

Using Bench Planes

These basic tools still do what machines can't

by Ian J. Kirby

In woodworking, there is no sound quite as delightful as the clear hiss of a sharp plane taking off a thin shaving. Nor can any other tool so precisely remove a modicum of wood tissue while leaving a perfectly flat and smooth surface. Of the three basic woodworking tools—saw, plane and chisel—the plane alone projects such a false sense of complexity that much modern woodworking is done without it. To be sure, many of its operations can now be done faster by machine. Where the cabinetmaker once had bench, plow and molding planes, he now has power jointer, router and spindle shaper.

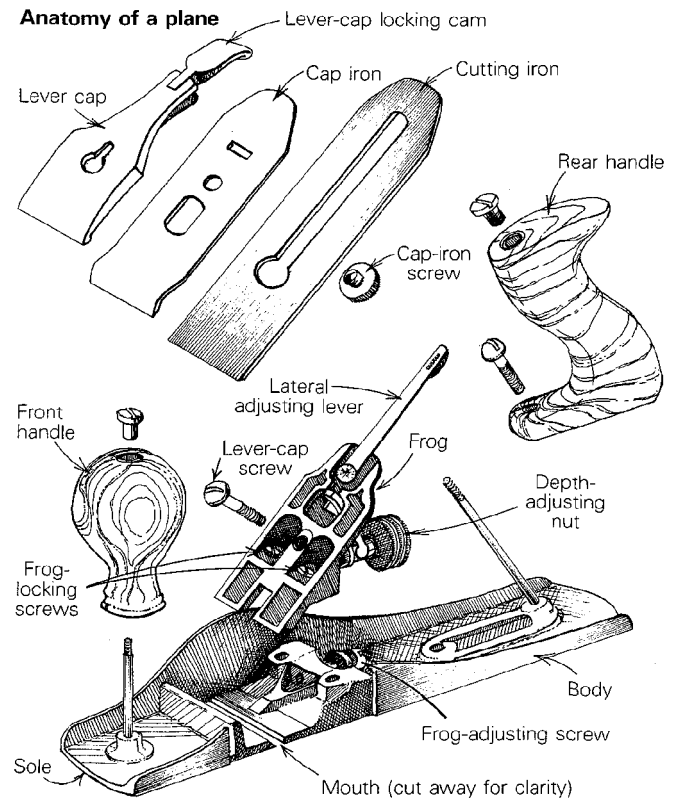
For those woodworkers intent on a more developed level of workmanship, however, the hand plane still has an assured place in the shop. No machine, no matter how cleverly contrived, can match the plane's virtuosity in fitting drawers and doors, aligning twisted frame assemblies or leveling surfaces. The plane is unique in its ability to deliver a smooth, clear surface unattainable in any other manner.

Woodworkers of yesterday had dozens of planes to pick from. Though many are still available today, you need to own only one or two to perform most planing work.

In this article, I'll explain the various types and parts of modern metal planes, how to select and adjust them and, most important, how to use them. These principles apply to wooden planes also.

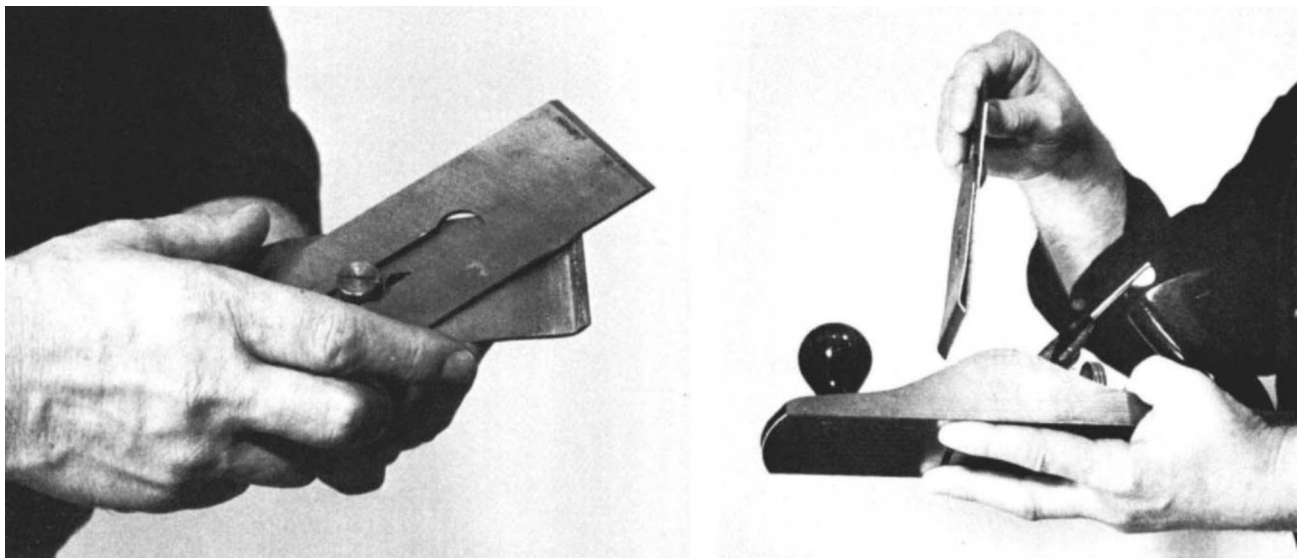
Why planes?—The woodworker's plane has been around for centuries. Unearthed tomb paintings depict Egyptian carpenters using planes to square up timbers. This remarkable history stems from the plane's basic usefulness; except for the adze and drawknife, no other primitive tool can prepare cleft or roughsawn wood to final dimensions. In its basic function and form, the plane has changed little: all planes consist of a blade or iron firmly mounted on a bed in the body of the tool. The blade must be adjustable and easily removable for sharpening. The bottom, or sole, of the plane must be kept flat and out of winding. The whole assembly, blade and body, must accommodate the hands or have handles so the operator can control the tool.

These requirements can be met with different designs and materials. Japanese planes, for example, are made of wood and are pulled. Western bench planes, whether metal or wood, are pushed. The result is the same: a smooth, accurate surface. Often the question is asked, which is better, metal or wood, and one can only reply that the answer lies with personal preference. Wooden planes are more difficult for the beginner to adjust and sharpen. A metal plane also delivers a clearer tactile sensation of the shaving being removed than does a wooden plane. Wooden planes can be made in the shop, and their soles can be flattened with another plane rather than with a grinding machine. A century ago, wooden planes evolved in such great variety because they suited the manufacturing technology then available. Each tradesman—

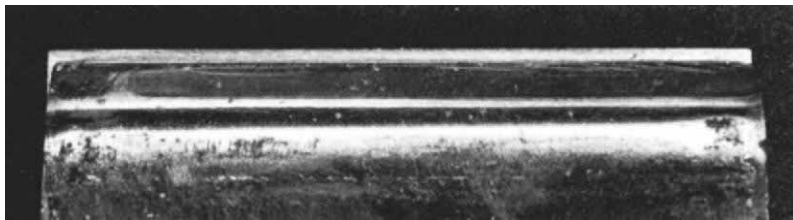


joiner, cabinetmaker, cooper, coachmaker, and so on—had his own array of planes suited to his own particular work. Some, an ogee molding plane for example, were designed for a single job and were thus used only occasionally. But the bench plane, because it could do many jobs well, was used constantly. The working specialty planes have vanished along with the trades to which they belonged, or else their functions are now better done with machines. The electric router, for instance, makes grooves much better and more quickly than plow planes can. Woodworkers today still need the utilitarian planing tools that the early tradesmen found so indispensable, and thus the bench plane has survived in very much its original configuration.

Three types of bench planes are commonly sold today, and these are distinguished by their lengths. The longest, about 22 in., is called a jointer. Of the lot, it is the most versatile; its length is designed for spanning and accurately flattening irregularities when making finished boards from roughsawn lumber. The smoothing plane is the shortest and has a body about 9 in. long. Its short sole cannot bridge irregularities in a board, so it's not the tool for making an accurately flat surface or edge. The smoothing plane is best for producing finished surfaces of high quality, when flatness is not impor-



Kirby uses the lever cap's tapered end as a screwdriver to disassemble and assemble the cutting iron. If you use a screwdriver, make sure it is large enough to avoid damaging the screw. When reassembling, the cutting and cap irons should initially be put together at right angles, above left. The screw is then finger-tightened and the cap iron is rotated into place. The cap iron should be placed about $\frac{1}{16}$ in. from the back or non-beveled edge of the cutting iron, as shown below. For best performance, this distance is critical; if too small, shavings will jam and if too large, the iron may chatter. To put the cutting iron back in the plane, grasp the tool as shown in the photo, above right. Then, holding the cutting-iron assembly between the thumb and forefinger, drop it into the plane and make certain it seats against the bed and engages the depth-adjusting mechanism. At right, the frog-locking screws are loosened to move the frog forward and backward. Use your forefinger to feel how far the lower edge of the frog projects into the mouth.



tant. In the middle, at about 14 in. long, is the jack plane, supposedly named because its medium length makes it a "jack-of-all-trades." I've always found this plane to be of limited use—it has neither the jointer's accuracy nor the smoothing plane's handiness. If I were to buy but one plane, I would get the jointer. It will do its job as a preparation plane and can also be used for truing subassemblies and for finishing and smoothing work. I find little use for the jack except in instances where the jointer is uncomfortably heavy.

Adjusting the plane—Before it can be used, the plane must be tuned up or "fettled" (see box, p. 87), its cutting iron must be sharpened and its various parts must be put in proper adjustment. Begin by removing the cutter and cap iron. With the plane on the bench, place your forefinger firmly on the lever cap and, using your thumb and middle finger, release the locking cam. Bear down with your forefinger to keep the lever cap from bouncing about. After you have removed the cutting-iron assembly, disassemble the cap iron from the cutting iron and sharpen the cutting iron (sharpening is discussed in *FWW* #29, p. 66). Holding the cutting iron in the palm of your hand, loosen the screw just enough to slide the cap iron free.

After sharpening the iron, reassemble the cap and cutting iron, making sure the cap iron doesn't slide across or bump the sharpened edge. Tighten the screw and slide the cap iron to within $\frac{1}{16}$ in. of the cutting iron's edge. This setting is critical and getting it right may take some trying—too small, and shavings will jam; too large, and the iron will chatter.

To put the iron assembly back into the plane, grasp the body in the palm of your hand with fore and middle fingers at opposite ends of the mouth. Hold the assembly between your thumb and forefinger, and lower it into place onto your fingers. As the iron seats itself, you will feel it slide through the mouth to contact your fingers evenly on each side. Sight alongside the iron to make sure that it has firmly seated on the frog—the cast-iron assembly that beds the cutting iron in the plane body—and that the depth-adjusting mechanism has engaged the window in the cap iron. Place the lever cap over its screw and lock it down with the locking cam.

Adjusting the frog varies the space between the cutting edge and the front of the plane's mouth. This space should be made about $\frac{1}{32}$ in. if delicate shavings are to be made, although for hogging off roughsawn stock it might be $\frac{1}{16}$ in. or wider. The frog is held in place by recessed screws, and to get at them you'll have to remove the cutting-iron assembly



Grip the plane with your index finger extended (above). This triangulates the grip and gives you more control than wrapping all four fingers around the handle. When edge-planing, curl the fingers of your other hand up under the sole so your fingernails ride against the face of the board. Stand close enough to the work so that your shoulder is aligned with the cut (right). Standing too far away will cause you to tilt the plane, producing an out-of-square cut. Start the edge-planing cut with the toe held against the work (below left). Stand with one foot well below the work and the other spread about a walking pace back. The back leg should be straight, the front leg slightly bent (below center). Remember, this is a lower body action, not an arm movement. As you make the cut, uncurl your body and crouch into the work. Follow through by leaning well over the board (below right), extending your arms if you start to become unbalanced.



again. With the locking screws loose, a screw under the adjusting nut moves the frog forward and backward.

Unfortunately, the frog does not ride on a track; it can slew from side to side as it is moved. Its alignment can be gauged only with the cutter assembly in place, so the adjustment is a matter of trial and error. A likely starting place is with the leading edge of the frog just overlapping the mouth. Lock the cutting iron back in place, then turn the plane over. With the lateral adjusting lever centered, you want the cutting edge to be only $\frac{1}{32}$ in. from the front of the mouth. The edge should be parallel to the mouth opening. Adjust the frog to make it so, and recheck the adjustment with the cutting iron in place. When you've got it right, tighten the locking screws. Then apply a light film of machine oil to the frog, the cutting iron and the cap iron, and put the cutting-iron assembly back in place.

To adjust the cutting iron, back off the depth-adjusting nut until the cutting edge is inside the mouth. Then turn the plane over and sight down the sole. Turn the depth-adjusting nut clockwise until the edge of the iron appears as a black hairline projecting from the mouth. The edge of the iron

should be parallel to the surface of the sole; if it isn't, adjust it with the lateral adjusting lever. When setting the depth of cut, never adjust the plane to take a thick shaving with the intention of backing the iron off for a thinner cut. Start from zero and make small adjustments downward to get the shaving you want. Once you've got it, back the adjuster off in the counterclockwise direction until it just stops turning freely—this will take up the slack in the mechanism and keep the cutter from creeping downward and taking too large a cut. Smear paraffin or candle wax on the sole for lubrication, and you're ready to make a test shaving.

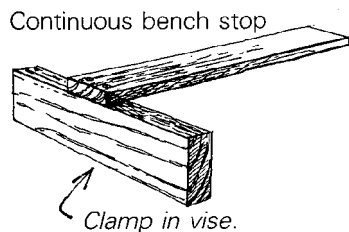
Select a board with an already planed edge, preferably not one done on a machine jointer. With the plane set for a fine cut, make a single pass and inspect the shaving. If it is uniformly thick and curls neatly against the cap iron, the plane is set correctly. If only crumbs appear in the mouth, advance the depth adjustment until a shaving can be made.

Using the plane—As with any tool, grip and stance are vital when using the plane. Other than working with a dull cutting iron, I find that ignoring these two points is the most

common planing fault. Begin by learning to grip the plane: grasp the rear handle with three fingers and your thumb, and place the forefinger on the frog casting, almost touching the depth-adjusting nut. Resist the impulse to cram your forefinger around the handle. It will be uncomfortable and you will lose the triangulation afforded by the proper grip. For edge-planing, grasp the toe of the plane in your other hand, with your fingers curled up under the sole so your fingernails can ride lightly against the face of the board as a fence. If you are surface-planing, grip the plane's front knob in whatever manner seems most comfortable.

In learning stance, it's helpful to remember that planing is a push from the lower body, not an arm movement. Stand close enough to the work so that the shoulder pushing against the back handle of the plane is directly over the direction of the cut. Stand with your front foot well under the work and your leg bent; your rear foot should be spread about a walking pace back, and your leg should be kept straight or flexed slightly. As you push the plane over the wood, uncurl your body and crouch into the action.

Start the cut by placing the plane's toe firmly on the board. Maintain an even downward pressure on both handles as you follow through. Skewing the plane in relation to the direction of the cut will ease the work, but keep the entire length of the sole on the work. Boards to be edge-planed can be held on the bench in a vise, with dogs or against a bench stop. I prefer the stop because there is no chance of the work becoming distorted by undue holding pressure, and it forces you to learn to keep the plane flat against the edge. If you are



doing it wrong, the board will just flop over. Boards to be surface-planed can be held against the stop, or else the continuous bench stop shown at left can be made up of hardwood and clamped in the vise for wider support.

Contrary to the opinion that a block plane is the tool for planing end grain, I find that full-size bench planes are better for squaring and smoothing the ends of a board. All you need do is knife a line around the board to be squared and then plane down to the line, taking as light a cut as possible. To avoid tear-out, plane in from each edge toward the center, clamp blocks on the edge of the board, or plane a small chamfer on the edges.

All of the skills I've described in this article can be mastered with a perseverance that can be enjoyable. The plane is the ideal tool for many woodworking operations that are frequently done with power tools and sanders. Once you've tuned up and learned to control this tool, you will wonder how you ever got along without it. □

Ian J. Kirby teaches design and woodworking at Kirby Studios in North Bennington, Vt. For more information on choosing planes, see FWW #3, p. 28. Tuning up planes can be read about in #1, p. 22; #2; and #14, p. 52. Japanese planes are discussed in #19, p. 91; #20, p. 60; and #29, p. 71. Another article on using planes appears in #13, p. 52. A book, Planecraft, published by C. and J. Hampton Ltd., is available from Woodcraft Supply Corp., 313 Montvale Ave., Woburn, Mass. 01802.

How to tune up a plane

As a production item, the metal plane emerges from the factory as a nearly perfect tool. All the necessary parts are there, and made of materials suited to the job at hand. But if the plane is to be used to its maximum potential, it must be tuned up or "fettled." This means taking up where the factory left off by cleaning and adjusting the various parts. For a really superb job, enlist a machine shop to grind the plane's sole perfectly flat. Even planes with years of use behind them can benefit from this attention.

I begin fettling a plane by filing the cam that locks the lever cap and iron assembly to the frog. The cam works against a spring, and on new planes it is sometimes a bit rough and burred from casting. As a result it binds against the lever cap spring. Use a fine-cut file to dress the cam until it operates smoothly.

Next, true the end of the cap iron where it will bear against the cutting iron. It must rest perfectly flat against the cutting iron, or else shavings can jam up and break off in the mouth of the plane instead of curling smoothly away. You can do this on a bench stone. Keep the ground edge of the cap iron at right angles to its sides, so it will be parallel to the cutting iron's edge.

Use a straightedge to inspect the cutting iron for flatness in length and width. If the iron is bent along its length, straighten it by placing it over a block of softwood and bending it in the proper direction. Put the convex side up, and strike the iron sharply one or two times with a steel hammer. Final flatness is achieved by backing off on the sharpening stone. Next, tend to the brass adjusting nut. This nut should travel smoothly throughout. Usually, brass running on steel needs no lubrication. If you find, however, that a few drops of light machine oil won't correct a stiff nut on a new plane, send it back for replacement.

The most important, and difficult, part of fettling is getting the sole perfectly flat. I've tried several hand methods, with only marginal results. Now I send planes to a machine shop. The machinist makes up a cradle to hold the plane, so that a few passes of a precision grinder will flatten the sole. Leave the frog in place during grinding, or else the sole will be distorted when you torque the screws to reinstall it.

Planes come from the factory supposedly ground to tolerances of about 0.003 in., which seems quite fine by woodworking standards. Yet I've seen as much as $\frac{1}{32}$ in. of metal removed to achieve flatness. Grinding the sole is expensive and you have to decide whether it's worth the money. I find the difference quite noticeable; a well-fettled plane can take consistently finer cuts than one that has not been tuned. Before grinding, the edges at the heel and toe of the sole should be chamfered slightly with a file, to prevent burrs from forming if the tool is inadvertently struck against a hard surface. Lightly file off any burrs or paint on the inside of the mouth opening and on the working surfaces of the frog. Either of the handles can be shaped to improve comfort and grip: scoop out the rear handle near its base to fit your own hand.

—I.J.K.