House and furniture share common elements. *Working with large timbers raised concerns for the author. What appears to be a solid-board top is actually a clever sandwich of MDF and veneer. Through-mortised legs are another clever deception. The breadboard ends (facing page) also have an unusual design.*

Hefty Sofa Table with a Delicate Touch

Understand the quirks of large timber before cutting the first board

BY ERIC KEIL

Of the 23 pieces of furniture I made for a house in the Pennsylvania Poconos, this sofa table was the most gratifying to build and the best designed. Large members make up the tabletop and legs, and a 5/4 cabinet rests below. It's a hefty design built in a light, natural cherry, with unique exposed joinery that complements other furniture I installed in the home. The table's effect is at once traditional and contemporary, as are the processes used to build it.

The sofa table is my favorite piece in the house, but I did have a few concerns with the initial design. I spoke with Robert McLaughlin, the architect who designed the table, and it was apparent that he had a lot of woodworking savvy. He anticipated many of my concerns and accepted some compromises to improve the joinery and chances that the table age gracefully.

Design compromises

As I looked at the preliminary drawings, there were three unconventional design elements that seemed troublesome. The configuration of the boards that made up the top was specific and unusual: two 2-in. by 5-in. pieces surrounded by a butt-jointed frame. Instead of a traditional breadboard design, the long outermost side boards sandwiched the end boards. This kind of joinery with solid lumber would have caused the joints between the end boards and the center of the table to fail over time. The architect had no problem with my solution to replace the center pieces with a stable substrate and veneer.

Another concern was that the design called for the legs to come through the top in a full through-tenon. Even if I consistently and accurately cut the mortises and through-tenons on the legs, I couldn't comfortably glue and clamp the top to the assembled cabinet and legs below. And housing the solid legs in a veneered substrate wouldn't allow for seasonal wood movement. We decided to make the tenons false. The legs would butt the bottom of the tabletop, and corresponding end-grain inserts could be carefully fit to shallow mortises on the top of the table.

Breadboards with a twist. *The unique breadboard design of the tabletop calls for the long side boards to sandwich the short end boards.*

The carcase of the cabinet itself was to be made of 5/4 solid cherry boards. The design called for the cabinet to be joined at the corners with an oversized finger or box joint. The fingers were 4 in. wide, corresponding with the seams between each 4-in.-wide board and its neighbor. The problem with this design was that the only long-grain-to-long-grain glue bond occurs every 4 in., which simply isn't sufficient. I added two biscuits to each finger (dowels or splines could have been used instead), which solved the problem of insufficient bonding surface but created another dilemma that I will address later.

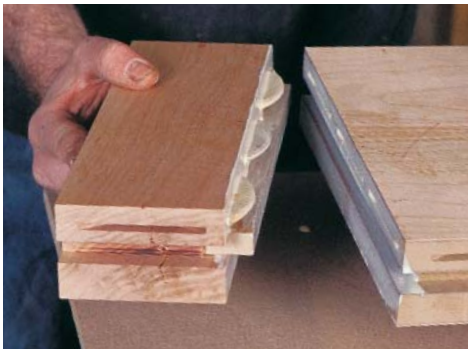
An unconventional tabletop

The tabletop's 2-in.-thick center was made by laminating three pieces of medium-density fiberboard (MDF)—two pieces ¾ in. thick and one piece ⅜ in. thick—then skinning both sides with 1/16-in.-thick cherry veneer. I glued up the veneer in two pieces so that it appears to be two 5-in.-wide boards. The veneer was cut about ¾ in. oversized on the tablesaw and then seamed. Making the substrate, cauls and veneer the same approximate size allowed for easy alignment and control of the pieces as they went into the vacuum bag. It was also quicker and less obnoxious to trim the ¾-in. oversized panels on a tablesaw than it would have been to trim

Photos: Michael Pekovich

TABLETOP HAS HEART OF MDF

Veneer sandwiches MDF. *Three layers of MDF and two layers of veneer are all coated in glue and set into the vacuum bag at the same time. Glued up slightly oversized, the entire center panel of the tabletop is later trimmed to size on the tablesaw.*



Short ends first. *Fitted with a spline and biscuits, the short ends of the table are clamped to the top. With the end boards glued into place, a spline is cut slightly short of the top's length.*

Tight splines are exposed. *Small lengths of spline are tapped into place to ensure that the conspicuous table ends fit tightly.*

glue squeeze-out and oversized veneer with a router and trimmer bit.

Placing the vacuum bag on an absolutely flat surface and laminating multiple layers of the substrate material produced a flat panel with no warp, cup or twist. After several hours in the vacuum bag, the veneered panel needed only a quick cleanup before it was cut to size. Trying to get clean edges of MDF on a jointer is fruitless, and it dulls knives instantly. So I measured out from the centerline (seam) of the top veneers to establish parallel lines, then tacked a straightedge to the unexposed bottom surface. I ripped the panel several times on the tablesaw until I was sure the edges were straight, square and parallel, but I left them about ¼ in. oversized for now.

I used the tablesaw to crosscut the panel to length, again taking several test passes to check the quality of cut. If the veneer was going to chip, it would be at the end of a crosscut. I ripped the panel to its final width last, which ensured crisp corners. When ripping, raising the blade higher than normal produces a cleaner top cut (and coarser bottom cut) because of the related angle at which the saw cuts through the material. When cutting with a raised blade, be sure the blade guard is in place.

I milled the solid frame pieces 1/32 in. thicker than the center panel. This, along with careful glue-up, made it easier to handplane the massive frame flush to the veneer. Frame members were cut to length and then grooved on the tablesaw. Although spline joinery by itself might have been sufficient, I added biscuits above the spline so that any discrepancies in flushness would show on the unexposed bottom of the tabletop rather than on top.

Because of the relative sloppiness of biscuit joinery, excess glue got trapped in the joint when the tabletop was glued up. This, coupled with the swelling of the biscuits,

A word from the architect

BY ROBERT McLAUGHLIN

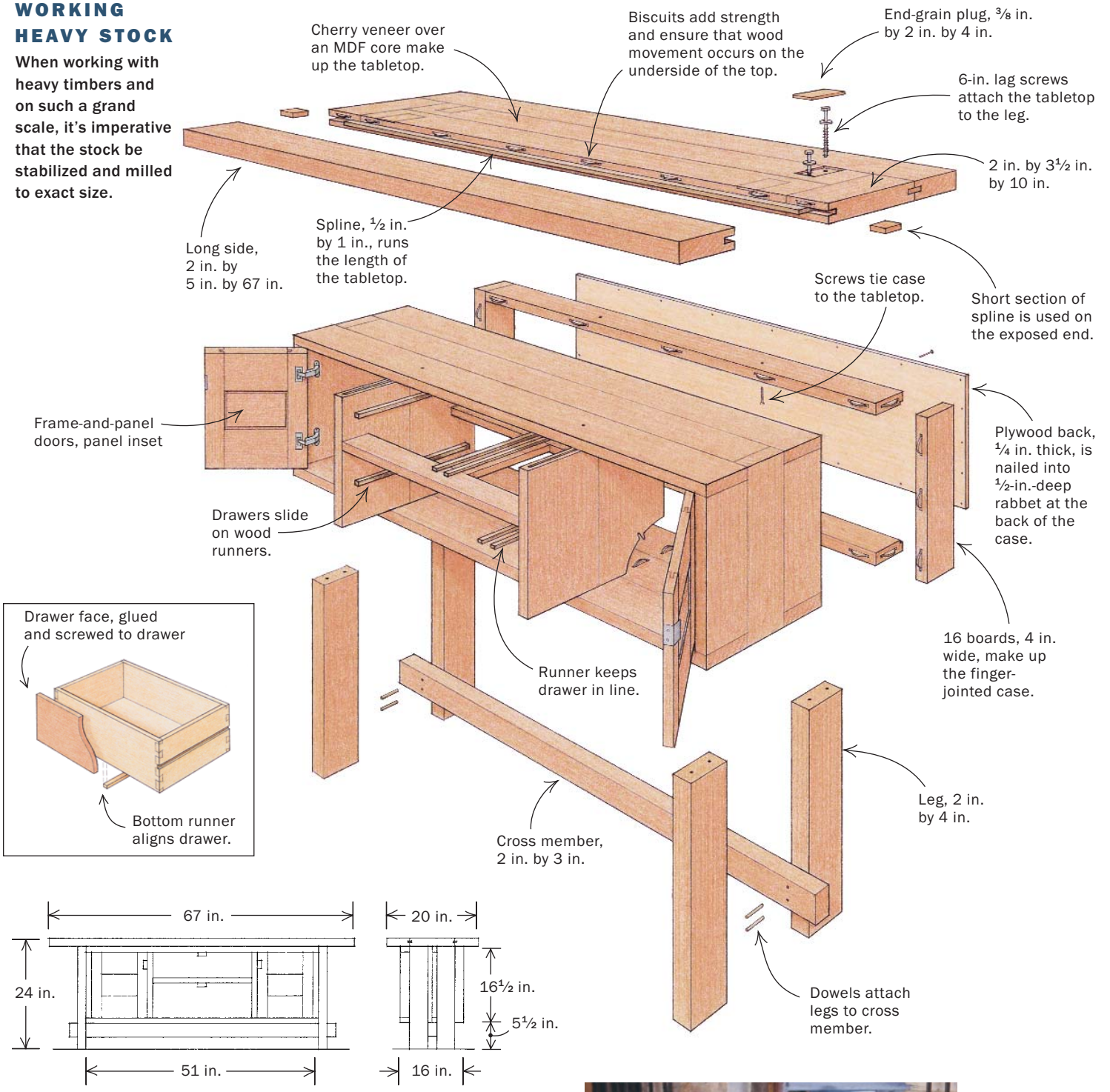
I've always tried to create houses and furniture that express the nature of both the materials and the construction process. Whether it's exposing bolts in steelwork or leaving the joinery uncovered in wood, the effect is always powerful.

The monumental scale of some of the rooms in the house led principal architect Peter Bohlin and me to these furniture designs. We needed sizable legs and cross members so that the furniture wouldn't seem lost against the 9-in. square columns that frame the house. We also designed overlapping and penetrating connections to match the Arts-and-Crafts or Japanese-like joinery seen throughout the home. It was clear early on that Eric Keil understood the styles that we were trying to create.

One aspect of this project that was amazingly successful was the collaboration between an owner, a craftsman and designers. Often, when too many people become involved in a project, the outcome becomes diluted. But that never happened. All parties were involved at each phase of the work, including full-sized mock-ups to see how the pieces would fit in the room. The work between Eric and me was almost always

WORKING HEAVY STOCK

When working with heavy timbers and on such a grand scale, it's imperative that the stock be stabilized and milled to exact size.



hands-on. I'd visit his shop at least every other week, and sometimes more.

Toward the end of the project, our sketches to Eric consisted only of the major dimensions and no notes. Eric knew what we wanted, and we trusted his judgment, so we didn't have to waste time mapping out every detail. This process led to the successful execution of all of the furniture, including this sofa table. □

Robert McLaughlin, formerly with Bohlin Cywinski Jackson Architects in Wilkes-Barre, Pa., is now principal of McLaughlin Design Associates in Kansas City, Kan.

A meeting of minds. *Furniture maker Eric Keil (right) and architect Robert McLaughlin discuss concerns about the sofa table's design.*

Drawings: Vince Babak

FINGER-JOINTED CARCASE

A race against curing glue. *The cabinet must be glued up in one swift process. Four-board boxes are biscuited, coated in white glue, then set onto similar assemblies.*

Plunge-cut the groove. *To cut a groove, the biscuit machine slides like a router along the edge of the divider.*

Like a hand in a glove. *Biscuits are glued into the cabinet frame, then the grooved divider slides easily into place.*

meant that I had to allow the swelling to go down before working the tabletop. Sanding or scraping the surface before the swelling had subsided would have left biscuit-shaped depressions in the finish.

After I milled splines to fit the grooves, I beveled the corners slightly to ease assembly. Splines can also be milled a little shy in width to allow excess glue to escape—and to ensure that the visible top joints pull tight. I cut the long splines 2 in. short in length so that the exposed spline could be hand-fitted. During clamping, I used a straightedge to make sure the slightly proud faces of the solid frame were parallel to the center panel.

Where the splines are exposed on the end of the table, a 1-in. length of spline was tightly fitted and set into place. I did this before the glue from the tabletop assembly had a chance to harden, eliminating the need to chisel dried glue out of the mortise. I tapped the 1-in. spline home, trimmed it flush and left the assembly to set overnight.

Faux finger joints

The 16-in.-deep cabinet under the sofa table was the most labor intensive part of the project. When I make a finger-jointed box, I typically cut the sides to size, machine the joinery and assemble it all at once. But this cabinet wouldn't go together that way. It was made by stacking four 4-in.-deep butt-jointed boxes (see the photos at left). Alternately butted and stacked, the boxes create a strong cabinet.

Rather than gluing up each of the four boxes separately and then stacking them in a subsequent operation, I had to glue together the 16 individual pieces at the same time. The process is nerve-racking and fast paced, but it was much easier to manipulate 16 loose pieces than to try to force four rigid boxes to come together as one. Slow-setting white glue, calm preparation and special clamping blocks helped everything go smoothly. I also cut the biscuit slots so that the exposed end grain would be a hair proud.

After flushing up these end-grain surfaces with a jack plane, I was ready to make the interior dividers. By using a biscuit machine as a groove cutter, I was able to slide the interior dividers into place after the exterior box had been assembled. After that, the cabinet needed only a quick scraping and some final sanding.

End-grain inserts in the tabletop

The legs were doweled to the cross member that supports the cabinet, then set into place under the tabletop. Waiting to cut mortises until the legs were attached to the cabinet ensured that the end-grain inserts would align with the legs below. A router with a template guide and a small-diameter straight-cutting bit made it easy to cut the mortises (see the top photo on the facing page). The small-diameter bit reduced the radius of the mortise corners, so I only had to chop them square with a chisel.

In a previous project with the same detail, I made the end-grain inserts too thin. During clamping, glue worked its way to the top surface. The glue-saturated pieces had to be removed and redone—a lesson

not soon forgotten. This time, I left the ⅜-in.-thick end-grain inserts a hair thicker than the depth of the mortises so that I could plane them flush later.

With a lower assembly of such weight, I worried that small screws would pull away from the MDF if the table was lifted by the top. To be safe, I used lag screws. The mortises for the end-grain inserts were drilled to accept 6-in. lag screws and washers. After attaching the tabletop to the lower assembly, the holes were filled to the bottom of the mortises with auto-body filler (see the middle photo at right). This eliminated any swelling caused by pockets of excess glue. It also prohibited any metal-to-glue contact that might discolor the end-grain inserts. I didn't use common wood fillers because they tend to shrink, which would have left depressions in the tabletop.

I carefully fit the inserts and fine-tuned them with a rigid sanding block. Yellow glue might eventually fail, allowing the inserts to pull away from their housings, so I coated the end-grain inserts with polyurethane glue and clamped them tightly into place (see the bottom photo at right).

A final touch

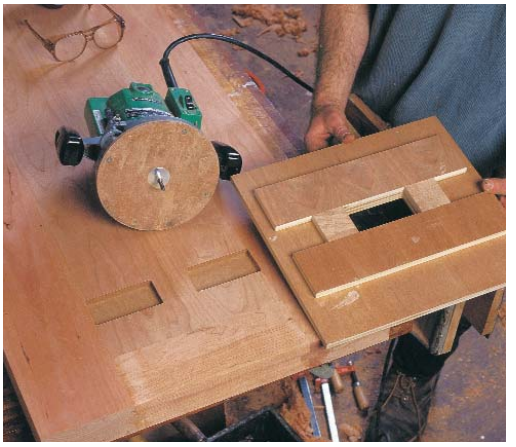
I made two frame-and-panel doors and dovetailed maple drawers with cherry bottoms. They were then fitted and sanded. Doors were hung on concealed hinges, and drawers were fitted to maple slides.

I finished the entire table with a coat of vinyl sealer and two light coats of catalyzed lacquer sprayed on with a low-pressure system. I cut the lacquer and sealer with retarder thinner, which allows more time for a finish to level out. The retarder thinner also prevents the more porous veins in the wood from filling up, leaving a more natural appearance, akin to that of an oil finish.

Four years after I made the piece, the sofa table looks as pristine as it did the day it was delivered. The techniques utilized seem to have been time worthy. When I reflect on this project, I still get gratification from how tightly crafted this table is. Another thing that makes this table so intriguing is the weight of the large cherry timbers and Robert McLaughlin's design. In the large room where it lives, the table appears to grow gracefully from the floor. □

Eric Keil designs and builds custom furniture in Wilkes-Barre, Pa.

INSERTS MIMIC THROUGH-TENONS



Mortises that match. *A small-diameter straight-cutting bit and a simple template make easy work of cutting the mortises in the tabletop.*

Bolts and Bondo. *The tabletop is secured to the legs with 6-in. lag screws, then covered with auto-body filler. More common wood fillers might shrink, leaving depressions in the tabletop.*

Faux leg ends. *End-grain inserts are coated with polyurethane glue and then tapped into place.*