

Custom Garage Doors Built to Last

BY DALE DIAMOND

Last fall, the owners of a home my company was renovating asked if we could repair the garage doors on a detached guest house and garage adjacent to the residence. I inspected the two sets of outswing wood doors and found they were hard to operate, the headers in both openings had sagged, and the jambs had rotted at the bottoms. Determining they were beyond repair, I recommended reframing the two door openings and installing replacement doors. The clients agreed, but noted they liked the hinged doors and wanted them replaced in kind.

A few weeks earlier, we had rebuilt the clients' front entry porch using sapele—a highly rot-resistant tropical hardwood—to recreate its intricate Gothic-style trim work. The homeowners were happy with the look of the new porch, so we suggested we make the new doors from the same, long-lasting material. They liked the idea and gave us the go-ahead to build them out of the exotic, premium wood.

I've built numerous custom doors on site over the past decade using a Festool Domino XL hand-held joiner and other tools, such as a router and contractor's table saw, commonly found on any jobsite. Most of the doors have been 1³/₄ inches thick with panels set in grooves routed into the stiles and rails, although I've made a few with the panels held in place with applied bead moldings. (See "Building Custom Doors on Site," Sep/16, for more information).

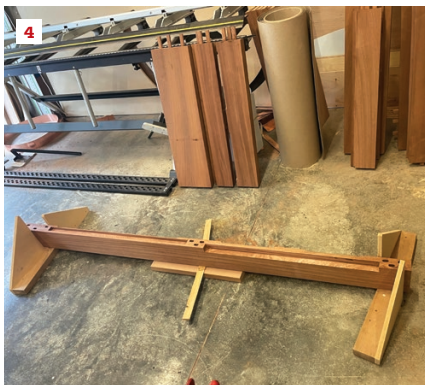
The process is pretty straightforward. Making the door frame, I position the stiles and rails on a worktable and mark lines with a framing square crossing both pieces; these serve as my alignment points for the domino cutter. I line up the center of the hand-held joiner with the alignment points, then cut the oval mortises needed to fit the domino tenons. I take the time to accurately align and cut the mortises, which eases the door assembly later on.

For the door panels, I cut the stock to size, lay up the pieces side by side, then mark a line across them. I center the joiner to the lines, cut the mortises, then glue up and domino the pieces together. To accommodate any movement, I build the finished panels so that they are slightly undersized. I then use a router set up with a double fence to make grooves in the stiles and rails to receive the door panels (1). Finishing up, I glue and tenon the assembly together on a worktable, using pipe clamps to secure it until the glue cures.

Big doors. In this case, replacing the four garage doors "in kind" presented certain challenges. I decided to build the 48-inch-wide-by-90-inch-high doors from 1²/₄-inch sapele in my shop with the same tools and techniques I would use on site. Due to the unwieldy size and weight of the doors—each finished door weighed 150 pounds—one of our crew members, Ed Brady, helped build and move the doors around as needed. Also, for ease of construction, I ordered the material from M.L. Condon Co. (condonlumber.net) located in Stormville, N.Y., a few towns away. It dimensioned and thickness-planed the sapele from a cut list I supplied.



The author typically builds standard 1³/₄-inch doors on site with a Festool Domino XL joiner and OF 1400 router set up with a double fence (1). The new, oversized, 2¹/₄-inch doors were built in the shop using the same tools and techniques (2). Here, three mortises are cut in a staggered pattern rather than in line to strengthen each side of the thick door (3).



Starting the assembly, a stile is placed into a door stand (4). Then, the author sets the first door panel into the routed groove and inserts glue and tenons into the three bottom-rail mortise cuts (5). The bottom and middle rails are tenoned to the center stile, which locks in the first door panel (6). Next, the front muntin cross and top rails are tenoned and the final door panel is slid into place. The last stile is driven down tight (7) with a 3-pound sledgehammer and a wood block. The assembly is secured with pipe clamps on both sides (8), then stood off to the side to dry (9).

Stiles, rails, and panels. The door design called for 6-inch-wide top and middle rails with a 9-inch-wide bottom rail; the stiles were also 6 inches wide. To protect against chipping out the sapele while handling the doors, I extended the outer frame stiles an inch below the bottom rail (2). I later cut off these extensions on site prior to hanging the doors.

After sizing the sapele stock, I used a Domino XL joiner to cut three mortises in the end grain of all the rails and in each shoulder (and middle) of the outer stiles. The center stile between the panels was mortised with three cuts in the end grain, while the bottom and middle rails were mortised in the middle. Because of the door's 2 $\frac{1}{4}$ -inch thickness, I cut the mortises in a staggered pattern rather than in line, typical of standard 1 $\frac{3}{4}$ -inch doors (3). I wanted to strengthen each side of the door and prevent the butt joints from possibly opening up. Also, for added flair, I routed a bevel cut in the stiles and rails with a chamfered bit on the exterior-facing door fronts. I ran the bevel cut 2 inches shy of the corners.

For the door panels, I glued up and domino-tenoned together

1-inch-thick sapele stock, also supplied by M.L. Condon. I routed 1-inch-wide grooves $\frac{3}{4}$ inch deep in the stiles and rails to receive the door panels, then squared up the ends of the groove with a hand chisel.

Muntins. The original doors had 3-over-3 true divided light windows. With the client's input, we redesigned the new doors to be 2-over-2, which we thought would look better and, frankly, would be a little easier to build. On the exterior-facing side of the door, I made the "front" muntins out of 1x2 sapele. I set up a compound-miter saw to half the depth to create a half-lap joint where the muntins crossed. These muntin "crosses" were later glued and domino-tenoned to the frame stiles and top and middle rails.

On the interior side, I made matching "closure" muntins, also out of 1x2 sapele, but within a removable frame just in case a glass pane were to break. The closure muntin frame fit within a 1 $\frac{1}{4}$ -inch-deep-by-1-inch-wide rabbet routed into the stiles and top and middle rails. On the back of the front muntins, I applied $\frac{1}{4}$ -by- $\frac{1}{4}$ -inch strips of sapele to act as spacers for the $\frac{1}{4}$ -inch tempered glass. We



Since the jamb framing and center support wall were rotted (10), the author rebuilt them using PT 2x6 framing. The door openings were then trimmed out with 1-inch-thick sapele (11).



Heavy-duty hinges made by RealCraft (realcraft.com) were used to hang the 150-pound doors. After the hinges were clamped in place (12), holes were drilled for the through-bolts (13), and the hinge strap and back plate were bolted together (14).

painted the spacers black to avoid the distraction of seeing raw wood when looking through the windows.

With all the door components mortised, routed, and stacked aside in four bundles, I assembled the doors one at a time.

Assembling the door. I started out by placing a stile into a site-built door stand, which I had shimmed in the middle to prevent bouncing when I drove the center pieces together (4). Next, I placed the first door panel into the routed groove, then glued 5½-inch-long domino tenons with Titebond III glue (titebond.com) and inserted them into the three bottom-rail mortise cuts (5). After setting the bottom rail, I tenoned the bottom and middle rails to the center stile, which locked the first door panel in place (6). I then tenoned the front muntin cross and top rails and slid the final door panel into place. Finishing up, I drove the last stile down tight using a 3-pound sledgehammer and a wood block. This was the hard part; the last stile had to engage 10 domino tenons, three in each of the rails and one in the muntin bar, and the tolerances were tight (7).

With the door assembled, we transferred it from the stand to the workbench, then secured it with pipe clamps on both sides (8). (Clamping just the top of door leaves the possibility that the joint will open up on the bottom face.) We stood the door off to the side, then started assembling the next one (9).

After the glue had set, we sanded out any imperfections and glue marks starting with 60-grit sandpaper, progressively using finer grades of sandpaper for final sanding.

On site. The guest home's two-bay garage was located in the building's walkout basement (10). We removed the old garage doors from the gable-end wall façade and demoed the existing jamb framing down to the block foundation. The existing support wall between the two door openings was badly rotted, so we removed it as well, then reframed the rough openings with pressure-treated 2x6 stock and the center support with a built-up PT 2x6 post. We trimmed out the door openings with 1-inch-thick sapele fastened with 2½-inch exterior screws, which were countersunk and later plugged (11).



The hinge leaves were attached to the rebuilt framed openings with galvanized lag bolts (15). From the interior, the hinge hardware included metal back plates, which were through-bolted to hinge straps (16). The panes of 1/4-inch tempered glass were set in a small bead of silicone sealant (17). The finish door hardware was made by Rocky Mountain Hardware (18).

Heavy-duty hinges were needed to hang the wide, 150-pound doors. The 12 hinges were purchased by others with the hope that they would work out, but they were designed with an offset that would have pushed the doors past the outside face of our trim. I was able to install the hinges backward, however, and make them work; this was accomplished by rabbeting the hinge pins into the trim. In addition, the screws that came with the hinges to connect to the jambs were undersized, so I bored out the beveled holes to accommodate beefier, 1/4-inch lag bolts.

On a bench set up in the driveway, we installed the hinges on the door. We clamped them into place (12), then we drilled holes for the 1/4-inch through-bolts using a drill with a guide attachment (13). The hinge straps came with a metal back plate, which is installed on the interior side of the door (16). We through-bolted the hinge strap and back plate together using a ratchet (14).

With the hinges attached to the doors, we cut off the 1-inch stile extensions with a track saw and installed the doors in the openings.

The hinge leaves were attached to the rebuilt framed openings with four 1/4-by-2 1/2-inch galvanized lag bolts (15). We later touched up the bolt heads with black spray paint.

Finishing up. We set the panes of 1/4-inch tempered glass in thin beads of silicone applied to the rear of the “fixed” front muntins. Then we screwed the removable closure muntin frame to the interior side of the door, tooling the silicone to shed water. Later, our painting trade partner finished the door with long-lasting clear sealer (17), and I installed the finish door hardware (rockymountainhardware.com) (18).

The last task was to install drop-down thresholds on all four doors (tmhardware.com). I chose to surface-mount them to the interior side of the doors rather than inseting them into the door bottoms, so they can more easily be replaced if they get damaged.

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