Routing Hardware Mortises

Working with templates and guide bushings

by Jeff Greef

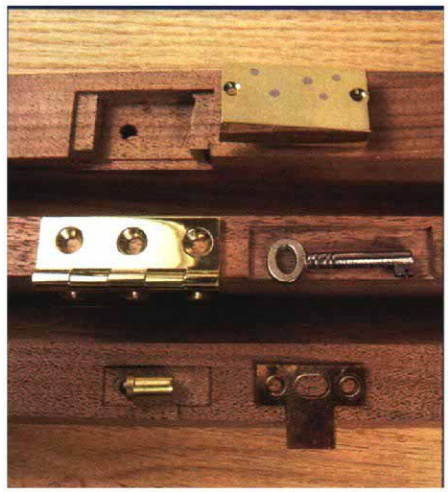
Mortised-in hardware, *such as the hinge on the cabinet at left, can add a touch of class to a piece of furniture. Routing these mortises with templates and a guide bushing is faster and more consistently accurate than hand-chiseling them.*

For years I tried faster and more accurate joinery methods while ignoring the amount of time spent chiseling hinge and lock mortises by hand. Then I made a few template fixtures and used them to rout perfect-fitting mortises for hardware on five display cases. Each case has two butt hinges (shown above), one lock, one bullet catch and its strike plate (shown at right). My router method proved to be more than twice as fast as doing the same job by hand, even though I have to chisel the corners square. I've used the fixtures when installing the hardware in other cabinets, so I've amortized the fixtures' cost and the time it took to make them over several jobs. Further, the method I'll describe can be used for mortising just about any kind of door or cabinet hardware.

The setup

My method for routing hardware mortises is cost-effective, even for relatively small jobs, because the fixtures and setup are simple.

Mortises for a lock, hinges and a bullet-catch strike plate *(shown from top to bottom in the photo below) are needed for most cabinets. Shopmade router templates are particularly helpful for cutting stepped lock mortises like the one shown below.*



Each fixture, like the one for routing a hinge mortise in the drawing on the facing page, has only two parts: a plywood template and a fence. The ¼-in.-thick birch-plywood template has a cutout that guides the router. A solid-wood fence screwed to the template aligns the template with the workpiece. The router's subbase is fitted with a guide bushing, which follows the edge of the cutout during mortising. Because the diameter of the bushing is larger than the router bit, the size of the cutout must be larger than the size of the desired mortise. (This is explained further in the sidebar on the next page.)

For routing most small-hardware mortises, I chuck a ¼-in.-dia. straight bit into my router and fit the subbase with a ½-in.-dia. guide bushing, as shown in the drawing. The relatively small-diameter cutter leaves a minimal corner radius, which means I don't spend much time chiseling the corners square after routing. By feeding the router slowly, you can avoid getting chatter, which

Top photo this page: Gary Weisenburger

Making a mortising fixture

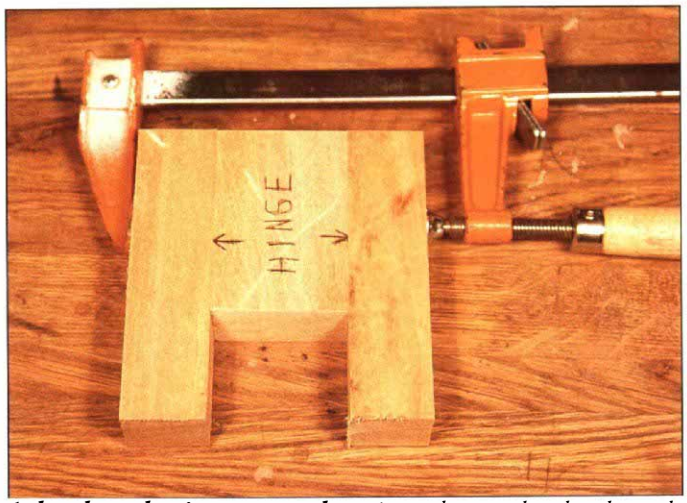
Although making a mortising fixture is easy, making the cutout in the template the right size takes some calculating. This is because the guide bushing that follows the cutout is larger in diameter than the bit. For example, a ¼-in.-dia. bit used with a ½-in.-dia. guide bushing results in a ⅛-in. offset. When laying out the cutout for the hinges, I add ⅛ in. to the width of the cutout and ¼ in. to its length, to allow for the offset at the hinge's ends.

To rout the cutout in the plywood fixture's working template accurately, I guide my router's flush-trimming bit with a solid-hardwood "primary" template, like the one in the left photo below. If I wear out the working template, I can rout the cutout in a new one with the U-shaped primary template.

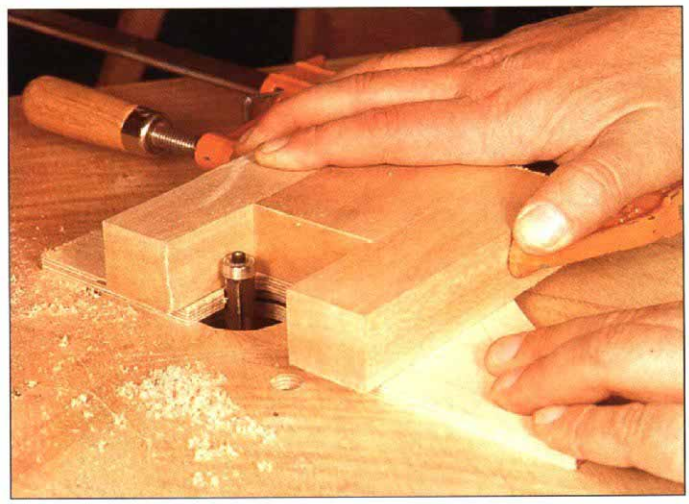
I make the primary template by gluing together three pieces of ¾-in.-thick hardwood. With this method, I can make the cutout exactly the correct size by simply ripping the center piece as wide as I want the length of the cutout in the working template to be. I then clamp side pieces onto the center piece to form the "cutout" in the primary template. The distance that the side pieces extend beyond the center piece equals the width of the cutout. I use hardwood so the flush-trimming bit's bearing won't wear out the primary template even if it gets used many times.

After clamping the three parts of the primary template together (shown below left), I trace the inside of the U-shape on my plywood working template and scroll-saw the cutout just inside the line. I then align and tack the plywood to the underside of the primary template, and trim the cutout on my router table with a flush-trimming bit, as shown below right.

To complete the working template, I clamp a fence on the underside of the plywood so it is aligned parallel with the back of the cutout. After checking that the distance between the back of the cutout and the fence is equal to the width of one hinge leaf plus the guide bushing factor, I screw the template to the fence. I use screws so I can move the fence to change the width of the mortise slightly, if it becomes necessary. —*J.G.*



A hardwood primary template *is used to make the plywood working template. To ensure accuracy, two pieces are clamped alongside a centerpiece that is the exact size of the desired cutout.*



The plywood working template's cutout *is first roughed out with a scroll saw. Then the template is tacked to the primary template, and the cutout is finished up with a flush-trimming bit.*

leaves a ragged edge that looks bad against the hardware.

Before routing, I always check that the cutter is in the exact center of the guide bushing. If it isn't, the mortise might end up too small or too large. If the bit is slightly off-center, I realign the subbase or shim the motor in its base with masking tape. I also reduce the error by keeping the same point on the guide bushing in contact with the template all the way around the cutout.

You could use a ½-in.-dia. flush-trimming bit with an overhead guide bearing. But its template would have to be 1¼ in. thick with a cutout the same size as the hardware, and you'd have to chisel more from the corners.

Routing hinge mortises

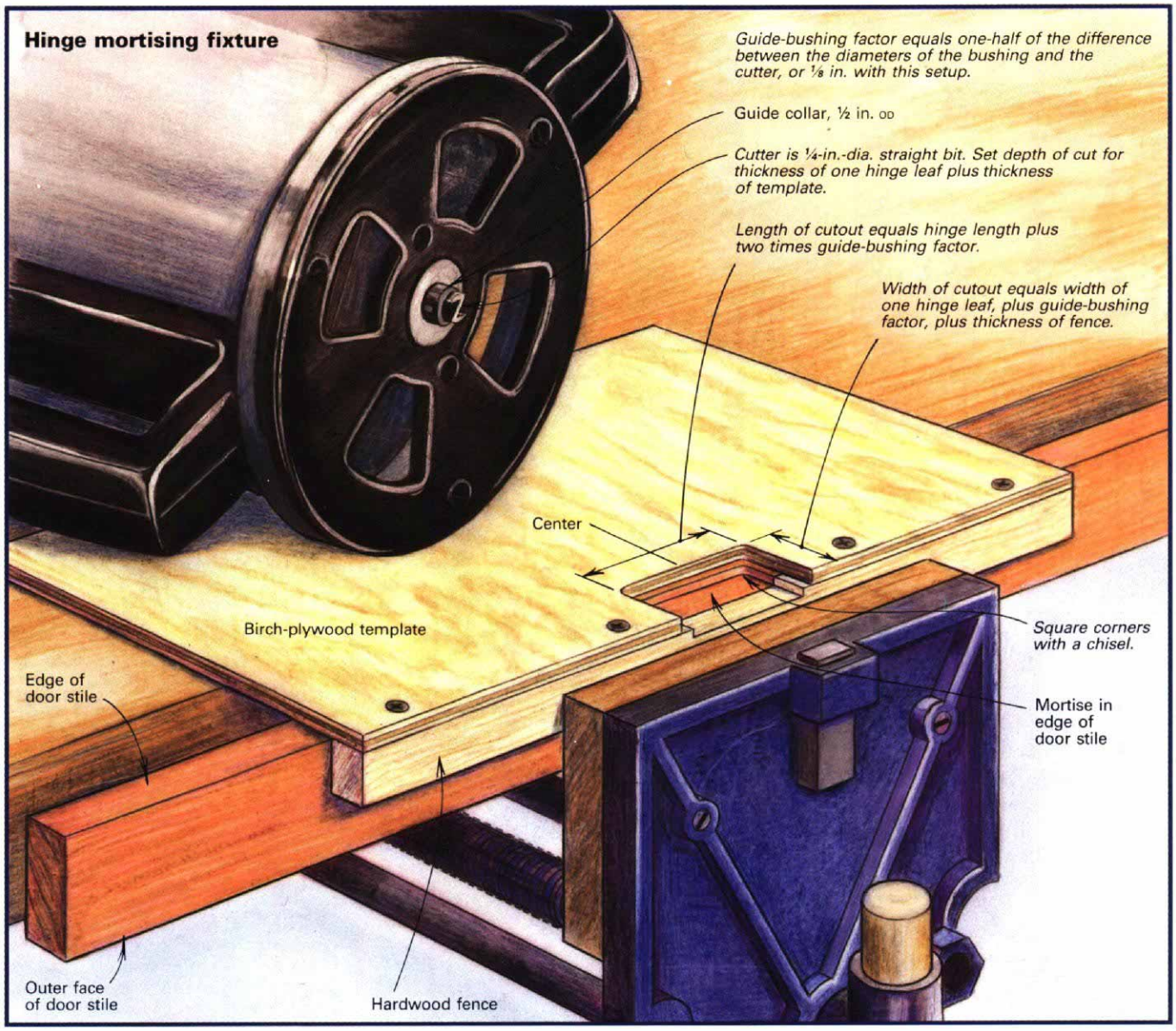
To rout a typical hinge mortise, say in a cabinet door, I first trim the door to fit its opening. Then I hold the door in place so I can mark a common center for both hinge leaves on the door stile and the frame. Next, I align the edge of the stile under a centerline I marked on the back of the template's cutout, hold the outer face of the stile against the fence, and clamp the fixture and stile in my bench vise, as shown in the drawing on the facing page. Then I set the router's depth of cut to the thickness of the hinge leaf, rout the mortise and chisel its corners square. Likewise, I rout the mortises in the case's face frame. I do this before assembling the case, since the router usually won't fit in the corners of the assembled case.

Since hardware dimensions may vary slightly (especially for higher-quality brasses that aren't stamped out), I measure each piece and make sure that the template fits the smallest one. For example, of the 10, 2-in.-long hinges that I recently used, two were 1/32 in. shorter than the others. This meant I had to chisel eight of the mortises to fit the full-length hinges. However, if it hadn't bothered me to have the two undersized hinges fit slightly loose, I could have saved time by making fixtures for the full-length hinges.

Routing a lock mortise

If I have a single, odd piece of hardware to install, carefully chiseling a complicated mortise can be time-consuming. This is especially true with cabinet-door locks, like the one in the top photo on the facing page. That small lock required a stepped mortise for the lock box, and a wider, longer and shallower step on the inner face and in the edge for the lock's L-shaped plate. If I have two or more pieces of hardware like this to

Photos except where noted: Author; drawing: Lee Hov



install, though, I make template fixtures and rout their mortises.

To rout a complicated lock mortise, I use two fixtures, both like the one for routing a hinge mortise. I make the mortise in three routing operations, changing cutter depth between each step. First, I rout the deep lock-box mortise in the inner face, aligning it under the template's cutout, which is sized to the box. Then, I exchange that fixture with one made for the strike plate (which has a wider, longer cutout), reset the depth of cut and rout the shallower plate mortise in the stile's inner face. To finish, I rotate the stile so its edge is up and clamp the fixture to it with a spacer between the stile and fence, to reduce the size of the cutout to suit the width of the mortise needed here.

Sometimes I install the lock before fitting the door. If I do this, I increase the depth of cut on the edge by about 1/32 in. to set the lock slightly deeper than the surface. This allows me to fit the door and sand its edge. If you do this, remember to also increase the width of the mortises for the lock box and the inner plate.

Mortising for a bullet-catch strike plate

In addition to a lock, my display cabinet also has a bullet catch, which holds the door shut. After hanging and sanding the door, I fit the cylindrical bullet catch in a hole drilled in the center edge of the face frame, about 3 in. from the top of the door opening. Next, I rout the mortise for the catch's T-shaped strike plate, which is shown in the bottom of the bottom photo on p. 91. To locate the plate, I close the door and mark the location of the bullet on the edge of the door stile. Then I remove the door and rout the strike plate's mortise. The fence on the strike plate's template centers the plate's rectangular opening on the center of the door stile's edge. I put a paper shim between the fence and the stile's outer face to move the mortise slightly closer to the outside of the door. This ensures that the catch's spring-loaded ball forces the door tightly against its stop.

My strike plate's fixture has only a rectangular cutout for mortising the top of the T-shaped plate. After routing that mortise, I chisel the bottom of the T after fitting the top of the plate in its mortise. I don't know why I didn't make a T-shaped cutout in the template in the first place. But since the template is so easy to change, I'll try that next time. □

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