BY ADAM CHERUBINI

18th-century Chairmaking

Building a Philadelphia Chippendale chair – PART 2

This is part two in my series of what will probably be several articles detailing the construction of a formal Philadelphia Chippendale chair. In the last article, I built up the structure of the chair's back, but did none of the shaping or carving. It would be nice to simply document the construction as I build it. But I'd like to have an article on carving, not little bits of carving in every article. Moreover, I'm attempting to show what I think the building process really looked like in the period. I believe Philadelphia's finest chairs were carved by professional carvers in the 18th century. Some of the shaping and carving would have been done "in-house" in the chairmaker's or cabinetmaker's shop. I'm going to attempt in a future article to show where I feel the work split was. In this article, I'm going to build up the chair's front and attach it to the back. My focus will be on structure and joinery.

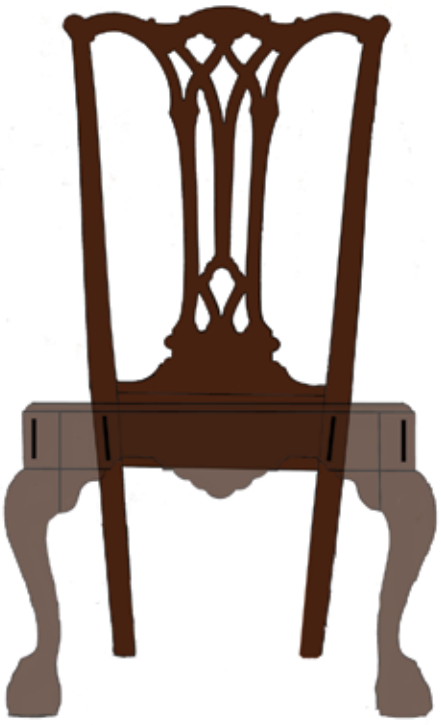
Understanding the Structure

At first glance, the structure of this chair is fairly simple. Each of the four seat rails attaches to its adjoining legs with mortise-and-tenon joints. The rear seat rail is relatively easy. You have to cut angled shoulders. The front seat rail is completely square. No problem there. The challenge is cutting the side seat rails. The trapezoidal shape of the seat means angled shoulders. But the side seat rails are further complicated by the difference between the vertical front legs and angled rear legs. As a result, the side seat rails are essentially twisted along their length. The combination of the angles and the twist make this part fairly tricky to build.

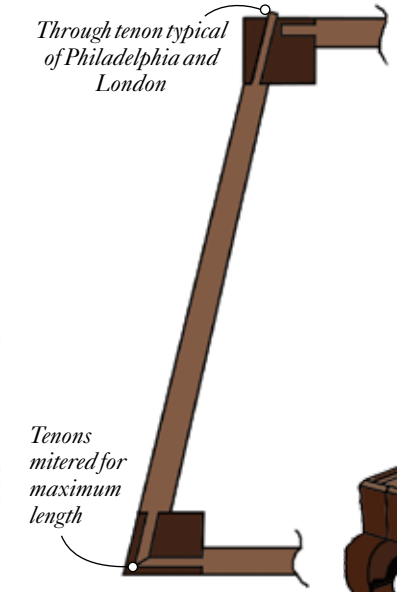
I've seen different craftsmen wrestle with this and attempt to find more elegant solutions. Some try to keep the mortises square with the back legs and angle the side rails' tenons. This is nothing new. If you look at Queen Anne

Beginning stages. *No I haven't switched to Tansu-inspired studio furniture. This really is the beginnings of a Philadelphia Chippendale chair. If it weren't for the discrete, strategically laid out tenons between the splat and the crest rail (see my article in November 2008, issue #172), this basic chair form could assume any of a wide variety of styles. In this article, I complete the basic structure and find a few new challenges to test my abilities.*

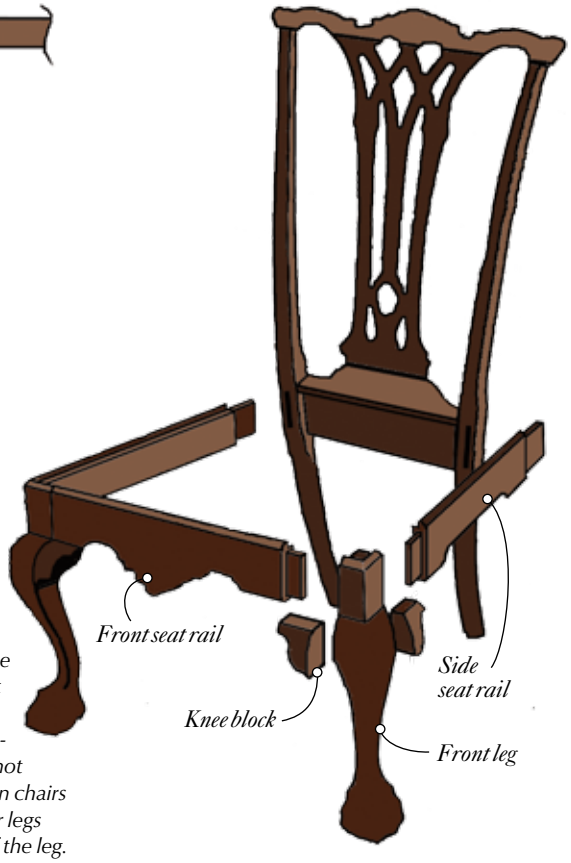
PHOTOS BY THE AUTHOR



Simple structure. *The basic structure of this sort of formal chair is simple enough. The seat frame is mortised and tenoned together. Knee blocks, glued in later, help visually blend the joint between the seat rails and the legs. They aren't structural. The picture above is missing glue blocks at the inside corners of the seat rails. I'll cover them in a future article.*



Angled mortises. *Looking down at a cross section of the right seat rail, the mortises are angled in the legs to keep the tenons running straight with the side seat rails. Tenons are sometimes mitered in the front leg joint to allow maximum penetration. These tenons are typically, but not always, pegged. Philadelphia and London chairs are unique in that the mortises in the rear legs are typically cut through the thickness of the leg. I've shown the tenon proud above, but these are always sawn flush with the back leg surface.*



Parallel mortises. *The mortises in these chairs run parallel to their attending legs.*

chairs, you'll see elaborate balloon-shaped seats. These complicated looking seats almost always offered easier, square tenons at the back legs. The side rails came out of the rear legs square, then ballooned out into a pleasing shape. On some Queen Anne chairs, the front legs tenoned into the balloon from underneath. The result was a dramatically sculpted chair with fairly straightforward joinery. I don't want to scare you or make excuses for my poor execution of this chair. But I believe this to be the most difficult form of seating furniture, and perhaps one of the most difficult pieces of furniture to build.

Stock Prep Conundrum

What should I do to prepare the stock for the side rails and front legs? I need two reference faces on the inside surfaces of the legs. I'll do all my lay out from these faces. But the outer faces? They are going to get carved away. I think for the sake of the carving I need to rough in the square shape. This will establish the widest part of the knee and help with the carving of the foot as well. I marked both sides of the leg blank and simply sawed the blank square. To keep a saw cut square in a thick block, I typically flip the board periodically.

The front seat rail is just straight and square, so no troubles there. But the side rails? I don't really think it matters. It's helpful to have the board uniform in width. I squared up one edge with my try plane, then gauged across $3\frac{1}{2}$" to set the width and simply sawed to the line. This stock needs to be thick. I'm using 5/4 stock, which seems about right. With the stock ready, it's time to cut the joints.

Laying Out the Mortises

A good accurate layout of the seat rail mortises is essential to cutting them correctly. The front leg mortises meet inside the leg to allow the maximum length of the seat rail tenons.

I started laying out the front legs by scribing a $1\frac{7}{8}$" square in the end grain, gauging in from my two reference faces. I set my bevel to the side-rail angle and marked that from the gauged corner. I ran these lines all the way across the end grain and down each face. Eventually I'm going to have to saw to these lines.

I marked out a $\frac{5}{16}$" mortise about $\frac{5}{16}$" in from my gauged line. I set my mortising gauge against the inner face of the leg (my reference face).

For the back legs, I again used my mortise gauge to mark a $\frac{5}{16}$" mortise, $\frac{5}{16}$" in from the outer surface of the leg. But these are through-mortises. My experience cutting through-mortises tells me it's best to come in from both sides with my mortise chisel. I'm thinking I

Leg layout. *Mark the outer surfaces of the legs using the inner reference faces. The angle of the side seat rails must come from a full-sized drawing or existing chair.*

can't just mortise straight through without splitting the wood at the back of the leg. This means I have to mark the mortise front and back, which is no simple task. The leg stock is only slightly uniform in width here and these legs are different left to right.

Cutting the Mortises

With everything marked out, cutting the mortises should be a simple matter. That wasn't exactly my experience. I'm going to show you what I did, but I'm not convinced this was the best way to go about it. I made myself a little guide block with the seat rail angle accurately sawn. I used this block not only to check the angle of my chisel as I chopped, but also to guide my chisel while I pared.

On the front legs, the mortises for the front and side rails intersect to allow maximum tenon length. This should be nothing new. I did the same job on the "forme" I built for the October 2008 issue (#171). You just have to go slowly and use less force as you get closer to the other mortise. My paring technique really helped here.

On the back legs, the through-mortise was a little trickier. I think the thing to do is cut down halfway from each side and hope for the best. Structurally, the front and back of the mortise matter more than the middle. If the mortise is a little sloppy through the center, it will just hold the hide glue better. This diamond-shaped mortise has actually been seen in period chairs. Whether it was intentional or not is anyone's guess.

Alternative Methods?

There doesn't appear to be any evidence of these mortises having been drilled and pared, though that is a possibility. There don't appear to be little nicks in the side wall where a bit went astray. But many more chairs need to be examined specifically for this to say with certainty what was done or not done. Center bits or shell bits would have been the tools of choice. Paring an angled surface is not easy. If you try going the wrong direction, it's easy

CONTINUED ON PAGE 28

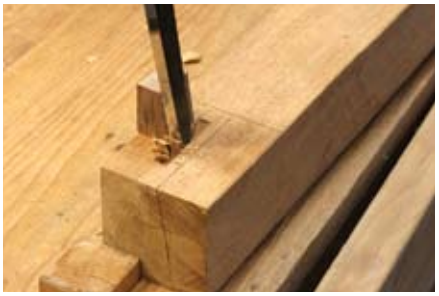
Mortise conundrum. *When I first learned that through-mortises were typical of Philadelphia and London chairs, I thought that this must have been some productivity improvement. The first thing that came to mind was the ability to cut the mortise from the backside. This would eliminate the need to support the legs on a block as shown above. But you really can't mortise through without risking splitting out wood (spelching?). You must work from both sides. An examination of Philadelphia chairs revealed evidence of scribe lines on both sides of the rear legs.*

Just right. *I placed my bevel gauge against the front face of the leg and measured over from the gauge to the mortise. This 1/2" chisel was just right.*

Chisels for marking. *I flipped the leg over, and measured in from the bevel using the same chisel. I like using chisels as gauge blocks. In the 18th century, you'd be lucky to have a ruler with eighths marked on it. But even today, this helps eliminate measuring errors and when you can do it, you can mark and measure at the same time.*

Set, then reset. *I reset my marking gauge to mark out the mortise. Because the left and right legs differ slightly in thickness, this setting won't work on the opposite leg.*

CONTINUED FROM PAGE 26



Guide block. *I used a guide block to check the angle of the chisel before I chopped. The surface of the leg was such that I thought this would work better than a bevel gauge.*

to undercut, which may or may not be a big problem. The bigger challenge seems to be keeping the brace at the correct angle. The first thing that came to my mind was using a smaller-diameter bit. I tried this and it was a bit more difficult than just cutting the mortise directly with the mortise chisel.

Sawing the Tenons

I do a lot of sawing. But I find a bit of practice helpful before I start a complicated job. I practiced my sawing on the easier front leg joints. These are straight tenons with an angled shoulder. The only trick is to leave the outer face of the seat rails proud a heavy $1/16$" to allow carving of the rails.

The back legs' tenons are harder. You have to accurately transfer the angle as well as the exact position of the mortise onto the seat rail. I put the chair on my bench to check the front leg and reference face on the rear legs with a framing square. Then I marked the tenon directly. The seat rail must be aligned such that its top outside corner lines up with the corner of the rear leg. I may have done a better job with a bevel gauge.

Conclusion

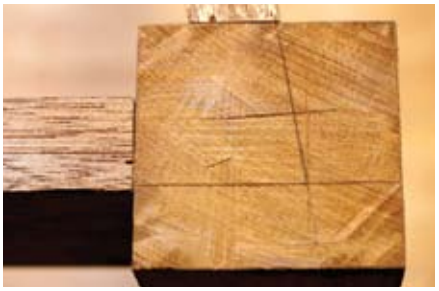
All my blind mortises went well. I don't think I pared any tenons or mortises. I know I only corrected one tenon shoulder. My blind joints fit straight from the saw. I did have trouble with the through-mortises, however. I chopped more from the front side than the back. When I worked in from the back, my angle was off slightly. Paring the walls created more troubles. The mortises got pretty raggedy. I made other mistakes that complicated matters. For example: When I cut the back-leg mortises, I hadn't yet leveled the feet. Once they were sawn flat, I lost a good $1/4$" and the mortises were that much too low.

Jig – of sorts. *I like to pare out the waste in my mortises. I squeezed my gauge block against the side of my mortise to help me maintain the correct angle. This is as close as I get to using jigs.*

Despite my initial impression, it's now clear to me that 18th-century Philadelphia and London chairmakers used through mortises because they are better than a blind joint. They certainly aren't easier. The through-tenon is longer, which makes the stress in the joint lower. There also is more glue surface area. The through-tenon also allows access to the mortise to perfect the fit or make repairs in the future.

A close examination of period chairs indicates that many or most were assembled with two tiny wedges in each rear side-rail tenon.

In position. *I have the side seat rail positioned correctly. The exposed material to the right of the leg will get planed flush with the back leg later.*



I hope I left enough! *The seat rails need to be proud of the pencil lines to allow for a small carved detail at the base of the rails. Eighteenth-century carvers didn't need much to produce a three-dimensional design. Some relief carvings are only $1/16$" deep.*

These were slid into saw cuts, purposely sawn in the tenons at the time of construction. This feature would help chairs that lack lower stretchers survive rough treatment.

Though this is one of the single-most difficult and important joints of the chair, more challenges are ahead. I'm going to repair my mistakes without too much fuss and move on. I have no delusions that this chair will be a showpiece. One of my favorite woodworkers, Colonial Williamsburg Journeyman Cabinetmaker Kaare Loftheim, says it takes maybe a dozen of these chairs to get the bugs worked out. From the twinkle in his eye, I don't think he was exaggerating. I don't know if I'll complete a dozen, but I hope this article and those that follow will help you complete yours. **PW**

Visit Adam's blog at artsandmysteries.com for more discussion of traditional woodworking techniques.

Tough job. *This is the toughest joint in a chair full of tough joints. Something went terribly wrong marking out this tenon, but at least I got the rail positioned correctly! Turns out these tenons were typically wedged, but not with the massive $1/4$" block in this one. As bad as it looks now though, I'll bet it will look a lot better with a couple wedges and some leftover mahogany veneer from my standing desk. We may be surprised when it's done.*