

Plane Truth

A simple method for building three basic hand planes.

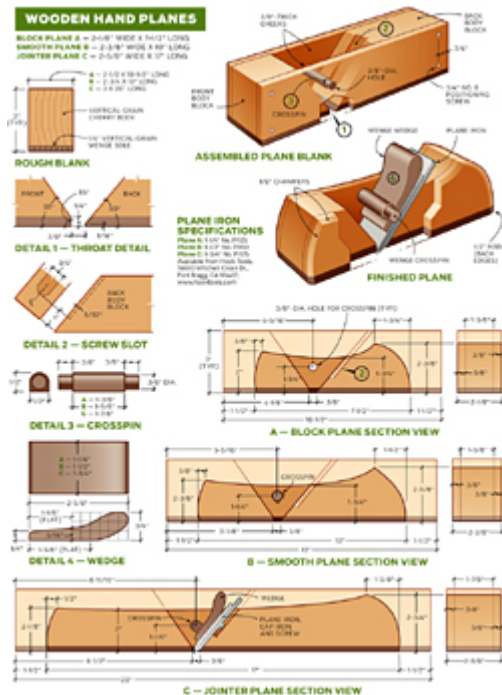


Of all the tools you use to shape wood, the hand plane is the one that has come to symbolize craftsmanship of the highest order. And it's no surprise. Here's a cutting tool that's designed to create truth: dead straight and flat surfaces ready for finishing and precise joinery. Tuning one up and mastering its use are two of the greatest thrills of woodworking. But, if you really want to bring the planes in your shop to the next level, it's time to make your own.

Our interpretations are easily built, and the basic design is well-suited to modification so you can make planes that match your needs. We offer three sizes: a block plane, smooth plane and jointer plane, all based on the same shape but each with a different-size cutter iron. We used irons specifically designed for wooden planes, available from Hock Tools, 16650 Mitchell Creek Dr., Fort Bragg, CA 95437; www.hocktools.com. The three sizes are: 1-1/4 in. (No. PI125), 1-1/2 in. (No. PI150) and 1-3/4 in. (No. PI175). Each iron comes with a cap iron and assembly screw.

While many woods are suitable, we chose cherry for the bodies and wenge for the soles of our planes. Wenge (pronounced WEN-gay) is a dense African hardwood that's available from mail-order suppliers such as A&M Wood Specialty, 358 Eagle St. N., Box 32040, Cambridge, Ontario, Canada N3H 5M2; www.amwoodinc.com. A sole isn't absolutely necessary, but a hard, dense wood resists wear on the bottom surface. Try to select stock that allows

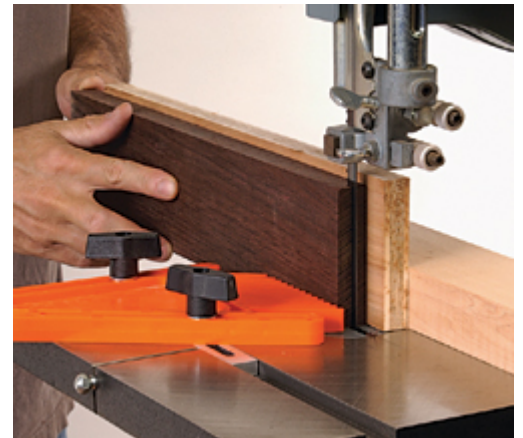
you to orient the grain vertically in both the plane body and sole to provide better dimensional stability.



PREPARING THE STOCK

If you're going to make more than one plane, it saves time in machine setup to make them all at once. First rip and crosscut the body blanks to size as shown in the [plans](#). Take care to ensure that the blanks are perfectly square in cross section.

Use a band saw to cut 5/16-in.-thick wenge slabs for the plane soles (1). Plane each piece to a finished thickness of 1/4 in., then trim it to length and width--about 1/4 in. larger in each dimension than its body blank. Glue the soles to the body blanks (2). When the glue sets, scrape off any squeeze-out and trim the soles flush.



1 Resaw wenge stock to form blanks for the soles. Use a fingerboard to hold work tight against a tall fence.

INTERNAL SHAPING

Clamp a tall fence to the band saw table and adjust it to cut 7/16-in.-wide cheeks from each side of the body blanks (3). After cutting all the cheeks, use a sharp plane or jointer to true one side of each inner body blank, then use a band saw to cut the bodies about 1/16 in. thicker than finished dimension. Plane the inner body pieces to their finished widths, and plane each cheek to 3/8 in. thick.

Mark the cheeks and body blocks to indicate the

1-1/2-in. waste portions at each end as shown in the drawing. Then, measure from those marks to lay out the angled internal shape. Use an angle gauge to lay out the cuts (4), and saw to the waste sides of the lines on a band saw.

Use a razor-sharp block plane to plane the sawn surfaces of the body blocks so they're square to the sides of the blocks (5). Work carefully because the results will affect the performance of the plane. If the back block is not flat, the iron will rock or chatter in use. When the back surfaces are flat, use the plane to relieve the sharp edge at the bottom of the rear block to form a 1/16-in. flat edge.



2 Cut the wenge sole about 1/4 in. longer and wider than the body blank, and glue the sole to the blank.



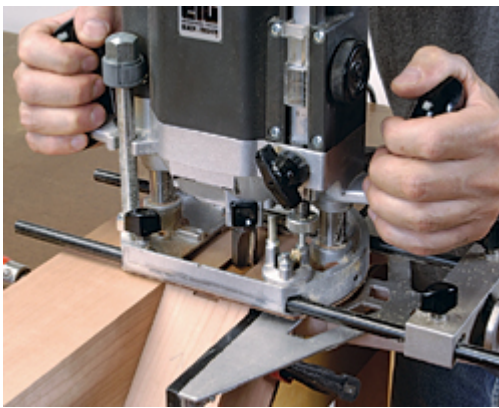
3 Adjust fence on the band saw for a 7/16-in.-wide cut, and saw cheeks off the sides of each plane blank.



4 Use an adjustable angle guide to mark inner body cuts on the blanks. Leave a 3/8-in. space at the sole.



5 Use a block plane to surface the angled faces. The faces must be perfectly flat and square to the sides.



6 Use a 3/4-in. bit to rout the recess for the cap-iron screw. A block clamped to side provides support.

Clamp a support block so that its surface is flush to the angled face of one of the back body blocks, then mount that assembly in a vise. Use a 3/4-in.-dia. straight bit in the router, along with an accessory edge guide, to cut the stopped slot for the cap-iron screw in the face of the block **(6)**.

Clamp the front and back body blocks to one of the cheeks using a straight board to align the parts accurately **(7)**. Adjust the blocks so that there is a 3/8-in. space between them at the sole, then mark their position on the inside face of the cheek. Add the opposite cheek, then temporarily clamp the parts and bore pilot holes in the end waste areas for screws **(8)**. Install the screws and remove the clamps.



7 Clamp a cheek and the body blocks to a straight board, and mark the inner block locations.

CROSSPIN WORK

Mark the location of the hole for the crosspin on the outside of the plane assembly, and use the drill press to bore the 3/8-in.-dia. hole through both cheeks **(9)**. Repeat the procedure for each plane. Remove the screws and set the parts aside while you prepare the crosspins.

Rip a strip of wenge stock to 1/2 x 1/2 in. and crosscut the pin blanks from this piece. Wrap the faces of each blank with masking tape so that your layout marks will be easily visible, then mark the shoulders of each tenon. Use a dovetail saw or backsaw to make a 1/16-in.-deep cut along each layout line to define the



8 Place the second cheek on the body, and bore pilot holes for the positioning screws in the waste areas.



9 Use a 3/8-in. drill bit to bore the crosspin holes. Bore straight through both cheeks .



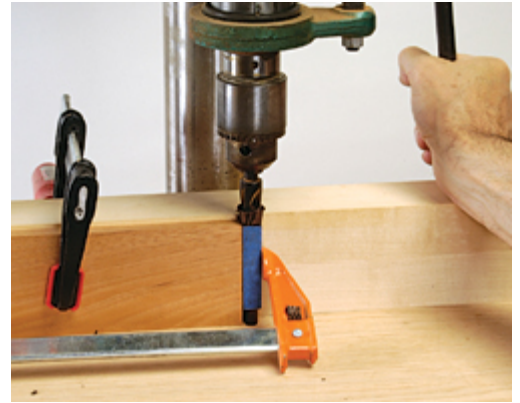
10 Wrap wenge crosspin blanks with tape so layout marks are visible. Then cut tenon shoulders.

You could use a knife and rasp to shape the tenons on the pins, but a much easier technique is to use a 3/8-in.-dia. plug cutter. Install the plug cutter in the drill press, then clamp a tall fence and stopblock to the drill press table. Clamp one of the pin blanks to the stopblock, and check that it is perfectly centered under the drill chuck. Install the plug cutter in the drill and use it to cut the tenon (11). Stop the cutter just before it reaches the shoulder kerf, then remove the blank and use a sharp chisel to clean up the shoulder. Repeat the process for each tenon. Check the fit of each tenon in a test hole drilled in a piece of scrap lumber. If the tenons are too tight, use 120-grit sandpaper to adjust them until they slide easily into the hole. It is important that the tenons are snug, but the pins need to be able to rotate to adjust properly to the angle of the wedge. Use a rasp, file and sandpaper to round the top pin surfaces as shown in the plans (12).

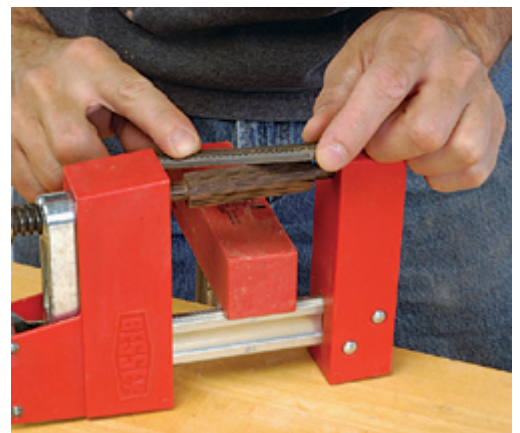
PLANE ASSEMBLY

Prepare one of the plane bodies for glue-up. Spread glue on one of the cheeks, keeping the glue about 1/8 in. back from the layout lines for the body blocks, so that squeeze-out is minimal in the central cavity of the plane. Next, apply glue to one face of each of the body blocks and place them on the cheek. Position the crosspin in the opposite cheek and spread glue on the remaining surfaces (13). Assemble the parts and drive the screws to ensure that the parts are aligned. Clamp the assembly (14), and allow the glue to set for at least an hour before removing the clamps and scraping off excess glue. Repeat the assembly process for each plane.

Use a band saw to cut off the waste portion at the ends of each block. Transfer the side profile of each plane to its blank and cut out the shape. Mount one of the plane bodies in a clamp and use a rasp to shape the back-end profile (15). Keep in mind that the plane should be comfortable in your hand, so test its feel as you shape it. Now is the opportunity to personalize your tool. Finish shaping the back using a file and sandpaper. Then chamfer the top and front edges, and sand all outer surfaces with 120-, 150- and 220-grit sandpaper.



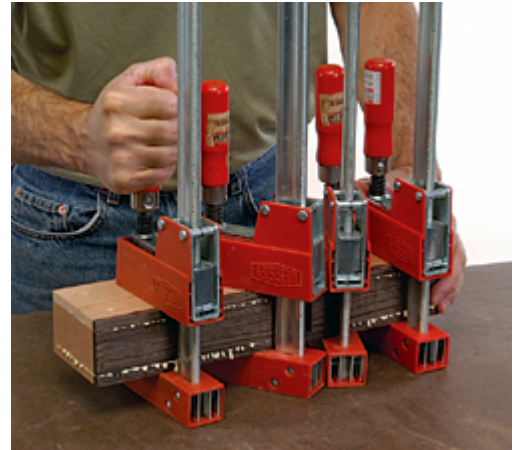
11 Use a plug cutter in the drill press to cut the tenons on the ends of the crosspins.



12 Use a rasp, file and sandpaper to shape the front face of each crosspin to a rounded profile.



13 Spread glue and screw one cheek to the blocks. Then, add the pin and join the other cheek.



14 Apply clamps to bring all joints tight. Keep the clamps away from the center space.



15 After sawing the plane body to its final profile, use a rasp, file and sandpaper to refine the shape.

For a plane to be useful as a flattening and straightening tool, it is essential that the sole be perfectly flat. If your assembly has gone smoothly, your tool is probably pretty close to being flat, but it still needs some work. The easiest way to flatten the sole is to stick a strip of self-adhesive sandpaper to the table saw table and repeatedly pass the plane over it. Apply pressure only on the forward stroke, then lift the tool to bring it back for the next stroke. Examine the sole of the plane frequently as you work. You will be able to see if there are areas that still need work. Use a sanding block to ease the corners around the sole, then repeat the process with 150- and 220-grit to polish the sole.

WEDGE AND CUTTING IRON



16 Apply masking tape to the wedge blank and mark the inside surface. Then cut to the line.

Rip a strip of wenge to width for one of the plane wedges, place a piece of masking tape on one edge and lay out the wedge shape. Then cut the inside surface of the wedge (16). Slide the iron and cap-iron assembly into the plane and test the fit of the wedge (17). Use 120-grit sandpaper to adjust the shape of the wedge, as necessary, so that it exerts even pressure across its entire width. You will know when the fit is correct when you see an evenly burnished line across the wedge face at the point where it contacts the crosspin. Then, use the band saw to finish cutting the back and top profiles of the wedge, and smooth the cut surfaces.

FINISHING AND ADJUSTING

To seal the wood we applied a penetrating finish of several coats of boiled linseed oil. Use a rag to completely soak all surfaces of the plane and wedge, let the oil absorb for about a half-hour and then wipe off the excess. After overnight drying, repeat the process. Apply at least three coats using this technique. When the final coat is dry, buff the surface of the plane with 4/0 steel wool and polish with a soft cloth. You can then apply a light coat of wax to the sole of the plane to further reduce friction.

Sharpen the plane irons according to their instructions, then assemble the cap iron to each blade, leaving about 1/32 in. exposed at the cutting edge (18). Slide an iron assembly into one of the planes so that the cutting edge is flush and parallel to the sole (19), then position the wedge and give it a light tap to lock the iron in place. To increase the depth of cut, use a small hammer to tap the iron lightly. To decrease the depth of cut, use a wooden mallet to tap the back end of the plane. After each adjustment, you should check the tension on the wedge, as it may need tightening.



17 Test the wedge in the plane. Sand the surface to achieve a snug fit against the crosspin.



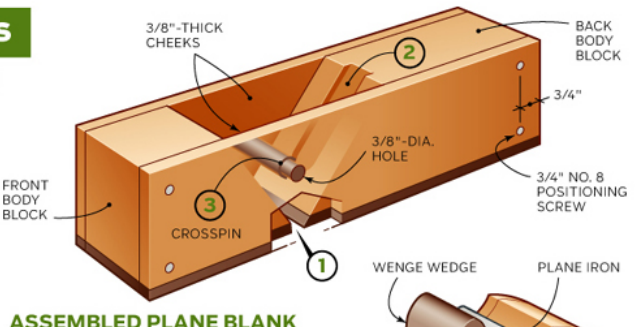
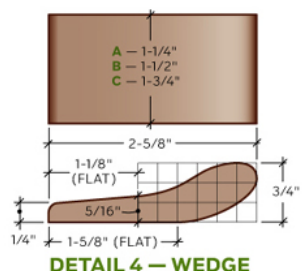
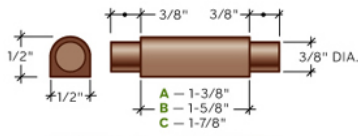
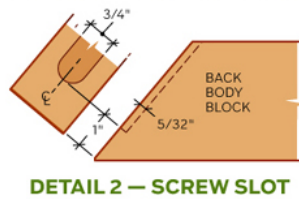
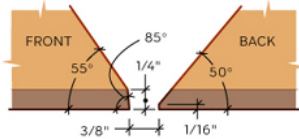
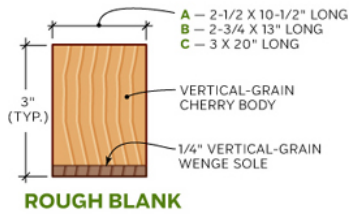
18 Hone the plane iron and install the cap iron so that it sits about 1/32 in. back from the edge.



19 Install the iron parallel to the sole. Tap to increase depth. Tap back of plane to reduce cut.

WOODEN HAND PLANES

BLOCK PLANE A — 2-1/8" WIDE X 7-1/2" LONG
SMOOTH PLANE B — 2-3/8" WIDE X 10" LONG
JOINTER PLANE C — 2-5/8" WIDE X 17" LONG



PLANE IRON SPECIFICATIONS
Plane A: 1-1/4" No. P1125
Plane B: 1-1/2" No. P1150
Plane C: 1-3/4" No. P1175
 Available from Hock Tools,
 16650 Mitchell Creek Dr.,
 Fort Bragg, CA 95437;
 www.hocktools.com

