the edges of the plywood.

I began the assembly by gluing up pairs of legs to the shorter aprons. I applied glue to the mortises and tenons; then I clamped each leg-apron assembly with pipe clamps, taking care that the legs remained parallel. Once they were dry, I glued the two subassemblies together with the long aprons, again placing the clamps carefully to keep the subassemblies parallel and the whole glue-up square. When this came out of clamps, I pinned the tray in place with dowels. With the tray clamped in position, I drilled a hole through each leg and the maple frame into the plywood shelf. Then I drove home 2½-in.-long dowels and glued in wooden plugs to cover the holes. I could have used longer dowels and left the end grain showing, but I wanted the plugs to match the ones capping the screws that fix the knife block.

I made the knife block by cutting wide, shallow dadoes in a blank of butcher block and laminating it to another blank. Then I screwed it in place between the legs at one end of the island (see the drawing). I find the location handy, but if you have young children, it would be wise to find another place for a knife block. The towel rack is also useful (no need to hide it from the kids) and is made quickly with standard dowels (see the towel-rack detail).

Plate joiner becomes a portable tenoner. *The author cut apron tenon cheeks with a plate joiner and cut the shoulders with a radial-arm saw. He used shims under the joiner to adjust the cut.*

Dado blades make quick work of mortises. *The stop block clamped to the fence ensures that all the mortises will be the same length. The bottom corner of the groove is squared up with a chisel.*

To the finish

It's easier to finish the island before the top is fastened. For durability, the legs, apron, tray and underside of the top should be brushed or sprayed with a water-repellent, durable finish such as a polyurethane varnish. (Apply the same finish to any wooden accessories you add to the island.) The top surface and edges of the butcher block should be coated with light mineral oil. To keep the butcher block clean, scrape the top occasionally. And for that job, what better tool than a cabinet scraper? I fitted one with a handle to make it more comfortable to use (see the bottom photo).

Butchers say that scraping is the best way to clean butcher block. *Attach a hardwood handle to a cabinet scraper, and you have the perfect tool for periodic cleaning. Light mineral oil is a good food-safe finish for butcher block.*

Buttoning up

To mount the top firmly to the island, I used cleats, also called cabinetmaker's buttons, as shown in the drawing details on the facing page. The cleats are screwed to the top and have a lip that fits in the groove along the inside edge of the apron. The cleats provide sure attachment, but they also allow the solid wood to expand and contract in response to changes in the kitchen's humidity. I made the cleats by rabbeting one edge of a 2½-in.-wide cross-grain strip of 4/4 stock. Then I drilled screw holes and cut off cleats like slices of bread.

I screwed some cup hooks (purchased from a local hardware store) along the underside of one of the aprons for hanging utensils, strainers and small pans. When I was finished, there was nothing to do but mount the wall-style bottle opener I found through mail order (part #29090 from The Woodworkers' Store, 21801 Industrial Blvd., Rogers, Minn. 55374-9514; 800-279-4441) and then set about using my new kitchen island. □

Sandor Nagyszalanczy is a contributing editor to Fine Woodworking *and a writer, musician and furniture craftsman in Santa Cruz, Calif. His forthcoming book,* Woodshop Jigs and Fixtures, *is to be published by The Taunton Press this fall.*

Working Green Wood

From raw logs, chairs that will stand the test of time

by Harriet Hodges

A shaving horse is ideal for green woodworking. *Other holding devices will work satisfactorily, but with the shaving horse, you can flip the workpiece around instantly and repeatedly so that you're nearly always cutting with the grain.*

Green woodworking delights our desire for thrift and speed. In a few days, you can fashion a chair from the forest. The tools are few, the techniques simple and the work satisfying. Green wood is simply wood that's still in possession of most of the moisture it had when it was a tree. This moisture makes the wood much softer and more responsive so that working it is pure delight. It's also a lot easier: The froe, drawknife, spokeshave, brace and auger bit—the main tools of the green woodworker—all respond much better to wood that is not yet dry and brittle. To use these tools on green wood is to understand how simple cutting tools are meant to respond. While still wet, hickory peels like a carrot. Dry, it rings like stone.

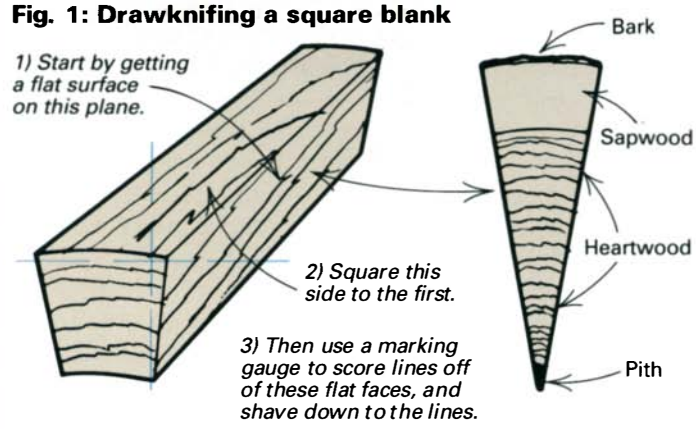
Why bother, though? Machine tools have taken much of the labor and difficulty out of working dried woods. But there are several reasons why a woodworker at the end of the 20th century should be interested in a technology that's more than 1,000 years old, and they all hark back to the essential nature of wood itself. A woodworker uses a drawknife to dimension green stock to follow the plane of one of the tree's growth rings. That maintains long, continuous fibers. These bundles of long fibers are strong: Because there are no severed bundles (short grain), there's no danger of any portion of a drawknifed spindle, for example, shearing or springing under stress. A Windsor chair, belying its delicate lines, can take a terrific beating (see the photo on the facing page).

Another reason green woodworking has endured is that phenomenally strong joints are possible. Green-wood joinery takes advantage of the high moisture content of freshly felled trees (or well-preserved tree sections, more on this later) and of the fact that wood shrinks much more in the tangential plane than in the radial plane (see figure 2 on p. 93). Wet-dry joinery takes a stretch-

Photos except where noted: Vincent Laurence

Windsors are the ultimate expression of the green-woodworking tradition. *They're tough, resilient chairs, making up in engineering what they lack in mass. Shaved components with long, continuous fibers; wet-dry joinery that mechanically locks the various parts; and choosing specific woods for specific uses all contribute to the chairs' great strength.*

Fig. 1: Drawknifing a square blank



er or spindle, dries it for a short while in a makeshift kiln and then inserts its tenoned ends, properly oriented, into properly situated mortises in the still wet legs or seat. This kind of joinery relies more on the nature of wood than on the strength of the glue for its longevity. As the two parts reach equilibrium in moisture content, the joint becomes tighter. A dry tenon in a wet mortise is a joint for the ages.

Another advantage of working green wood is the ease with which it can be bent (for a primer on steam-bending, see *FWW* #107, p. 62). Green wood bends readily as long as your bending stock is free of defects. That's because it hasn't had the chance to dry out, and kiln drying hasn't baked the wood and set the lignin.

One of the most satisfying aspects of green woodworking for me is to take what many would consider no more than firewood—logs in their raw form—and make of it something as refined as the Windsor chairs I build professionally. It's an elemental process, from felling a tree and bucking it into lengths, to riving blanks for the various parts and squaring up those blanks with a drawknife, to shaping the parts and attending to the joinery. Then a bit of sanding, a couple of coats of milk paint, and you have a unified, elegant whole, a strong, handsome chair that will last for generations.

The best way to learn the basics of green woodworking is to take a course with a good teacher. The hands-on experience will give you the confidence to dive in. I learned most of what I know from Curtis Buchanan in a class I took five years ago and a private tutorial a year later. But if you can't afford a class or don't have the time, you can still learn the process on your own. The craft is forgiving, and you need no jigs, just good eyes and hands.

Getting logs

The first thing you need to do is get some stock. Fortunately, this is simple and cheap in most parts of the country. You want logs. Look in the local paper for a firewood dealer or check the yellow pages for a sawmill nearby. Or if you live in a rural area and have a truck, many farmers will let you cut your own for a lot less than you'd pay even a firewood dealer. If you're going to cut down your own trees, look for perfectly straight boles with no limbs. Make sure there aren't any bark striations or irregularities revealing twisted grain or buried knots. If your project involves bending, you'll do best to get a hickory, white-oak or red-oak log. Other trees that bend well are beech, birch and ash. Sugar maple is ideal for many purposes, particularly for turned legs (it takes crisp, sharp detailing), but beech, red maple, birch, walnut, cherry, almost any North American hardwood, is fine.

Your log should be freshly cut—no more than a week old. After that, checking starts, and you lose useable stock. Logs should be crosscut to no longer than 5 to 6 ft. for easy handling, though there are exceptions. A settee, which has the longest bent member of common Windsor designs, requires nearly 7 ft. for the rough back blank. I've also found that trees in the neighborhood of 12 to 14 in. dia. are just about right. Smaller trees can also yield good stock, but often, by the time you rive (split) off the sapwood and the pith, neither of which is particularly desirable, you will get no more than one blank from each pie-slice shaped wedge that you split out, which makes it kind of a waste. At the other end of the spectrum, a great hickory tree came down last year when Hurricane Hugo blew through our neck of the woods. At nearly 30-in. across, there's plenty of useable wood, but moving sections around is all but impossible.

For stock that won't be bent, I crosscut bolts, or short log sections, fairly close to their final length as spindles or legs or whatever. For your bending stock, you want no more than 15 growth rings to the inch; eight is about ideal. This may seem counter-intuitive, but for ring-porous hardwoods (oak, ash, hickory—all your best bending woods), the greater the ring density, the higher

Drawings: Maria Meleschnig

PREPARING GREEN STOCK

***Green-woodworking stock is cheap and easy to prepare** (top left). Log sections can be split out by driving a wedge into the end and then leapfrogging wedges in the crack that opens on the sections' inner face.*

***A froe and club work well to separate sapwood from heartwood** (bottom left). Although the sapwood can be used, its moisture content differs from the heartwood, which could result in uneven or unpredictable shrinkage.*

***A forked log, called a brake, holds a wedge-shaped section upright** (far right) while the author removes bark, sapwood and pith and rives the section into rough chair-part blanks.*

the proportion of weak, large-pored earlywood to overall tissue.

Bending wood must be virtually perfect: If the first log you split for bending doesn't split easily into quarters to reveal perfectly straight grain, try another log. You can always use sections of the first log between defects for shorter pieces. Just don't kid yourself about bending flawed stock. Bending perfect wood is quick and easy. Bending stock with even a pin knot usually turns out to be a waste of all the effort you put into shaping the bending blank.

Preparing green stock from logs to square blanks

The absolute minimum in tools is a steel maul and three wedges, but a froe and club work well on smaller stock and will make the job more pleasant. Starting with a log, you position a wedge with one hand at the center of the log and strike it. Follow the split back with other wedges, leapfrogging them as one loosens the other. Then repeat with each half, quarter and so on, starting the splits at the log ends (see the top left photo).

When your log is down to manageable pie-slice shaped wedges, move one to a brake (a propped-up horizontal portion of a forked tree), as shown in the photo at right, or brace one end against another tree. The nice thing about the brake is it holds a pie-shaped piece well. Mark the end of each piece to be rived just where you intend to make divisions. Always mark divisions and begin splits from the smaller end of a log section; that way, if it wanders, you won't end up with a piece that's too small (see the photo at right). If you need a 1-in.-sq. piece for a chair back, try for 1½-in.-sq. pieces until you can do that consistently and have a good feel for how a log will split. Be generous in your divisions. I've ruined a lot of pieces trying to make one perfectly good, but slightly oversized, blank into two that were "just right." Make extras of everything.

Always try to halve each section, and then halve again and so on. By keeping the mass on each side of a division equal, the split runs truer. You can correct a split somewhat, but it's not a precise science. If you're using a froe and a brake, for instance, and your split begins to run to one side, you can exert pressure on the thicker side and possibly force a correction. With a maul and wedge, your only recourse is to flip the stock and start again from the other end as soon as you see a split start to drift.

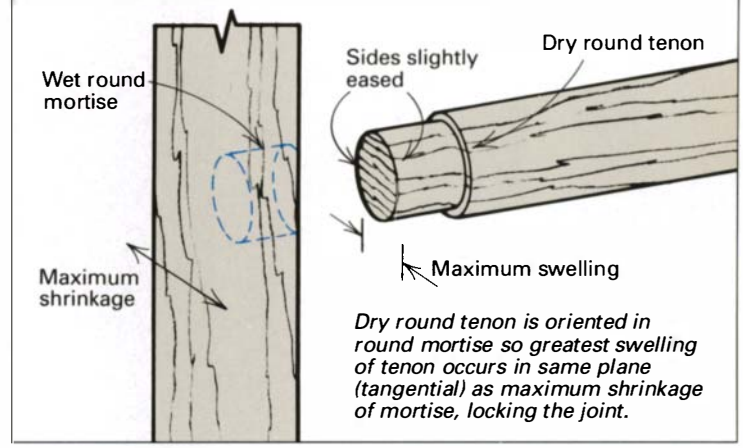
You're interested in heartwood only. Bark and pith are obviously out, but even sapwood's tricky. You can use it, but its moisture content is so much different from heartwood that it's usually more of a pain than it's worth. To remove bark and sapwood, I usually wait until I'm down to a pie-slice shaped wedge to froe it off (see the bottom left photo). The pith generally gets discarded with the small triangular section I discard from a final split.

I take rough blanks to the shaving horse (see the photo on p. 90), although other holding devices such as a bench vise would also work. I begin drawknifing, bevel down, in the radial plane, shaping a flat side perpendicular to the growth rings (see figure 1 on p. 91). Sight down stock frequently, and correct wind, or twist, as necessary. Then flip stock to an adjacent side, and square it to the first, being careful to follow the line of one growth ring. When in doubt, study the piece from the side, marking the ring line you're trying to follow. Reverse stock as necessary so that you're cutting with the grain as much as possible. Once adjacent sides are square and true, score down from those faces with a marking gauge to mark your needed dimension. The dimension chosen must allow for shrinkage. For a chair back-bow that must be ¾ in. dry, I square to about 13/16 in. Square to your marked lines, and your piece is ready for drying or bending if you're going to make a

Photos this page: Eric Day

A drive plate helps size tenons precisely. *Simply a thick piece of precisely machined steel, the drive plate helps to match tenons exactly to the auger bit used to drill the socket mortises. Such precise joinery ensures the longevity of the final product.*

Fig. 2: Wet-dry joinery



Dry round tenon is oriented in round mortise so greatest swelling of tenon occurs in same plane (tangential) as maximum shrinkage of mortise, locking the joint.

stool or rustic chair with square members. For Windsors and other pieces requiring round members, you have a bit more work.

The closer to a perfect square you produce, the more nearly perfect your round. A perfect round bends perfectly. A round begins as a square, which is turned into an octagon and then rounded. To turn squares into octagons, remove corners with a drawknife. Then just spokeshave the high points off to get a round. A concave-sole spokeshave is particularly handy here.

Stock that you're not going to be using right away needs to be stored properly if it's to stay green. Minimally, stock should always be stored out of the sun, but ideally, it should be kept immersed in water. I keep blanks in a pond by my house, but even a trough would do the job. Log halves and smaller sections also can be stored heart side down on damp ground, out of the sun and covered with a tarp. Stock that you intend to bend requires more care in this regard than wood that will be used for straight parts.

Joining green-wood components

Green-wood joinery techniques take advantage of wood's tendency to dry predominantly in the tangential plane, or roughly parallel to the growth rings. Bone-dry tenons (0 to 5% moisture) are created from the green stock by drying the shaved components, generally stretchers and spindles, in a kiln for 48 hours or so. My makeshift kiln consists of scored, foil-faced building insulation folded into a box, with wooden ends and a light bulb for a heating element. The dry tenons are then sized to a very tight fit in the tangential plane, eased slightly in the radial plane to prevent splitting out the socket mortise, and inserted into mortises drilled in moist, green wood (15 to 20% moisture). As the tenon picks up moisture from the surrounding wood, glue and air, the tenon swells in the tangential plane, locking itself permanently in place. One important caveat: A tenoned member that will also have a mortise drilled in it needs to have the mortise area protected from drying. An aluminum-foil wrap works well.

Glue in this joint acts initially to reintroduce water to an artificially dry tenon, and then it acts as a barrier to overly quick moisture exchange, protecting the wood from drastic changes. The glue is actually of secondary importance to the strength of the joint, though; it's primarily a mechanical bond.

These joints depend on close tolerances for optimum strength. A less-than-perfect joint won't usually relegate a chair to the scrap pile, but the sturdiest, most long-lived chairs will be those with perfect joints. For that reason, I had a machinist make a drive plate for me. It's nothing fancy, just a ¼-in.-thick sheet of ground steel with holes bored in it at precisely ⅜ in., ½ in. and ⅝ in. and above and below each of these in 1/64 in. increments (see the photo above). That way, I can size my tenons to the auger bit I use for the socket mortises, thereby ensuring a perfect fit. The incremental steps also allow me to take a roughly shaved spindle and gradually work it down to exactly the dimension I need by driving it to depth in successively smaller holes. Any metalworking shop should be able to make one of these plates.

A word of caution: Some woods react better to being driven than others, especially in small diameters. I've had good luck with hickory mostly and with an occasional piece of red oak, but you should take your time and get the spindles as close to tolerance as possible before driving them. □

Harriet Hodges raises sheep and harvests chair wood on a Craig County, Va., farm. She is also the indexer for Fine Woodworking.

Heirlooms for Infants

Woodworkers tackle the challenge of crafting cradles

by William Sampson

Elevated cradles are comfortable for parent and infant. *Christian Becksvoort of Maine built this cherry cradle with wishbone legs that raise it off the ground.*

Almost any woodworker who has children or grandchildren has considered building a cradle. There is something especially compelling about the idea of constructing an infant's bed and potentially creating a family heirloom to be handed down for generations.

The attraction cradles have for woodworkers prompted us to cast our editorial net to find distinctive examples of finely crafted cradles. We found designs varied as much as the woodworkers who made them, and as associate editor Alec Waters discovered in collecting cradles for this article, most have stories to go with them.

My favorite is Jean Favron's tale of a cradle he says was "built for one generation but used by the next" (see the bottom photo on the facing page). Favron, who today lives in St. Laurent, Quebec, started his cradle in 1958 on Long Island, N.Y. But his busy schedule as an aerospace engineer kept him from the woodwork, so the cradle wasn't ready for his first child.

He kept working on it, but it still wasn't done for his second child, who was born in 1961. He finally finished it in 1963 and put it into storage. Then a cross-country move made it unavailable for his third child. Let Favron tell the rest of the story: "The cradle was put in 'moth balls' until 1992. In June 1992, we became the proud grandparents of a gorgeous baby girl, and my cradle was finally put to its intended use for nearly 10 months. Mission accomplished in a somewhat unexpected way!"

When woodworkers start to design a cradle, they should keep in mind some safety issues. The Consumer Product Safety Commission's crib industry standards and guidelines for crib safety specify a maximum space of 2⅜ in. between spindles or slats (see "Crib Safety," *FWW* #100, p. 74). That's so the smallest child's torso won't fit through. Anything that could catch clothing, such as knobs or finials, should be avoided.

The designs, materials and construction of theses cradles are all different, but their makers have in common a sentiment for their subject that shows in the work. □

William Sampson is the editor of Fine Woodworking.

Photo this page: Kip Brundage

Photo: Dho K. Kim

Classic lines in a modern interpretation—*Californian Del Cover built this Windsor-style cradle (above) of koa with spindles of Macassar ebony. He spaced the spindles closely together for safety.*

Balance is critical for single-support system—*Ohio woodworker Josef Otmar built a fiberboard mock-up of this cradle (below) to ensure the right balance. The final version in cherry pivots on a hinge from a fire door support. The bassinet is fabric, reducing some of the weight.*

Photo: J. Miles Wolf

Photo: E.W. Carson

Fleur-de-lis cradle blooms from salvaged wood. *For his cradle (above), E.W. Carson of Virginia used walnut burl rescued from a neighbor's wood pile and apple from a tree taken down in a friend's yard. He used a computer graphics package to develop the fleur-de-lis shape.*

Photo: Jean Favron

Built by one generation for a second, but used by a third—*Jean Favron of Quebec started building this cradle (right) for his own children, but his construction schedule didn't keep pace with their births. His granddaughter was the first to use the cradle, which was built of birch.*

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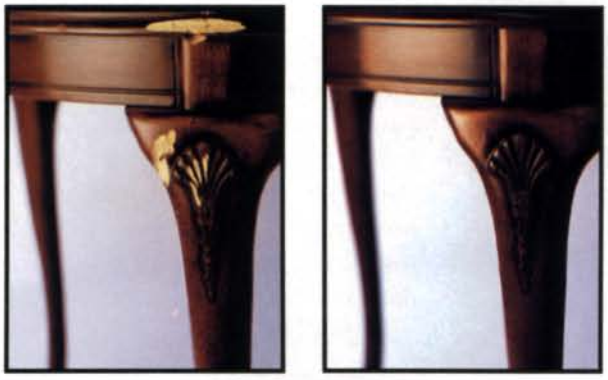

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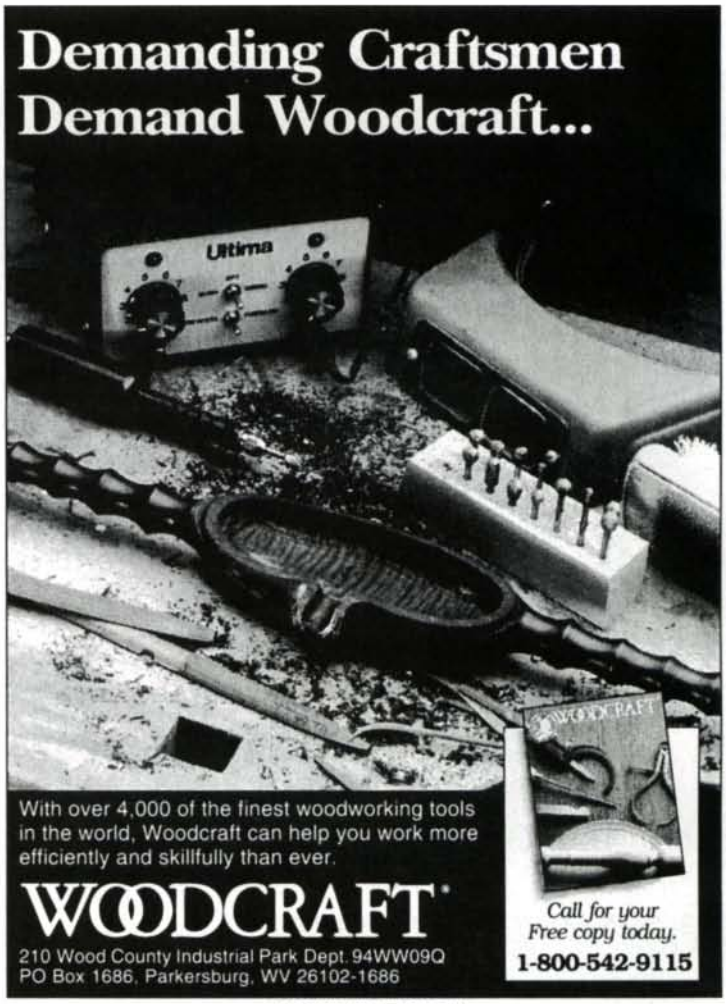

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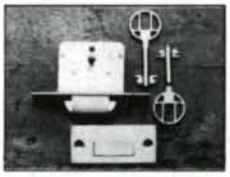

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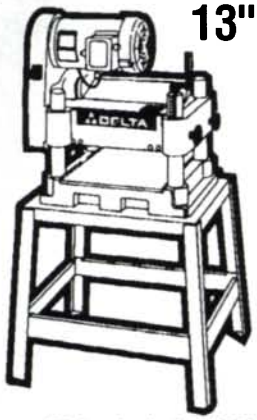

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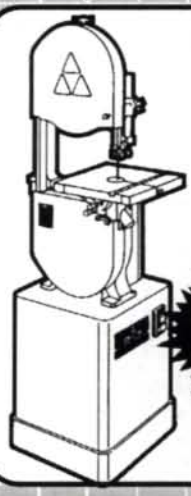

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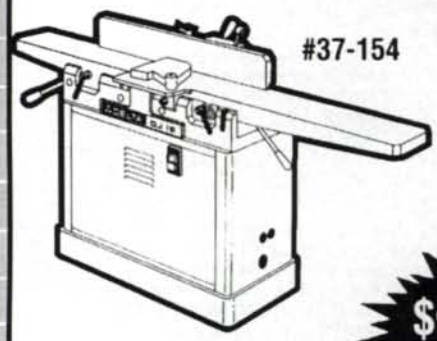

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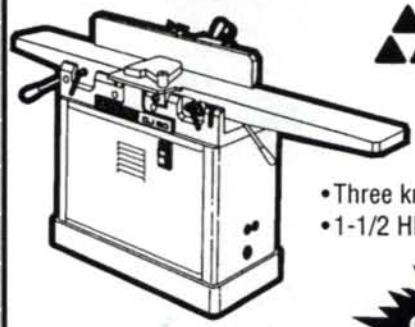

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1791208 oscillating spndle sndr 299
1791020 3/4" wood shaper 1hp 479
1791040 14" floor drill press 369
1791050 6" jointer with stand 499
1791060 14" bandsaw w/stand 599
1791070 1-1/2hp dust coll 399
1791200 6x48 belt/10" disc sndr 449
1791100 6"x89" edge sander 639

DELTA

22-540 12"Portable Planer w/Dust Collector Chute
$399

36-210 **New** 10" cmpd mtr saw 259
28-190 **New** 12" bandsaw w/std 399
11-990 12" bench drill press 204
36-380 XL-10 table saw 419
46-700 12" vs wood lathe 439
43-505 router/shaper 289
11-090 radial drill press w/stand 309
14-650 **New** mortising machine 299
28-245 14" bandsaw w/stand 599

40-560 16" 2 Speed Scroll Saw
$179

37-070 6" vs bench jointer 249
33-060 sidekick trim saw 379
40-640 20" VS scroll saw 304
31-460 4x36 belt/disc sander 134
28-180 bench bandsaw 159
23-700 wet/dry grinder 179
11-950 8" bench drill press 145
36-090 10" Sidekick miter saw 219

SSC

C4 NEW Panel Saw
$889

H5 64" capacity panel saw 1349

SIOUX

690 Air Palm Finish Sander
$134

690VV air sander w/vacuum 169
8000 3/8" VSR 0-1300 drill 129
8020 1300 rpm electric scrdrvr 169
8030 kls 3/8" R.A. drill 0-1500 149

freud

JS100 Plate Jointer With Case
$139*

JS102 jontng sys w/adj, fnc, bag 189
EDS13213.2v cdls dr kit w/2 bat 219
EDS120 12v cdls dr kit, 2 bat 199
FT-2000E 3.25 hp vs routr 179*
EB-100 edge banding system 229
UC-900 5 pc shaper cabinet set 349
94-100 5 pc router cabinet set 159
91-100 13pc 1/2" router bit set 189
SD506 **New** 6" super dado set 159
SD508 **New** 8" super dado set 179
* Price Includes Rebate

Paslode

IM-325 404600 Impulse Framing Nailer
$569

900105 Trimpulse finish nailer 569

HITACHI

C8FB2 8-1/2" Compound Mitre Saw
$599
NEW!

P12RA 12" planer/6" jointer 999
D10DFK9.6v vsr drill kit w/2 bt. 169
C10FC **New** 10" cmpnd mitre saw 289
C7BD 7-1/4" circular saw w/brk 119
M12V 3-1/4 hp VS pl. router 249
TR12 3 hp plunge router 189
CB75F resaw bandsaw 1679
F1000A 12" planer/6" jointer 1579

BIESEMEYER

50L12 50" Commercial w/12" Left
$299

26L12 26" commercial fence 269
52L12 52" homeshop fence 239
40L12 40" homeshop fence 209
28L12 28" homeshop fence 199

RYOBI

OSS450 Oscillating Spindle Sander
$169

RE600 3 hp VS plunge router 229
JP-155 6-1/8" jointer/planer 309
QS1000 **NEW** quickstand 49
TS260 10" comp. miter saw 245
TSS220 8-1/2" sldng comp. mit 469
TS380 15" miter saw 369
RA202 **New** 8-1/4" radial saw 399

AP12 12" Portable Planer
$399

BT3000 10" sliding tble saw w/sd 539
TR30U laminate trimmer 89
BE321 3x21 VS belt sander 149
DS1000 triangle detail sander 44
JM100K plate jointer 219
TFD2202VRK 12v cdls kit/2 bat. 154
TDS4000K 12v drywl drvr kt 229
BS900 **New** 9" bench bandsaw 175
BMM2400 24V mulch. mowr 349
RE175 1-3/4hp vs plunge router 129
SC162VS **New** 16" vs scroll saw 179

PORTER•CABLE

The Woodworker's Choice

333 NEW! Quicksand™, 5" Dustless Random Orbit Sander
$78

332 **New** 5" Quicksand PSA sndr 69
334 5" dustless PSA sander 78
9352VS 3x21 vs sander w/case 169
7116 **New** 24" Omni jig w/video 299

7335K-2 5" VS Sander w/Case, Pad, Dust Kit, 2 Rolls Holed Paper
$179

7336K-2 6" sander kit as above 189
7334 random oribtal sander 124
7335 5" VS random sander 134
7336 6" VS random sander 138
505 1/2 sheet finish sander 124
330 speed bloc finish sander 64
97310 laminate trimmer kit 199

550 NEW! Pocket Cutter
$185

352 3x21 sander with bag 159
360 3x24 sander with bag 199
362 4x24 sander with bag 204
503 3x24 wormdriver w/bag 359
504 3x24 wormdrive sander 349

9853 - 12 V, 3/8" VSR, 2 Speed Drill Kit W/Keyless Chuck & 2 Batteries
$164

9840 9.6 drill kit w/2 bat 164
9841 9.6v drill kit 15 min. chg. 174
9855 12v, 1/2" kit w/2 batteries 189
6611 3/8" VSR 5.5 amp drill 124
6614 1/2" VSR 5.5 amp drill 129
6615 1/2" VSR 5.5 amp, kyless 134
6645 0-2500 VSR 5.5 amp drvr 109

9690 1-1/2 HP Router W/Case
$145

556 plate jointer w/cs & adj fnc 184
555 plate joiner w/case 159
5116 16" Omni jig 259
7536 2-1/2 hp router 204
7537 2-1/2 D handle router 214
7399 drywall cutout 84
7310 laminate trimmer 99
9118 porta plane kit w/ct cutter 219

347 NEW! 7-1/4" 15 Amp Saw
$129

345 6" Saw Boss w/c.t. blade 109
9347 7-1/4" 15 amp saw w/cs 149
447 7-1/4" 15 amp saw w/brk 144
314 4-1/2" trim saw 144
9314 4-1/2" trim saw kit 158
9315-1 7-1/4" saw w/case, ct bl 144
7549 top handle VS jig saw 134

7539 3-1/4 HP 5 Speed Plunge Router
$269

690 1-1/2 HP router 144
691 1-1/2 hp D handle router 154
696 router-shaper table 134
695 router table w/router 224
7518 3-1/4 hp 5 speed router 269
7519 3 hp production router 244
7538 3-1/4 hp plunge router 244

7700 NEW! LaserLoc 10" Mitre Saw
$345

9637 electronic vs tiger saw kit 149
9647 tiger cub with case 119
693 1-1/2 hp plunge router 174
6931 plunge router base 79
97751 1/2" 2 spd hmr drl kt 159

PONY AIR

LPN672 Air Palm Nailer With Glove
$94

Drives 6d-50d nails!

DELTA

36-820 3 HP Unisaw w/52"Unifence & Motor Cover
$1549

36-830 3hp unisaw w/30" unif 1449
34-782 3hp unisaw w/unif &mc 1599
34-763 3hp Jet-Lock unisaw 1499
34-777 5hp Jetlock unisaw 1699
34-778 5 hp unisaw w/52" uni 1799

34-445K 10" Contractor's Saw w/30" Unifence & Table Board
$769*

34-444 10" contractors' saw 619
34-670 10" motorized table saw 399
34-330 8-1/4" bench table saw 249
33-890 12" radial arm saw 1429
33-990 10" radial arm saw 649

28-283K 14" 3/4 HP Bandsaw w/Fence & 3 Blades
$749*

33-055 8-1/4" sawbuck w/legs 619
37-280 6" motorized jointer 399
37-154 6" jointer, DJ-15w/stnd 1124*
17-900 16-1/2" floor drill press 409
34-080 10" mitre saw 199

43-379 3 HP HD Two Speed Shaper
$1499
NEW!

43-375 3hp LVC 2 spd shaper 1749
43-355 1-1/2 HP wood shaper 769
31-730 6" belt/12" disc sander 1199
37-350 8" jointer,DJ-20 w/stnd 1499*
46-541S 12" V.S. wood lathe 1529
40-601 18" V.S. scroll saw 769

36-220 10" Compound Mitre Saw
$229

50-181 2 hp dust collector 629
50-180 1 hp dust collector 429
50-179 3/4 hp dust collector 349
34-897 50" Delta unifence 289
34-915 30" Delta unifence 229
32-100 plate jointer 259

22-661K 13", 2 HP Planer w/Stand
$1124*

37-190 **New** 6" jointer w/stand 489
34-995 3 phase stock feeder 879
34-994 1 phase stock feeder 929
34-985 1 phase stock feeder 549

31-280 NEW Sanding Center w/Stand
$749

36-755 10" cabinet saw 979
36-751 10" cab.w/30" Unifence 1119
36-752 10" cab.w/50" Unifence 1229
70-200 20" floor drill press 799
31-380 4"x132" edge sander 1499

50-901 NEW! 3 HP, 230V Cyclone 2 Stage Dust Collector
$1,679

50-902 5 hp3 ph cyclin collectr 1799
50-903 5hp 230v cyclin collectr 1999
43-155 **New** 115v invrtd pin rtr 1399
43-156 **New** 220v invrtd pin rtr 1399
28-640 New 20" wd bandsaw 2399
* Price Includes Rebate

Panasonic

EY6100EQKW NEW! 12 V, 3/8, 21 Position Clutch Kit
$224
Plus 2 Ironman Batteries

EY6100CRKW 12v Pred kt 2 bt 189
EY6100CQKW 12v 15 min dl kt 199
EY6181CRKW 9.6v Pred kt/2 bt 169
EY6205EQK 12v 3/8" lrmmn kt 189
EY6207EQK 12v 1/2" lrmmn kt 229

JET

WBS-14CS 14" Wood Bandsaw w/Enclosed Stand
$544
NEW!

JBS-18 18" bndsw 2hp w/stand 969
WBS-20 20" wdcttng bandsaw 2299
OVS-10 oscillating spindle sndr 1849

DC-650 1HP, 650 CFM Dust Collector
$229

DC-1200 2 HP, dust collector 439
DC-1900 d. col. 3 hp/1900 cfm 599
EHVS-80 6x89 edge sander 629
JSG-6 6"belt/12" disc sander 569

JJ-6CS 6" Long Bed Jointer
$479

JJ-4 4" deluxe jointer 369
JJ-8CS 8" long bed jointer 1069
JJ-12 12" long bed jointer 2799

JTS-10JF 10" Saw With Jet Fence
$539

JCS-10A 10" cab. saw w/Jet fnc 969
JSS-20VS **NEW** 20" VS scrll saw 314
JDP-14M 14" bench 16 s. press 349
JDP-17MF 17" floor 16 s. press 414
JDP-20MF 20" floor 12 s. press 729

JDPN-607.2 18 Ga. 3/8" - 1-1/4" Nailer w/Case
$109

JDPN-671.46g 1" 1-1/2" nlr w/cs 219
JDPN-6013.2A 18g1/4" stplr w/cs 109
DHC-15T4 1-1/2hp pncake comp 299

JWL-1236 12" VS Wood Lathe w/Stand
$549

JWP-15H0 15" planer 3 hp 1229
JWP-208-1 20" plnr 2sp/3hp 1899
JWP-20H-1 20x7 planer 3hp 2999

Nailers.

2655 Original Cordura Tool Belt System
$99
Tools Not Included

Emglo

AM78-HC4V 1-1/2 HP Vertical Twin Tank
$299

AMDOL78-HC4V 1-1/2hp oilless 299
AM99-HC4V 2hp ver.twn.tnk 389
AM99-HC4 2hp twin tank 379
AM78-HC4 1-1/2hp twin tank 299
AM39-HC4V 3/4hp v twin tank 289
K15A8P 1.5hp wheelbarrow 599
K2A8P 2hp wheelbarrow 669
K5HGA-8P 5hp Honda whlbrrw 749
K4WGA-8P 4hp Wisc whlbrw 649
045 3/8" x 50' Goodyear hose 20

Nikon

AX-1 Auto Level Package
$499
Includes Tripod & Rod

AZ-2 24X auto level package 699
AL12 auto laser level 999

"Jorgensen"

8" Handscrew
$12

1 10" handscrew 13
2 12" handscrew 15
3 14" handscrew 19
4 16" handscrew 25
7224 24" I-bar clamp 19
7236 36" I-bar clamp 21
7248 48" I-bar clamp 23
7260 60" I-bar clamp 25

md

SMPR2 SMARTLEVEL 2' Pro Rail w/Module & Case
$89

PR4 4' Pro Rail w/mod. 105
PR78 78"Pro Rail w/mod. 139

Milwaukee

6527 Variable Speed Super Sawzall
$174

5377-1 1/2" kylss hamr drill kit 209
5369-1 3/4" SDS hamr drill kit 239
5371-1 1/2" hammer drill kit 189
5365-1 Hawk 1" SDS rtry. h. kit 349
5353 Eagle 1-1/2" rtry hmr kit 529
5660 1-1/2 hp 10 amp router 189
5680 2 hp 12 amp router 209

6491 10" Miter Saw With C.T. Blade & Bag
$289

6507 VS sawzall with case 144
6508 VS sawzall with case 144
6528 VS super sawzall 174
5397-1 3/8" hammer drill kit 139
5375-1 1/2" hammer drill kit 179

0407-1 NEW! 12 Volt VSR Cordless Kit w/Keyless Chuck & Extra Battery
$174

6127 5" random orbital sander 149
0222-1 3/8" VSR 3.5 amp drill 108
0229-1 3/8"vsr keyless drill 114
0234-1 1/2"VSR 0-850 magnum 129
0236-1 1/2" drill w/case & bits 159
0244-1 1/2"VSR 0-600 magnum 129
1676-1 2 sp. hole hawg kit 269

6368 7-1/4" Saw w/C.T. Blade, Case and Fence
$139

6369 7-1/4" saw w/ct blade 149
6758-1 0-4000 VSR screwdriver 98
0380-1 3/8" keyless angle drill 169
0375-1 3/8" close quarter drill 129

6767-1 5 Amp Heavy Duty Screw Shooter Kit
$139

3107-1 vs right angle drill kit 214
6142 4-1/2" angle grinder 124
5455 7" 1750 rpm polisher 138
5460 7" vs 0-1750 polisher 169
6256 VS top handle jig saw 144
6010 1/2 sheet finishing sander 124
8975 dual temp. heat gun 59

READER SERVICE NO. 303

Industry Standards!

Hours: M-F 7:00-7:00 CST
Saturday 8:00-4:00 CST

shop-vac

890-11
10 Gallon, 2 Stage, 2 HP By-Pass S. Steel Vac
$289

610-50 10 gal. S.S. cont. vac 174
750-01 300 CFM Tool Mate 239
464-38 12 gal. poly. cont. vac 189

Vein

MSX-636
Triangular Oscillating Sander w/Case & Paper
$189

FUJI

Three Stage Turbine High Volume Low Pressure Sprayer
$599

SENCO

SN60 NEW
Full Head Stick Nailer w/Case
$449

SN325+ NEW 6d-12d nailer 419
SLP20 NEW 5/8"-1-5/8" brad nlr 279
SN70 6d-16d frame nailer 479
SFN-1 1"-2" finish nailer 309
SFN40 1-1/2 to 2-1/2 fin. nlr. 389
SKS 1/4" crown finish stapler 279
M-II 1-3/8" to 2" HD stapler 369
SPS-RFR roofing stapler 349

AEG

TXE-150
6" EVS Random Sander
$142

FSPE-100X 3x21 VS belt sander 179
BSPE-100X New barrel grip jigsw 159
BSPE-100X New top hndl jigsaw 159

makita

3612BRA
3 HP Plunge Router w/Brake
$179

6095DWE 9.6v 3/8"vsr kyls, 2/bt 139
5007NBK 7-1/4" saw w/case 129
5007NBA 7-1/4" saw w/elct. brk. 134
2711 10" table saw w/brake 569
2708W 8-1/4" table saw w/ct bl. 299
LS1030 10" mitre saw 239
2012 12"port. planer w/dust cht 539

LS1011
10" Compound Mitre Saw
$529

LS1020 10" miter saw w/10" bld 229
LS1440 14" hd miter saw 399
6201DWE 9.6v Makpak kyls 2 bt 159
6211DWE 12v MakPac kit w/2 bat 169
9820-2 blade sharpener 209
HP2010N 3/4", VSR hammer kit 179
JR3000V VS recip. saw kit 138
N1900B 3-1/4" planer w/case 134
2040 15-5/8" stationary planer 1699

SKIL

HD77M New!
Magnum 77 Worm Drive Saw
$179

2736-04 12v, 3/8" dr. kt w/2 bat 139
7484 5" random orbital sander 109
1605 plate jointer w/case 139
77 7-1/4" worm drive saw 144
5525 New! 6-1/2" circular saw 119
5660 8-1/4" 60° pro bevel saw 149
5860 8-1/4" 60° rafter master 179

PERFORMAX S/T

16-32 NEW
16"-32" Bench Drum Sander
$799
Optional Stand

Powerfeed attachment 319
Per-ST100 radial saw srfc sndr 279
ProMax III stationary sander 1589
SuperMax 25" stationary sander 2269
SuperMax-25 25"dual drm sndr 2749
SuperMax 37 37" drum sander 2995
SuperMax37x2 37"dual drmsndr 3449

HITACHI

NR83A
Full Head Stick Nailer
$399

NR83AA clipped head stick nlr 414
NV83A full head coil nailer 414
NV45AB coil roofing nailer 419
N5008AA 5/8" to 2" HD stapler 329
NT65A 1" to 2-1/2" brad nailer 324
NT45A 5/8" to 1-3/4" brad nailer 274

Bauer Corporation

30406
6' yellow, 300 lb Fiberglass Stepladder
$79

30405 5' fiberglass ladder 69
30404 4' fiberglass ladder 59

lignomat

Mini-Ligno Wood Moisture Meter 6-20%
$99

Mini-ligno E 6-36% 109

Wap

766RDF
Turbo Vacuum
$429

Drywaller turbo drywaller vac 529

KRAUSE

121482
12' Multimatic Alum. Ladder
$129

121499 16 foot ladder 149

Skil

2694
7-1/4" Super Sawcat w/Brake & Case
$154

2695 8-1/4" super sawcat w/br. 164
79-034 # 400 workmate 109
2874K 14.4v 3/8 drill driver kit 219
2872K-2 12v 3/8 rill kit 2/bat 199
2764K-2 9.6v cyclone kit w/2 bat 139
2765K-2 12v, kylss supr cyclone 174
1311 1/2" HD VSR Holgun drill 129
1180 3/8" HD VSR Holgun drill 114

5014
3/4" Rotary Hammer w/Case
$199

2037 0-4000, VSR, 5A scrugun 99
2054 0-2500, VSR, 5A scrugun 159
2059 0-2500, VSR, 5A tek gun 119
2670 1/2" HD impact wrench 159
5073 1/2" VSR hammer drill kit 179
3157K VS orbital jig saw kit 154
3105 VS orbital cutsaw kit 149
4076 Wildcat grinder 6000rpm 164
2750 4-1/2" angle grinder 84

STABILA

24670
4' Level w/Hand Holes & Padded Case
$20 Case Value!
$59

24640 2' level w/hand holes 45
24680 6' level w/hand holes 105
27000 78" level wo/hand holes 115
27010 96" level wo/hand holes 125

BOSCH

B7000 New
Corner Detail Sander
$69

3272 3-1/4" planer 4.2 amps 89
1608U underscribe lam. trmr 149
1609KX laminate trimmer kit 219
1195VSR 3/8" 6amp hmr drill 139
1194VSR 1/2VSR 6amp hmr dr. 159

1613EVS NEW!
Microfine Plunge Router
$194

1614EVS 1-1/4 hp,vs, pl router 159
1370DEVS 6" hd random sander 224
B4050 New in-line jig saw 124
B1650K New plate joiner kit 179
B7300 6" random orb. sander 139
B9250 5" 8.5 amp grinder. 149
B2300K 12 V vsr 3/8 drill kit 179
1289D 1/4 sheet palm sander 69
1347AK 4-1/2" grinder kit 109

VEGA

U26
Utility 26" Fence
$169

U50 utility 50" fence 189
PRO40 professional 40" fence 239
PRO50 professional 50" fence 249
DU-36 utility 36" duplicator 395
D-36 prof. 36" duplicator 569

Elu

3338
2-1/4 HP Electronic VS Plunge Router
$199

3339 3 hp vs plunge router 269
3380 joiner/spliner w/case 175
2721 1.5hp fixed base router 149
3379K plate joiner w/case 239
3375 3-1/8" universal planer 169
4024 3x21 VS sander 184

David White

LP6-20
20X Sight Level Package
$199

ALP8-20 NEW auto level pkg. 549
LP6-20XL NEW sight level pkg. 259
ML100 visible beam laser 1099
AEL-300 auto laser level 1599
LTP6-900 level transit pkg. 379
ALTP6-900 18 auto lvl trnst pkg 479
AL8-22 22 x auto level 424
LT6-900 20 x level transit 244
LT8-300 26 x transit 445
LT8300P 26 x opt. transit 519
ALT6-900 18x auto level transit 399
ALP6-18HD 18x auto package 379

qual-craft

2200
Pump Jack
$58

2201 top brace 20
2203 guard rail holder 21
2204 work bench 38
2601 NEW wall jack 109

Honda Power Equipment

EB2500XKIA NEW!
2500 Watt Construction Generator
$999

EB3500XK1A 3500 w generator 1439
EB5000XK1A 5000 w generator 1799
EB6500SXA 6500 w generator 2399
EW171AB8 4000 watt gen/weld. 2099
EB12DAGA1 12,000 w. dsel gen. 7499

EX1000A
1000 Watt Generator
$639

EM2500XKIA 2500 watt gen. 1029
EM3500SXK1A 3500 elec. start 1549
EM5000SXK1A 5000 elec. start 1899
ES6500KIA 6500 electric start 2599

GX160K1QX
5 HP Horz. w/Oil Alert
$339

GX240K1QA 8 hp horz. engine 499
GX340K1QA 11 hp horz. engine 599

For optimum performance & safety we recommend you read the owner's manual before operating your Honda Power Equipment. Connection of generators to house power requires transfer device to avoid possible injury to power company personnel. Consult a qualified electrician.

STANLEY BOSTITCH

N80S-1
16d Stick Nailer
$359
NEW!

N80C-1 New coil nailer 379
N60FN 1-1/4"-2-1/2" finish nlr 339
BT35-2 5/8" to 1-3/8" brad tackr 179
T50S4-1 sheathing/deck stapler 369
MIIIFS floor stapler 549

Accu-Miter

Precision Mitre Gauge
Bar Included!
$149

24-46 miter gauge w/bar 164

Porta-Nailer

401P
Hardwood Floor Nailer
$199

501 floor face nailer 199
120 universal router table 329

BOSCH

1587VS
Top Handle Jig Saw w/Case & 30 Blades
$199

1587VS top handle jigsaw 149
1584VS barrel grip Clic jig saw 149
1587DVS top hdl dustless jigsaw 194
1584DVS barrel dustless jig saw 194
1632VSK VS recip saw kit 159
3051VSRK kyls3/8VSRkit w/2bat 144
3258 3-1/4" power plane 139
1654 7-1/4" saw w/ct blade 114

3283DVS
Dustless Random Orbital Sander
$95

3283DVSK 5" random sander kit 119
1348AE 5" elec. mini grinder 119
1608 laminate trimmer 98
1609 offset base laminate trmr 149
1942 heavy duty heat gun 79

3054VSRK
12 V, 3/8" VSR Kit w/2 Batteries
$189

1273DVS 4x24 vs belt sander 229
1273D 4x24 sander with bag 219
1272D 3x24 sander with bag 209
3270DVS 3x21 vs sander w/bag 169

1615EVS
3 -1/4 HP, VS Plunge Router
$269

1608DW drywall cutout tool 94
1604 1-3/4 hp router 144
1606 1.75 D-handle router 189
1609K 3 in one trimmer kit 179

1003VSR
3/8" Keyless 0-1100 Drill
$94

1021VSR 3/8" VSR 0-1100 drill 109
1022VSR 3/8" 0-1100 XHD VSR 114
1023VSR 1/2" 0-550 hd VSR dr. 129
1024VSR 3/8" 0-1000 m. midget 124
1025VSR 1/2" 0-650m. m drill 124

1404VSR
0-4000 Drywall Driver
$89

1405VSR 0-2500 drywall driver 109
1420VSR 0-4000 hd drywall dr 99
1421VSR 0-2500 hd drywall dr 119

11212VSR
3/4" Bulldog SDS Rotary Hammer
$199

11214VS 1.75 VS rotary hmr 749
11304 Brute breaker hammer 1199
11305 demolition hmr 10 amp 729
11220EVS 1-1/2" spline hmr 499
11219EVS 1-1/2" spline w/stop 569
11310EVS vs demolition hmr 549

DaVIS

7425
NEW Weather Wizard III
$189

7440 weather monitor II 359

SPIRIT

SV10K NEW!
1 Watt Communication Radios (Pair)
$339
Complete with charger & batteries.

DeWALT

DW705
12" Compound Miter Saw
$359

DW682K plate jointer kit 225
DW625 3hp elec, vs plng router 269
DW615 1-1/4 hp vs plg router 159
DW3647-1/4" saw w/brk rear pvt 149
DW360 7-1/4" saw w/brake 139
DW675K 3-1/8" planer w/case 169
DW610 1-1/2 hp, 1/2" router 149
DW306K 8 amp, vs, recip saw 164

DW421
5" Random Orbital Sander
NEW!
$79

DW420 5" PSA random sander 74
DW431 3"x21" vs belt sander 184
DW411 1/4 sheet sander w/bag 59
DW160 3/8" RA shorty drill 139
DW318K top hdl vs jigsaw kit 154
DW280K all purpose scwdrvr kt 119
DW290 1/2" impact wrench 169
DW510K 1/2" vsr hmr drill kit 169
DW402 4-1/2" angle grinder 89

DW991K
14.4 Volt, 3/8" Drill Driver Kit
NEW!
KIT BOX INCLUDED
$199

DW972K-2 12v 3/8 vsr dr w/2 bt 189
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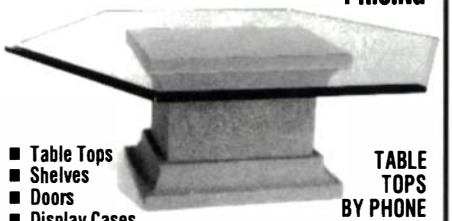

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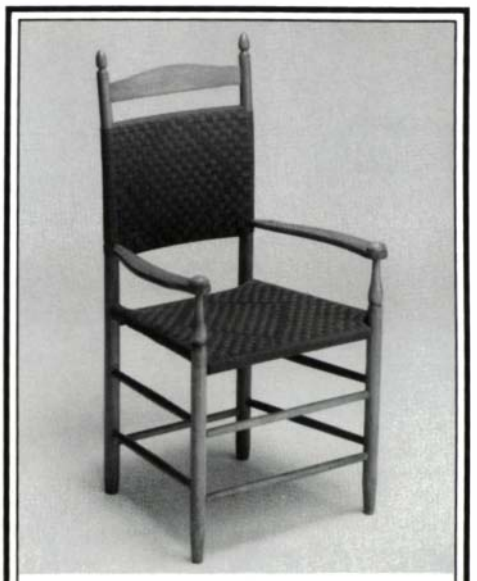

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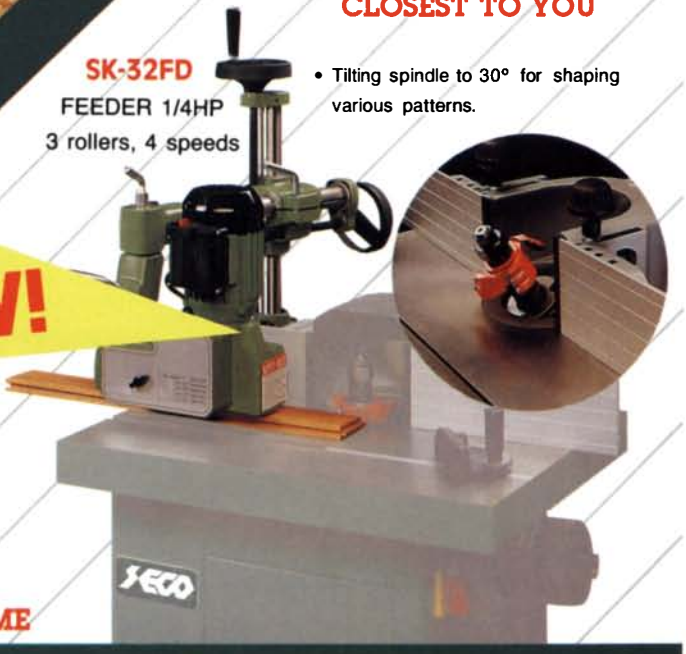

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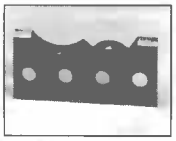

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BANDSAW BLADES

from CMT Tools

That's right, the company that's set the standard for premium router bits, circular saw blades and other cutting tools has brought its expertise to the bandsaw. And we didn't just put our name on any blade! With our reputation on the line, we've developed a line of blades that will deliver the performance the fine woodworker demands. With over 110 sizes available, CMT Tools has blades to fit just about any popular saw. Most of the blades below are "flexback" style: long-lasting alloy steel bands with hardened teeth that are ideal for wood cutting. For extra-heavy work, try our Bi-metal blades. All blades are .025" thick.

52-3/4" Blades. Fits Black & Decker 74-480, 9422

Item	Width	Pitch	Style	List	Sale
BSB-521	1/8"	14 TPI	Std.	$12.30	$9.20
BSB-522	1/4"	6 TPI	Hook	$9.20	$6.90
BSB-523	1/4"	14 TPI	Std.	$9.20	$6.90
BSB-524	1/4"	32 TPI	Wavy	$9.20	$6.90
BSB-525	3/8"	6 TPI	Hook	$9.40	$7.00

56-1/8" Blades: Fits Delta 28-160, 28-180, Black & Decker 9443

Item	Width	Pitch	Style	List	Sale
BSB-561	1/8"	14 TPI	Std.	$12.90	$9.60
BSB-562	1/4"	6 TPI	Hook	$9.50	$7.10
BSB-563	1/4"	14 TPI	Std.	$9.50	$7.10
BSB-564	1/4"	32 TPI	Wavy	$9.50	$7.10
BSB-565	3/8"	6 TPI	Hook	$9.70	$7.30

57" Blades: Fits Sears 244530, Shopcraft, Duracraft

Item	Width	Pitch	Style	List	Sale
BSB-571	1/8"	14 TPI	Std.	$12.90	$9.60
BSB-572	1/4"	6 TPI	Hook	$9.50	$7.10
BSB-573	1/4"	14 TPI	Std.	$9.50	$7.10
BSB-574	1/4"	32 TPI	Wavy	$9.50	$7.10
BSB-575	3/8"	6 TPI	Hook	$9.70	$7.30

59-1/2" Blades: Fits B & D 9411, Pro-Tech 9", Ryobi BS900

Item	Width	Pitch	Style	List	Sale
BSB-591	1/8"	14 TPI	Std.	$12.90	$9.60
BSB-592	1/4"	6 TPI	Hook	$9.50	$7.10
BSB-593	1/4"	14 TPI	Std.	$9.50	$7.10
BSB-594	1/4"	32 TPI	Wavy	$9.50	$7.10
BSB-595	3/8"	6 TPI	Hook	$9.70	$7.30

62" Blades: Fits Walker-Turner 10", Skil 3104, Sears 2442

Item	Width	Pitch	Style	List	Sale
BSB-621	1/8"	14 TPI	Std.	$13.60	$10.20
BSB-622	1/4"	6 TPI	Hook	$9.90	$7.40
BSB-623	1/4"	14 TPI	Std.	$9.90	$7.40
BSB-624	1/4"	32 TPI	Wavy	$9.90	$7.40
BSB-625	3/8"	6 TPI	Hook	$10.10	$7.60

71-3/4" Blades: Fits Delta 28-140, Shopsmith

Item	Width	Pitch	Style	List	Sale
BSB-711	1/8"	14 TPI	Std.	$14.30	$10.70
BSB-712	3/16"	4 TPI	Skip	$10.30	$7.70
BSB-713	3/16"	10 TPI	Std.	$10.30	$7.70
BSB-714	1/4"	6 TPI	Skip	$10.30	$7.70
BSB-715	3/8"	4 TPI	Skip	$10.30	$7.70

72-5/8" Blades: Fits Sears 10", Skil HD3640, Dremel 1120

Item	Width	Pitch	Style	List	Sale
BSB-721	1/8"	14 TPI	Std.	$15.00	$11.20
BSB-722	3/16"	4 TPI	Skip	$10.60	$9.00
BSB-723	3/16"	10 TPI	Std.	$10.60	$9.00
BSB-724	1/4"	6 TPI	Skip	$10.60	$9.00
BSB-725	3/8"	4 TPI	Skip	$10.60	$9.00

80" Blades: Fits Boice Crane 800, Sears 2428, 24832N

Item	Width	Pitch	Style	List	Sale
BSB-801	1/8"	14 TPI	Std.	$15.70	$11.80
BSB-802	3/16"	4 TPI	Skip	$11.00	$8.20
BSB-803	3/16"	10 TPI	Std.	$11.00	$8.20
BSB-804	1/4"	6 TPI	Skip	$11.00	$8.20
BSB-805	3/8"	4 TPI	Skip	$11.00	$8.20

82" Blades: Fits Delta 28-190, 28-560

Item	Width	Pitch	Style	List	Sale
BSB-821	1/8"	14 TPI	Std.	$15.70	$11.80
BSB-822	3/16"	4 TPI	Skip	$11.00	$8.20
BSB-823	3/16"	10 TPI	Std.	$11.00	$8.20
BSB-824	1/4"	6 TPI	Skip	$11.00	$8.20
BSB-825	3/8"	4 TPI	Skip	$11.30	$8.50

92-1/2" Blades: Fits Sears 24393, most 14" imports

Item	Width	Pitch	Style	List	Sale
BSB-921	1/8"	14 TPI	Std.	$17.10	$12.80
BSB-922	3/16"	4 TPI	Skip	$11.70	$8.80
BSB-923	3/16"	10 TPI	Std.	$11.70	$8.80
BSB-924	1/4"	6 TPI	Skip	$11.70	$8.80
BSB-925	3/8"	4 TPI	Skip	$12.10	$9.10
Heavy-duty resaw blades:					
BSB-926	3/4"	3 TPI	Hook	$14.40	$10.80
BSB-927	3/4"	3 TPI	Skip	$14.40	$10.80
BSB-928	3/4"	6 TPI	Std.	$14.40	$10.80
BSB-929	3/4"	10 TPI	Std.	$14.40	$10.80
BSB-920	1"	3 TPI	Hook	$16.80	$12.60
BSB-192	1"	8 TPI	Std.	$16.80	$12.60
BSB-292	1"	14 TPI	Std.	$16.80	$12.60

93-1/2" Blades: Fits Delta 28-245, Jet JBS-14CS, Enlon EN-BS14, Elephant VBS-14, Reliant 14"

Item	Width	Pitch	Style	List	Sale
BSB-931	1/8"	14 TPI	Std.	$17.10	$12.80
BSB-932	3/16"	4 TPI	Skip	$11.70	$8.80
BSB-933	3/16"	10 TPI	Std.	$11.70	$8.80
BSB-934	1/4"	6 TPI	Skip	$11.70	$8.80
BSB-935	3/8"	4 TPI	Skip	$12.10	$9.10
Heavy-duty resaw blades:					
BSB-936	3/4"	3 TPI	Hook	$14.40	$10.80
BSB-937	3/4"	3 TPI	Skip	$14.40	$10.80
BSB-938	3/4"	6 TPI	Std.	$14.40	$10.80
BSB-939	3/4"	10 TPI	Std.	$14.40	$10.80
BSB-930	1"	3 TPI	Hook	$16.80	$12.60
BSB-193	1"	8 TPI	Std.	$16.80	$12.60
BSB-293	1"	14 TPI	Std.	$16.80	$12.60

95" Blades: Fits Duro 3022, Powermatic 141, 143

Item	Width	Pitch	Style	List	Sale
BSB-951	1/8"	14 TPI	Std.	$17.10	$12.80
BSB-952	3/16"	4 TPI	Skip	$11.70	$8.80
BSB-953	3/16"	10 TPI	Std.	$11.70	$8.80
BSB-954	1/4"	6 TPI	Skip	$11.70	$8.80
BSB-955	3/8"	4 TPI	Skip	$12.10	$9.10
Heavy-duty resaw blades:					
BSB-956	3/4"	3 TPI	Hook	$14.40	$10.80
BSB-957	3/4"	3 TPI	Skip	$14.40	$10.80
BSB-958	3/4"	6 TPI	Std.	$14.40	$10.80
BSB-959	3/4"	10 TPI	Std.	$14.40	$10.80
BSB-950	1"	3 TPI	Hook	$16.80	$12.60
BSB-195	1"	8 TPI	Std.	$16.80	$12.60
BSB-295	1"	14 TPI	Std.	$16.80	$12.60

105" Blades: Fits Inca 710, Delta, Jet & other 14" extended

Item	Width	Pitch	Style	List	Sale
BSB-101	1/8"	14 TPI	Std.	$19.20	$14.40
BSB-102	3/16"	4 TPI	Skip	$13.20	$9.90
BSB-103	3/16"	10 TPI	Std.	$13.20	$9.90
BSB-104	1/4"	6 TPI	Skip	$13.20	$9.90
BSB-105	3/8"	4 TPI	Skip	$13.60	$10.20
Heavy-duty resaw blades:					
BSB-106	3/4"	3 TPI	Hook	$16.20	$12.10
BSB-107	3/4"	3 TPI	Skip	$16.20	$12.10
BSB-108	3/4"	6 TPI	Std.	$16.20	$12.10
BSB-109	3/4"	10 TPI	Std.	$16.20	$12.10
BSB-110	1"	3 TPI	Hook	$18.90	$14.20
BSB-111	1"	8 TPI	Std.	$18.90	$14.20
BSB-112	1"	14 TPI	Std.	$18.90	$14.20

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Standard
General purpose teeth for curved or straight cuts.

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Good for soft materials & non-ferrous metals.

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Cuts soft woods & non-ferrous metals faster than the Skip tooth.

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This handy jig holds both ends of the blade in perfect position for brazing. Use your propane torch to quickly fix broken blades, or make your own custom blades from the coil stock sold below. Kit includes blade clamp, 1 oz. of flux, 10" of silver solder (enough for about 20 blades) & instructions.

BBF-001 Soldering Fixture List: $67.50 Sale: $44.90

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These coils are a great money-saver for high-volume shops. All band is our high-quality .025" thick "flexback" stock.

	1/8" wide	1/4" wide	3/8" wide	1/2" wide	3/4" wide
List	$140.70	$73.70	$78.20	$84.90	$107.20
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Sure, our bi-metal blades cost more, but they can pay off handsomely if you plan to keep your saw running all day, every day! Special high speed steel hook-style teeth are electron-beam welded to a tough, flexible back. Last 10 times longer than other blades, cut wood, steel & non-ferrous metals

Item	Length	Width	Pitch	List	Sale
BBB-821	82"	1/4"	6 TPI	$35.60	**$26.70**
BBB-822	82"	3/8"	4 TPI	$35.60	**$26.70**
BBB-823	82"	1/2"	4 TPI	$35.60	**$26.70**
BBB-931	93.5"	1/4"	6 TPI	$37.50	**$28.10**
BBB-932	93.5"	3/8"	4 TPI	$37.50	**$28.10**
BBB-933	93.5"	1/2"	4 TPI	$37.50	**$28.10**
BBB-101	105"	1/4"	6 TPI	$42.10	**$31.60**
BBB-102	105"	3/8"	4 TPI	$42.10	**$31.60**
BBB-103	105"	1/2"	4 TPI	$42.10	**$31.60**

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Second-generation synthetic waterstones

Until recently, choosing synthetic Japanese waterstones has been simple. The King-brand stones cornered the market long ago, with no harm done. Mine have seen years of faultless daily use.

However, in the last few years, a wide variety of newer synthetic stones has become available. I recently honed various Western and Japanese tools with each of the stones shown in the photo below, and I found that these newer stones outperform my old standbys, the Kings, each brand in its own particular way.

Bester

Bester ceramic stones are the most aggressive of the bunch, cutting substantially faster than King stones but also quite cleanly. And their extra width (a full 3 in.) is a bonus when honing plane irons and the backs of long-bladed Western chisels. Bester stones have a harder surface than Kings, but they produce a slurry, or mud, very quickly and can wear more rapidly. They are easy to re-flatten, though. Sandpaper on glass or a hard, supercoarse stone (#220 or so) works best. Unlike the Kings, the Besters don't true each other well. But when being re-flattened, the Bester's matte colors show the contrast between high and low spots boldly, making it easy to tell when they're flat again.

Aquastone

Aquastones are also ceramic and remind me the most of King stones. They are about the same size as the Kings, come in the same grits and are similarly consistent overall. However, Aquastones are clearly—and pleasantly—superior. They wear better than King stones, and it takes just a few seconds to produce a smooth mud while honing a tool on them. Steel cruises through the mud, cutting quickly and without grabbing. Aquastones are also easy to re-flatten. They flatten each other efficiently (a coarser stone trues a finer one), or you can use sandpaper on glass or a hard, supercoarse stone if you prefer. Low spots show well during flattening.

The Aquastone finishing stone (#8000) is big, fast-cutting and hard-wearing. It's ideal for Western tools, though it doesn't polish Japanese tools as well as other finish stones. Using a nagura (a soft, fine-grained natural stone) to build up a polishing mud is essential with the Aquastone, though, and takes longer than with a King #8000 stone. Truing the Aquastone flat is also slightly more work.

Debado

Debado stones are unique in all respects. They are manufactured and used differently from other waterstones. But once you learn the ropes, they're quite rewarding to use. Debados should appeal to die-hard oilstone users who haven't tried waterstones. For one thing, they don't soak in water. They're made to stay dry and only need to be wet lightly before using. Also, Debados are the hardest wearing waterstones I've ever used. The downside of this, though, is that when they do need to be trued, it's more work. Sandpaper is useless, and the Debados won't true each other. Your best bet is to use a hard, supercoarse stone or a flattening plate and powdered grit, although that can be a pain. Debados also need extensive initial surface prep before they'll cut well.

Though hard, Debados produce a fine mud, which is critical to their proper use. Without mud, tools skate around on the surface and hone unevenly. With the mud raised from a nagura or similar stone, the Debados cut wonderfully. The mud is especially slick, and tools don't grab or chatter. In general, Debado stones seem better suited to Japanese than Western tools. As a long-time King user, I would call the Debados a satisfying but acquired taste.

Photo: William Tandy Young

Synthetic waterstones are better today than they were 10 years ago. *Each of the eight stones in this photo is better in some way than the industry-standard King stones, which have dominated the market since the 1970s.*

Saw-Pruf coil protects power-tool cords

Congratulations are in order if you've been working wood for more than a couple of years and haven't yet sawn, routed or sanded through one of your power cords. I've not been as careful or fortunate. Luckily, neither I nor the random-orbit sander I'd borrowed from a friend sustained any permanent damage. However, I was irked that I'd pulled off such a move, sanding halfway through the cord before the power died.

It won't happen again. A group of ingenious entrepreneurs, See-Saw Manufacturing Inc. (P.O. Box 241, Macomb, Ill. 61455; 309-833-5870), have come up with an inexpensive ($3.49 suggested retail), efficient way to prevent damaged cords (see the photo below). The Saw-Pruf is a coil that threads onto the cord of your power tool and is held in place with a rubber grommet. It's easy to install and will save you from ever having to fess up to having destroyed a power cord. And at $3.49, it's a steal. You can buy the Saw-Pruf at many hardware stores and home centers or you can order it directly from the manufacturer.

—Vincent Laurence

The Saw-Pruf cord protector keeps power cords safely out of the way *of blades, bits and sanding pads. It takes only a minute to attach and costs just $3.49.*

Photos except where noted: Vincent Laurence

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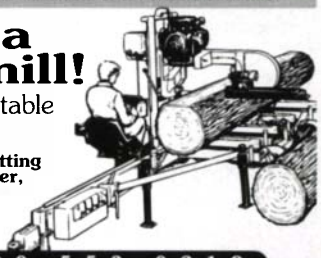

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Takenoko

Although fairly hard, the Takenoko stone polishes the bevel edges of tools with far less stuttering than the King finish stone. Like the King, though, the Takenoko stone can grab hold of the back of a wide Western tool if you let the layer of mud get too thin. The Takenoko polishing stone is the best synthetic finish stone for both Western and Japanese tools that I have ever used. It's softer than the Aquastone and the King, and it gives a higher polish, even when used without a nagura. The stone polishes with a supple, responsive feel, and the Takenoko, though not as hard-wearing, is easy to true up with an intermediate stone and shows low spots well during flattening.

Conclusion and sources

Having said all the above, here's the best advice I can offer. Stones are ultimately a matter of preference. If possible, visit a dealer and try out different brands before you buy. Japanese tool shops are especially helpful with this; other shops should follow their lead. The stones discussed in this review are available from one of the following companies:

All but the Aquastones are available from The Japan Woodworker, 1731 Clement Ave., Alameda Calif. 94501; (800) 537-7820.

As of June 1994, Aquastones are only available from Aqua Sharpening Stone and Tool, Inc., 819 Stannage Ave., Albany, Calif. 94706; (510) 525-8948.

Takenoko and Bester stones are available from Hida Tool and Hardware Co., 1333 San Pablo Ave., Berkeley, Calif. 94702; (510) 524-3700.

—William Tandy Young

Briefly noted

New Stanley catalog

A new Stanley plane is never going to have the same appeal to me that a well-used, vintage one with a rosewood handle will. That said, it's still heartening to see that Stanley has come out with a new catalog illustrating the Stanley Fine Woodworking & Specialty Tools line. Included are all the standard bench planes from the #3 to the #7 (with some of the wider half sizes), as well as many specialty planes like the #10 carriagemaker's rabbet, the #79 side rabbet and the #71 router plane. There are many other interesting items in the catalog, such as tools made by the French company Goldenberg (acquired by Stanley in 1986) and the English company Rabone (acquired by Stanley in 1989). It's worth checking out. To get a copy of the catalog, write to Stanley at Advertising Services, Stanley Tools, 600 Myrtle St., New Britain, Conn. 06050. *—V.L.*

***Aggressive and long-lasting, 3M's new purple belts** feature an extremely durable abrasive, a cloth backing and a seaming technique that makes the belts reversible.*

3M's purple sanding belts

New purple sanding belts from 3M cut faster and run smoother and cooler than the standard aluminum oxide belts I'm used to (see the photo above). Regalite, 3M's name for its new abrasive used on these belts, is a patented proprietary ceramic material that 3M's testing has shown to last four times longer than aluminum oxide, the standard belt abrasive.

These belts also feature an innovative joint technique. The manufacturer cuts the belts on an angle like regular belts. But instead of removing the abrasive from one edge and overlapping the backing material, 3M butted the two ends together and taped them on the inside with a thin layer of polyester cloth. This not only eliminates the bump but also makes the belt omnidirectional, so it's impossible to put it on backward. This effectively extends the life of the belt.

I sanded a 4-ft. length of roughsawn walnut to 120-grit on both sides in four-and-a-half minutes. I removed all the millmarks with an 80-grit belt and then switched to 120-grit to remove the 80-grit scratches.

The belts are cloth-backed and come in 3x18, 3x21 and 3x24 sizes in 50-, 80- and 120-grits. They're available at most home centers. *—Gary Straub*

New scrollsaw blade reduces tearout

Bottom chipout has always been a problem with scrollsaws. Olson's new #PG 459 blade goes a long way toward addressing this problem: Its teeth are precision ground rather than stamped, and the bottom six teeth face up. So cutting occurs on the upstroke as well as the downstroke, significantly reducing tearout (see the photo at right).

The teeth on this 8 teeth-per-inch blade have almost no set, so the resulting cut is both thin and exquisitely smooth, virtually ready for a finish. It's a perfect blade for intricate fretwork for fine furniture.

This is not for a beginner nor for anyone with a poorly tuned machine. Sloppy feeding will heat and weaken the blade to the breaking point easier than other blades this thin. Also, the reversed teeth seem to increase the tendency of the workpiece to lift. On ¾-in.-thick stock, I've had to slow my feed rate by about a third from what I'm used to with Olson's larger #409 blade. For ¼-in. stock, this new blade will cut as fast as I can accurately follow a line. What little extra care this blade requires is trivial considering its performance. To buy some of the blades or to get the name of a dealer near you, contact Olson Catalog Sales, 16 Stony Hill Road, Bethel, Conn. 06801; (800) 634-4047. *—Robert Vaughan*

Photo: Robert Vaughan

***Precision grinding and six reversed teeth prevent tearout.** Olson's new PG #459 is a little more delicate than other scrollsaw blades of the same size, but the tearout-free finish it leaves far outweighs its slightly more fragile nature.*

William Tandy Young is a professional cabinetmaker and conservator in Stow, Mass. Vincent Laurence is an associate editor of Fine Woodworking. *Gary Straub is a professional woodworker in Columbia, Mo. Robert Vaughan is a contributing editor to* Fine Woodworking *and a woodworking machinery rehabilitation specialist in Roanoke, Va.*

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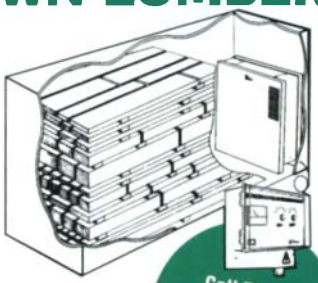

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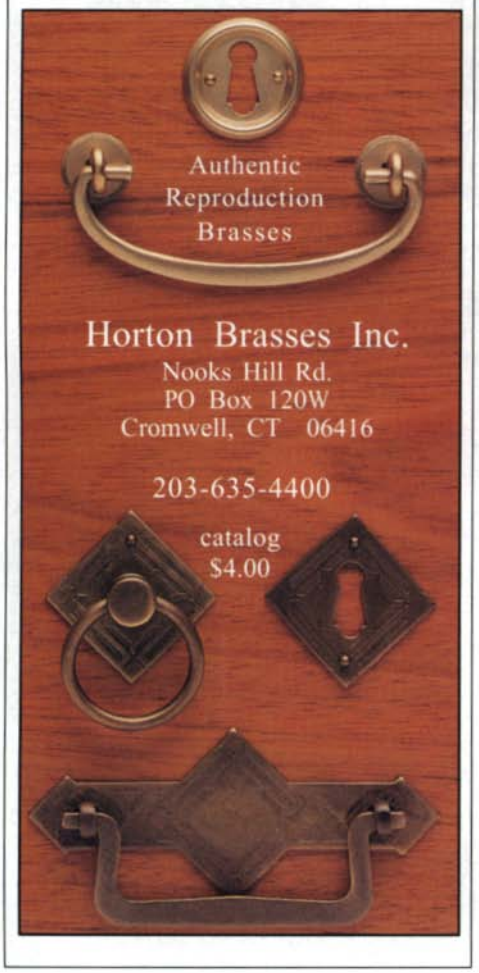

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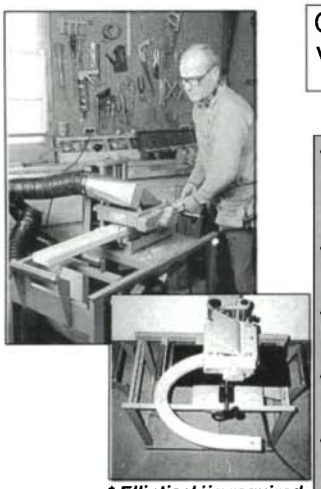

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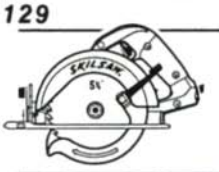

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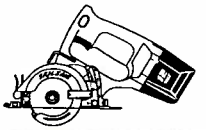

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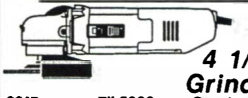

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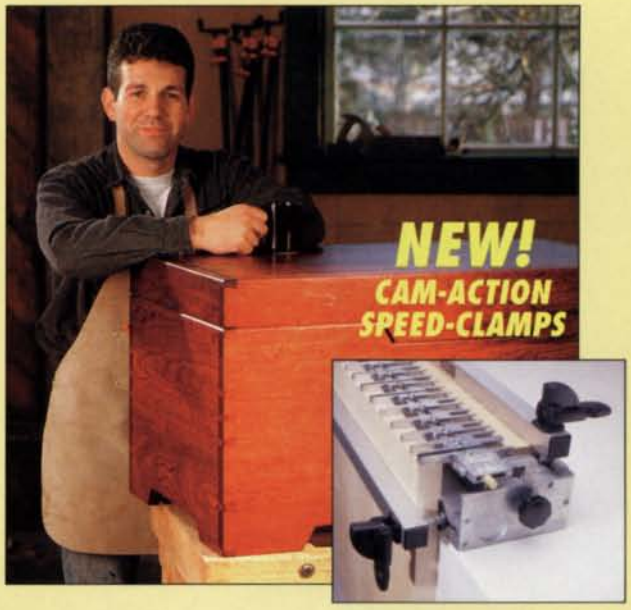

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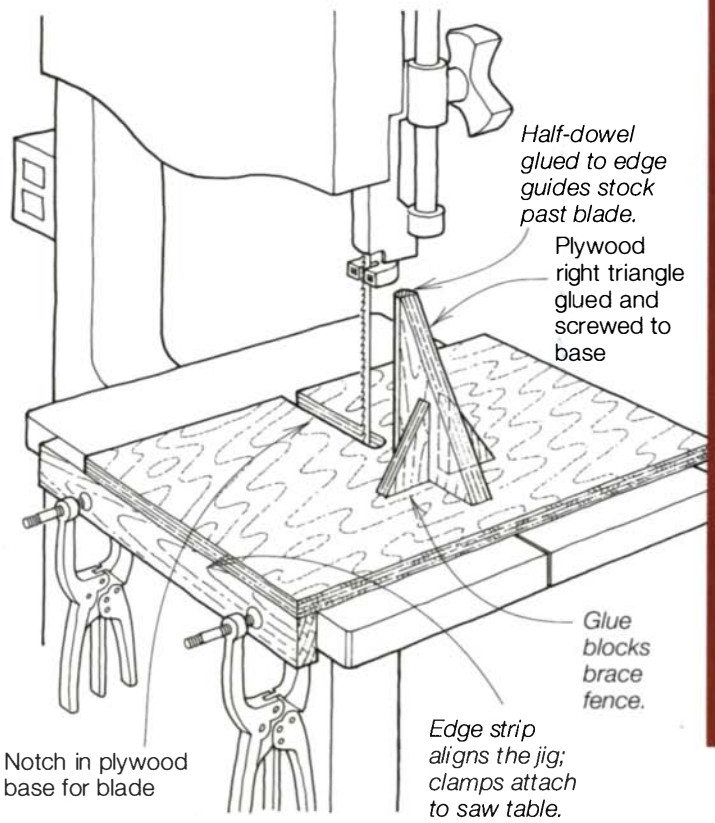

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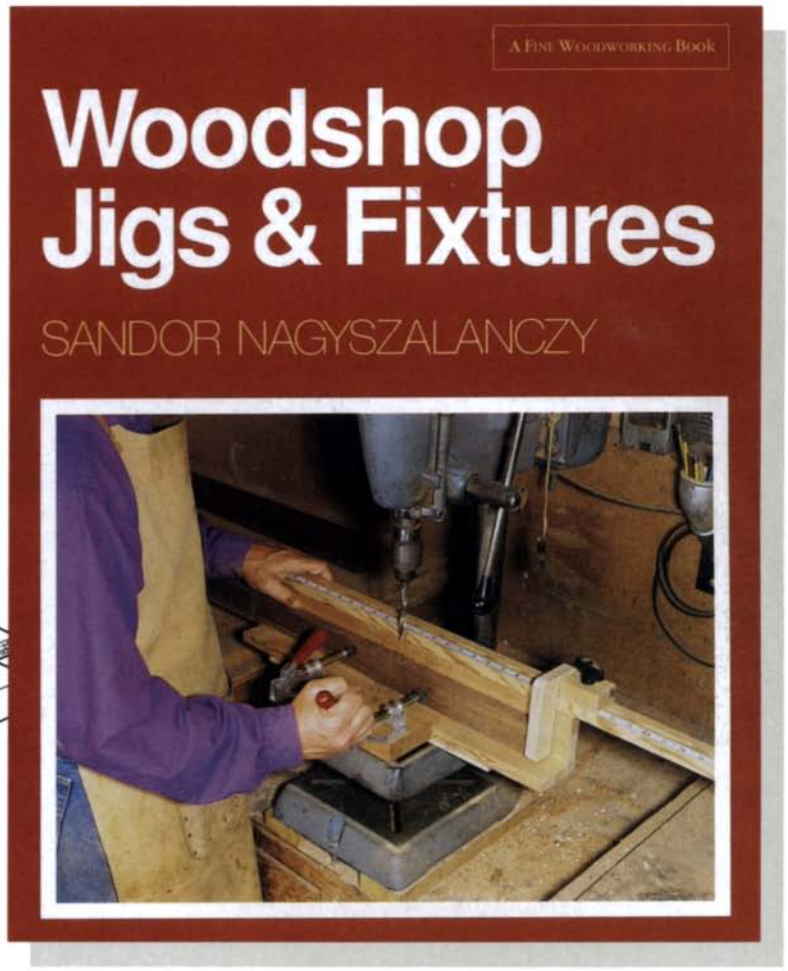

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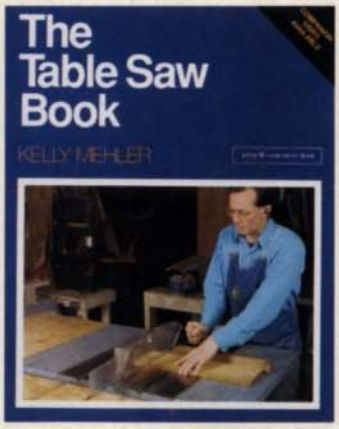

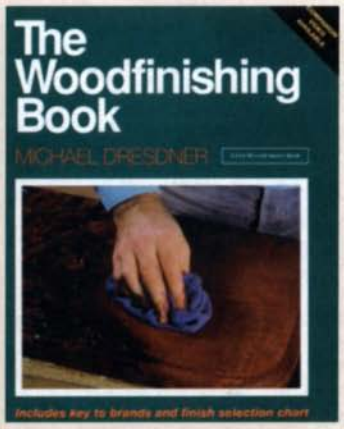

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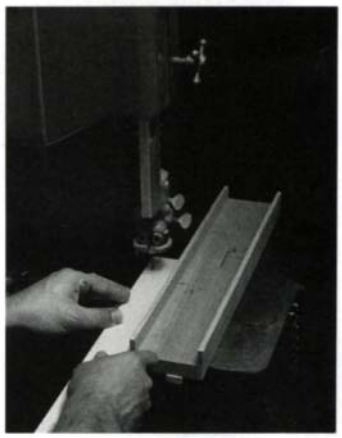

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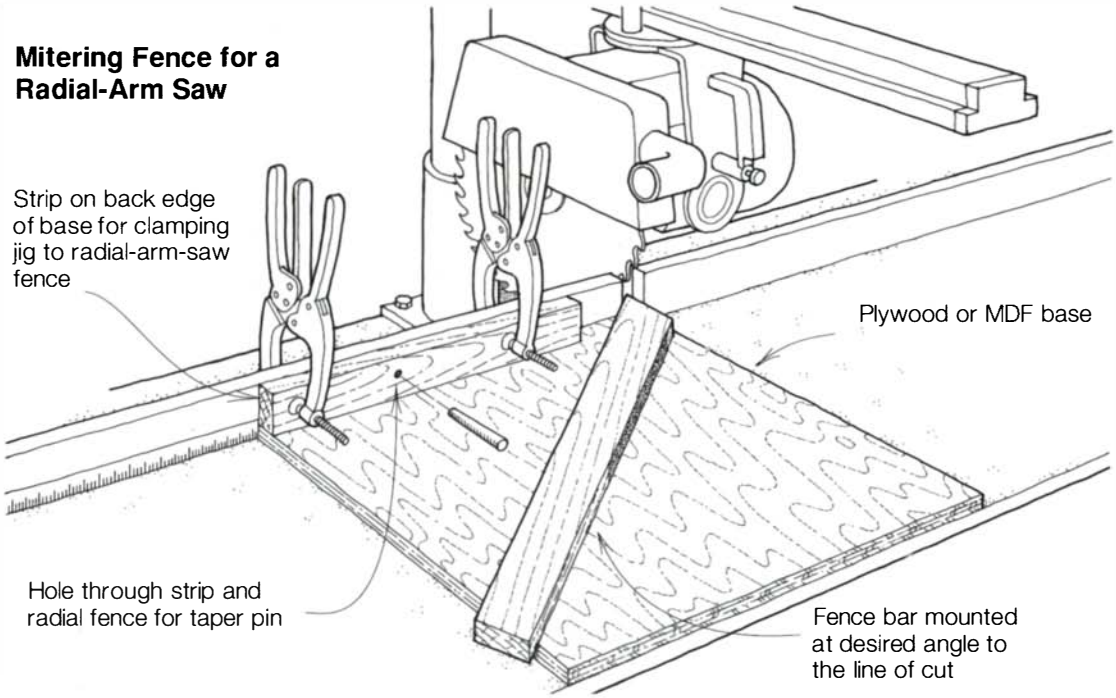

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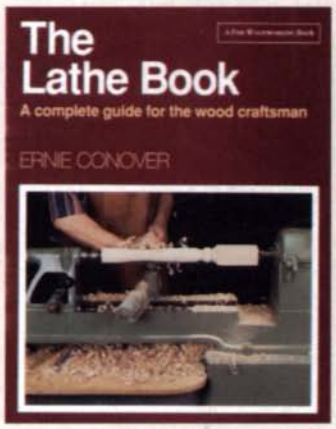

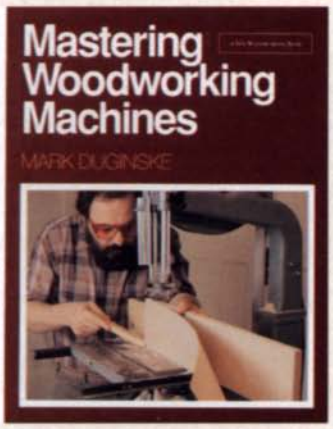

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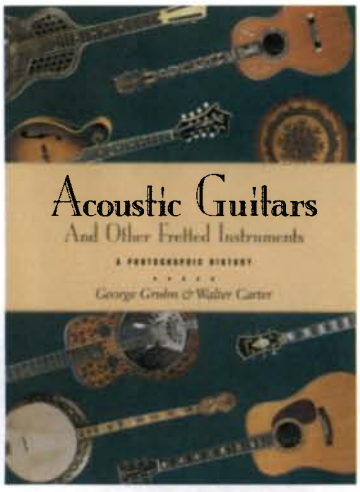
Acoustic Guitars and Other Fretted Instruments: A Photographic History by George Gruhn and Walter Carter. *GPI Books, Miller Freeman, Inc., 600 Harrison St., San Francisco, Calif. 94107; 1993. $39.95, hardback; 320 pp.*



Filled with stunning photographs of equally stunning musical instruments, this book is like a trip to a musical history museum. Anyone who appreciates fine workmanship in guitars, banjos and mandolins will find a host of exciting examples, both old and contemporary, in these pages.

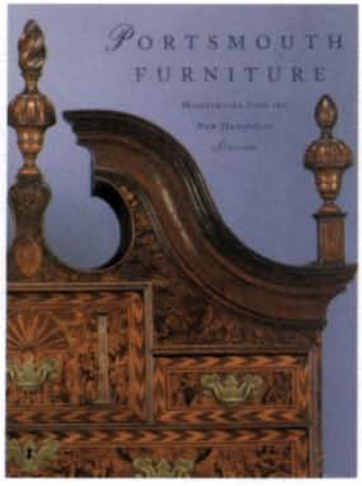
Along with the photos in *Acoustic Guitars* comes the authoritative commentary of George Gruhn, a well-known vintage instrument dealer and collector in Nashville, Tenn. He teamed up with Nashville writer Walter Carter to put the words with the pictures.

As a gallery of beautiful instruments, the book clearly succeeds with lavish color photos and fine reproduction. But if you are looking for a thorough historical discussion, the book falls short. The selected instruments too often lean toward the spectacularly unique, rather than the historically significant. Space is found for more than a few collectible oddballs, yet there are some gaps in various musical family trees. You won't find photos of every model of Martin guitar or Gibson mandolin in this book, for example. But more space is devoted to other makers such as Washburn and Lyon and Healy than in other books.

Despite the gaps in history, I suspect most woodworkers interested in fretted musical instruments will be more than satisfied by the wealth of ideas and examples that fill the book.

—William Sampson

Portsmouth Furniture: Masterworks from the New Hampshire Seacoast edited by Brock Jobe. *Distributed by University Press of New England for Society for the Preservation of New England Antiquities., 23 South Main St., Hanover, N.H. 03755; 1993. $39.95, softback; 454 pp.*



Portsmouth Furniture is a visual feast, a historical narrative and a construction primer, all wrapped into one. The book is the catalog of a superb exhibit that opened at the Currier Gallery of Art in Manchester, N.H. in the fall of 1992 before traveling to Hartford, Conn., and Portland, Maine. It examines the furniture made in and around Portsmouth, N.H., in the years from 1670 to 1840, highlighting the Queen Anne (also called Baroque), Chippendale (Rococo) and Federal (Neoclassical) styles.

Three excellent historical essays open the book. They document the rise and fall of Portsmouth as a mercantile capital, as well as the rise and fall of its furnituremakers and their wares. The essays are followed by a catalog of 117 pieces of furniture. Each entry in the catalog features a crisp black-and-white overall photograph of the piece and in many cases, there are detail shots as well. The accompanying text describes the piece and explains why it is significant, either historically or aesthetically.

Each entry also has a section providing highly detailed information on joinery, materials, finishes, hardware, repairs to the piece and more. The somewhat telegraphic format here will leave questions unanswered for the beginning woodworker, but in combination with the photos, the information is a treasure trove for the traditionally inclined woodworker with a few years at the bench.

Rounding out the book are 14 spectacular color plates of selected pieces along with a couple of appendices.

Portsmouth Furniture is not a how-to book and might be considered a coffee-table book by some. But if you appreciate beautiful, virtuosic work, you will be missing out on a tremendous value and a great experience if you don't get your hands on this book.

—Vincent Laurence

VIDEO

Swiss Cooperage: Two Days in the Workshop of Ruedi Kohler. *Country Workshops, 90 Mill Creek Road, Marshall, N.C. 28753; (704) 656-2280; 1992. $35, VHS; 46 minutes.*

If you've ever wanted to watch a master of traditional woodworking at his craft, you can't do better than watch this videotape of Swiss master cooper Ruedi Kohler. When the tape was made in 1988 at his mountainside chalet workshop, Kohler was 87 and had been making staved wooden containers for over 60 years. At an age when most of us would be glad to be able to get out of bed, this quiet virtuoso got about his work with energy, concentration and joy, making music with a full complement of familiar and specialized hand tools. Beautifully shot and edited, the tape captures Kohler as he fashions an oval milking bucket with flaring sides. There's no narration, and aside from Kohler's playing a traditional horn outside his chalet in the opening scene, the only sounds are of tools on wood, of Kohler's exertions, and an occasional "So...is good." There were a few places where I could have used a little explanation, but overall, I didn't miss the chat. This poetry didn't need words.

I was astonished by the way Kohler flawlessly jointed 14 tapered edges by hand and eye, so they met cleanly and formed a flaring oval. I was intrigued, too, by the synergy of shaving horse and workbench and by the absolute efficiency of his working. The way he worked reflected a purity of tradition, skills and knowledge brought to a rare perfection.

Shaping and fitting the beautiful arrow-lock wooden hoops that ring the bucket involved splitting from a log, measuring circumference by string, shaving, shaping and tapering, whittling and notching, bending with boiling water, final fitting and pegging with pins split from a short block. This is a woodworking course in itself. And Kohler performed it all as if he were buttoning up a shirt.

After I watched the video, I read the accompanying article on Kohler and cooperage by Drew Langsner (*FWW* #40, p. 73 and reprinted in *FWW on Bending Wood*, p. 9, The Taunton Press, 1985). I'm not sure I'm ready to make a tapered oval bucket. However, I am ready to try out the tools and techniques I observed on other projects. As Kohler's example shows, there's still plenty of time to learn.

—Tico Vogt

William Sampson is an amateur luthier and the editor of FWW. *Vincent Laurence is an associate editor of* FWW. *Tico Vogt runs a one-person woodworking shop in Saratoga Springs, New York.*

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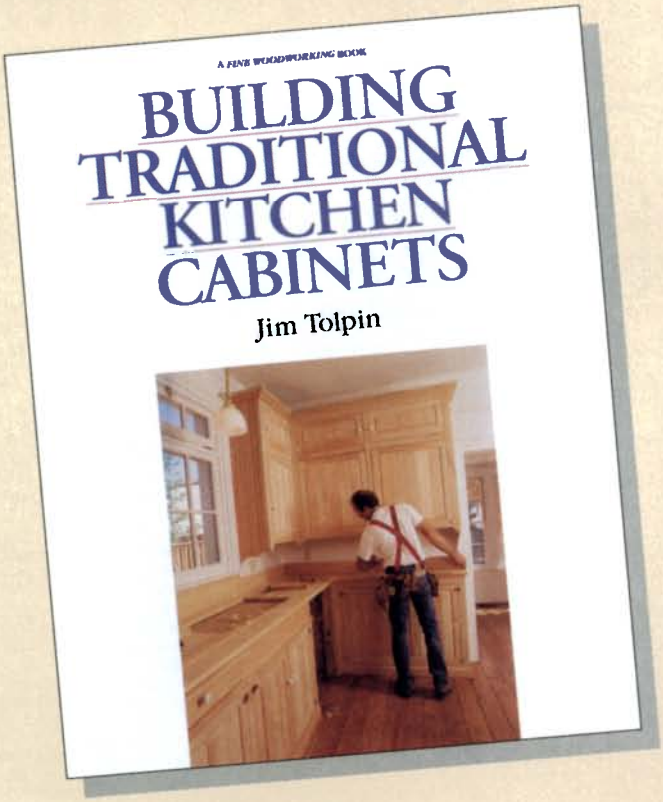

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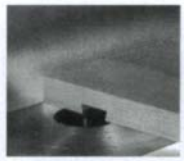

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Listings of gallery shows, major craft fairs, lectures, workshops and exhibitions are free, but restricted to happenings of direct interest to woodworkers. We list events (including entry deadlines for future juried shows) that are current with the time period indicated on the cover of the magazine, with overlap when space permits. We go to press three months before the issue date of the magazine and must be notified well in advance. For example, the deadline for events to be held in March or April is January 1; for July and August, it's May 1, and so on.

INTERNATIONAL: **Tour**-Tour Europe with George Frank, Oct. 3-13. For more information, contact Eva Frank, Horizon Travel, 3530 South Osprey Ave., Sarasota, FL 34239. (813) 955-6567.
Tour-Crafts Study Tour in Switzerland, Oct. 7-16. For more information, contact Drew Langsner, Country Workshops, 90 Mill Creek Road, Marshall, NC 28753. (704) 656-2280.
Exhibition-International Lathe Turned Objects: Challenge V, thru-Oct. 1. For more information, contact California Crafts Museum, Ghirardelli Square, 900 North Point, Box 25, San Francisco, 94109. (415) 771-1919.

ARIZONA: **Call for entries**-Turning Plus... Redefining the Lathe-Turned Object III, Dec. 10-Feb. 5. Deadline: Sept. 30. For more information, send an SASE to Arizona State University Art Museum, Nelson Fine Arts Center, Box 872911, Tempe, 85287-2911. (602) 965-2787.

ARKANSAS: **Meetings**-Woodworker's Association of Arkansas meets the first Monday of each month at 7:00 p.m. at Woodworkers Supply Center, 6110 Carnegie, Sherwood, 72117. For more information, call (501) 835-7339.
Show-The Fourth Annual Holiday Showcase, Oct. 14-16. Highway 7 Artists and Crafters Coop, 10 miles south of Jasper on Highway7. For more information, contact Sam Parsons, PO Box 326, Jasper, 72641. (501) 428-5501.
Workshops-Wood-strip canoemaking, bamboo fly-rod making, forged toolmaking for the woodworker, October thru November. White River Artisans School, 202 South Ave., PO Box 308, Cotter, 72626. (501) 435-2600.
Exhibition-Marriage in Form featuring Kay Sekimachi and Bob Stocksdale, thru Sept. 25. The Arkansas Arts Center, Decorative Art Museum, Little Rock. For more information, call Kenna Moser at (415) 329-2605.

CALIFORNIA: **Workshops**-Woodworking for women. Furnituremaking with hand tools using traditional joinery, weekends. San Francisco. For more information, contact Debey Zito (415) 648-6861.
Workshops-Various workshops including Japanese woodworking, joinery and sharpening. For further information, contact the Hida Tool Co., 1333 San Pablo, Berkeley, 94702. (415) 524-3700.
Show-The Carnival of Carvings by the Tri-Valley Woodcarvers, Sept. 10-11. The Barn, 3000 Pacific Ave., Livermore. For more information, call (408) 252-8251.
Exhibition-Sierra woodworking exhibition, Oct. 21-Nov. 13. North Columbia Schoolhouse Cultural Center, Nevada City. For further information, send an SASE to NCSCC, 17894 Tyler Foote Road, Nevada City, 95959. (916) 265-2826.
Class-Building the Norwegian Sailing Pram with Simon Watts, Oct. 10-15. For more info, contact the National Maritime Museum Association. Building 275, Crissy Field, San Francisco, 94129. (415) 929-0202.
Show-Celebration of Craftswomen, Dec. 3-4 and Dec. 10-11, Fort Mason's Herbst Pavilion, San Francisco. For more information, contact San Francisco Women's Building, 3543 18th St., #8, San Francisco, 94110. (415) 431-1180.
Show-The 1994 Wildlife Art Show and Wildfowl Carving Competition, Oct. 8-9, Doubletree Hotel, Orange. For more information, contact Lloyd MacBride, PO Box 8215, Hemet, 92545. (909) 845-2237.
Show-The Contemporary Crafts Market, Nov. 4-6, Santa Monica Civic Auditorium, 1855 Main Street at Pico Boulevard, Santa Monica. For more information, call (808) 422-7362.
Show-The California Carvers Guild 17th annual statewide wood carving show, Sept. 17-18. Coast Union High School, Cambria. For more information, call (805) 544-1745.
Show-The Southern California Woodworking Show, Oct. 28-30, Long Beach Convention Center Arena, 300 E. Ocean Blvd., Long Beach, 90802. (800) 826-8257.
Show-The Northern California Woodworking Show, Nov. 4-6, San Mateo Expo Center, Fiesta Hall, 2495 S. Delaware St., San Mateo, 94403. (800) 826-8257.
Exhibition-Northern California Association of Luthiers exhibition of handmade musical instruments, Oct. 9. Veteran's Memorial Hall, 6401 Stockton Ave, El Cerrito. For more information, call (510) 548-6445.
Exhibition-California Design 1994 furniture exhibition, thru Oct. 1, Contract Design Center, 600 Townsend, San Francisco. For info, contact the California Contemporary Craft Association, PO Box 2060, Sausalito, 94966. (415) 927-3158.

COLORADO: **Classes**-Woodworking and related classes, year-round. For more information, write Red Rocks Community College, 13300 W. 6th Ave., Lakewood, 80401, or call (303) 988-6160.
Seminars-Woodworking seminars, September thru April. For more information, contact Schlosser Tool and Manufacturing Co., 301 Bryant St., Denver, 80219. (303) 922-8244.
Juried exhibition-10th annual exhibit sponsored by the Woodworkers Guild of Colorado Springs, Oct. 15 thru Nov. 19, Smokebrush Center for Art and Theater. For more information, contact John Lewis, 918 N. Royer St., Colorado Springs, 80903. (719) 633-5015.
Show-The Colorado Woodworking Show, Oct. 21-23. National Western Complex, Expo Hall, Humboldt St. & E. 47th Ave., Denver, 80216. (800) 826-8257.

CONNECTICUT: **Exposition**-The Greater Connecticut Woodworking Exposition, Oct. 28-30. New Haven Coliseum, New Haven. For further information, contact Good Living Expositions, PO Box 41, Spring Valley, NY 10977, call (914) 356-2100.
Show-On the Green, Sept. 10-11, Hubbard Street Green, Glastonbury. For more information, contact Glastonbury Art Guild at (203) 659-0634.
Exhibition-18th annual holiday craft exhibition and sale, Deadline: Oct. 30. For more information, contact the Brookfield Craft Center, PO Box 122, Route 25, Brookfield, 06804. (203) 775-4526.
Show-Woodworker's Day, Sept. 17, 8:00-3:00 pm. Antique tools, manufacturer's representatives, woodworking demos, furnituremakers, guided tours, sale items. For more information, Harris Enterprise Corporation, 80 Colonial Road, Manchester, 06040. (203) 649-4663.
Exhibition-The Celebration of American Crafts, 26th annual juried exhibition, Nov. 12 thru Dec. 24. For more information, contact the Creative Arts Workshop, 80 Audubon St., New Haven, 06510. (203) 562-4927.
Show-The Connecticut Woodworking Show, Oct. 7-9. Hartford Civic Center, East Exhibition Hall, One Civic Center Plaza, Hartford. For more information, contact The Woodworking Shows, 1516 South Pontius Avenue, Los Angeles, CA 90025. (800) 826-8257.
Workshops-Woodturning and advanced woodturning, carving wooden spoons, advanced bandsawed boxes, October thru November. Brookfield Craft Center, Route 25, PO Box 122, Brookfield, 06804. (203) 775-4526.

DELAWARE: **Show**-Delaware Valley Woodworking Show, Sept. 30-Oct. 2. South Jersey Exposition Center, Hall A, 2323 Route 73, Pennsauken. For more information, contact the Woodworking Shows, 1516 South Pontius Ave., Los Angeles, CA 90025. (800) 826-8257.

DISTRICT OF COLUMBIA: **Show**-Washington D.C. Woodworking Show, Sept. 23-25. D.C. Armory, Main Hall, 2001 E. Capitol St., Washington, D.C. 20003. For more information, contact the Woodworking Shows, 1516 South Pontius Avenue, Los Angeles, CA 90025. (800) 826-8257

FLORIDA: **Meetings**-South Florida Woodworking Guild meets every second Monday, 7 p.m. Constantines, 1040 East Oakland Park Blvd., Ft. Lauderdale. For further information, contact Woody McLane at (305) 565-2729.
Meetings-Central Florida Woodworkers Guild meets the second Thursday of each month at 7:30 p.m. Woodcraft Supply Corp, 246 East Semoran Blvd., Casselberry. For more information, contact Roger Lovell at (407) 841-6155.
Meetings-Palm Beach Country Woodturners, monthly meetings. For further information contact Steve Blank (407) 747-7035.
Show-Coral Gables International Festival of Craft Arts, Nov. 12-13, Coral Gables. For more information, contact Coral Gables International Festival of Craft Arts, (305) 445-9973.
Show-Starke Festival of the Arts, Oct. 1-2. Santa Fe Community College, Andrews Center. For further information, contact Santa Fe Community College, Starke Festival of the Arts, 3000 NW 83rd St., Gainesville, 32606. (904) 395-5355.
Exhibition-Marriage in Form featuring Kay Sekimachi and Bob Stocksdale, Jan. 9 thru March 8, 1995. Tampa Museum of Art, Tampa. For further information, contact Kenna Moser at (415) 329-2605.

GEORGIA: **Workshops**-Japanese woodworking by Toshihiro Sahara. One Saturday each month. For further information, contact Sahara Japanese Architectural Woodworks. (404) 355-1976.
Show-Prater's Mill Country Fair, Oct. 8-9. Crafts and woodcarving. Dalton. For more information, contact The Prater's Mill Foundation, 848 Shugart Road, Dalton, 30720-2429. (706) 275-6455.

HAWAII: **Exhibition**-Woods of Hawaii 1994, Sept. 15-21, Ala Moana Center, Honolulu. For more information, contact Len Tai Venuti, 567 South King St., #301, Honolulu, 96813. (808) 523-6354.

ILLINOIS: **Show**-Chicagoland Woodworking Show, Sept. 16-18. Odeum North Hall, 1033 N. Villa Ave., Villa Park. For information, contact the Woodworking Shows, 1516 South Pontius Avenue, Los Angeles, CA 90025. (800) 826-8257.
Show-SOFA 1994: Sculpture, Objects and Functional Art, Oct. 20-23. Sheraton Chicago Hotel & Towers, Columbus Drive, Chicago. For more information, contact Expressions of Culture at (312) 654-0870.

INDIANA: **Classes**-Various woodworking classes and workshops. For further information, contact Woodworking Unlimited, 6038 E. 82nd St., Indianapolis, 46250, or call (317) 849-0193.
Show-Works in Wood, Oct. 1-30. Chesterton Art Gallery, 114 South Fourth St., Chesterton. For further information, contact Marsha Demkovich at (219) 926-4711.
Classes-Various hands-on woodworking classes woodturning, furniture building, finishing and technique classes. For more information, contact Superior Woodworking Supply, 922 Ft. Wayne Ave., Indianapolis, 46202. (317) 635-5747.

KENTUCKY: **Workshops**-Woodturning and joinery instruction. For further information, write Jim Hall, Adventures in Wood, 415 Center St., Berea, 40403, or call (606) 986-8083.
Meetings-Kyana Woodcrafters Inc. meets the first Thursday of each month. Bethel United Church of Christ, 4004 Shelbyville Road, Louisville, 40207. For further information, call (502) 426-2991.
Workshops-Traditional Windsor chairmaking instruction. One-week courses. For further information, contact David Wright (606) 986-7962.
Workshops-Woodturning workshops with Rude Osolnik, thru September. All ability levels welcome. For more information, call (606) 986-4440.

MAINE: **Workshops**-Two-week basic and intermediate furnituremaking courses. The faculty includes Peter Korn, John McAlevey, Bill Thomas, Scott Hausmann and Owen Edwards. For more information, contact the Center for Furniture Craftsmanship, 125 W. Meadow Road, Rockland, 04841. (207) 594-5611.
Meetings-Guild of Maine Woodworkers meets the first Wednesday of every month. For time and location, call Guild of Maine Woodworkers at (800) 805-5100.
Internship-Summer boat building internship offered by The Landing School of Boat Building and Design. Kennebunkport. For more information, call The Landing School at (207) 985-7976.

MARYLAND: **Meeting**-Chesapeake Woodturners Regional Conference '94. Annapolis. Featuring demonstrations by David Ellsworth, Giles Gilson, John Jordon, Bonnie Klein. For more information write to Conference '94, Chesapeake Woodturners, 403 Chesterfield Ave., Centreville, 21617. Written inquiries only.
Festivals-Sugarloaf Craft Festival, Nov. 18-20 and Dec. 9-11, Montgomery County Fairgrounds, Gaithersburg; Oct. 7-9, Maryland State Fairgrounds, Timonium. For more information, contact Deann Verdier, Director, Sugarloaf Mountain Works, Inc., 200 Orchard Ridge Drive, Suite 215, Gaithersburg, 20878. (301) 990-1400.

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Classes-Woodworking classes, throughout most of the year. For information, contact Boston Center for Adult Education, 5 Commonwealth Ave., Boston, 02116. (617) 267-4430.
Workshops-Various woodworking workshops thru October. The Heartwood School, Johnson Hill Road, Washington, 01235. (413) 623-6677.
Workshops-Toolmaking for woodworkers. First three weekends of each month, registration limited to two students per weekend. For more info, contact Ray Larsen, Genuine Forgery, 1126 Broadway, Hanover, 02339. (617) 826-8931.
Classes-Make a Mt. Lebanon candle stand, Shaker lap desk, writing-arm Windsor chair, or Shaker oval boxes, thru September. Berkshire Workshops, PO Box 928, Sheffield, 01257. (413) 229-3280.
Classes-Woodworking, veneering bowl turning, finishing, design, hand tools, joinery and more. For more information, contact Michael Coffey, One Cottage Street School of Fine Woodworking, One Cottage Street, Easthampton, 01027. (413) 527-8480.
Workshop-Out of the Woods: Furniture & Beyond, Jon Brooks, Oct. 8-10, Shaker inspired furniture furniture, Mark Ragonese, Oct. 22-24. Horizons New England Craft Program, 108-P N. Main St., Sunderland, 01375. (413) 665-0300.
Exhibition-Annual Holiday exhibit and sale, Boston. Deadline: Oct. 1. Send a SASE with slides and info to Randi Lathrop, Society of Arts and Crafts Holiday Exhibit, 175 Newbury St., Boston 02116. (617) 266-1810.

MICHIGAN: **Show**-Metro-Detroit Woodworking Show, Dec. 2-4, Novi Expo Center, Hall A, 43700 Expo Center Drive, Novi, 48375. For further information, contact the Woodworking Shows, 1516 South Pontius Avenue, Los Angeles, CA 90025 (800) 826-8257.
Meetings-Michigan Violinmakers Association meets Oct. 30. Host: Brian Bishop. East Lansing Michigan State University, Student Union. 1377 Hickory, Haslett. For more info, call (517) 339-0375.

MINNESOTA: **Classes**-Woodcarving classes year-round. For information, contact the Wood Carving School, 3056 Excelsior Blvd., Minneapolis, 55416. (612) 927-7491.
Show-Seven Corners Hardware's fourth annual woodworking tool show, Sept. 22-24. Seven Corners Hardware, Inc., 216 W. 7th St., St. Paul. (800) 328-0457 or (612) 224-4859.
Classes-Information, manuals and hands-on experiences are offered through Wild Earth Woodworking at a Minneapolis/St. Paul facility. Instruction in fundamental to advanced woodworking for the home hobbyist and corporate businesses. Lathe turning, safety and customized classes also available. Contact Wild Earth Woodworking, 401 Hunter Hill Road, #3 Hudson, WI 54016. (715) 386-3186.
Call for entries- Minnesota Woodworkers Guild 12th annual Northern Woods exhibition, Oct. 20-23. Southdale Mall, Edina. (This is not a craft show). Deadline: Sept. 24. For more information, contact Joel Simon at (612) 378-2605.
Class-Kiln drying short course, Sept. 12-15, University of Minnesota, St. Paul. For more information, contact Harlan Pe-

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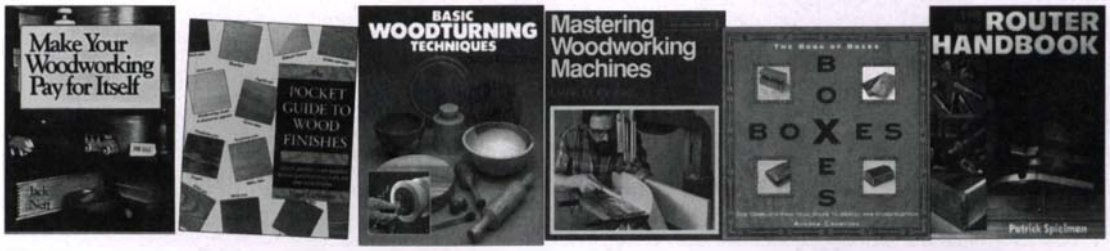

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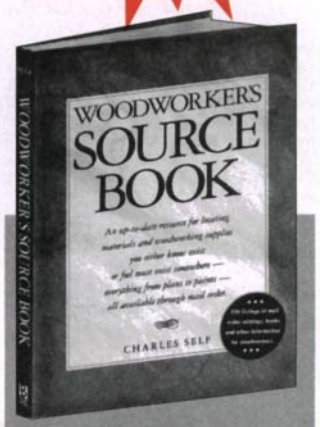

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tersen, Department of Forest Products, University of Minnesota, 2004, Folwell Ave., St. Paul, 55108. (612) 624-3407.

MISSISSIPPI: **Classes**-Various woodworking classes. For more info, contact Allison Wells School of Arts & Crafts, Inc., Canton. (800) 489-2787.

MISSOURI: **Show**-St. Louis area Wood Carver's fourth annual show, Nov. 26-27. Kirkwood Community Center, 101 South Geyer, Kirkwood. For more information, contact Ron Blanton, 412 Woodrun Drive, St. Louis, 63021. (314) 381-8670.

MONTANA: **Show**-Montana Woodcarvers Good Wood Show V, Sept. 30-Oct. 2. Billings Elk's Club, 934 Lewis. For more information, contact Dick Torbert (406) 628-7447.

NEBRASKA: **Meetings**-Omaha Woodworkers Guild meets at 7 p.m. the third Tuesday of every month. Westside Community Center, Omaha. For more information, contact John Cahill at 334-5550.

NEW HAMPSHIRE: **Classes**-Fine arts and studio arts. Manchester Institute of Arts and Sciences, 114 Concord St., Manchester, 03104.
Classes-Various woodworking classes. For information, contact The Hand & I, PO Box 264, Route 25, Moultonboro, 03254. (603) 476-5121.
Auctions-Antique and craftsman's tool auctions, year-round. Contact: Richard A. Crane, Your Country Auctioneer, 63 Poor Farm Road, Hillsboro, 03244. (603) 478-5723.
Workshops-Week-long Shaker-style furniture and chairmaking workshops, year-round. For more info, contact Mary Sweet, Dana Robes, Wood Craftsmen, Lower Shaker Village, Enfield, 03748. (603) 632-5385.
Workshops-Make a Windsor chair with Michael Dunbar, Sept. 10-14; writing arm chair and sack back, Oct. 1-5. Class size is limited to five people. For further information, contact Michael Dunbar, Box 805, Portsmouth, 03802, or call (603) 431-4676.

NEW JERSEY: **Exposition**-Central Jersey Woodworking Expo, Sept. 23-25. Monmouth Park, Oceanport. For more information, contact Good Living Expositions, PO Box 41, Spring Valley, NY 10977. (914) 356-2100.
Show-Waterloo Arts & Crafts Festival, Sept. 24-25, Waterloo Concert Field, Waterloo Road, Stanhope. For more information, call the Stella Show Management Co. at (201) 384-0010.
Show-Delaware Valley Woodworking Show, Sept. 30-Oct. 2. S. Jersey Expo Center, Hall A, 2323 Route 73, Pennsauken. For info, contact the Woodworking Shows, 1516 South Pontius Avenue, Los Angeles, CA 90025. (800) 826-8257.

NEW MEXICO: **Classes**-Woodworking classes. For more information, contact North New Mexico Community College, El Rito, 87520. (505) 581-4501.
Classes-Fine woodworking classes. For more information, write Santa Fe Community College, Santa Fe 87502, or call (505) 438-1361.
Show-Southwest Arts & Crafts Festival, Nov. 10-13. For more information contact Southwest Arts & Crafts Festival, 525 San Pedro NE, Suite 107, Albuquerque, 87108. (505) 262-2448.
Show-The Santa Fe Furniture Expo, Albuquerque Convention Center, Oct. 7-9. For more information, contact The Mayfair Group, 369 Montezuma, Suite 338, Santa Fe, 87501, or call (505) 984-7080.

NEW YORK: **Classes**-Various beginning and advanced woodworking classes. Constantine's, 2050 Eastchester Road, Bronx, 10461. (718) 792-1600.
Classes-Traditional 18th-century woodworking techniques with Mario Rodriguez. Contact: Warwick Country Workshops, PO Box 665, Warwick, 10990. (914)-986-6636.
Meetings and classes-New York Woodturners Association meets bi-monthly. YWCA, 610 Lexington Ave. (53rd. St.) New York City. Contact Howard Alalouf (914) 337-0226.
Classes-Various gilding classes for fine furniture, antiques, frames, carvings, restoration. Center for the Gilding Arts, 381 Park Ave. South, New York City. (212) 683-4822.
Classes-Boatbuilding, refinishing, paddlemaking, woodbending lapstrake planking, thru September. For more information, contact The Antique Boat Museum, 1000 Islands, Clayton, 13624. (315) 686-4104.
Classes-Woodworking, traditional and contemporary; turning and finishing with Maurice Fraser and Bill Gundling. All levels. Free demonstration of hand dovetails and turning Sept. 13, 6:00-8:00 p.m. The Craft Students League at the YWCA, 610 Lexington Ave., New York City, 10012. For more information, call (212) 735-9731.
Show-YWCA Craft Students League faculty show and reception, Sept. 13, 5:00-7:30 p.m. For information and catalog, call (212) 735-9732.
Classes-Build a Shaker blanket chest and advanced Shaker furniture design with Eric Eklum, begins mid-September. For more information, call the director of adult education, Jamestown Public Schools (716) 483-4384.
Show-Snug Harbor Craft Fair, Sept. 30 and Oct. 1-2. Newhouse Center for Contemporary Art, Snug Harbor Cultural Center, Staten Island. For information, call (718) 448-2500.
Show-Designer Crafts Council Crafts Festival '94, Nov. 5-6. The Schenectady Museum, Turnbull Gallery. For more information, call Martha Hubbard at (518) 463-6496.
Show-Westchester fine crafts show, Sept. 24-25. Westchester County Center, Routes 119 and 100 at the Bronx River Parkway, White Plains. For more information, call (203) 254-0486.
Classes-French polish and other wood finishes, Sept. 19-21. Center for the Gilding Arts, 381 Park Avenue South, New York, 10016. (212) 683-2840.
Fair-Millbrook Crafts Fair, Nov. 25-26. Thorne Building, Millbrook. For more information, contact the Artisans Group, PO Box 468, Pine Plains, 12567. (914) 985-7409.
Fair-Woodstock-New Paltz arts and crafts fair, Sept. 3-5. Ulster County Fairgrounds, New Paltz. For more information, contact Quail Hollow Events, PO Box 825, Woodstock, 12498. (914) 679-8087.
Festival-Fall crafts harvest festival, Oct. 8-10. Franklin Delano Roosevelt Estate, Hyde Park. For more information, contact Quail Hollow Events, PO Box 825, Woodstock, 12498. (914) 679-8087.
Show-Capital arts and crafts marketplace, Nov. 5-6. Thruway Inn, Albany. For more information, contact Quail Hollow Events, PO Box 825, Woodstock, 12498. (914) 679-8087.

NORTH CAROLINA: **Meetings**-North Carolina Woodturners, second Saturday of each month. For more information, contact PO Box 1833, Hickory, 28603. (704) 324-5960.
Workshops-Summer workshops in chairmaking, joinery, turning, boatbuilding, woodworking with kids. For more information, contact Drew Langsner at Country Workshops, 90 Mill Creek Road, Marshall, 28753. (704) 656-2280.
Show-Annual North Carolina Piedmont woodcarvers show, Oct. 1. Statesville. For information, contact Bob Williams, Route 7, Box 234, Mooresville, 28115. (704) 663-3736.
Show-Albemarle Craftsman's Fair, Oct. 28-30. Knobbs Creek Recreation Center, Ward St., Elizabeth City. For more info, contact Candace L. Murray, 1209 McPherson St., Elizabeth City, 27909. (919) 338-3954.

OHIO: **Classes**-Handplaning, finishing, bowl turning, joinery, routers, chip carving and more, Oct. 1-23. Conover Workshops, 18125 Madison Road, PO Box 679, Parkman, 44080. (216)548-3491.
Show-The Greater Cincinnati Woodworking Show, Oct. 14-16. Cincinnati Gardens, Annex Building, 2250 Seymour Ave., Cincinnati, 45212. (800) 826-8257.
Meetings-Cincinnati Woodworking Club meets from 9:00 a.m. to noon on the second Saturday of September, November, January, March and May. Reading High School, 801 E.

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Columbia Ave., Reading. For more information about the club, contact them at 5974 Gaines Road, Cincinnati, 45247.

OREGON: **Meetings**-Cascade Woodturner's Association meets every third Thursday. For information, contact Cascade Woodturners, PO Box 91486, Portland 97291.
Classes-Oregon School of Arts and Crafts, 8245 S.W. Barnes Road, Portland, 97225. (503) 297-5544.
Show-Table, Lamp + Chair 1994, Sept. 24-Oct. 22. Portland. For more information, contact Furniture and Lighting Design Competition, PO Box 5906, Portland, 97228-5906. (503) 226-3556.
Show-Open house, Sept. 23-25. Artists included will be Lewis Judy (furnituremaker), Tom Allen (raised marquetry) and Dan Kvitka (woodturner). Made in Jefferson Gallery, 3219 Jefferson Scio Drive, Jefferson, 97352. (503) 327-2543.
Show-The Oregon Woodworking Show, Nov. 18-20. Portland Expo Center, Exhibit Hall C, 2060 N. Marine Drive, Portland, 97217. (800) 826-8257.

PENNSYLVANIA: **Classes**-Windsor chairmaking, weekly and weekends. Contact Jim Rendi, Philadelphia Windsor Chair Shop, PO Box 67, Earlville, 19519. (215) 689-4717.
Call for entries-Holiday ornament juried sale and exhibition, Palmer Museum of Art, The Pennsylvania State University, University Park, Nov. 18-20. Deadline: Nov. 1. For entry form send SASE to True Fisher, Friends of the Palmer Museum of Art, Pennsylvania State University, University Park, 16802-2507. (814) 865-7672.
Show-Penn's Colony Festival and Marketplace, Sept. 17-25, North Park, Pittsburgh. For further information, write to Penn's Colony Festival, PO Box 8157, Pittsburgh, 15217, or call (412) 487-6922.
Show-The Pittsburgh Tri-State Woodworking Show, Dec. 9-11. Pittsburgh Expomart, East Hall, 105 Mall Blvd., Monroeville, 15146. (800) 826-8257.
Classes-Handplaning, finishing, bowl turning, joinery, routers, chip carving and more, Oct. 1-23. Conover Workshops, 18125 Madison Road, PO Box 679, Parkman, 44080. (216) 548-3491.
Call for entries-The Philadelphia Furniture Show. Deadline: Dec. 15. Send your name and address to receive application for this juried show to be held in late April to Philadelphia Furniture Show, 3605 Hamilton St., Philadelphia, 19104. (215) 440-7136.

SOUTH CAROLINA: **Call for entries**-First Southeastern Art & Craft Exposition, Sept. 30-Oct. 2. Reviewing begins in January. The University of South Carolina, Columbia. For more info, contact Rolfe Godshalk, The Columbia Museum of Art, 1112 Bull Street, Columbia, 29201. (803) 383-0003.

TENNESSEE: **Show**-Smoky Mountain Woodcarvers Show, Sept. 30-Oct. 2, Dollywood, Pigeon Forge. For further information, call (615) 691-1855.
Conference-Woodturning: A Tribute to the Osolniks, Oct. 20-22. Arrowmont School of the Arts and Crafts, PO Box 567, Gatlinburg, 37738. (615)436-5860.

TEXAS: **Meetings**-North Texas Woodworker's Association meets the third Tuesday of each month. Contact Bruce May. NTWA, PO Box 831567, Richardson, 75083. (214) 271-0125.
Classes-Woodworking classes year-round. Bowl turning basics to advanced furniture and cabinetry. Woodshop, Inc. Woodworking School, 1225 W. College, Suite 612, Carrollton, 75006. (214) 466-3689.
Show-Rio Grande Valley Woodcarvers show and sale, Jan. 20-21. McAllen, Civic Center. For more information, contact Dorothy Chapapas, Route 2 Box 150, McAllen, 78504. (210) 581-2448.
Call for entries-20th Texas Crafts Exhibition, April 1-2. Deadline: Oct. 15. The University of Texas at Austin, Winedale Historical Center, PO Box 11, Round Top, 78954. (409) 278-3530.
Show-Texas Mesquite Association's Heart of Texas Mesquite Art Festival, Oct. 15-16. Downtown Fredericksburg Market Square. For more information, call (210) 997-8515.

VERMONT: **Courses**-Yestermorrow Design and Building School. For more information, contact the school at Route 1 Box 97-5, Warren, 05674. (802) 496-5545.

VIRGINIA: **Show**-Claytor Lake Arts and Crafts Show, Sept. 3-5, Claytor Lake State Park, near Dublin. For more information, contact Kathy Hudson, PO Box 1369, Salem, 24123. (703) 389-6163.
Show-The Metro Richmond Woodworking Show, Dec. 2-4. Virginia State Fairgrounds, Old Dominion Building, Richmond. For more information, call Charles Harper, Harper Hardware Co., (804) 643-9007.
Show-Sugarloaf Craft Festival, Sept. 9-11. Prince William County Fairgrounds, Manassas. For further information, send three loose stamps to Deann Verdier, Director, Sugarloaf Mountain Works, Inc., 200 Orchard Ridge Drive, Suite 215, Gaithersburg, MD 20878. (301) 990-1400.
Show-30th Annual Richmond Craft and Design Show, Nov. 11-13. Richmond Centre for Conventions and Exhibitions. The show is sponsored by the Hand Workshop. For further information, contact the Hand Workshop at 1812 West Main St., Richmond, 23220, or call (804) 353-0094.

WASHINGTON: **Show**-Foundry Furniture: Forged and fabricated functional art, thru Oct. 9. Peterson Art Furniture, 122 Central Way, Kirkland, 08033. (206) 827-8053.
Show-The Western Washington Woodworking Show, Nov. 11-13. Seattle Center, Exhibition Hall, Mercer St. at 3rd, Ave., N. Seattle, 98109. (800) 826-8257.

WISCONSIN: **Show**-International Lathe-turned Objects: Challenge V, Nov. 5-Jan. 8. Leigh Yawkey Woodson Art Museum, 700 N. 12th St., Wausau, 54403-5007. (715) 845-7010.

CANADA: **Workshops**-Five days of intensive hands-on Ultra-Lite-Sawmilling in a rain forest on a small N.W. Pacific Island with Will Malloff. The North Island College, Box 320 Sointula, B.C. V0N 3E0. (604) 974-5429.
Workshop-Traditional Windsor chairmaking. Weekly courses. For info or a brochure, contact David Goodwin, The Village Chairmaker, Sparta, Ont., N0L 2H0. (519) 775-2751.
Show-Markham Wood Show, Sept. 9-11. Markham Fairgrounds, McCowan Road, north of Highway 7. For more information, contact Cryderman Productions, 136 Thames St., Chatham, Ont. N7L 2Y8. (519) 351-8344.
Call for entries-Edmonton Wood Show, Sept. 30-Oct. 2. Northlands Agricultural Complex, 73rd & 116th Ave. Deadline: Sept. 15. For more info, contact Cryderman Productions, 136 Thames St., Chatham, Ont. N7L 2Y8. (519) 351-8344.
Association-The Canadian Woodturners Association. To receive our quarterly newsletter, CWA membership and benefits, send $20 to 12A-4991 Highway 7 East, Suite 236, Markham, Ont., L3R 1N1, or call (905) 479-0755.
Workshops-Courses on ecosystem-based forest use. Landscape ecology, Sept. 19-23; stand level management, Sept. 26-30. For more information, contact Silva Forest Foundation, PO Box 9, Slocan Park, B.C., V0G 2E0. (604) 226-7222.
Meetings-West Island Woodturners Club (Montreal) meets every Tuesday, September thru May. Contact: Dennis Brown, 8817 Cure Legault, Lasalle, Que. H8R 2V9. (514) 366-6071.
Show-From Grandfather's Tool Chest-19th Century Hand Tools, From the Rhuda Collection, thru Oct. 16. The Nova Scotia Museum of Natural History, 1747 Summer St., Halifax, Nova Scotia. (902) 424-7353.

SCOTLAND: **Workshops**-Ongoing workshops beginning in September. For more information, contact the Myreside International School of Antique Furniture Restoration, Myreside Grange, Gifford, East Lothian, Eh41 4Ja. (062 081) 0680.

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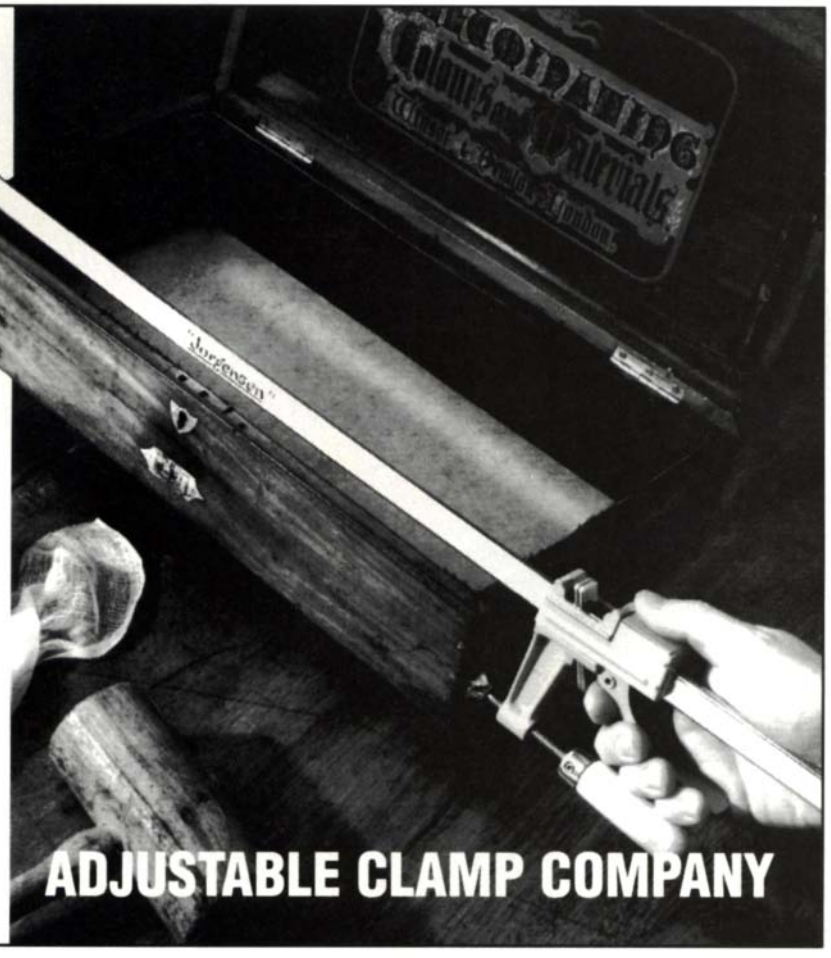

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6017	6016 Sander with dust bag	97	56
6008	1/3 sheet 12,000 orb/min 5 amp	209	118
8975	Heat Gun 570° & 1000°	98	59
8980	8975 Heat Gun with case, & access.	148	92
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6125	NEW 5" Random Orbit Sander	200	117
6126	NEW 6" Random Orbit Sander	205	124
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0225-1	Same as 0224-1 but w/kyiss chuck	203	119
0234-1	1/2" Drill 5.4 amp mag 0-850 rpm	237	124
0235-1	Same as 0234-1 but w/kylss chuck	237	128
0244-1	1/2" Drill 5.4 amp mag 0-600 rpm	237	124
0222-1	3/8" Drill 3.5 amp 0-1000 rpm	198	109
0228-1	3/8" Drill 3.5 amp 0-1000 rpm	195	109
0375-1	3/8" close quarter Drill	237	129
0379-1	1/2" close quarter Drill	268	152
6539-1	cordless Screwdriver 190 rpm	130	75
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6546-1	cordless Screwdriver 200 & 400 rpm	141	82
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5371-1	1/2" var. speed Hammer Drill Kit	340	188
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3107-1	1/2" var. speed right angle Drill Kit	399	219
6754-1	Drywall Gun 0-4000 rpm 5.4 amp	196	112
3300-1	1/2" variable speed right angle Drill	356	194
5680	Router 2 HP - 12 amp	362	198
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5353	Eagle 1-1/2" Rot. Hammer with case	974	525
6365	7-1/4" Circular Saw 13 amp	218	122
6367	above Saw - double insulated	213	128
6366	6365 with fence & carbide blade	228	127
6368	6365 w/fence,carbide blade,& case	249	139
6377	7-1/4" Worm Drive Saw	330	184
6369	NEW 7-1/4" Circular Saw with brake	259	148
6490	NEW 10" Miter Saw	444	255
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LU84M011	Combo 10"	50	78	42
LU85M010	Super Cut-off 10"	80	115	59
LM72M010	Ripping 10"	24	69	38
LU73M010	Cut off 10"	60	84	45
LU87M010	Thin Kerf 10"	24	72	39
LU88M010	Thin Kerf 10"	60	88	45
LU85M015	Mitre Saw blade 15"	108	175	99
LU91M010	Compound Mitre Blade	60	88	54
LU98M010	Ultimate 10"	80	128	68
LU89M010	Ferrous metal 10"	72	104	58
F410	New Quiet Blade - 10"	40	95	49
F810	New Quiet Blade - 10"	80	135	74
TK203	7-1/4" Framing - 24 tooth		31	18
TK303	7-1/4" Finishing - 40 tooth		38	22
TK306	10" Finishing - 40 tooth		47	25
TK903	7-1/4" Combo - 30 tooth		33	19
TK906	10" Combo - 50 tooth		53	29
SD306	6" Dado - Carbide		215	112
SD308	8" Dado - Carbide		230	119
SD506	6" Super Dado-carbide w/cse&shims		292	155
SD508	8" Super Dado-carbide w/cse&shims		344	179
F0	#0 - 1-3/4" x 5/8" Biscuit 1000 Qty		43	29
F10	#10 - 2-1/8" x 3/4" Bisuit 1000 Qty		43	29
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EDS120	12 volt cordless drill kit w/2 batt		379	195
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6172DWE	3/8" var. spd Drill Kit w/2 batt	220	109
5090DW	3-3/8" Saw Kit 9.6 volt	270	145
6010DWK	3/8" cordless Drill Kit 7.2 volt	182	99
4390DW	9.6 volt cordless Recip Saw Kit	258	148
4300DW	9.6 volt Jig Saw Kit	261	154
DA391DW	3/8" angle Drill Kit 9.6 volt	312	169
ML900	Incandescent Flashlight 9.6 volt	Sale	37
6010DL	3/8" Drill with flashlight 7.2 volt	230	125
6891DW	Drywall Gun 0-1400 9.6 volt	270	154
T220DW	New cordless Stapler Kit 9.6 volt	370	198
6012HDWE	2 speed Drill with clutch-comp	243	129
6093DW	Variable speed Drill Kit complete	283	135
6093DWE	6093DW Drill Kit w/2 batteries	270	139
6095DW	6093DW Kit with keyless chuck	291	135
6095DWE	6095DW Drill Kit w/2 batteries	270	139
6201DWE	NEW 9.6 volt Drill Kit w/2 battenes	298	158
6211DWE	12 volt "Mac Pak" Drill Kit	330	175
6011DWE	NEW 12 volt Drill Kit w/ 2 batt	330	165
632007-4	9.6 volt Battery	47	30
632002-4	7.2 volt Battery	39	28
5007NBA	7-1/4" Saw with electric brake	263	129
5008NBA	8-1/4" Saw with electric brake	346	195
B04510	1/4 sheet Pad Sander	106	59
9900B	3" x 21" Belt Sander with bag	344	169
9924DB	3" x 24" Belt Sander with bag	329	178
4301BV	Orb. var. speed Jig Saw 3.5 amp	292	149
JR3000V	Var. speed Recip Saw with case	252	135
LS1020	10" Mitre Saw 12 amp	630	355
9820-2	Blade Sharpener	394	199
N1900B	3-1/4" Planer with case	244	129
1911B	4-3/8" Planer 7.5 amp	309	179
3601B	1-3/8 HP Router	288	165
B04550	1/4 sheet Pad Sander with bag	98	54
DA3000R	3/8" Angle Drill variable speed	314	179
HP2010N	3/4" var. spd Hammer Drill w/cse	335	178
2708W	8-1/4" Table Saw	585	298
2711	10" Table Saw with brake	1067	565
5005BA	5-1/2" Circular Saw	250	148
6404	3/8" Drill Rev. 0-2100 rpm 2 amp	112	58
6510LVR	3/8" Drill Rev. 0-1050 rpm	168	93
6820V	0-4000 rpm Drywall Gun 5.2 amp	171	92
6013BR	1/2" Drill Rev. 6 amp	280	139
5402A	16" Circular Saw 12 amp	743	429
9401	4" x 24" Belt Sander with bag	378	215
4302C	Variable speed Orbital Jig Saw	351	199
5077B	7-1/4" Hypoid Saw	281	155
LS1440	14" Mitre Saw	969	545
LS1030	10" Mitre Saw	428	225
5007NB	7-1/4" Circular Saw 13 amp	232	124
5007NBK	5007NB Saw w/ plastic case	Sale	129
5007S	5007NB w/square cutting guide	283	139
2012	12" Portable Planer	959	539
LS1011	10" Slide Compound Saw	946	539
3620A	1-1/4 HP Plunge Router w/case	220	129
GV5000	5" Disc Sander	123	74
9514B	4" Grinder 4.6 amp	111	59
N9501B	4" Grinder 4.0 amp with case	168	94
9207SPC	7" Sander/polisher var. speed	350	184
4200N	4-3/8" Circular Saw	252	145
2414	14" Cut-off Saw AC/DC	403	225
4320	V/spd economy Jig Saw 2.9 amp	156	89
6302	1/2" Drill 0-550 rpm 5.2 amp	228	124
DA6300	1/2" angle Drill 300/1200 rpm	472	249
3612BRA	3 HP Plunge Router w/brake	524	175
BO5000	NEW 5" Random Orbit Sander	120	69
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N60FN-2	Finishing Nailer 1-1/4" - 2-1/2"	650	335
N60FN-2K	N60FN-2 with case, oil, & nails	647	379
T50S4-1	Decking Sheathing Stapler	619	355
MIIIFS	Flooring Stapler 15 gauge	931	525
N100S	Stick Nailer 2" - 4"	931	539
T31	Brad Nailer 5/8" - 1"	281	145
CWC100	1 HP Pancake Compressor	463	289

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EY6282EQK	Var. spd 9.6 volt Drill with 15 min. charger, case, and Ironman battery	315	169
EY62821DKW	9.6 volt Drill Kit w/2 batteries	395	162

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NEW Ironman	battery, 15 min. charger & cse	375	199
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77M	NEW 77 Mag Worm Saw-2 lbs lightr	300	164
5825	6-1/2" Worm Drive Saw	257	165
2735-04	12 volt cordless Drill Kit	249	144
2736-04	2735-04 with keyless chuck	269	145
1605-02	NEW Biscuit Joiner with case	221	129
5510	5-1/2" Circular Saw	166	110
5860	NEW 8-1/4" 60° Worm Saw	282	172
5790	10-1/4" Circ. Saw 15 amp	472	305
5657	NEW 7-1/4" Circ Saw - pivot foot	205	118
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SL248	NEW 4 FT Level with sensor	95	65

BOSCH

Model	Description	List	Sale
1587VS	NEW Top Handle "CLIC" Jig Saw	292	149
1587DVS	above saw with dust collection	295	194
1584VS	NEW "CLIC" Barrell Grip Jig Saw	285	149
1584DVS	above saw with dust collection	295	189

Buy any Bosch jig saw and receive a FREE 10 piece deluxe blade assortment!

	Bosch Metal Case for above Jig Saws	34	32
	Bosch 30 blade assortment for Jig Saws		27.99
1942	Heat Gun 600° - 900° temp range	125	78
1272D	3" x 24" Belt Sander with bag	375	204
1273D	4" x 24" Belt Sander with bag	380	208
1289D	1/4 sheet Sander	107	68
11-212VSR	Bulldog 3/4" SDS Rotary Drill	390	209
1194VSR	1/2" variable speed Hammer Drill	282	149
1194VSRK	above Hammer Drill with case	313	169
1195VSR	3/8" variable speed Hammer Drill	229	135
1608	5.6 amp Laminate Trimmer	168	95
1608LX	5.6 amp Laminate Trimmer w/guide	191	110
1608T	5.6 amp tilt base Trimmer	191	104
1608U	Underscribe Laminate Trimmer	227	145
1609K	Lam Installers Kit w/1609Trimmer	343	184
1609KX	Deluxe Installers kit	405	228
1601A	1 HP Router	191	119
1604A	1-3/4 HP 2 Handle Router	250	139
1604AK	Same as above w/case & access	318	185
1606A	1-3/4 HP D-handle Router	295	185
3258	3-1/4" Planer with blade guard	247	155
3258K	3258 Planer with steel case	273	169
3270DVS	3" x 21" v/spd Belt Sander w/bag	270	165
1273DVS	var. speed 4" x 24" Belt Sander	415	219
1615	NEW 3 HP Plunge Router	430	259
1615EVS	NEW 3 HP v/spd Plunge Router	505	278
1613	NEW 1-3/4 HP Plunge Router	316	169
1613EVS	NEW 2 HP v/spd Plunge Router - Receive FREE 6 piece router bit set!	359	183
1614	NEW 1 HP Plunge Router	245	149
1614EVS	NEW 1-1/4 HP v/sp Plunge Router	283	155
1632VSRK	Recip Saw 8.4A orb-v/spd	225	154
3050VSRK	9.6V cordless v/spd Drill Kit comp	288	149
3051VSRK	3050VSRK with keyless chuck	299	145
3054VSRK	NEW 12 volt cordless drill kit with 2 batteries & case - Receive FREE 10 piece drill bit set!	330	189
1370DEVS	6" Random Orbit Sander	427	224
3283DVS	5" Random Orbit Sander	169	98
3283DVSK	3283DVS w/case & accessones	199	118
B1650K	NEW Biscuit joiner	289	165
B7000	NEW Corner Detail Sander	122	79
B4050	NEW In Line Jig Saw	199	119
3272A	3-1/4" Planer 4.2 amp	173	105
3272AK	above Planer with case	187	115
1347AK	4-1/2" Grinder with case & access.	185	109
1348AE	5" Grinder 8.5 amp	225	129
11304	"The Brute" Breaker Hammer	2240	1199
11305	Demolition Hammer 10 amp	1199	699
11310EVS	Demolition Hammer	879	529
11220EVS	1-1/2" Spline Hammer Drill	889	479
1021VSR	3/8" Drill 4.8 amp 0-1100 rpm	203	112
1022VSR	3/8" Drill 4.8 amp 0-1100 rpm	210	119
1023VSR	1/2" Drill 4.8 amp 0-550 rpm	227	114
11210VSR	3/4" Rotary Drill variable speed	355	199
1420VSR	Drywall Gun 4.8 amp 0-4000 rpm	179	98

RYOBI SPECIALS

Model	Description	List	Sale
JP-155	6-1/8" Jointer/Planer	700	305
TS-254	NEW 10" Mitre Saw	440	209
TS-254K	above Saw with access. kit & B&D 73-770 carbide blade	510	265
RE600	3 HP Plunge Router var. speed	500	235
BE321	3" x 21" var. speed Belt Sander	310	135
SC160	NEW 16" Bench Scroll Saw	282	135
TFD172VRK	9.6 volt cordless Drill Kit	330	139
TFD222VRK	12 volt cordless Drill Kit	365	155
TFF100	Flashlight uses 7.2,9.6,or 12v battery		19.95
JM100K	Biscuit Jointer with case	475	218
RS115	4-1/2"v/sp Random Orb Sndr	136	74
BT3000	NEW 10" Table Saw with stand	1125	529
W660	BEST BUY 7-1/4" Circ Saw 13A	184	88
TSS220	8-1/2" Slide Comp. Saw	966	445
TS260	10" Compound Mitre Saw	486	239
TR30U	3/4 HP Trimmer	174	85
OS1000	NEW Detail Sander	90	44
S550	1/6 sheet Palm Sander	82	54
RS112	Palm grip Random Orb Sander	90	55
AP12	12" Bench Planer	884	399
JS45	NEW Top Hdle Jig Saw var. spd	98	59
TDS4000K	NEW 12V Drywall Gun kit 2 spd	420	215
RA202	NEW 8-1/4" Bench Radial Arm Saw	800	389
BS900	NEW 9" Bench Band Saw	340	174
IOV28	NEW 28 Gal. Industrial Dry Vac	225	119
OSS450	NEW Oscillating Spindle Sander	340	174
BMM2400K	NEW 24 volt Mulching Mower	Sale	349
R175	NEW 1-3/4 HP Plunge Router	158	95
RE175	NEW 1-3/4 HP v/spd Plunge Router	210	124
SC162VS	NEW 16" var. speed scroll saw	298	179

PORTER CABLE

Model	Description	List	Sale
690	1-1/2 HP Router 8 amp	260	138
9690	690 Router w/steel case	305	145
691	1-1/2 HP Router D-handle	285	155
43800	Router bit case		2.99
695	1-1/2 HP Router/Shaper	400	223
696	HD Shaper Table	230	129
351	3" x 21" Belt Sander without bag	280	154
352	3" x 21" Belt Sander with bag	290	159
360	3" x 24" Belt Sander with bag	365	194
361	3" x 24" Bell Sander without bag	345	189
362	4" x 24" Bell Sander with bag	380	205
363	4" x 24" Belt Sander without bag	360	195
314	4-1/2" Trim Saw	255	142
9314	4-1/2" Trim Saw 4.5 amp w/case	280	158
97751	1/2" var. speed Hammer Drill w/case	270	155
9629	Recip Saw variable speed 8 amp	270	148
9637	Full var. speed Recip Saw 8amp	270	148
666	3/8" HD var. speed Drill 0-1200 rpm	230	128
2620	3/8" HD var. speed Drill 0-1000 rpm	185	105
9118	Porta Plane Kit 7 amp	390	215
6645	New 0-2500 Drywall Gun 5.2 amp	195	108
505	1/2 sheet Pad Sander	230	128
6611	New 3/8" var. speed Drill 5.2 amp	220	125
6614	New 1/2" var. speed Drill 0-750 rpm	230	128
6615	New 6614 with keyless chuck	230	128
330	Speed Block Sander 1/4 sheet	110	60
555	Plate Biscuit Jointer with case	320	159
556	555 jointer with 5556 tilt fence		184
345	6" Saw Boss 9 amp	190	104
9345	345 comp. w/case & carbide blade	220	124
100	7/8 HP Router	190	109
5116	16" Omni-Jig	470	258
9647	TIGER CUB Recip. Saw	210	119
7519	3-1/4 HP Router 2 Handle	445	239
7518	3-1/4 HP 5 speed Router	510	275
7536	2-1/2 HP 2 Handle Router	365	205
7537	2-1/2 HP D-Handle Router	385	208
7538	3-1/4 HP Plunge Router	445	239
7539	3-1/4 HP var. spd Plunge Router	510	275
7399	5.6 amp Drywall Cutout Unit	140	84
7310	5.6 amp Laminate Trimmer	165	95
7312	5.6 amp Offset Base Lam Trim	230	128
97310	Laminate Trimmer Kit comp	360	198
7334	5" Random Orbit Sander	225	122
7335	5" var. spd Ran Orbit Sander w/case	245	132
7336	6" var. spd Random Orbit Sander	250	137
73333	Dust Collection system	31	24.50
693	1-1/2 HP Plunge Router	320	174
6931	Plunge Router Base	125	77
9852	12V 3/8" Drill w/cse 0-400/0-1000rpm	280	154
9853	9852 with keyless chuck	280	154
9855	12V 1/2" Drill w/cs 0-360/0-1000rpm	335	188
8500	12V battery for above drills	69	45
7549	Top handle Jig Saw 4.8 amp	270	135
7649	Barrel-grip Jig Saw	270	149
7556	1/2" Right Angle Drill w/case	385	224
5009	Mortise & Tenon Jig	75	48
5061	"Stair Ease" Hard Wood Templet	243	145

NEW TOOLS BY PORTER CABLE

9841	9.6 volt cordless Drill Kit	309	169
9840	9.6 volt cordless Drill Kit	289	164
332	Palmgrip Random Orb Sander	120	69
333	above Sander with dust bag	135	75
334	333 sander with PSA pad	135	74
352VS	3 x 21 Bell Sander v/spd w/case	305	169
7116	24" Omni-Jig	535	294
1700	Heat gun 750 - 1000 degrees	120	74
550	Pocket cutter with case	330	179
7700	10" "Lazerloc" Miter saw	634	344
347	7-1/4" "Framers" Circ Saw	225	129
9347	347 Saw with case	255	145
447	7-1/4" "Framers" Circ Saw w/brake	245	139

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DELTA BENCH TOP TOOLS

Model	Description	List	Sale
23-700	Wet/Dry Grinder	234	178
23-680	6" Bench Grinder 1/4 HP	86	75
23-880	8" Bench Grinder 1/2 HP	151	115
11-950	8" Drill Press	199	138
28-160	10" Hobby Band Saw	210	138
31-050	1" Belt Sander 2.0 amp	104	78
31-460	4" Belt/6" Disc Sander	198	129
31-340	1" Belt/8" Disc Sander	268	204
31-080	1" Belt/5" Disc Sander	134	94
40-560	16" 2 speed Scroll Saw	266	178
11-990	12" Bench Drill Press	276	205
11-090	32" Radial Bench Drill Press	399	305
43-505	1/2" Bench Router/Shaper	399	285
22-540	12" Bench Top Planer	595	398
36-220	10" Compound Mitre Saw	350	229
14-650	Hollow Chisel Mortiser	668	289

NEW TOOLS BY DELTA

33-060	NEW "Side kick" Miter saw	510	375
14-070	NEW 14" Floor Drill Press	450	349
28-180	NEW Bench Band Saw	232	165
40-640	NEW 20" Bench Scroll Saw	466	295
28-190	NEW 12" Band Saw w/stand	465	385
50-075	NEW Dust Collector/Sweeper 3/4 HP	360	259
20-150	NEW 14" Cut-off Saw	375	219
36-090	NEW 10" Sidekick Miter Saw	293	214
37-070	NEW 6" var. speed Bench Jointer	337	249
37-190	NEW 6" Deluxe jointer	554	469
36-275	NEW 8-1/4" Builders Saw	444	265
36-210	NEW 10" Compound Mitre Saw	438	259
36-070	NEW 10" Mitre Saw	284	169

DELTA STATIONARY

34-444	Table Saw w/1-1/2HP motor & stand	812	619
17-900	16-1/2" Floor Drill Press	462	399
40-601	18" Scroll Saw w/stand and blades	1003	759
34-080	10" Mitre Box	Xtra Special	198
34-761	10" Unisaw 1-1/2 HP	1715	1359
33-990	10" Radial Arm Saw	818	639
37-280	6" Motorized Jointer	488	395
50-179	3/4 HP 2 stage Dust Collector	483	345
43-355	3/4" Shaper 1-1/2 HP	964	749
46-700	12" Wood Lathe	548	445
33-055	8-1/4" Sawbuck comp with legs	865	615
34-330	8-1/4" Table Saw 13 amp	343	245
36-540	10" Table saw	210	169
34-670	10" Motorized Table Saw	511	395
32-100	Stationary Plate Jointer	645	255
36-040	8-1/4" Compound Mitre Saw	224	155
34-915	30" Unifence	385	239
34-897	50" Delta Unifence	525	285
36-755	10" Tilt Arbor Saw	1264	965
33-890	12" Radial Arm Saw	1829	1425
14-040	14" Bench Drill Press	382	345
28-560	16" Three Wheel Band Saw	487	445
28-245	14" Band Saw w/open stand 1/2 HP	719	585

The following Delta Tools have Rebates !
Rebates start 9-15-94
$50 Rebate

28-283	14" Band Saw with enc stand 3/4 HP	910	745
34-445	34-444 Saw with 30" unifence	1200	775

$75 Rebate

22-661	13" Planer with 2 HP motor	1513	1189
37-154	DJ15 6"Jointer with 3/4 HP motor	1451	1155

DELTA Industrial Saw Blades
Carbide Tipped - 5/8" bore - Lifetime guarantee

Model	Description	Hook	Tth.	List	Sale
35-593	Sawbuck blade 8"	-6°	48	52	40
35-616	Crosscut 10"	12°	60	55	44
35-617	Combo 10"	15°	50	54	43
35-619	Slide Cmpd/Rad Arm 10"	-6°	60	63	50
35-624	Super Cutoff 10"	10°	80	78	60
35-625	Super Cutoff/Rad Arm 10"	-6°	80	77	60

NEW DEWALT TOOLS

DW944K	3/8" 9.6V cdlss drill kit w/cs & 2 batt	283	165
DW945K	3/8" 12V cdlss drill kit w/cs & 2 batt	309	169
DW364	7-1/4" Circ. Saw w/brake, 13 amp	285	154
DW306K	8.0 amp Recip Saw w/case var. spd	291	164
DW610	1-1/2 HP 2 handle Router	274	154
DW411	1/4 sheet Palm Sander, 1.7 amp	97	58
DW705	12" Compound Mitre Saw	706	379
DW704	12" Mitre Saw	570	325
DW100	3/8" Drill, 4 amp, 0-2500 rpm, rev	118	68
DW250	4.5A Drywall Gun, 0-4000 rpm, rev.	169	98
DW254	4.5A Drywall Gun, 0-2500 rpm, rev.	169	94
DW280K	NEW Screwdriver kit complete	207	119
DW402	4-1/2" Grinder 6 amp	158	94
DW682K	NEW Biscuit Joiner with case	429	238
DW615	NEW 1-1/4 HP Elec. Plge Router	290	158
DW624	NEW 3 HP Plunge Router	441	245
DW625	NEW 3 HP Electronic Plge Router	511	274
DW675K	NEW 3-1/8" Planer with case	289	164
DW430	NEW 3 x 21 Belt Sander	291	165
DW431	NEW 3 x 21 var. speed Belt Sander	331	184
DW420	NEW Palmgrip Random Orb Sander	120	69
DW421	above Sander with dust collector	138	79

NEW DEWALT CORDLESS DRILLS

DW952K	3/8" v/spd incl. one 9.6V batt	280	165
DW953K	3/8" v/spd incl. one 12V batt	306	179
DW962K-2	3/8" v/spd incl. two 9.6V XR batt.	324	189
DW972K-2	3/8" v/spd incl. two 12V XR batt	352	199
DW991K	3/8" v/spd inc. one 14.4V XR batt	370	219

Above drill kits come w/charger & steel case !

SIOUX TOOLS

8030	New 3/8" variable speed Drill	250	145
8000	3/8"v/sp close quarter Drill 0-1300rpm	201	125
8005	Same as 8000 but is 0-2500 rpm	200	134
690	5" Air Random Orbit Sander	139	132
658	5" Air Random Sander - dual action	261	155

DREMEL TOOLS

3950	Moto Tool Kit with bits & case	134	79
3952	Super Moto Tool Kit with accessories	152	95
1671	16" Scroll Saw - 2 speed "Best buy"	302	174
1695	NEW 16" var. speed Scroll Saw	408	224
290	Electric Engraver with point	25	16
8508	Cordless Moto Tool Kit with case	109	64
1731	5" Disc 1" x 30" Belt Sander	189	114

JORGENSEN ADJUSTABLE HANDSCREWS

Item#	Jaw Length	Opening Capacity	List	Sale	Box of 6
#5/0	4"	2"	14.34	8.35	48.59
#4/0	5"	2-1/2"	15.40	8.95	51.99
#3/0	6"	3"	16.53	9.59	55.75
#2/0	7"	3-1/2"	17.75	10.35	58.95
#0	8"	4-1/2"	19.76	11.75	58.00
#1	10"	6"	22.63	12.50	68.00
#2	12"	8-1/2"	25.95	14.50	78.00
#3	14"	10"	32.88	18.00	99.00
#4	16"	12"	42.76	23.95	139.00

JORGENSEN STYLE 37 2-1/2" Throat 1/4"x3/4"

Item#	Jaw Length	List	Sale	Box of 6
3724	24"	14.25	7.99	42.50
3730	30"	15.88	8.85	47.75
3736	36"	17.36	9.99	53.95

STYLE 36 - STYLE 37 CLAMP W/E-Z HOLD

Item#	Bar Length	List	Sale	Box of 6
3606	6"	18.96	11.75	65.95
3612	12"	20.11	12.49	69.95
3618	18"	21.95	13.65	76.95
3624	24"	27.08	15.45	85.95
3630	30"	29.42	16.85	95.95
3636	36"	35.09	18.25	103.95

JORGENSEN STYLE 45 5" Throat 1-3/8" x 5/16"

Item	Jaw Length	List	Sale	Lots of 6
4512	12"	33.17	19.95	109.99
4518	18"	34.97	21.45	116.99
4524	24"	37.02	22.75	123.99

PONY CLAMP FIXTURES

Model	Description	List	Sale	Lots of 12
50	3/4" Black Pipe Clamps	14.87	7.90	89.95
52	1/2" Black Pipe Clamps	12.40	6.80	72.95

JORGENSEN STEEL "I" BAR CLAMPS

Model	Size	List	Sale	Lots of 6
7224	24"	34.36	17.99	103.00
7236	36"	36.88	18.99	109.00
7248	48"	40.54	20.99	119.00
7272	72"	46.64	27.99	159.95

Msx636	FEIN Triangle Sander Kit	Sale	185
LPN672	PONY Air Palm Nailer with glove	Sale	94.99

ELU BY BLACK & DECKER

3338	2-1/4 HP var. speed Plunge Router	501	199
3304	1 HP variable speed Plunge Router	307	169
3375	3-1/8" Univ. Planer 7.2 amp	329	159
3380	Biscuit Jointer with case	569	185
4024	3 x 21 variable speed Belt Sander	338	179
3339	NEW 3 HP var. spd Plunge Router	511	269

BLACK & DECKER

1166	3/8" Drill 0-2500 rpm 4 amp	118	65
2600	3/8" Drill 0-1200 rpm 4.5 amp	167	95
1703-1	10" Mitre Saw with 73-770 blade	344	198
4011	1/4 sheet Palm Sander	86	59
79-034	Workmate 400	184	109
1349-09	1/2" Timberwolf Drill 2 speed	551	309
1180	3/8" Drill rev. 0-1200 rpm 5 amp	207	114
2037	Drywall Gun 0-4000 5.0 amp	184	98
2038	Drywall Gun 0-2500 rpm 5 amp	184	99
3157	Orbital var spd Jig Saw 4.5 amp	263	149
2665K	NEW 3/8" cdls 12V Cyclone Drill	294	168
5045K	MACHO Rotary Hammer Drill	813	439
2054	Tek Gun 0-2500 5.0 amp	287	159
2660	Drywall Gun 0-4000 4.5 amp	149	88
1321	1/2" Spade hdle Drill 450 rpm 7 amp	320	188
2750	4-1/2" Grinder 10,000 rpm 6 amp	156	83
2694	7-1/4" Super Sawcat Circ Saw w/cse	285	152
2695	8-1/4" Super Sawcat Circ Saw w/cse	328	162
BD5200	Quantum New 5" Rand Orb Sander	160	88
BD5900	Quantum New 1/2" Belt Sander	121	69

Piranha by Black & Decker
Carbide Tooth Saw Blades

Model #	Diameter	# Teeth	List	Sale
73-715	5-1/2	16	14.39	7.99
73-716	6-1/2	18	14.39	7.55
73-717	7-1/4	18	14.60	7.99
73-737	7-1/4	24	18.06	9.29
73-757	7-1/4	40	32.87	16.89
73-718	8	22	20.95	10.95
73-759	8-1/4	40	46.88	24.99
73-719	8-1/4	22	20.63	11.95
73-740	10	32	34.63	17.95
73-770	10	60	70.37	33.95
73-711	10	50	68.33	33.95

DURA III- ADJUSTABLE STILTS

Model	Description	List	Sale
D1422	14"-22" extension	258	189
D1830	18"-30" extension	274	205
D2440	24"-40" extension	289	219

Above models include strap adapter kits

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ALUMINUM LADDER JACKS
Must be installed on Type 1 or Type 1A ladders only

Model	Accepts Stage Width	Spans	Attaches to Rung	Sale
10-14-02	14"	2 rung	2 rungs	68.95
10-20-02	20"	3 rung	2 rungs	81.95
10-20-03	20"	3 rung	3 rungs	89.95

ALUMINUM ARTICULATED LADDERS
TYPE II - 225# RATING

Model	Size	Weight(lbs)	Sale
M2-6-12	6'	34	125.00
M2-7-14	7'	38	135.00
M2-8-16	8'	41	145.00

ALUMINUM ARTICULATED LADDERS
TYPE IA -300 # RATING

M6-12	6'	39	129.00
M7-14	7'	43	145.00
M8-16	8'	46	159.00

FIBERGLASS STEP - TYPE 1- 250# RATING

6004	4'	13#	53.95
6005	5'	16#	64.95
6006	6'	18#	67.95

FIBERGLASS STEP - TYPE 1- 250# RATING

6004-S w/pail shelf	4'	15#	59.95
6005-S w/pail shelf	5'	18#	69.95
6006-S w/pail shelf	6'	20#	73.95

FIBERGLASS STEP - TYPE 1A- 300# RATING

6204	4'	14#	65.00
6205	5'	18#	75.00
6206	6'	20#	82.00

ALUMINUM FLAT STEP TYPE 11- 225# RATED EXTENSION

Model	Size	Working Length	Weight(lbs)	Sale
D1216-2	16'	13'	22#	117.95
D1220-2	20'	17'	27#	135.95
D1224-2	24'	21'	33#	159.95
D1228-2	28'	25'	42#	185.95
D1232-2	32'	29'	53#	209.95
D1236-2	36'	32'	62#	239.95
D1240-2	40'	35'	73#	298.95

ALUMINUM FLAT STEP TYPE 1- 250# RATED EXTENSION

D1316-2	16'	13'	26#	127.95
D1320-2	20'	17'	32#	152.95
D1324-2	24'	21'	39#	169.95
D1328-2	28'	25'	50#	199.95
D1332-2	32'	29'	62#	229.95
D1336-2	36'	32'	77#	299.95
D1340-2	40'	35'	85#	329.95

ALUMINUM FLAT STEP TYPE 1A- 300# RATED EXTENSION

D1516-2	16'	13'	31#	159.95
D1520-2	20'	17'	37#	169.95
D1524-2	24'	21'	45#	199.95
D1528-2	28'	25'	56#	219.95
D1532-2	32'	29'	66#	259.95
D1536-2	36'	32'(250# rating)	79#	309.95
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121482	12' Aluminum Multi Purpose	228	128
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SKS300	NEW 10" Compound Mitre Saw	1019	499

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TR12	Plunge Router 3 HP	389	188
F1000A	12" Planer/6" Jointer	2970	1559
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C10FC	NEW 10" Mitre Saw	432	259
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DS10DVAK	12 volt Cordless Drill Kit w/2 batt	393	199
NR83A	Framing Nailer 2 - 3-1/2 Full Head.	700	385
NR83AA	Framing Nailer 2 - 3-1/2 Clip Head	750	414
NT65A	16 ga. Brad Nailer 1 - 2-1/2	610	328
NT45A	18 ga. Brad Nailer 13/16 - 1-3/4	490	275
NV45AB	Coil Roofing Nailer 7/8 - 1-3/4	750	409
NV83A	Coil Nailer 2 - 3-1/4	750	415
NV50A1	Coil Nailer 1-1/4 - 2.	564	305
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ALT6-900	Automatic Level - Transit - 18x	638	409
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SFN40	NEW Finish Nailer 1-1/4" - 2-1/2"	571	385
SN325	Nailer 1-7/8" - 3-1/4"	665	419
SLP20	NEW Pinner w/case 5/8" - 1-5/8"	399	269
SKS	Stapler 5/8" - 1-1/2"	390	269
M2	Stapler 1/16" wide - 1-3/8"- 2" length	535	355
SN70	Framing Nailer Clip Hd 2" - 3-1/2"	690	475
SN60	Framing Nailer-Full Hd 2" - 3-1/2"	638	455

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AIRY AIR NAILERS

0241SK	Brad Nailer 3/8" - 1-9/16" Same as Senco SLP-20	180	98
0250SK	Brad Nailer 3/4" - 2"	296	169
0626SK	1/4" Crown Stapler 3/8" - 1"	194	109
0635SK	1/4" Crown Stapler 1/2" - 1-3/8" Same as Senco SKS	310	175

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HFN-880C	Finish Nailer 1-1/2" - 2-1/2"	720	425
RCN-60\225	Coil Roofing Nailer	740	435
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CN-325	Framing Nailer - Clip Head	670	395

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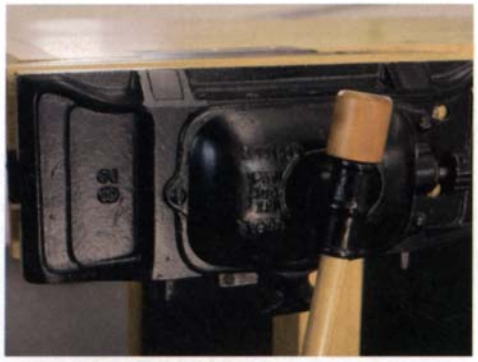
Built largely from salvaged materials, *Peter Brown's Shaker-style bench is actually stronger than the Hancock Shaker Village original on which it's based. Where the Shakers simply nailed boards across the back of the bench, Brown framed the carcase all the way around with fir 4x4s.*

Both vises were flea-market finds. *The shoulder vise (top photo), a turn-of-the-century Emmert, cost $100, and it required only a stripping and repainting. The bench screw, nut and garter (bottom photo) were made by the Ohio Tool Co., and they cost $15. The patent date on the garter plate is April 1884.*



Pallet wood turns into Shaker-style workbench

As a woodworker visiting Hancock Shaker Village in the late 1970s, I was impressed by the wonderful workbench there. Years later, when I saw plans for that same bench published in Scott Landis' *The Workbench Book* (The Taunton Press), I knew I'd build a similar bench one day. I got around to the project last year (see the photo above).

I built my bench based on the drawings of the original, but scaled my bench down to just under 8½ ft. The original, at nearly 11½ ft. in length, would have taken up just a bit too much space in my shop. My only other significant departure from the original is that I continued the frame of the base around the back of my bench to give it increased strength.

But what is really unusual about my bench is that it's constructed almost entirely of salvaged materials. I bought some maple and ash for the top (which were used on the original) and some locally sawn poplar for the drawers, but the rest of the bench—from the fir 4x4s that make up the frame to the shiplapped panels, door frame and panel, drawer dividers, runners and drawer bottoms—is made from stock reclaimed from shipping crates, pallets and skids. Some of the drawer bottoms still have the crate markings on them. I spent less than $150 on wood for this bench.

I purchased the tail-vise screw, nut and garter plate at a flea market for $15 and purchased the shoulder vise, an Emmert "turtleback," at another flea market for $100 (see the photos at right). Not knowing exactly what I was buying (such vises sell regularly for about $500 to $1,000), I even tried to dicker with the man selling the vise. Some hand-forged bench dogs came with the vise. They are the largest I've ever seen, measuring nearly 1½ in. sq. by 11 in. long, with hand-filed serrations on their faces.

I painted the door frame and panel, all the drawers and dividers, and the panels on the ends and the rear of the bench like the original. I left the fir frame and the benchtop natural. I sanded the benchtop to 360-grit and then finished it with six to eight coats of tung oil, which gives it a beautiful glow.

A bench of this size may not be what every woodworker needs, but with the architectural work I reproduce for our 1826 house, the large size is convenient. It's also nice to know that lumber that would have gone to the landfill was put to good use.

—Peter Brown, Lebanon, Ohio.

Woodworking on the information superhighway

Thanks to computer networking, you can participate in a constant worldwide discussion of everything from the care of handplanes to the merits of television woodworking shows.

It's called *rec.woodworking,* and it's a Usenet newsgroup (forum). Usenet started in 1979 and is now part of the Internet. Internet is a worldwide scientific research network that connects more than 20 million people throughout the world. Any message sent in the Usenet newsgroup is copied to all the computers on the net within a day or so after it's posted.

Rec.woodworking is a great place to get questions answered fast (and so are its sisters *rec.crafts.metalworking* and *sci.electronics*). Do you need an instruction manual for your 1942 Craftsman lathe or a mail-order source for spalted maple? The hundreds of participants are eager to help. As just one example, a recent question about the diameter of candles in Sweden received half a dozen replies. There is no standard way to transmit pictures, but newsgroup participants are adept at typewriter art (ASCII graphics).

About the only things forbidden on *rec.woodworking* are off-topic messages (e.g., politics in the woodworking forum) and commercial advertising. It's okay to

Photos this page: Peter Brown

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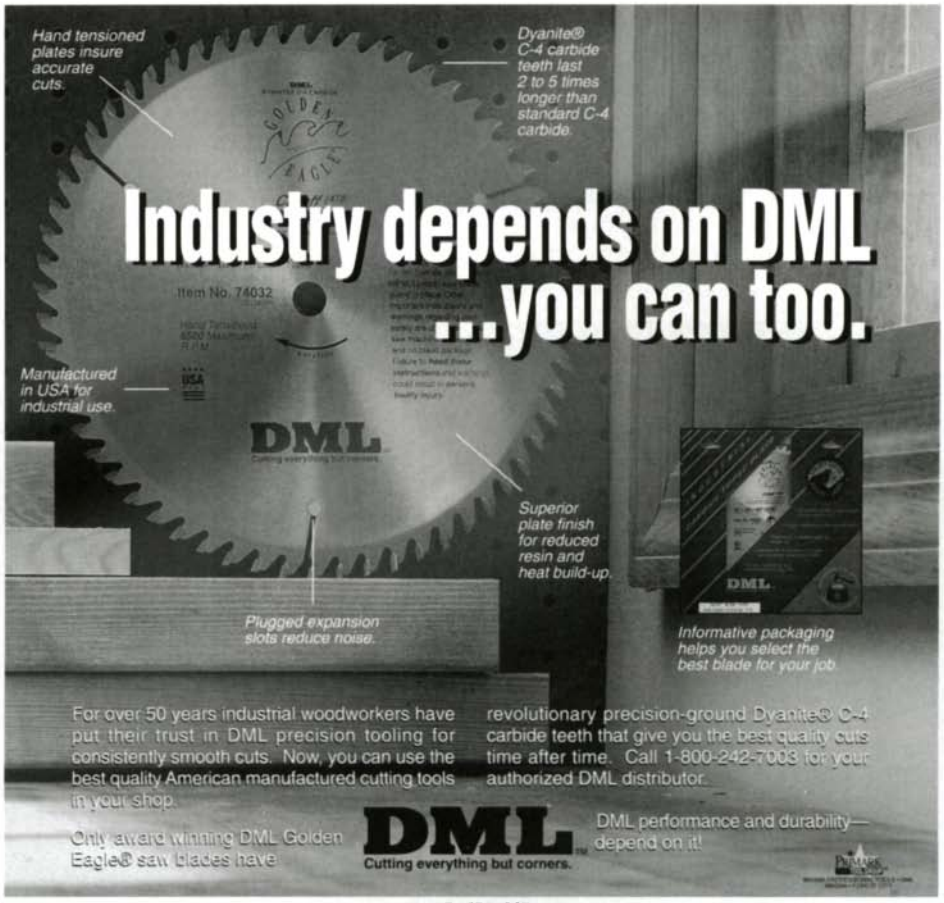

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answer direct questions about products and post personal "for sale" and "wanted" ads, but be reasonable—New Zealand doesn't want to hear about the tablesaw you're selling in San Francisco.

How do you access *rec.woodworking*? Several ways. If you're at a university, just get an account on the local UNIX machine. Otherwise, subscribe to Delphi, America Online or another commercial service that offers newsgroup access. (CompuServe has its own woodworking forum separate from this one.) Or ask local user groups whether there are cheaper ways to get to Usenet in your city.

If you can exchange electronic mail with Internet but can't read newsgroups, you can get the contents of *rec.woodworking* mailed to you. Just send the one-line message "subscribe woodwork" (without quotes) to LISTSERV@IPFWVM.BITNET. But this tactic is not for the fainthearted. You'll get 50 to 100 pieces of e-mail per day, every day, some of them quite inane. Be sure to cancel your subscription ("signoff woodwork") if you're going to be away for more than a day so that your incoming mail area does not fill up with thousands of unwanted messages.

—Michael Covington, Athens, Ga.

***Antique tools are placed into context** in displays, such as this one, that show the tools and provide explanations of how craftsmen lived and worked in the 18th century.*

***A new old tool**—This 18th-century-style plane iron was crafted at Colonial Williamsburg in 1991 as part of a program to replace authentic antique tools that were worn out from use.*

Tool replacement program spawns Colonial Williamsburg exhibit

It all started with a project begun over seven years ago to retire all the 18th-century woodworking tools from active use in the Colonial Williamsburg workshops. Curators realized that the extensive daily use of these original tools would soon wear them out, and they would be gone forever. In the course of researching alternatives to using these tools, the curators discovered an amazing range of tools that were works of art, worthy of a dedicated exhibition. That's how the exhibit, "Tools: Working Wood In 18th-Century America," came to be. Since then, Williamsburg has begun to reproduce 18th-century handplanes, chisels and handsaws in its own tool shop with impressive results.

For the exhibit, however, more than 1,500 authentic tools are on display in a 2,400-sq.-ft. space, arranged according to function. They range from plain, user-made tools to beautiful and extravagant creations of rosewood and gunmetal, some with brass and ivory fittings. The tools are displayed in wall-hung showcases and also in simulated 18th-century workshop settings; some are so realistic that it seems as if the craftsman just stepped away and could return any minute.

Although the exhibition, which runs through June 1995, is intended for the general public, woodworkers and collectors in particular will consider it a feast. The text accompanying each tool is kept to a minimum, letting the tools speak for themselves. But there's also a catalog for sale that details the exhibited tools, providing historical background and more in-depth information on the tools.

For me, the tool chests are the most fascinating part of the exhibit. There are several chests, each with numerous drawers, perches, partitions and wells holding a precious array of early tools. The chests are arranged so the contents of each are displayed vertically: You don't have to peer down into a dark wooden box and hazard guesses about the hidden treasures.

There are also two videotapes in continuous play, one showing Williamsburg "interpreters" in authentic Colonial garb,

Photos this page: Mario Rodriguez

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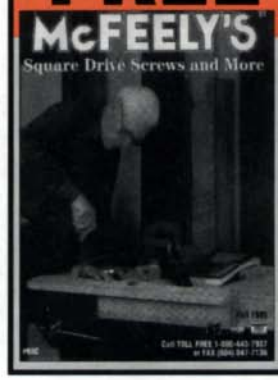

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using the tools of the Colonial craftsmen to demonstrate pit sawing, planing, veneering and other aspects of early woodworking. The other tape has some of the Williamsburg craftsmen discussing their tools and work. You hear, in the craftsman's own words, how he uses his tools to practice 18th-century woodworking.

One of the best aspects of having this exhibition at Colonial Williamsburg is that visitors with questions about a particular tool or woodworking technique can simply walk a few hundred yards to the historic trades area for an answer in the form of a demonstration. This is the perfect location for a wonderful exhibit that will appeal to all woodworkers. For more information on the exhibit, call (804) 220-7724.

—Mario Rodriguez, Warwick, N.Y.

Photo: Mario Rodriguez

***The live demonstrations of 18th-century woodworking skills** at Colonial Williamsburg's historic trades area make the living museum the perfect locale for the exhibition "Tools: Working Wood in 18th-Century America."*

Photo: Jack Harich

***"Flat surfaces lead to thinking in straight lines."** That's according to Jack Harich, who employs curves and contours throughout his work. To create the pattern for this swirled carving, he laminated layers of walnut and maple on one of the curly maple boards that make up the tabletop and then carved through them.*

Photo: Jack Harich

Along curved lines

"The look I strive for," Jack Harich told me in his Atlanta workshop, "is for the piece to look as if it grew, not as if it were man-made." So he uses natural forms, curves, swirls and deep carving in his work. Unlike much wood furniture, Harich's work emphasizes wood's plasticity. "Flat surfaces lead to thinking in straight lines," he said.

Harich likes contrasting colors but dislikes the flatness of traditional inlay. So he glues up laminations of contrasting woods to create inlay in three dimensions and great sculptural freedom, as shown in the carving in the table shown at left.

His primary shaping tools are a 1¼-in.-dia. ball mill, a hand-held disc sander and a Sioux angle drill with a soft-pad, 120-grit sanding disc. His most indispensable tool, though, is an Emmert patternmaker's vise. It swivels, tilts and locks, toes in and out, has dogs on both 18-in. by 7-in. faces and opens to 14 in. Designed a century ago, the vise has been out of production for 30 years. *—Barbara Schneider, Atlanta, Ga.*

Notes and Comment

Got an idea you'd like to get off your chest? Know about any woodworking shows, events or craftsmen of note? Just finished a great project? If so, we would like to hear about them. How about writing to us? And, if possible, send photos or transparencies to Notes and Comment, Fine Woodworking, *PO Box 5506, Newtown, Conn. 06470-5506.*

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SALE:
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2 H.P. DUST COLLECTOR

- 220V, 15 AMPS
- 1,059 C.F.M.
- 2 INTAKES @ 4"

*EN-DC20
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SALE:
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FREE 4" x 10' P.V.C. HOSE with purchase of any Dust Collector.

6" JOINTER

- 1 H.P., 110/220V, SINGLE PHASE MOTOR
- CENTER MOUNT CAST IRON FENCE W/TABLE SLIDE PROTECTOR
- QUICK ADJUSTMENT HAND CRANK FOR OUTFEED TABLE
- STURDY BASE CABINET W/DUST COLLECTOR CHUTE

*EN3104
REG.:$380.00
SALE:
$360.00

8" HEAVY DUTY JOINTER

- 1 1/2 H.P., 220V, SINGLE PHASE MOTOR
- CENTER MOUNT CAST IRON FENCE W/TABLE SLIDE PROTECTOR
- QUICK ADJUSTMENT HAND CRANK FOR OUTFEED TABLE
- MAGNETIC SAFETY SWITCH, 65" LONG CAST IRON BED

*EN3105
REG.:$660.00
SALE:
$650.00

10" H.D. TABLE SAW

- 1 1/2 H.P., 110/220V, SINGLE PHASE MOTOR
- 41" X 27" TABLE SIZE W/CAST IRON EXTENSIONS
- BUILT-IN DUST COLLECTOR CHUTE
- PRECISION SINGLE LEVEL RIP FENCE W/MICRO-ADJUSTMENT

*EN3201
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SALE:
$345.00

12" PLANER

- 2 H.P., 110V, 14 AMPS
- 16,000 C.P.M.
- 2-KNIFE CUTTERHEAD

EN-PN12
REG.:$375.00
SALE:
$365.00
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15" PLANER

- 3 H.P., 110/220V, 30/15 AMPS
- 2 SPEEDS: 16 & 20 F.P.M.
- 3-KNIFE CUTTERHEAD

*EN-PN15
REG.:$860.00
SALE:
$825.00

10" SUPER H.D. TILTING ARBOR TABLE SAW

- 3 H.P., 220V, 15 AMPS
- PRECISION GROUND CAST IRON TABLE
- PRECISION LEVER LOCK FENCE SYSTEM
- STEEL BASE CABINET

*EN3202
REG.:$840.00
SALE:
$750.00

1 1/2 H.P. WOOD SHAPER

- 110/220V, 7,000/10,000 R.P.M.
- 1/2" & 3/4" SPINDLES
- CAST IRON TABLE

*EN3302
REG.:$490.00
SALE:
$420.00

3 H.P. HEAVY DUTY WOOD SHAPER

- 220V, 7,000/10,000 R.P.M.
- 1/2", 3/4" & 1" SPINDLES
- CAST IRON TABLE

*EN3303
REG.:$785.00
SALE:
$715.00

3 H.P. SLIDING TABLE WOOD SHAPER

- 220V, 7,000/10,000 R.P.M.
- 24" X 9" SLIDING TABLE
- 1/2", 3/4" & 1" SPINDLES

*EN3304
REG.:$990.00
SALE:
$940.00

6" X 48" BELT/9" DISC SANDER

- 3/4 H.P., 110/220V
- MITER GAUGE
- ADJUSTABLE TABLE 0-45°

*EN-SN69
REG.:$190.00
SALE:
$180.00

6" X 30" EDGE SANDER

- 1 1/2 H.P., 110/220V
- 6" X 80" BELT
- QUICK RELEASE LEVER
- CAST IRON TABLE
- (MAGNETIC SWITCH IS OPTIONAL)

*EN3405
REG.:$420.00
SALE:
$360.00

OSCILLATING SPINDLE SANDER

- 1 H.P., 110V/220V, SINGLE PHASE MOTOR
- SPINDLE SPEED 1,725 R.P.M.
- 75 OSCILLATIONS PER MINUTE
- 10 SPINDLES FROM 1/4" TO 4" DIA. INCLUDED

*EN3407
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THE IMPERSONATOR

The jester represents man as a fool. He hides within the protective shell of convention, symbolized by his cap and bells, the uniform of the fool. He is equipped with a variety of masks or personalities to be worn at different times and from behind which he peers nervously at the world. Of course, no one is taken in by his charade, and even his mace, his symbol of office, mocks him.

The exquisite detailing in this piece and the introspective look at life is typical of the carvings of Ian Norbury of Hertford, England. *The Impersonator* is made of walnut, pear, boxwood, gold, briar burl, copper, silver, lime burl, Brazilian rosewood, Nootka cypress, pink ivory-wood, olive, bog oak, embuia, African blackwood, ripple sycamore, cherry, partridge wood, yew, bone, brown oak, lime, red padauk, marble, burl elm and ebony inlay. The statue, without its pedestal, is approximately 30 in. high.

Photos: Ian Norbury