

Build a Dining Room Chair

Dining Room Chair Class

Here is some general information about the dining chair class. **We'll supply the wood for your chair unless you arrange for something different.** The class is taught in our shop, 2139 Humboldt Street. It's a red shop building on the corner of Virginia and Humboldt and we are on the alley or West end. You can park on the alley side. Expect to begin on Monday about 8:50 am and work till around 5:30 through the week (Friday). You'll have your own bench station and can leave your things there for the week. Bring along your own eye and hearing protection and any layout tools you like to use. We usually have a 16 foot tape measure, a 6 inch Starrett double square, a 6 inch Starrett rule, a ball point pen in our aprons. Everything but the dust mask is at the shop for you to use if you don't have these things. We also have tool aprons for you to use. Join us for lunch if you'd like. You are welcome to stay in the shop and eat lunch, too. There's a microwave and a small refrigerator/freezer in the shop. And a reverse osmosis water filter.

Cost of the class is 1250 dollars. You can pay at the end of the class. We can arrange to have your upholstery done (ahead of time if you get me fabric or leather). I have some leather and fabric choices in the shop and I can order hides. Cost of upholstery is 75 dollars if you provide the leather/fabric and 135 dollars if you choose from a hide that we have and a bit less for fabric. We usually have some seat bottoms made up for folks to buy on hand. If you have any questions you can call Tom at 360-393-7577

If Tom is involved in the class we usually have a dinner at Jennifer and his house Thursday night of the class. Partners are welcome. So are offspring.

A list of the wood required for the dining room chair class (Due to time limitations WE USUALLY SUPPLY THE WOOD FOR THE CHAIRS).

8/4: 36 inches by 5.5 inches for back legs

17.25 by 1 and 5/8ths inches square for front legs

2.5 by 1.75 (minimum) by 13.5 inches for crest rail

3 by 1.75 (minimum) by 13.5 inches for back seat rail

5/4: 4 pieces at approximately 15.25 by 1 and 1/16th's by 1 and 7/8ths (minimum) inches

4/4: 16.75 by 7/8ths by 3 inches for front rail

2 pieces at 3.5 by 16 inches by 7/8ths for side rails (will be 15 inches long after compound cuts)

Other: 1/2 inch thick ash or oak 3.25 inches wide by 3 feet for tenon stock

30 inches 7/8ths inches square for screw blocks

3/4 inch plywood 18 by 17 inches for seat bottoms

General notes for building the dining room chair – 7 degree

We started by drawing the back leg shape on 8/4 stock with the template. Bear in mind that we left about 1/16 th of an inch of waste beyond the line when cutting out on the band saw. Consider flipping the template end for end for subsequent leg cutouts for a better chance of symmetrical grain orientation. If the stock is not very flat and/or stable, I'd leave more than 1/16 th of an inch from the line (or I'd joint and plane down the wood, too, if it wasn't very flat before I started, but not down to 1.5 inches yet). We jointed and planed down the rough leg blanks to 1.5 inches after they were cut out. We then shaped the front of

the first back leg in the shaper jig, using another unshaped leg in the back for clamping in the jig. We marked the side rail mortise marks on the first back leg before removing from the jig and then using the back leg template to mark the bottom of the leg referencing from the mortise marks; we cut the leg to length on the chop saw (6 degree long point on the style of the chair). We located this leg in the back of the shaper jig making sure it was firm against the stops and shaped it along with another back leg in front until we had cycled through all the legs.

We then cut out the remaining stock for the chairs, first ripping the stock close to their final widths on the band saw or table saw so as to minimize warping. We jointed and planed down the stock, did a final joint on the edges and ran the stock through the planer on edge for the final width (ripping close to the finished size on the band saw first, if necessary).

We cut the stock to length on the table saw (back rails to 13.5 inches, front rail to 16 and $\frac{3}{4}$ inches, legs to 17.25 inches) and cut the side rails with the blade set at 7 degrees on the table saw (using a wixey type gauge) and with the miter set at about 4 degrees. If you make MDF templates of the side rails, it will make the set up for subsequent chairs much easier. The length of these side rails is 15 inches, long point to short point on top. You can cut all the fronts of one side (left or right) of the side rails and all the backs of the others that are "kitty corner" with the same set up and then you have to reposition the miter gauge to finish the cuts for the corresponding fronts and back of the rails on the other side. Remember to nibble up on the length.

I like to mortise the back of the side rails now since this is a critical joint and I want to have the tenon fill the mortise accurately. The shoulders for this mortise in the

back of the side rails are .25 inches top and bottom. This $\frac{3}{8}$ th inch mortise has a $\frac{1}{4}$ " shoulder from the long point (inside face) and put the corresponding mortise in the leg so have a $\frac{3}{16}$ th inch reveal to the outside face of the rail (standard for most of my furniture). I often use ash for my tenon stock. Remember to make the mortise in the front of the back leg a little longer than $\frac{3}{4}$'s of an inch so the tenon doesn't bottom out.

I mark out and cut the mortises now in a run for the front of the side rails, the back bottom rail (that will eventually be cut out in a curve) and the front rail since all these mortises can be the same width (when making the back and front seat rails run through the planer on edge at the same setting (and make the mortise in the front of the side rail the same). These mortises all go in $\frac{3}{4}$'s of an inch into the ends of these rails but remember that the corresponding mortises into the sides of the legs will be shorter so as not to interfere with the side rail mortises (usually $\frac{11}{16}$ th inch into the side of the front legs and $\frac{9}{16}$ th inch into the side of the back leg). The mortises in the curved back rails have a $\frac{3}{8}$ th inch shoulder from the front of the rail (facing forward) and on the bottom 3 inch rail the top and bottom shoulders are .25 inches and on the 2.5 inch crest rail, the top and bottom shoulder are $\frac{3}{8}$ ths. Switch to a $\frac{1}{4}$ inch tenon for the crest rail so have a little more room here. The corresponding mortise in the top of the back leg will have some "slop" in the length to allow the crest rail to come down tight on the slats with the lumbar. Remember that this mortise has to be positioned carefully front to back in the top of the back leg since the crest rail isn't much thinner than the width of the top of the back leg. I mark the curve (I have this curved labeled as "G and G") $\frac{1}{16}$ th of an inch in from the front face for the front of the rail and 1 inch in from the front for the back curved cut. The front of the lower mortise in the side of the back leg is $\frac{9}{16}$ th of an inch in from the front of the

back leg. The front of the upper $\frac{1}{4}$ inch mortise in the side of the top of the back leg is $\frac{5}{16}$ th inches in from the front of the back leg. You can cut the mortises for the crest rail at this time, make all the tenon stock and glue in the tenons. Remember, too, that if you want to taper the top of your back legs on the sides that you'll want to make your mortise in the top of the leg shallow enough to allow for that taper (I usually go in $\frac{3}{4}$ " here).

The top of the curved back seat rail has to be beveled or cut on the table saw @ 9.7degrees (long point to the front, set with the wixey) and the bottoms of the crest rails are cut at 9.7 degrees, long point to the front. This makes the mating surfaces for the slats parallel.

You can now mill your stock for the lumbar slats (make sure they are all the same width since if they vary it would cause problems due to the way they are mortised). Put a chair together with the back rails in to check to make sure 15.25 inch length will work for the back slats (can make slightly longer or shorter without worry if you have to).

I mark out the spacing for the lumbar slats at this time on the beveled back rail surfaces, using a 12 inch adjustable square so as to minimize the chance of measuring inconsistently. I usually go with 1.75 inches spacing between the center slats and 1.25 inches between the center slats and the outside slats. I have the curves marked out, but I cut these shapes after I mark out the mortises. I mortise the ends of the lumbar slats next, tipping them up at 9.7 degrees with the front of the blank down and the mortise, which is near the back of the blank, up on the table of the mortiser (which is why they all have to be the exact same width). On the sides of the lumbar blanks I mark (from the back of blank) $\frac{1}{8}$ th of an inch in for the back of the slat and $\frac{13}{16}$ th in for the front of the slat

(measurements for where you set the "PW" template). Flush the "PW" template to the bottom of the lumbar slat blanks. With this orientation, the $\frac{1}{4}$ " mortise is $\frac{5}{16}$ th inch in from the back of the lumbar slat blank. I generally have a $\frac{1}{8}$ th inch shoulder on the sides of the lumbar slats. Keep the side to side setting on the mortising machine and you can cut out the curves in the back rail now. Cut the concave side first and then the convex side (back) last since more stable this way for sanding. Take the line for the curve at the start and end of the cut for the crest rail which will give you a bit more leeway for rounding over the top of the back leg in this area, but leave the line before you reach the first mortise for the outside slat.

Now you can cut the mortises in the curved rails with the convex side down on the table, clamping with a single clamp directly over where the mortise is marked out. You'll have to position these mortises carefully, too, since you don't have a lot of room forward and back here. Glue in the tenons in the ends of the lumbar slats (these mortises are usually $\frac{1}{2}$ inches long in the lumbar slats, $\frac{5}{8}$ ths long in the back curved rails and the tenons are 1 inch long so they don't bottom out). Cut the lumbar shape out of the slat blanks, round over and sand them (I usually band saw the concave or back of the lumbar shape first). Shape and finish sand the back curved rails and glue up the back lumbar assemblies. Save the cutoffs if you put curves in the top of the crest rail or the bottom of the seat rail and tape them on to help when clamping. You can save the angled cutoffs from the top of the back seat rail for clamping, too.

Mark the top of the back assembly on the inside of the back legs to help you figure out where to cut the top of the back legs to length, shape and sand them, and shape and sand the side rails and the front legs now, too. Glue up the side assemblies using the clamping cauls (put the clamps on the outside faces when gluing up). Some of that matting paper

helps to protect the wood from the clamps and strips of this can be used to concentrate the clamping pressure on one side or other of the joint.

Dry clamp the whole chair together, clamp and glue (Titebond III), cut and screw in the corner blocks (set down 1 inch to the top of the corner block if using .75 inch plywood for the seat bottoms and the front screw blocks are cut at 41.5 degrees with a 3 or 4 degree bevel on front end, 5 inches long, and a 53 degree miter cut for the back and 3 or 4 degree bevel on back end and 5 inches long) make your seat bottoms (for leather upholstery and the 1.5 inch foam (HRF-2743 or 2753) wrapped with muslin, the seat bottom is just over 1/8 th of an inch shy all the way around of the seat opening). Remember that the front edge of the seat bottom blank was ripped to about 9 degrees (long point to the top) and that the notch in the front of the seat bottom is sawed with a hand saw to that same angle. Sign and date your chairs on the bottom of a rail and congratulate yourselves on making something you can comfortably dine on for many years to come.

If you are doing a bottom stretcher assembly, I usually use $\frac{1}{4}$ inch mortises and loose tenons here. The front of the side rails (1.125 inches wide by 7/8ths or $\frac{3}{4}$ of an inch thick and about 15.25 inches long) is 6 inches up to their tops from the bottom of the leg and 5 inches up to their tops from the bottom of the leg in the back. They'll be beveled at 7 degrees on the saw, but the angle on the miter gauge is not right at 4 degrees and each end will have to be cut separately. I make MDF templates for these once I've settled on the fit. I mortise the side rails first, put the chair together and then cut the horizontal middle stretcher to length. It's cut at 7 degrees on the miter gauge, with the saw blade at 90 degrees and I cut it so it fits about 6 inches back from the front of the leg (this isn't critical, just make these rails all the same when making a run of

chairs and don't have it come forward of 6 inches since can interfere with your legs and feet). The shorter you cut the middle stretcher, the more it moves back. Mark out where the joinery is going for the middle and side stretchers and do this joinery. The middle stretcher is usually about 1.75 inches wide and about 5/8ths inches thick on the chairs I make. It helps to make two 7 degree wedges for clamping the middle stretcher when you glue up the chair.

My upholsterer uses 1.5 thick HRF-2953 foam for the seat bottoms

Notes for how Tom usually shapes the chair:

On the 7 degree dining chair use the #1 curve in the bottom of the side rails and the top of the crest, the "seat bottom" curve in the bottom of the front rail, slat spacing: 1.75 and then 1.25 inches, front rail is 16 and 15/16ths long, taper the inside of the back leg to 7/8ths, 12 inches up, 10 degrees beveled on bottom of crest and the top of the curved seat rail, taper top of the back leg to 7/8ths, 17 inches down and taper the front leg to 7/8ths of an inch, going 13 inches up.

Clamping Cauls:

Here's some information for making the clamping cauls for gluing up the side assemblies. They are about 6 inches long by 1.5 with 1/4" MDF or plywood and the caul is glued to the top. The 7 degree angle is perpendicular to the axis of this piece always (for a chair with 7 degree splay) and the 4 degree angle is in line with the long axis of this piece. I just glue on the cauls with Titebond III. For the Right Back caul: 7 degree long (try 3 degrees here since the joint tends to roll and open to the inside in the back) point is 4 to the left and the 4 degree long point is up. For the Right Front caul: 7 degree long point to the left and the 4 degree long point is pointed down. For the Left Back caul the 7 degree (try 3 degrees here) long point is to the right

and the 4 degree long point is pointed up. For the Left Front caul the 7 degree long point is to the right and the 4 degree long point is pointed down.

Here's an idea of the schedule for the week:

Day 1 Introduction, cut out and shape back legs, make side rails, start mortising

Day 2 All the 3/8ths joinery including jointing and planing front legs, back, front and seat rails

Day 3 All the joinery done (crest rail and back slats), start shaping and sanding

Day 4 Back and sides get glued up

Day 5 Glued up entire chair, made seat bottoms and screw block and put in screw blocks, copy templates as time allows, answer questions